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April 2, 2024

**-VIA ELECTRONIC FILING-**
Adam Teitzman
Commission Clerk
Florida Public Service Commission
2540 Shumard Oak Blvd.
Tallahassee, FL 32399-0850

**Re: Docket No. 20240012-EG: Commission Review of Numeric Conservation Goals (Florida Power & Light Company)**

Dear Mr. Teitzman:

In accordance with Rule 25-17.0021, Florida Administrative Code, please find enclosed for filing in the above referenced docket Florida Power & Light Company's ("FPL's") Petition for Approval of Numeric Conservation Goals, along with the testimony and exhibits of three witnesses.

This filing is being made via the Florida Public Service Commission's Web Based Electronic Filing portal and consists of four submittals. This letter, the petition, and the certificate of service are being filed as document 1 of 4. The remaining documents will be submitted as follows:

- Prefiled Testimony and Exhibits of J. Floyd, FPL (document 2 of 4);
- Prefiled Testimony and Exhibits of A. Whitley, FPL (document 3 of 4);
- Prefiled Testimony and Exhibits of J. Herndon, Resource Innovations (document 4 of 4).

Please contact me if there are any questions regarding this filing.

Sincerely,

*s/ William P. Cox*
William P. Cox
Fla. Bar No. 0093531

Enclosures
cc: Counsel for Parties of Record (w/encl.)

**BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION**

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| Commission Review of Numeric Conservation Goals (Florida Power & Light Company) | Docket No: 20240012-EG<br><br>Filed: April 2, 2024 |

**FLORIDA POWER & LIGHT COMPANY'S**
**PETITION FOR APPROVAL OF NUMERIC CONSERVATION GOALS**

Pursuant to Sections 366.81 and 366.82, Florida Statutes ("F.S."), and Rule 25-17.0021, Florida Administrative Code ("F.A.C."), Florida Power & Light Company ("FPL" or the "Company") petitions the Florida Public Service Commission ("Commission") to approve FPL's proposed numeric conservation goals for the years 2025-2034, as found on page 1 of Exhibit JNF-4 attached to FPL witness John Floyd's testimony. In support of this petition, FPL states:

1. FPL is a public utility subject to the jurisdiction of the Commission pursuant to Chapter 366 of the Florida Statutes. The Commission has jurisdiction pursuant to Sections 366.81 and 366.82, F.S., to establish numeric conservation goals for each affected electric utility. The Commission will establish conservation goals for FPL in this proceeding. The establishment of FPL's conservation goals will affect the need for and selection of resource alternatives by FPL, and the goals will be the target for FPL to meet in its subsequent filing of a Demand-Side Management ("DSM") Plan; therefore, FPL's substantial interests will be determined in this proceeding.

2. The names and addresses of FPL's representatives to receive communications regarding this docket are:

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3. This Petition is being filed consistent with Rule 28-106.201, F.A.C. The agency affected is the Florida Public Service Commission, located at 2540 Shumard Oak Blvd, Tallahassee, FL 32399. This case does not involve reversal or modification of an agency decision or an agency's proposed action. Therefore, paragraph (c) and portions of paragraphs (e), (f), and (g) of subsection (2) of such rule are not applicable to this Petition. In compliance with paragraph (d), FPL states that it is not known which, if any, of the issues of material fact set forth in the body of this Petition, or the supporting testimony and exhibits filed herewith, may be disputed by others planning to participate in this proceeding.

## BACKGROUND AND OVERVIEW

4. Rule 25-17.0021, F.A.C., establishes that the Commission shall set DSM goals for each utility at least once every five years. This rule was promulgated pursuant to the Florida Energy Efficiency and Conservation Act ("FEECA"), Sections 366.80-366.83 and 403.519, F.S. Each utility is required to propose numeric goals for the ten-year period and provide ten-year projections of the total cost-effective, summer and winter peak demand

savings (MW) and annual energy savings (GWh) reasonably achievable in the residential and commercial/industrial classes through DSM. These goals must be based upon the utility's most recent planning process. *See* Rule 25-17.0021(1)-(3), F.A.C.

5. FPL is an industry leader in DSM and has been offering DSM programs for more than forty years, predating Florida's adoption of FEECA. Through year-end 2023, FPL has avoided the need to construct the equivalent of more than 66 new 100 megawatt ("MW") generating units (a Summer peak demand reduction of 5,579 MW) and has reduced annual energy consumption by 100,422 gigawatt hours ("GWh") at the generator – equal to approximately 73% of the electric consumption of all of FPL's customers for a year.

6. FPL's supply-side efficiency improvements have also yielded significant benefits for its customers. For example, due to a reduction in the average heat rate of its generation fleet, FPL uses 27% less fossil fuel to produce the same number of kilowatt-hours in 2023 than it did in 2001.

7. Importantly, FPL has achieved these demand-side and supply-side savings while keeping electric rates low for all customers – not just those who choose to participate in DSM programs. To this point, FPL's typical residential bill is approximately 32% lower than the national average as of the time of this filing.

8. FPL's proposed DSM goals for the 2025-2034 timeframe were developed consistent with the requirements of Rule 25-17.0021, F.A.C. As explained below and in FPL's supporting testimonies and exhibits, FPL's proposed DSM goals largely continue the existing DSM programs with a few additional measures and enhancements, including expansion of the existing low-income weatherization program, introduction of a new low-income Renter Pilot, and expansion of the On Call® load-management program. FPL's

proposed DSM goals will ensure that FPL continues to offer meaningful DSM programs to its customers that provide real energy and demand savings opportunities, while keeping electric service rates low for all FPL customers.

9. The testimony and exhibits of FPL witnesses John N. Floyd and Andrew W. Whitley, and witness Jim Herndon with Resource Innovations further support and explain FPL's proposed DSM goals and are incorporated herein by reference.[1]

## DEVELOPMENT OF PROPOSED DSM GOALS

10. FPL followed a rigorous analytical process similar to the process it has used in past DSM goal-setting proceedings to develop DSM goals. This process utilizes current forecasts and assumptions and appropriately reflects FPL's specific resource needs and system costs.

11. Specifically, FPL followed the process prescribed by the FEECA statute and Commission rules in developing its proposed DSM goals, which primarily included a Technical Potential ("TP") Study, DSM measure screening utilizing Commission prescribed cost-effectiveness tests, and the development of proposed goals based on the reasonably achievable demand and energy savings of potential DSM programs. In their testimonies filed with this Petition, witness Herndon discusses the TP study, FPL witness Whitley discusses measure screening and FPL's resource planning process, and FPL witness Floyd addresses the goals and program development process.

12. In summary, this process includes the following key steps:

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[1] The testimony and exhibits of Jim Herndon with Resource Innovations, a consultant retained by the FEECA utilities, is included with this filing, including his market potential study used by each utility in support of the goals to be established in this and each utility's respective docket.

- First, a TP analysis determines the breadth of measures to be considered and their maximum hypothetical demand and energy savings, conducted by witness Herndon;
- Second, FPL's resource needs during the DSM goals timeframe are determined, conducted by FPL witness Whitley and FPL's Integrated Resource Planning group;
- Third, as required by Rule 25-17.0021, F.A.C., a preliminary economic cost-effectiveness screening of the DSM measures is performed using the Participant, Rate Impact Measure ("RIM"), and Total Resource Cost ("TRC") preliminary screening tests, their maximum rebate amounts are calculated, and the impact of free riders is taken into account, conducted by FPL witness Whitley;
- Fourth, the ten-year projection for the amount of DSM that is reasonably achievable is determined based on potential programs for each of the goals scenarios as prescribed by the Commission rule, conducted by FPL witness Floyd;
- Fifth, supply and DSM-based resource plans are developed, conducted by FPL witness Whitley; and
- Sixth, those resource plans are analyzed from both economic and non-economic (*i.e.*, fuel usage and system emission) perspectives to determine the optimum level of DSM goals, conducted by FPL witness Whitley.

## RESULTS OF DSM GOAL-SETTING ANALYSES

13. FPL understands the need to offer its customers meaningful DSM programs that provide real energy and demand savings opportunities. For over four decades, FPL has accomplished this through utilization of the RIM test. Goals based on RIM ensure all customers benefit – both those who voluntarily participate in DSM programs and those who cannot or elect not to participate. Based on FPL's avoided cost profile and the available energy-efficiency measures to consider for programs, however, a RIM-only DSM proposal would result in a zero goal for efficiency savings.

14. While FPL supports the use of the RIM test as the primary cost-effectiveness standard to set DSM goals, the Company also recognizes that appropriately tailored DSM programs and goals should be consistent with the objective of FEECA to reduce the growth rate of electricity consumption. FPL examined various options to continue providing cost-effective DSM that keeps rates low while at the same time offering meaningful programs to help customers that elect to participate to reduce their energy consumption.

15. After careful analysis, FPL recommends goals for the period 2025-2034 that reflect continuation of its existing DSM programs with several enhancements, including additional support for FPL's Low Income program, a new pilot program for low-income renters, and a new addition to FPL's Residential On Call® load-management program to provide an on-bill upgrade option for heating, ventilation, and air conditioning ("HVAC") systems.

16. The proposed DSM Goals include FPL's load-management programs, which all pass the RIM test with the exception of the Commercial/Industrial Demand Reduction ("CDR") program, which only passes the TRC test. These proposed goals also include the

continuation and expansion of FPL's current energy-efficiency programs, all of which pass the TRC test but do not pass the RIM test. FPL's proposed DSM goals are essentially an approach that results in potential programs that have demand and energy impacts in between those under the RIM and TRC tests, with little incremental rate impact beyond what customers are incurring under FPL's current DSM goals.

17. This proposal of RIM- and TRC-passing existing programs will allow FPL to continue delivering meaningful energy-efficiency savings options to homeowners, renters, businesses, and low-income customers. The proposed goals incorporate adjustments in participation levels to reflect market conditions and adjustments in projections based on the 2024 TP Study measure impacts. The results of FPL's analysis support FPL's proposed goals and enhanced programs of 408 Summer MW, 316 Winter MW, and 885 GWh for the 2025-2034 DSM goals period.

## LOW-INCOME CUSTOMER PROGRAM EXPANSION, RENTER PILOT PROGRAM, AND ENHANCED RESIDENTIAL ON CALL® PROGRAM

18. FPL is proposing to expand its existing Low-Income program. Although this program is not cost-effective, it is consistent with Order No. PSC-2019-0509-FOF-EG in the Commission's 2019 Conservation Goals docket for FPL (Docket No. 20190015-EG), as well as with Order No. PSC-2020-0274-PAA-EG in the Commission's DSM Plan docket for FPL (Docket No. 20200056-EG), wherein the Commission affirmed FPL's commitment to supporting low-income customers.

19. FPL is also proposing a new pilot program to serve a population that has been traditionally underserved by DSM programs – low-income customers who rent their residences. FPL is proposing a new approach that would allow low-income renters to

receive the energy-saving benefit of more efficient HVAC equipment while keeping the property owners whole from a capital investment perspective, thereby addressing the existing split-incentive problem that exists between tenants and landlords. Under a proposed limited pilot to evaluate this program, FPL would pay the incremental cost of a more efficient HVAC unit, up to $1,000, with the property owner only covering the installed cost for code-compliant equipment. This approach will serve to help eliminate any disincentive the landlord may have to make an incremental investment in energy-efficient equipment, while at the same time allowing the low-income renter to receive the benefit of the more efficient HVAC equipment by reducing their energy consumption and electric bill.

20. With many traditional energy efficiency measures no longer viable due, in part, to the impact of Codes and Standards, FPL has continued to search for potential next-generation DSM measures. To that end, FPL's goals proposal includes an enhanced Residential On Call® program that will bring new HVAC systems to customers as a part of the traditional load-management program, including a new On Bill HVAC option for the Residential On Call® program as described by FPL witness Floyd. As part of its culture of continuous improvement, FPL will continue to evaluate new and alternative technologies that can be cost-effectively deployed for control of behind-the-meter appliances.

## CONCLUSION

21. In total, FPL proposes goals with a ten-year impact of 408 Summer MW, 316 Winter MW, and 885 GWh energy reduction to be achieved through 10 programs as described in FPL witness Floyd's testimony.

22. Collectively, FPL's proposed potential DSM programs focus on the highest priorities of weather-sensitive peak demand, continue to provide customer incentives for making energy-efficient investments, and can be delivered with little incremental bill impact to customers. FPL's proposal will establish DSM goals at a reasonable and appropriate level given current projections of FPL system costs while continuing to maintain low electric rates for all FPL customers.

**WHEREFORE**, for the reasons above and more fully supported by the testimony and exhibits filed with this Petition, FPL respectfully requests that the Commission approve the proposed numeric conservation goals for FPL attached to the direct testimony of FPL witness Floyd as Exhibit JNF-4.

Respectfully submitted,

By: *s/ William P. Cox*

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**CERTIFICATE OF SERVICE**
**Docket No. 20240012-EG**

I HEREBY CERTIFY that a true and correct copy of FPL's Petition for Approval of Numeric Conservation Goals with accompanying testimony and exhibits was served by electronic delivery this 2nd day of April, 2024 to the following:

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By: *s/ William P. Cox*
William P. Cox

# BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

# FLORIDA POWER & LIGHT COMPANY

# DIRECT TESTIMONY OF JOHN N. FLOYD

# DOCKET NO. 20240012-EG

# APRIL 2, 2024

## TABLE OF CONTENTS

## I. INTRODUCTION

**Q. Please state your name, business address, employer and position.**

A. My name is John N. Floyd. My business address is One Energy Place, Pensacola, Florida 32520. I am employed by Florida Power & Light Company (FPL or the Company) as Director, Demand-Side Management Strategy.

**Q. Please describe your duties and responsibilities in that position.**

A. I am responsible for development of strategy, program implementation, regulatory filings, reporting, and cost management for FPL's Demand-Side Management (DSM)-related activities.

**Q. Please describe your educational background and professional experience.**

A. I have a Bachelor of Electrical Engineering from Auburn University. After completing a commission in the United States Air Force, I began my career in the electric utility industry at Gulf Power Company, a former Southern Company operating subsidiary. During my 29-year tenure, I held various positions with the company in Power Generation, Metering, Power Delivery, and Customer Service. In 2019, I joined FPL as the DSM Regulatory Support Manager and was promoted to my current position as Director of DSM Strategy in 2023.

**Q. Have you previously testified before the Florida Public Service Commission (FPSC or Commission)?**

A. Yes. I have testified in multiple DSM goals proceedings and other DSM-related dockets on behalf of Gulf Power and FPL.

**Q. Are you sponsoring any exhibits in this case?**

A. Yes. I am sponsoring Exhibits JNF-1 through JNF-5, which are attached to my testimony:

- JNF-1 – Historical DSM Participation and Achievements
- JNF-2 – Current DSM Programs and Associated Measures
- JNF-3 – List of Measures Evaluated for Technical Potential
- JNF-4 – 2025-2034 Goals Scenarios and Potential Programs
- JNF-5 – Comparison of Current Programs to Proposed Programs

**Q. Please summarize your testimony.**

A. The Florida Energy Efficiency and Conservation Act (FEECA) and Commission rules require that utilities develop and offer DSM programs to cost-effectively reduce weather-sensitive peak-demand and the overall growth rate of electricity consumption in the state. FPL has successfully implemented this policy by providing impactful DSM programs that keep rates low and meet customer needs.

FPL followed the process prescribed by the FEECA statute and Commission rules in developing the goals scenarios described throughout my testimony. In general, the process included development of a Technical Potential (TP) Study, measure-screening utilizing Commission-prescribed cost-effectiveness tests, and goal development based on the reasonably achievable demand and energy savings of potential DSM programs. Witness Jim Herndon with Resource Innovations discusses the TP study, FPL witness Andrew Whitley discusses measure screening and FPL's resource planning process, and I address the goal and program development process.

FPL is committed to continuing to provide DSM programs that keep rates low and meet customers' needs. For more than four decades, FPL has accomplished this through utilization of the Rate Impact Measure (RIM) test. Goals based on RIM ensure all customers benefit – both those who voluntarily participate in DSM programs and those who cannot or elect not to participate. Based on FPL's avoided cost profile and the available energy-efficiency measures to consider for programs, however, a RIM-only DSM proposal would result in a zero goal for efficiency savings.

While FPL supports the use of the RIM test as the primary cost-effectiveness standard to set DSM goals, the Company also recognizes that appropriately tailored DSM programs and goals are consistent with the objective of FEECA to reduce the growth rate of electricity consumption. FPL explored various options to maintain cost-effective DSM initiatives that ensure affordable rates, while also providing valuable programs to help customers reduce their energy usage.

After careful analysis, FPL recommends goals for the period 2025-2034 that reflect continuation of its current portfolio of energy-efficiency and load-management programs, expansion of the existing low-income weatherization program, and introduction of a new low-income Renter Pilot. FPL's proposal also includes expansion of our industry-leading On Call® load-management program with a new HVAC on-bill option. This new option expands the On Call® load-management program to allow greater customer access to new energy-saving HVAC equipment in a way that also passes the RIM cost-effectiveness test. Under this program, a customer will receive a new efficient HVAC unit that FPL will have the ability to control in peak demand situations.

Collectively, FPL's proposed DSM programs focus on the highest priorities of weather-sensitive peak demand, continue to provide customer incentives for making energy-efficient investments, and can be delivered with little to no incremental bill impact to customers. In total, FPL proposes goals with a ten-year impact of 408 Summer MW, 316 Winter MW, and 885 GWh energy reduction to be achieved through 10 energy-efficiency and load-management programs as further described later in my testimony. FPL's proposal will establish DSM goals at a reasonable and appropriate level given current projections of FPL system costs while continuing to maintain low electric rates for all FPL customers.

## II. FPL'S HISTORICAL DSM ACHIEVEMENTS

**Q. Please provide an overview of FPL's history and results in implementing DSM.**

A. FPL began offering DSM programs in the late 1970s prior to the Florida Legislature's adoption of FEECA in 1980. Since then, FPL has maintained a continuous commitment to cost-effective DSM as a complement to evolving Florida Building Code and federal appliance efficiency standards (collectively, Codes and Standards). As described in greater detail by FPL witness Whitley, FPL has made DSM an integral part of its resource planning process and has consistently evaluated DSM in accordance with the Commission's long-standing goal-setting policies. Through this process, FPL has developed a wide array of cost-effective load-management and energy-efficiency programs for both residential and business customers, which have achieved significant reductions in energy consumption and peak demand. As shown on Exhibit JNF-1, there have been approximately 10.5 million participants in these programs (some customers have participated in multiple programs) since inception.

Through 2023, FPL's highly effective DSM efforts have resulted in a cumulative summer peak demand reduction of 5,579 MW. After accounting for the 20% total reserve margin requirement, this equates to eliminating the need to construct the equivalent of approximately 66 new 100-MW generating units. Cumulative energy consumption savings are 100,422 GWh at the generator, equal to approximately 73% of the consumption of all FPL customers for one year. At the same time, the discipline of working within the traditional Commission goal-setting policies and requirements has helped ensure FPL's electric rates remain low. As of the time of this filing, FPL's typical residential bill is approximately 32% lower than the national average.

**Q. Please describe FPL's currently offered DSM programs and their achievements.**

A. FPL's current programs are focused on helping customers save with financial incentives to install energy-efficient appliances and building-envelope improvements (energy efficiency), as well as bill credits for allowing FPL to control large appliances or facility loads during peak conditions (load management). FPL's current programs and included measures are shown on Exhibit JNF-2.

**Load Management** – FPL operates one of the largest load-management programs in the nation. As of year-end 2023, FPL's Residential On Call® program, established in 1986, was the largest residential program in the United States with about 653,000 participants. Along with FPL's more than 17,000 business load-management participants, FPL currently has more than 1,700 MW of Summer load-management demand reduction available for use by FPL system operators.

**Energy Efficiency –** FPL has also offered large energy-efficiency programs for decades. More than two million customers have participated in FPL's residential HVAC energy-efficiency program, making their homes' largest sources of energy consumption more efficient than required by the Codes and Standards that were applicable at the time of installation. Likewise, more than 24,000 business customers have participated in FPL's HVAC program, installing efficient direct expansion and chiller units as well as Thermal Energy Storage systems. In addition, more than 21,400 business customers have participated in FPL's Business Lighting program, which encourages customers to replace existing lights with light-emitting diodes (LED). Since 2019, FPL has served 33,947 low-income customers with direct installation of weatherization and energy savings measures.

**Customer Education (Surveys) –** Since 1981, FPL has emphasized energy-efficiency education for customers regardless of whether they own or rent their home or business. FPL uses residential Home Energy Surveys (HES) and Business Energy Evaluations (BEE) as foundational components of the DSM portfolio. The surveys and evaluations are used for customer education on conservation measures that make economic sense for customers, whether offered as a part of FPL's DSM programs or not. FPL has performed close to 4.5 million HESs and almost 275,000 BEEs via online, phone, and on-site delivery channels. Since 2019, more than 300 residential customers per day had a HES, and 20 business customers per workday had FPL conduct a BEE. In addition to the utility-provided educational resources, customers also have access to many other public sources of information (including the U.S. Department of Energy's ENERGY STAR® program and website, in addition to contractors, appliance retailers, and manufacturers) to help them decide on what actions they wish to implement to use energy more efficiently.

**Q. How is FPL continuing to explore innovative approaches to DSM?**

A. FPL has a long history of evaluating new technologies to meet customer needs and provide cost-effective demand-side solutions. For example, in Docket No. 20210015-EI, the Commission approved a limited pilot for FPL to evaluate smart electrical panels as a next-generation DSM solution that could benefit customers through increased visibility and control of their energy usage and provide FPL capabilities to manage certain large appliance loads during peak times. To date, 100 smart panels have been installed in customer homes. FPL has gained valuable insights on customer interest in the technology, installation and commissioning of the panels, appliance usage profiles, and load-management functionality. Although these smart panels deliver on providing visibility and control of major circuits, their high cost remains a barrier to large-scale use for utility DSM in the near-term. As part of its culture of continuous improvement, FPL will continue to evaluate new and alternative technologies that can be cost-effectively deployed for control of behind-the-meter appliances.

## III. FACTORS IMPACTING DSM GOALS

**Q. What are the main factors that impact potential DSM goals and how?**

A. There are two main factors that impact the level of goals for DSM. The first factor in determining the appropriate level of DSM goals is the potential demand and energy savings in the marketplace. To determine the potential savings for utility DSM programs, all commercially available options for reducing demand and energy are evaluated. As outlined in Commission Rule 25-17.0021, Florida Administrative Code (F.A.C.), these options are in the form of demand-side conservation and efficiency "measures," including demand-side renewable energy systems that can be implemented by customers. The determination of the potential savings begins with a Technical Potential Study, which quantifies the theoretical maximum savings opportunity for these measures. As discussed in more detail in later sections of my testimony, the study for the 2024 DSM goals process included 436 energy-efficiency, demand-response and demand-side renewable energy measures – significantly more than were evaluated in 2019. An important aspect of this evaluation is that it only includes potential savings above current and known future Codes and Standards. Codes and Standards establish the baseline from which utility DSM opportunities exist. While customers benefit from increasing Codes and Standards absent any utility DSM, the result of increasing Codes and Standards is a reduction in the incremental benefits of DSM to the utility system and to customers.

The second factor is cost-effectiveness. Cost-effectiveness, in general terms, is a comparison of the benefits and costs of DSM options. The Commission has recognized three industry standard tests as described in Rule 25-17.008(3), "Florida Public Service Commission Cost Effectiveness Manual for Demand Side Management Programs and Self-Service Wheeling Proposals" (7-7-91) for the purposes of evaluating cost-effectiveness since the earliest goal-setting docket in 1993. These tests are the RIM test, the Total Resource Cost (TRC) test, and the Participant test.

**Q. Please explain the cost-effectiveness tests and how they impact potential DSM goals.**

A. The RIM, TRC and Participant tests measure cost-effectiveness from different perspectives and thus consider different costs and benefits. First, I will discuss the RIM and TRC tests as they measure cost-effectiveness from the utility system perspective.

The RIM test measures the impact on rates resulting from a DSM program and represents the perspective of non-participants. The TRC test measures the impact on total costs to the utility and customer base. The RIM and TRC tests both consider the same benefits of DSM, that is the utility system savings, or avoided cost, of reducing peak demand and energy requirements to be met. These benefits are in the form of avoided generation, transmission, and distribution capital and O&M costs as well as net fuel impacts.

The difference in the RIM and TRC tests is which costs are included. The RIM test includes consideration of the cost of incentives paid to participating customers, the revenue impact resulting from the DSM program, and the cost of implementing the program itself (administrative cost). Consideration of these costs is consistent with Section 366.82(3), Florida Statutes, which is part of the FEECA Statute.

As mentioned earlier, the TRC test considers the same benefits as RIM, but different costs. Specifically, the TRC test only considers the incremental cost of the measure (equipment) and the administrative cost of implementing the program. Notably, the TRC test does not address one of the required costs identified in Section 366.82(3)(b), Florida Statutes, the cost of utility incentives. The TRC test also does not measure impact on electricity rates for customers, both participants and non-participants.

The Commission has long recognized the benefit of utilizing the RIM test as it serves the interest of both customers who participate in utility DSM programs as well as customers who cannot, or elect not to, participate in these programs. In short, the RIM test ensures that even non-participants benefit from utility DSM through downward pressure on electric rates. So, by utilizing the RIM test to establish DSM goals, the Commission can be assured that all customers will benefit through electric rates that are lower than they would otherwise be without implementation of the program. The cost of RIM-passing programs is justified on this basis. Utilizing the TRC test to measure the cost-effectiveness of DSM, however, can expose all utility customers, whether they participate in a DSM program or not, to higher electric rates resulting from unrecovered revenue requirements. For these reasons, use of the TRC test without appropriate guardrails and limits on cost would be inconsistent with the Commission's statutory obligations to avoid undue rate impact.

Given that RIM-passing programs result in the lowest rate impact, benefit all customers, and avoid cross-subsidization of participants by non-participants, FPL supports utilizing the RIM test as a primary means of evaluating cost-effectiveness and establishing goals.

The third cost-effectiveness test used by the Commission to evaluate DSM goals is the Participant test. This test measures cost-effectiveness from the perspective of the customer participating in the DSM program or measure. It is a simple test that evaluates the economic payback to a potential participant in a DSM program. The benefits considered in the Participant test are the bill savings and incentives received associated with a particular measure, while the costs are the incremental equipment costs borne by the customer. The incentives include both upfront contributions by the utility and tax credits. For example, by considering both the costs of adopting a higher-efficiency HVAC system and the resulting bill savings, the Participant test measures whether the investment pays for itself over time. From a practical and logical standpoint, this is the primary evaluation a customer considers for making an energy-efficiency investment, and therefore, a utility DSM program should pass this test. This concept of economic payback is also useful in limiting incentive costs so as not to unnecessarily incent a customer to make an investment that otherwise already has a very strong value proposition.

**Q. Please elaborate on the impacts Codes and Standards have on potential for cost-effective DSM.**

A. Increased Codes and Standards impact all residents and businesses by mandating higher energy-efficiency minimums for prospective end-use equipment installations and/or building design improvements. The impact of Codes and Standards for FPL is two-fold: a reduction in the forecast of energy and peak demand; and a reduction in the incremental savings potential for utility DSM. FPL witness Whitley discusses the impact of Codes and Standards on FPL's load forecast for energy and peak demand.

In addition to the impact on FPL's load forecast, Codes and Standards also reduce the savings potential for utility DSM. First, any utility-offered measures that are no longer above Codes and Standards are rendered obsolete. The previously achieved utility participation and energy and demand savings are now attained by the Codes and Standards instead, thereby replacing efficiency savings that had been obtained from DSM programs.

Second, the "baseline" efficiency level also increases, reducing the incremental savings that remaining DSM measures could achieve. For example, in 2023, the U.S. Department of Energy (DOE) increased the minimum efficiency standard for residential air conditioning from 14 Seasonal Energy Efficiency Rating (SEER) to 15 SEER.[1] This increase in minimum required efficiency resulted in a loss of 0.145 Summer kW and 350 annual kWh incremental savings for all higher SEER units. For a customer installing a new HVAC system beginning in January 2023, that customer automatically realizes this amount of efficiency savings compared to the previous minimum standard. For a utility DSM program, however, the result of this change reduces savings from incrementally higher efficiency units, which impacts opportunity for DSM program savings and cost-effectiveness.

**Q. How do utility programs and initiatives complement these Codes and Standards to reduce overall energy use?**

A. Utilities play two key roles in improving the overall efficiency of energy utilization by customers. The first role is through education. FPL provides information to customers about ways to save energy through our energy survey programs, on FPL.com, through FPL's Customer Care Centers, through community events and presentations, and through various other media channels. To date, FPL has performed close to 4.5 million residential energy surveys, providing education and information about specific ways customers

[1] The DOE also introduced a new SEER2 unit of measure to reflect changes in the test procedure to measure HVAC system efficiency. For simplicity, FPL will continue to reference SEER ratings unless otherwise indicated.

can reduce energy consumption. Second, utilities offer cost-effective programs that are designed to encourage adoption of technology that is above these minimum Codes and Standards as part of approved DSM programs. These programs help customers save energy and help the utility system operate more efficiently for the benefit of all customers.

## IV. DSM GOALS AND PROGRAMS PROCESS

**Q. Please provide an overview of the process and main analyses performed to develop FPL's proposed DSM goals and potential programs for the period 2025-2034?**

A. The process for developing DSM goals and programs is outlined in the FEECA Statute, Section 366.82(3) and (7), F.S., and Commission Rule 25-17.0021, F.A.C. Specifically, DSM goals development involves three primary interrelated analyses as part of FPL's resource planning process:

**(1) Technical Potential (TP) –** determines the breadth of measures to be considered and their maximum hypothetical demand and energy savings;

**(2) Measure Screening –** economic screening of the DSM measures based on Commission-approved cost effectiveness tests and an assessment of free-ridership; and

**(3) Program Development and Goals Scenarios –** projection of the ten-year (2025-2034) program potential and development of the RIM and TRC goals scenarios.

FPL and the other five utilities subject to FEECA (FEECA Utilities) worked jointly on certain aspects of the analyses and engaged a nationally recognized DSM consultant, Resource Innovations, which has performed many of these types of studies, to assist with portions of the work. Resource Innovations conducted the TP analysis for FPL and the other FEECA Utilities. Resource Innovations also assisted FPL with adoption modeling as part of developing the goals scenarios.

**Q. Please briefly describe the Technical Potential (TP) Analysis.**

A. Rule 25-17.0021(2) requires utilities to "… assess the full technical potential of all available demand-side conservation and efficiency measures, including demand-side renewable energy systems…." The purpose of the TP Analysis is to identify the theoretical maximum limit for reducing Summer and Winter electric peak demand and energy. The TP assumes every identified potential end-use measure (or measures) is installed everywhere it is "technically" feasible to do so from an engineering standpoint. The TP does not consider cost, customer acceptance, or any other real-world constraints (such as product availability, contractor/vendor capacity, cost-effectiveness, or customer preferences). Therefore, the TP is purely hypothetical and in no way reflects the MW and MWh savings that could potentially be achieved through real-world voluntary utility DSM programs.

Resource Innovations performed the TP analysis for each of the FEECA Utilities. This included coordinating development of the DSM measure list and collecting all data necessary to perform the analysis. The analysis required extensive iterative analytical work and continuous collaboration among the FEECA Utilities to ensure that it was comprehensive. Witness Herndon's testimony provides the analysis details and results. During the development of the measure list for the TP analysis, the FEECA Utilities requested input from various stakeholders in previous DSM dockets. Multiple stakeholders provided recommendations on additional measures that should be included for this study. The FEECA Utilities reviewed each recommendation and incorporated all qualifying recommendations received from these stakeholders. In total, there were 436 unique energy-efficiency, demand-response, and demand-side renewable measures evaluated for Technical Potential. When considering the unique measure impacts across multiple customer segments, building types and rates, these 436 measures represent over 20,000 calculations for each step of the Technical Potential and measure screening process. A full list of measures evaluated in the Technical Potential Study is provided in Exhibit JNF-3, pages 1-14.

**Q. Please briefly describe the measure-screening process.**

A. The measure-screening process is a multi-step economic analysis that includes calculation of cost-effectiveness and payback for each of the DSM measures identified in the Technical Potential Study. This process narrows the list of measures to be considered for potential programs. As prescribed by Rule 25-

17.0021 and described in the testimony of FPL witness Whitley, FPL used the RIM test for the RIM goals scenario and the TRC test for the TRC goals scenario, as well as the Participant test for both scenarios, to screen these measures for cost-effectiveness. The initial measure screening only considered the measure peak demand and energy savings and measure cost to ensure the maximum number of measures were screened for further consideration. Measure screening also included eliminating measures with a payback period less than two years as a means of addressing free ridership in the goals development process. Subsequent cost-effectiveness analysis added assumptions for administrative cost to further refine the potential measures to be considered for programs. The analytical tools utilized to conduct measure screening were also used to calculate sensitivities of the results based on differing payback periods, higher and lower fuel cost projections, and inclusion of potential $CO_2$ costs as DSM benefits.

**Q. Please briefly describe the program development and goals scenario analysis.**

A. Developing the proposed goals involved a multi-step, iterative process that began with compiling all the measures that survived the measure-screening process for each of the cost-effectiveness scenarios (RIM and TRC). These measures represent components of potential programs that can be offered to customers. Experienced FPL DSM program managers crafted potential programs using the passing measures, based on common measure types and program delivery channels. Then, adoption projections were developed utilizing measure-level adoption modeling and historical FPL program participation to produce program-level participation projections. Finally, the programs were re-evaluated for cost-effectiveness using the program-level participation projections and more specific administrative and incentive cost assumptions. The programs for each of the goals scenarios are described in Section V of my testimony.

**Q. Please explain the process FPL used to develop its goals scenarios.**

A. The process used to develop the two goals scenarios is the same basic approach used by FPL and relied upon by the Commission in the 2019 DSM goals docket. For each measure that passed the cost-effectiveness and payback screening under either RIM/Participant test or TRC/Participant test, FPL used a combination of quantitative information, qualitative information, and FPL's market experience to develop projections for each of the goals scenarios.

Voluntary DSM programs attract participants through marketing, education, training, and by providing financial incentives. A customer's decision whether to participate in a DSM program is the result of many interrelated factors. These factors are reflected in FPL's program adoption projection. FPL calculated the estimated ten-year adoption of each potential program in the goals scenarios by relying on a number of elements that reflect FPL's and Resource Innovations' customer and market experience:

- **Historical FPL Adoption Rates** – provided "baseline" market experience reflecting both the empirical and the non-quantifiable factors (such as customer awareness);
- **Projected Changes in Market Conditions –** used to adjust historic adoption for changes, such as saturation of a program or changes to incentives;
- **Payback Acceptance Curves –** provided the percent of expected market adoption based on years-to-payback. Multiple curves are used to account for differences in adoption of new technologies/programs, existing programs, and level of maturity of programs.

FPL's proposed goals build on historic achievements of existing programs, with adjustments for market changes and program modifications. For programs with measures that are not a part of FPL's current portfolio, FPL relied on Resource Innovations' measure adoption models to forecast ramp rate and overall projections for the ten-year period. For new programs, FPL considered start-up processes, including system modifications and third-party agreements, as applicable, in estimating the ramp up of projected adoption.

For residential program participation projections, each customer residence represents one participant. For business programs, the qualification of a "participant" was standardized to one Summer kW, since projects widely vary across the multiple business types. The projected adoption values were then translated into their respective kW and kWh amounts and summed to create the residential and business sector goals for each of the goals scenarios.

**Q. How did FPL address free ridership in developing the proposed goals?**

A. FPL and all FEECA utilities utilized the two-year payback screening criterion to minimize the impact of "free riders." The term "free riders" refers to the fact that many cost-effective conservation measures will be undertaken on a customer's own volition, without the need for a promotion or incentive provided by the customer's utility company and paid for by the general body of customers of the utility. It simply recognizes that "rational" customers will act in their own economic self-interest and take measures to reduce energy consumption if it is sufficiently attractive economically for them to do so without a utility incentive payment. It is an example of a free-market economy working as it should – rational economic decisions being made in one's best interest without government intervention through mandates or provision of incentives.

A good example would be a customer deciding to install a programmable thermostat. Customers make the economic decision to invest in such measures because it quickly benefits them economically. However, if such a customer also receives a utility incentive, then they become a free rider. If costs are incurred to incentivize such free riders, rates for the general body of customers will be higher than necessary to achieve the same level of conservation.

It should be emphasized that the ultimate goal is to achieve the maximum amount of cost-effective conservation by the most efficient means. The objective is not to set DSM goals at any cost or higher than they should be simply for the sake of having higher goals. Indeed, doing so would be inconsistent with the requirement of Rules 25-17.008 and 25-17.021 that the DSM goals are to be cost-effective. As such, a proper recognition of free riders is necessary to achieve the appropriate goals.

The Commission has used a two-year payback criterion for decades as the threshold below which a customer would be a free rider and, therefore, should not be considered eligible for an additional utility-provided incentive. This policy has been litigated in multiple previous DSM goals proceedings wherein the Commission has determined it was an appropriate metric for determining free riders. In fact, the Commission reaffirmed their position in the 2014 DSM goals docket, Order No. PSC-14-0696-FOF-EU, stating, "[w]e approved goals based on a two-year payback criterion to identify free riders since 1994 and we find it appropriate to continue this policy."

FPL submits that the two-year payback screening criterion remains an effective common-sense approach that is both reasonable and administratively efficient for meeting the requirement in Rule 25-17.0021 that goals reflect consideration of free riders. It avoids unnecessary incentives (and their associated impacts on the rates of non-participants).

**Q. Did FPL conduct any sensitivities on the free ridership period?**

A. Yes. FPL analyzed the impact of applying one- and three-year payback period screens as part of the measure-screening process. A summary of measures removed and added, at the building-type level, for each of the evaluation sensitivities is shown in FPL witness Whitley's Exhibit AWW-3.

## V. FPL PROPOSED GOALS AND PROGRAMS

**Q. Did FPL develop proposed goals for each of the two goals scenarios described in the DSM Goals Rule?**

A. Yes. FPL developed goals for each of the two goals scenarios following the same process described earlier. For the RIM and Participant test scenario, RIM-passing programs are projected to achieve 198 Summer MW, 173 Winter MW, and 1 GWh annual energy reduction over the period 2025-2034. For the TRC and Participant test scenario, all potential TRC-passing programs are projected to achieve 511 Summer MW, 507 Winter MW, and 1,509 GWh annual energy reduction over the period 2025-2034. The annual goals for each scenario are shown in Exhibit JNF-4, page 1.

**Q. What are the programs for the RIM and TRC goals scenarios?**

A. For the RIM and Participant test scenario, the programs are:

**Residential Sector:**

1. Residential Load Management (On Call®) with new HVAC on-bill option

**Commercial/Industrial Sector:**

1. Business On Call®
2. Commercial/Industrial Demand Reduction (CDR)
3. Business Custom Incentive

For the TRC and Participant test scenario, the programs are:

**Residential Sector:**

1. Residential HVAC Plus
2. Residential Building Envelope
3. Residential Low Income
4. Whole Home Plus
5. Retail Products
6. Residential Load Management (On Call®) with new HVAC on-bill option

**Commercial/Industrial Sector:**

1. Business HVAC Plus
2. Business Lighting Plus
3. Business Water Heating
4. Business Refrigeration
5. Business Motors and Drives

6. Business Cooking
7. Commercial/Industrial Demand Reduction (CDR)
8. Business On Call®
9. Business Custom Incentive

The goals scenarios also include FPL's foundational Residential and Business Survey programs and the Conservation Research and Development (CRD) program. These programs will be included in all scenarios. The full list of potential programs, savings, annual participation projections and annual costs are included in Exhibit JNF-4, pages 2-34.

**Q. What are the projected costs and rate impacts of these scenarios?**

A. The total cost of the RIM and Participant test scenario is estimated to be $385 million over the ten-year goal period. The estimated residential rate impact[2] of the RIM and Participant test scenario begins at $0.35 and declines to $0.27 over the ten-year goals period for a customer using 1,000 kWh per month.

For the scenario that includes all TRC and Participant test passing programs, the total cost is estimated to be $626 million over the ten-year goals period. The estimated residential rate impact of the TRC and Participant test scenario begins at $0.51 and slightly decreases to $0.45 over the ten-year goals period for a customer using 1,000 kWh per month.

[2] Energy Conservation Cost Recovery Clause.

Projections of costs and rate impacts for all scenarios do not include Energy Survey programs, FPL's Commercial Load Control programs – Commercial Industrial Load Control (CILC) and Commercial/Industrial Demand Reduction (CDR) programs and FPL's CRD program. Costs for these programs are assumed to be the same for all goals scenarios.

**Q. What goals and programs are FPL proposing for the period 2025-2034?**

A. FPL is proposing goals of 408 Summer MW, 316 Winter MW, and 885 Annual GWh reductions over the period 2025-2034. The proposed DSM goals include FPL's load-management programs, which all pass the RIM test with the exception of the CDR program, which only passes the TRC test. These proposed goals also include the continuation and enhancement of FPL's current energy-efficiency programs, all of which pass the TRC test but do not pass the RIM test. The five Residential and five Commercial/Industrial programs associated with these proposed goals are summarized below:

**Residential Sector:**

1. Residential HVAC
2. Residential Ceiling Insulation
3. Residential Low Income
    a. Renter Pilot
4. Residential New Construction (BuildSmart®)
5. Residential Load Management (On Call®) with new HVAC on-bill option

**Commercial/Industrial Sector:**

1. Business HVAC
2. Business Lighting
3. Commercial/Industrial Demand Reduction
4. Business Custom Incentive
5. Business On Call®

This proposal of RIM- and TRC-passing programs will allow FPL to continue delivering meaningful energy-efficiency savings options to all customers including owners, renters, and low-income customers. The proposed goals factor in adjustments in participation levels to reflect market conditions and adjustments in projections based on the 2024 TP Study measure impacts. FPL has successfully built awareness of these programs with customers and contractors alike such that they can continue without any new start-up costs or ramp-up and be delivered with little or no incremental bill impact. Projections associated with the HVAC on-bill option ramp up, as this is a new program option that is planned to be delivered through a network of HVAC contractors. Additionally, the Low-Income program will add ceiling insulation for qualifying homes to increase the energy savings for these customers and the Renter Pilot is expected to bring additional benefits to low-income renters. The complete list of proposed programs and goals is shown on Exhibit JNF-4, page 1 and pages 23-34.

**Q. What are the projected costs and rate impacts of FPL's proposed goals?**

A. The total cost of FPL's proposed goals and programs is estimated to be $525 million over the ten-year goal period. The estimated residential rate impact of FPL's proposed goals and programs begins at $0.46 and decreases to $0.37 over the ten-year goals period for a customer using 1,000 kWh per month. FPL's proposed goals and programs, including the enhancements, are estimated to have lower costs compared to FPL's projected program costs in 2024.

**Q. How does the cost of FPL's proposed goals and programs compare to the projected costs for the TRC scenario?**

A. The TRC scenario has much higher costs than the FPL proposed goals and programs. The cost of additional energy-efficiency programs in the TRC scenario is about 50% higher in 2025 and increases to almost double the cost of FPL's proposed energy-efficiency programs over the ten-year goals period. The TRC scenario is expected to cost customers about $100 million more than FPL's proposed goals and programs over the ten-year goals period. A comparison of the ECCR rate impacts for each of the scenarios can be found in Exhibit JNF-4, page 1.

**Q. Please describe the proposed HVAC on-bill tariff option for On Call®.**

A. The foundation of FPL's overall DSM program is On Call®. On Call® is the largest residential demand-response program in the country and a key component of FPL's success in implementing cost-effective DSM for almost 40 years. Currently, On Call® provides bill credits to customers for allowing FPL to control customer-owned HVAC, water heating, and pool pump appliances. FPL is proposing to expand the program in an innovative way by offering an on-bill payment option for efficient HVAC equipment. Through a voluntary tariff, this HVAC on-bill option would provide interested customers an opportunity to acquire a new, more energy-efficient HVAC unit for a fixed monthly charge. FPL would own and maintain the HVAC unit and the monthly charge would cover the capital cost of the HVAC equipment plus all maintenance and repairs of the unit for the ten-year duration of the tariffed agreement. In exchange for the right to control the unit during peak periods (load management), FPL would reduce the total cost to be collected over the term of the agreement and provide that savings to participating customers. Assuming the unit being replaced by the customer is less efficient than the current minimum standard, the customer would further benefit from the efficiency savings of the unit towards their energy consumption and monthly bill. The customer would also receive an upfront rebate from FPL's Residential HVAC program if selecting a qualifying high-efficiency unit. Since each HVAC installation is unique in terms of size and scope, the monthly charge would be structured as a formula based on the installed capital cost and expenses for each specific unit.

**Q. Is this HVAC on-bill option cost-effective for FPL customers?**

A. Yes. The program would be designed for the participants to pay all of the equipment and expenses of the program, while the general body of customers benefit from the avoided capacity savings related to FPL retaining control of the HVAC equipment. Notably, the program passes the RIM test and benefits participants with reduced monthly equipment charges similar to how other On Call® customers benefit with monthly bill credits.

**Q. How does the HVAC on-bill program impact the ECCR rate for FPL's customers?**

A. Like other DSM programs, all costs associated with the HVAC on-bill tariff would be recovered through the ECCR mechanism. All of the monthly program revenues would also flow through the ECCR clause to offset program expenses. Since this program passes RIM, the general body of customers is assured the overall benefits of the program exceed costs, net of program revenues, over the term of the HVAC on-bill service agreement.

**Q. How do FPL's proposed programs benefit customers who rent?**

A. All of FPL's proposed DSM programs are inclusive of renter participation. FPL's energy survey programs provide renters with free energy assessments and recommendations for low- and no-cost actions that can be taken to reduce energy consumption. With landlord approval, renters can participate in FPL's load-management programs and benefit from other DSM programs that encourage energy efficiency. However, FPL recognizes that renters face a unique obstacle when it comes to making investments in energy-efficiency measures. Sometimes referred to as a the "landlord renter split incentive," the traditional value proposition for making an energy-efficiency investment does not hold true when the party paying the utility bill is not the same as the party making the capital investment. Landlords are typically responsible for equipment installations, replacements, and maintenance, while renters are typically responsible for paying the utility bill for the unit they are renting. This creates a split in the traditional economic value proposition for making energy-efficiency investments. Since landlords do not pay the utility bill, there is no economic incentive to them for making incremental investments in more efficient appliances or building improvements. Renters, on the other hand, typically pay the utility bill yet do not have the opportunity to make capital investments that can produce energy-efficiency savings. This results in renters having less options to manage their utility expenses and increase their energy efficiency. FPL has historically addressed this situation first by offering energy surveys to all customers, whether they rent or own. An energy survey identifies not only investment opportunities to improve energy efficiency, but also many behavioral and no/low-cost actions renters can take to save energy. Examples include recommendations for thermostat settings, utilization of LED light bulbs, proper use of ceiling fans, and keeping windows and blinds closed. FPL also allows participation in other programs, including On Call®, with landlord agreement. Yet these options still do not overcome the landlord-renter split incentive.

FPL is proposing a new approach to overcoming this split incentive in a manner that allows low-income renters to receive the energy-saving benefit of more efficient HVAC equipment while keeping the landlord whole from a capital investment perspective. Proposed as a limited pilot to evaluate the effectiveness of this approach, FPL will pay the incremental cost of a more efficient HVAC unit, up to $1,000, such that the landlord will only cover the cost of installing code-compliant equipment when replacing an HVAC unit for a tenant property. This will eliminate the disincentive the landlord has to make an incremental investment in energy-efficient equipment while allowing the low-income renter to receive the benefit of the more efficient HVAC equipment on their energy consumption and electric bill. FPL is proposing to operate this pilot for three years with an annual cap of 500 participants.

**Q. In development of the proposed programs, did FPL include any measures that were eliminated during the screening process?**

A. Yes. FPL's proposed Low Income program includes six measures that were eliminated in the measure screening due to the free-ridership screen. While the savings of these measures provide a reasonable economic value proposition for adoption, FPL recognizes that low-income customers may not have the financial resources or awareness to adopt such measures. Therefore, FPL believes a modest inclusion of appropriately tailored measures specifically for low-income customers is reasonable and does not unduly burden the general body of customers with their limited cost.

FPL also leveraged the benefits of certain heat pump measures, when combined with Air Conditioning measures, to ensure continuation of existing Residential HVAC program has broad applicability across FPL's customer base.

**Q. Do FPL's proposed programs include any modifications or enhancements to increase participation?**

A. Yes. FPL is proposing to continue each of its long-standing DSM programs with adjustments and enhancements intended to simplify program offerings, improve participation and results, and to reflect current market conditions. In the residential sector, FPL is proposing to increase the Residential HVAC program incentive to increase participating independent contractor (PIC) engagement and resulting program participation. FPL has experienced a decline in PIC participation in recent years which has negatively impacted program enrollments. By increasing the customer incentive, FPL expects more PICs will voluntarily participate in the program, leading to increased overall customer participation.

For the Residential On Call® program, FPL is adding a new HVAC on-bill option to increase participation. Since 2020, participation in the On Call® program has been significantly below the projections in the 2020 DSM Plan. The HVAC on-bill option is expected to increase overall participation in the program in a manner that keeps the program cost-effective.

In the commercial/industrial sector, FPL proposes to enhance the design of the Business HVAC program. FPL's current program design has been less effective in reaching the small and medium business sector. The enhancements include adding PICs as a delivery channel for small and medium business

HVAC systems and simplifying the incentive structure to foster greater participation by these customers. Many small business HVAC systems are installed and serviced by HVAC contractors who serve the residential market and are already PICs for FPL's residential program. By enhancing the Business HVAC program to include these PICs, FPL expects to increase participation by small and medium business customers. Larger systems will continue to be enrolled through FPL customer advisors and other independent engineering and construction contractors. A comparison of the proposed and current programs, including added and removed measures, is shown in Exhibit JNF-5.

**Q. Are there any restrictions to FPL's proposed program designs from current settlement agreements?**

A. No. FPL's proposed program designs are not impacted by the Company's 2021 base rate case settlement agreement. FPL's settlement agreement as approved by the Commission only limits modifications to the CDR and CILC bill credits, and FPL is not proposing any such modifications to those programs in this proceeding.[3]

[3] See Docket No. 20210015-EI, *In re: Petition by FPL for Base Rate Increase and Rate Unification*, Joint Motion for Approval of Settlement on behalf of FPL, OPC, FRF, FIPUG, and SACE, filed Aug. 10, 2021, Attachment A, Stipulation and Settlement Agreement at p.6; Final Order Approving 2021 Stipulation and Settlement Agreement, Order No. PSC-2021-0446-S-EI (Dec. 2, 2021); Supplemental Final Order, Order No. PSC-2024-0078-FOF-EI (March 25, 2024).

**Q. How does FPL propose to ensure continuation of these programs does not cause increased costs generally associated with non-RIM passing programs?**

A. FPL proposes to limit costs of non-RIM passing programs by capping participation once sector-level goals are met. This limitation on participation would only apply to energy-efficiency programs and provides a way to limit overall portfolio costs while still making valuable energy savings programs available to FPL customers. The Commission has previously approved such an approach with FPL's current DSM Plan.

**Q. Does this conclude your direct testimony?**

A. Yes.

| | Current DSM Programs | Inception Date | Cumulative - Inception to Year-End 2023* | | | |
|---|---|---|---|---|---|---|
| | | | Participants | Summer MW | Winter MW | GWh |
| **Residential** | | | | | | |
| 1 | **Home Energy Survey**** | 1/1981 | 4,456,559 | n/a | n/a | n/a |
| 2 | **Load Management (On Call®)** | 7/1986 | 652,942 | 831 | 743 | 28 |
| 3 | **Air Conditioning** | 10/1990 | 2,051,376 | 1,357 | 473 | 32,707 |
| 4 | **New Construction (BuildSmart®)** | 2/1996 | 67,820 | 51 | 36 | 1,116 |
| 5 | **Ceiling Insulation** | 10/1981 | 590,344 | 265 | 309 | 11,826 |
| 6 | **Low Income** | 3/2005 | 51,429 | 18 | 5 | 114 |
| **Business** | | | | | | |
| 7 | **Business Energy Evaluation**** | 10/1990 | 274,707 | n/a | n/a | n/a |
| 8 | **Commercial/Industrial Demand Reduction** | 5/2000 | 738 | 414 | 266 | 48 |
| 9 | **Commercial/Industrial Load Control** | 4/1988 | 324 | 442 | 376 | 111 |
| 10 | **Business On Call®** | 6/1995 | 17,178 | 67 | - | 2 |
| 11 | **Heating, Ventilating & Air Conditioning** | 2/1990 | 24,199 | 458 | 119 | 14,346 |
| 12 | **Lighting** | 6/1984 | 21,463 | 325 | 202 | 24,368 |
| 13 | **Custom Incentive** | 4/1993 | 129 | 55 | 64 | 4,781 |
| **Current DSM Programs Total** | | | **8,209,208** | **4,284** | **2,593** | **89,447** |

| | | | | |
|---|---|---|---|---|
| **Discontinued DSM Programs***** | **2,295,981** | **1,295** | **1,119** | **10,974** |
| **Grand Total** | **10,505,189** | **5,579** | **3,712** | **100,422** |

Notes:

* MW and GWh values are at the generator

** No MW or GWh savings attributed to Survey programs

*** Ongoing savings related to participation in discontinued FPL programs

| Programs | Measures (if multiple per Program) |
|---|---|
| **Residential Energy Survey** | Online Home Energy Survey (OHES) |
| | Phone Energy Survey (PES) |
| | Home Energy Survey (HES) |
| **Residential Load Management (On Call®)** | |
| **Residential Air Conditioning** | |
| **Residential New Construction (BuildSmart®)** | |
| **Residential Ceiling Insulation** | |
| **Residential Low Income** | Energy Survey |
| | Weatherization (Caulking/Stripping) |
| | Duct Testing & Repair |
| | Air Conditioning Unit Maintenance |
| | Air Conditioning Outdoor Coil Cleaning |
| | Faucet Aerators |
| | Low-Flow Showerhead |
| | LED |
| | Water Heater Pipe Wrap |
| | |
| **Business Energy Evaluation (BEE)** | Online BEE |
| | Phone BEE |
| | Field BEE |
| **Business On Call®** | |
| **Commercial/Industrial Demand Reduction** | |
| **Commercial/Industrial Load Control (Closed)** | |
| **Business Heating, Ventilating, & Air Conditioning (HVAC)** | Chillers |
| | Thermal Energy Storage (TES) |
| | Split/Packaged Direct Expansion (DX) |
| | Demand Control Ventilation (DCV) |
| | Energy Recovery Ventilation (ERV) |
| **Business Lighting** | High Bay Light Emitting Diodes (LED) |
| | Pulse Start Metal Halide (PSMH) Lighting |
| | Premium Linear Fluorescent Lamps with High Efficiency Electronic Ballasts |
| | Compact Fluorescent Lamps (CFL) |
| **Business Custom Incentive (BCI)** | |
| | |
| **Conservation Research & Development (CRD)** | |
| **Cogeneration & Small Power Production** | |

**Residential EE**

| Measure | Description |
|---|---|
| 120v Heat Pump Water Heater 50 Gallons | 120v Heat Pump Water Heater 50 Gallons |
| Air Sealing-Infiltration Control | Standard Heating and Cooling System with Improved Infiltration Control |
| Air-to-Water Heat Pump | Energy Star Air-to-Water Heat Pump, 25 SEER, 13 HSPF |
| ASHP - 15 SEER/14.3 SEER2 from base electric resistance | ASHP 15 SEER from base electric resistance |
| ASHP - 24 SEER/22.9 SEER2 (from elec resistance) | ASHP: 24/22.9 SEER/SEER2, 10.5 HSPF |
| ASHP - 24 SEER/22.9 SEER2, 10.5 HSPF | ASHP: 24/22.9 SEER/SEER2, 10.5 HSPF |
| ASHP - CEE Advanced Tier: 17.8 SEER/17 SEER2; 10.0 HSPF | CEE Advanced Tier ASHP:17.8/17 SEER/SEER2; 10.0 HSPF |
| ASHP - CEE Advanced Tier: 17.8 SEER/17 SEER2; 10.0 HSPF (from elec resistance) | CEE Advanced Tier ASHP:17.8/17 SEER/SEER2; 10.0 HSPF |
| ASHP - CEE Tier 2: 16.8 SEER/16 SEER2; 9.0 HSPF | CEE Tier 2 ASHP: 16.8/16 SEER/SEER2; 9.0 HSPF |
| ASHP - CEE Tier 2: 16.8 SEER/16 SEER2; 9.0 HSPF (from elec resistance) | CEE Tier 2 ASHP: 16.8/16 SEER/SEER2; 9.0 HSPF |
| ASHP - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 (from elect resistance) | ENERGY STAR/CEE Tier 1 ASHP: 16/15.2 SEER/SEER2, 9.0 HSPF |
| ASHP - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2, 9.0 HSPF | ENERGY STAR/CEE Tier 1 ASHP: 16/15.2 SEER/SEER2, 9.0 HSPF |
| Basement or Crawlspace Wall Insulation R-15 | Increased Basement or Crawlspace Wall Insulation (R-15) |
| Bathroom Faucet Aerators | Low-Flow Faucet Aerator with Flow Rate of 1.5 gpm |
| CEE Advanced Tier Clothes Dryer | CEE Advanced Tier Clothes Dryer |
| CEE Advanced Tier Clothes Washer | Tier 3 CEE Clothes washer |
| CEE Tier 3 Refrigerator | Residential Tier 3 Refrigerator |
| Ceiling Insulation (R11 to R30) | Blown-in insulation in ceiling cavity/attic, existing (1982-1985) homes, bring to current code |
| Ceiling Insulation (R11 to R38) | Blown-in insulation in ceiling cavity/attic, existing (1982-1985) homes |
| Ceiling Insulation (R11 to R49) | Blown-in insulation in ceiling cavity/attic, existing (1982-1985) homes - Beyond Code |
| Ceiling Insulation (R19 to R30) | Blown-in insulation in ceiling cavity/attic, existing (1982-2020) homes, bring to current code |
| Ceiling Insulation (R19 to R38) | Blown-in insulation in ceiling cavity/attic, existing (1982-2020) homes |
| Ceiling Insulation (R19 to R49) | Blown-in insulation in ceiling cavity/attic, existing (1982-2020) homes - Beyond Code |
| Ceiling Insulation (R2 to R30) | Blown-in insulation in ceiling cavity/attic, older (pre-1982) homes, bring to current code |
| Ceiling Insulation (R2 to R38) | Blown-in insulation in ceiling cavity/attic, older (pre-1982) homes |
| Ceiling Insulation (R2 to R49) | Blown-in insulation in ceiling cavity/attic, older (pre-1982) homes - Beyond Code |
| Ceiling Insulation (R30 to R38) | Blown-in insulation in ceiling cavity/attic, existing (1986-2020) homes |
| Ceiling Insulation (R30 to R49) | Blown-in insulation in ceiling cavity/attic, existing (1986-2020) homes - Beyond Code |
| Ceiling Insulation (R38 to R49) | Blown-in insulation in ceiling cavity/attic, existing (1986-2020) homes - Beyond Code |
| Central AC - CEE Tier 2: 16.8 SEER/16 SEER2 | Central AC - CEE Tier 2: 16.8 SEER/16 SEER2 |
| Central AC - 24 SEER/22.9 SEER2 | Central AC - 24 SEER/22.9 SEER2 |
| Central AC - CEE Advanced Tier: 17.8 SEER/17 SEER2 | Central AC - CEE Advanced Tier: 17.8 SEER/17 SEER2 |
| Central AC - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 | Central AC - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 |
| Central AC Tune Up | System tune-up, including coil cleaning, refrigerant charging, and other diagnostics |
| Dehumidifier Recycling | No dehumidifier |
| Drain Water Heat Recovery | 50 Gallon Electric Resistance Heater and Drain Water Heat Exchanger |
| Duct Insulation | Standard Electric Heating and Central AC with Insulated Ductwork |
| Duct Repair | Duct Repair to eliminate/minimize leaks, includes testing and sealing |
| ECM Circulator Pump | Install ECM Circulator Pump |
| Energy Star Air Purifier | One Air Purifier meeting ENERGY STAR 2.0 Standards |
| Energy Star Audio-Video Equipment | One DVD/Blu-Ray Player meeting current ENERGY STAR Standards |
| Energy Star Bathroom Ventilating Fan | Bathroom Exhaust Fan meeting current ENERGY STAR Standards |
| Energy Star Ceiling Fan | 60" Ceiling Fan Meeting ENERGY STAR 3.1 Standards |
| Energy Star Clothes Dryer | One Electric Resistance Clothes Dryer meeting ENERGY STAR 1.1 Standards |

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| Energy Star Clothes Washer | One Clothes Washer meeting ENERGY STAR 8.1 Standards |
| Energy Star Dehumidifier | One Dehumidifier meeting ENERGY STAR 5.0 Standards |
| Energy Star Dishwasher | One Dishwasher meeting ENERGY STAR 7.0 Requirements (effective on July 19, 2023), electric water heating |
| Energy Star Dishwasher (Gas Water Heating) | One Dishwasher meeting ENERGY STAR 7.0 Requirements, gas water heating |
| Energy Star Door | 100ft2 of Opaque Door meeting Energy Star Version 6.0 Requirements (U-Value: 0.17) |
| ENERGY STAR EV supply equipment (level 2 charger) | Level 2 Electric Vehicle Supply Equipment (EVSE) |
| Energy Star Freezer | One Freezer meeting current ENERGY STAR 5.1 Standards |
| Energy Star Ground Source Heat Pump | Energy Star GSHP, 17.1 SEER, 12 HSPF |
| Energy Star Imaging Equipment | One imaging device meeting current ENERGY STAR Standards |
| Energy Star Monitor | One Monitor meeting ENERGY STAR 8.0 Standards |
| Energy Star Personal Computer | One Personal Computer meeting ENERGY STAR 8.0 Standards |
| Energy Star Refrigerator | One Refrigerator/Freezer meeting ENERGY STAR 5.1 Standards |
| Energy Star Room AC | Room AC meeting current ENERGY STAR standards |
| Energy Star Set-Top Receiver | One Set-top Box meeting ENERGY STAR 4.1 Standards |
| Energy Star TV | One Television meeting ENERGY STAR 9.0 Standards |
| Energy Star Windows | 100ft2 of Window meeting Energy Star Version 6.0 Requirements (U-Value: 0.27, SHGC: 0.21) |
| Exterior Wall Insulation | Increased Exterior Above-Grade Wall Insulation (R-13) |
| Filter Whistle | Install the Furnace Filter Alarm |
| Floor Insulation | Increased Floor Insulation (R-30) |
| Freezer Recycling | No Freezer |
| Green Roof | Vegetated Roof Surface on top of Standard Roof |
| Heat Pump Clothes Dryer | One Heat Pump Clothes Dryer |
| Heat Pump Pool Heater | Heat Pump Swimming Pool Heater |
| Heat Pump Tune Up | System tune-up, including coil cleaning, refrigerant charging, and other diagnostics |
| Heat Pump Water Heater 50 Gallons- CEE Advanced Tier | CEE Advanced Tier Heat Pump Water Heater 50 Gallons |
| Heat Pump Water Heater 50 Gallons-ENERGY STAR | Heat Pump Water Heater 50 Gallons |
| Heat Pump Water Heater 80 Gallons-ENERGY STAR | Energy Star Heat Pump Water Heater 80 Gallons |
| Heat Trap | Heat Trap |
| High Efficiency Convection Oven | One Full-Size Convection Oven meeting ENERGY STAR 3.0 Standards |
| High Efficiency Induction Cooktop | One residential induction cooktop |
| Home Energy Management System | Typical HVAC by Building Type Controlled by Energy Management System |
| Hot Water Pipe Insulation | 1' of Insulated Pipe in Unconditioned Spaces, Insulation of R-5 |
| HVAC ECM Motor | A brushless permanent magnet (ECM) blower motor for electric furnace |
| HVAC Economizer | Install residential economizer |
| HVAC Zoning System | Install dampers in the ducts, dividing home into multiple zones, each controlled by its own thermostat |
| Indoor Daylight Sensor | Install Indoor Daylight Sensors, 500 Watts Controlled |
| Induction Range | Residential induction range |
| Instantaneous Hot Water System | Instantaneous Hot Water System |
| Kitchen Faucet Aerators | Low-Flow Faucet Aerator with Flow Rate of 1.5 gpm |
| LED - 9W_CFL Baseline | LED (assume 9W) replacing CFL baseline lamp |
| LED - 9W_Halogen Baseline | LED (assume 9W) replacing EISA-2020 compliant baseline lamp |
| LED Specialty Lamps-5W Chandelier | 5 W Chandelier LED |
| Linear LED | Linear LED Lamps in Linear Fluorescent Fixture |
| Low Flow Showerhead | Low-Flow Handheld Showerhead, Flow Rate: 1.60 gpm |
| New Construction - Whole Home Improvements - Tier 1 | Performance-based improvements in new homes - 20% savings |
| New Construction - Whole Home Improvements - Tier 2 | Performance-based improvements in new homes - 35% savings |

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| Occupancy Sensors Switch Mounted | Switch Mounted Occupancy Sensor, 500 Watts Controlled |
| Outdoor Lighting Timer | Timer on Outdoor Lighting, Controlling 120 Watts |
| Outdoor Motion Sensor | Motion Sensor on Outdoor Lighting, Controlling 120 Watts |
| Ozone Laundry | Add a New, Single-Unit Ozone Laundry System to the Clothes Washer |
| Programmable Thermostat | Standard Heating and Cooling System with Programmable Thermostat |
| Properly Sized CAC | Properly Sized Central Air Conditioning |
| Radiant Barrier | Radiant Barrier |
| Reflective Roof | Reflective Roof Treatment |
| Refrigerator Coil Cleaning | Refrigerator Coil Cleaning |
| Refrigerator Recycling | No Refrigerator |
| Residential Whole House Fan | Standard Central Air Conditioning with Whole House Fan |
| Sealed crawlspace | Encapsulated and semi-conditioned crawlspace |
| Smart Breaker | Smart Breaker |
| Smart Panel | Multi-channel device that attaches to customer's circuit breaker to enable monitoring and control of major end-use appliances by customer |
| Smart Power Strip | Smart plug strips for entertainment centers and home office |
| Smart Thermostat | Standard Heating and Cooling System with Smart Thermostat |
| Solar Attic Fan | Standard Central Air Conditioning with Solar Attic Fan |
| Solar Pool Heater | Solar Swimming Pool Heater |
| Solar Powered Pool Pumps | Solar Powered Pool Pump |
| Solar Thermal Water Heating System | Solar Thermal System with Electric Backup |
| Spray Foam Insulation (Base R11) | Open cell spray foam along roofline in existing (1982-1985) homes |
| Spray Foam Insulation (Base R19) | Open cell spray foam along roofline in existing (1982-1985) homes |
| Spray Foam Insulation (Base R2) | Open cell spray foam along roofline in older (pre-1982) homes |
| Spray Foam Insulation (Base R30) | Open cell spray foam along roofline in existing (1986-2020) homes |
| Thermostatic Shower Restriction Valve | 50 Gallon Electric Resistance Heater and Thermostatic Shower Valves |
| Variable Refrigerant Flow (VRF) HVAC Systems | Variable Refrigerant Flow (VRF) HVAC Systems |
| Water Heater Blanket | 50 Gallon Electric Resistance Water Heater with Insulated Tank Wrap |
| Water Heater Thermostat Setback | 50 Gallon Electric Resistance Water Heater with Temperature Setpoint of 119°F |
| Water Heater Timeclock | Water Heater Timeclock |
| Weather stripping | Specific quantity of weather stripping to seal |
| Window Caulking | Window caulking |
| Window Sun Protection | Window Film Applied to Standard Window |

**Commercial EE**

| Measure | Description |
|---|---|
| 1.5HP Open Drip-Proof (ODP) Motor | High Efficiency 1.5 HP Open-Drip Proof Motor |
| 10HP Open Drip-Proof (ODP) Motor | High Efficiency 10 HP Open-Drip Proof Motor |
| 20HP Open Drip-Proof (ODP) Motor | High Efficiency 20 HP Open-Drip Proof Motor |
| Advanced Rooftop Controller | Advanced Rooftop Controller |
| Air Compressor Optimization | Performing Routine Maintenance on 20HP Inlet Modulation Fixed-Speed Compressor |
| Air Curtains | Air Curtain across door opening |
| Airside Economizer | Airside Economizer |
| Anti-Sweat Controls | One Medium Temperature Reach-In Case with Anti-Sweat Heater Controls |
| Auto Off Time Switch | Auto-Off Time Switch on Interior Lighting, 500 Watts Controlled |
| Automatic Door Closer for Walk-in Coolers and Freezers | One Medium Temperature Walk-In Refrigerator Door with Auto-Closer |
| Beverage Vending Machine Controls | One non-ENERGY STAR beverage vending machine equipped with infrared occupancy sensing controls |
| Bi-Level Lighting Control (Exterior) | Bi-Level Controls on Exterior Lighting, 500 Watts Controlled |
| Bi-Level Lighting Control (Interior) | Bi-Level Controls on Interior Lighting, 500 Watts Controlled |
| Ceiling Insulation (R19 to R30) | Blown-in insulation in ceiling cavity/attic |
| Ceiling Insulation (R19 to R38) | Blown-in insulation in ceiling cavity/attic |
| Ceiling Insulation (R19 to R49) | Blown-in insulation in ceiling cavity/attic - Beyond Code |
| Ceiling Insulation (R2 to R30) | Blown-in insulation in ceiling cavity/attic |
| Ceiling Insulation (R2 to R38) | Blown-in insulation in ceiling cavity/attic |
| Ceiling Insulation (R2 to R49) | Blown-in insulation in ceiling cavity/attic - Beyond Code |
| Chilled Water Reset | One Chiller with Reset of Chilled Water Temperature Setpoint |
| Chiller maintenance | O&M improvements to restore chiller performance |
| CO Sensors for Parking Garage Exhaust | Enclosed Parking Garage Exhaust with CO Control |
| Commercial Duct Sealing | Standard Electric Heating and Central AC with Improved Duct Sealing |
| Commercial Strategic Energy Management | Commercial Strategic Energy Management |
| Custom measure - Non-lighting | Custom Improvement to Facility's Operations |
| Data Center Hot Cold Aisle | Equipment configuration that saves HVAC |
| Dedicated Outside Air System (DOAS) | Install Dedicated Outside Air System (DOAS) |
| Demand Controlled Circulating Systems | Recirculation Pump with Demand Control Mechanism |
| Demand Controlled Ventilation | Return Air System with CO2 Sensors |
| Demand Defrost | Walk-In Freezer System with Demand-Controlled Electric Defrost Cycle |
| Destratification Fans | Destratification Fans improve temperature distribution by circulating warmer air from the ceiling back down to the floor level |
| Door Gasket (Cooler) | New Door Gasket on One-Door Medium Temperature Reach-In Case |
| Door Gasket (Freezer) | New Door Gasket on One-Door Medium Temperature Reach-In Case |
| Drain water heat recovery | Hot Water Loop with 50 Gallon Electric Resistance Heater and Drain Water Heat Exchanger |
| Dual Enthalpy Economizer | Standard HVAC Unit with an economizer and dual enthalpy differential control |
| Duct Insulation | Standard Electric Heating and Central AC with Insulated Ductwork (R-8) |
| Ductless Mini-Split AC | Ductless Mini-Split AC, 4 Ton, 16 SEER |
| Ductless Mini-Split HP | Ductless Mini-Split HP, 17 SEER, 9.5 HSPF |
| DX Coil Cleaning | DX Coil Cleaning |

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| ECM Motors on Furnaces | Variable Speed Electronically Commutated Motor for an Electric Furnace |
| Efficient Battery Charger | Efficient Battery Charger |
| Efficient Exhaust Hood | Kitchen ventilation with automatically adjusting fan controls |
| Efficient Motor Belts | Synchronous belt, 98% efficiency |
| Efficient New Construction Lighting | Efficient New Construction Lighting, 15% Better than Code |
| Energy Recovery Ventilation System (ERV) | Unitary Cooling Equipment that Incorporates Energy Recovery |
| Energy Star Combination Oven | Energy Star Combination Oven meeting ENERGY STAR Version 3.0 Standards |
| Energy Star Commercial Clothes Washer | One Commercial Clothes Washer meeting current ENERGY STAR Version 8.1 Standards |
| Energy Star Commercial Dishwasher | One Commercial Dishwasher meeting ENERGY STAR Version 3.0 Standards |
| Energy Star Commercial Glass Door Freezer | One Glass Door Freezer meeting ENERGY STAR Version 5.0 Standards |
| Energy Star Commercial Glass Door Refrigerator | One Glass Door Refrigerator meeting ENERGY STAR Version 5.0 Standards |
| Energy Star Commercial Solid Door Freezer | One Solid Door Freezer meeting ENERGY STAR Version 5.0 Standards |
| Energy Star Commercial Solid Door Refrigerator | One Solid Door Refrigerator meeting ENERGY STAR Version 5.0 Standards |
| Energy Star convection oven | Energy Star convection oven meeting ENERGY STAR Version 3.0 Standards |
| Energy Star EV Chargers | Level 2 Electric Vehicle Supply Equipment (EVSE) |
| Energy Star Fryer | One Standard Vat Electric Fryer meeting ENERGY STAR Version 3.0 Standards |
| Energy Star Griddle | One Griddle meeting current ENERGY STAR Version 1.2 Standards |
| Energy Star Hot Food Holding Cabinet | One Hot Food Holding Cabinet meeting current ENERGY STAR Version 2.0 Standards |
| Energy Star Ice Maker | One Continuous Self-Contained Ice Maker meeting ENERGY STAR Version 3.0 Standards |
| ENERGY STAR Imaging Equipment | One imaging device meeting current ENERGY STAR Standards |
| Energy Star LED Directional Lamp | Energy Star 7.6W Directional LED lamp |
| Energy Star Monitors | One Monitor meeting ENERGY STAR 8.0 Standards |
| Energy Star PCs | One Personal Computer (desktop or laptop) meeting current ENERGY STARÂ® Standards |
| Energy Star room AC | Room AC meeting current ENERGY STAR standards |
| Energy Star Servers | One Server meeting ENERGY STAR 2.0 Standards |
| Energy Star Steamer | One 4-Pan Electric Steamer meeting ENERGY STARÂ® 2.0 Standards |
| Energy Star Uninterruptable Power Supply | Standard Desktop Plugged into Energy Star Uninterruptable Power Supply at 25% Load |
| Energy Star Vending Machine | One Refrigerated Vending Machine meeting ENERGY STAR Version 4.0 Standards |
| ENERGY STAR Water Cooler | One Storage Type Hot/Cold Water Cooler Unit meeting ENERGY STAR Version 3.0 Standards |
| Energy Star windows | 100ft2 of Window meeting Energy Star Version 6.0 Requirements (U-Value: 0.27, SHGC: 0.21) |
| Engine Block Timer | Plug-in timer that activates engine block timer to reduce unnecessary run time |
| Escalator Motor Efficiency Controller | Install Escalator Motor Efficiency Controller |
| Facility Commissioning | Perform facility commissioning to optimize building operations in new facilities |
| Facility Energy Management System | Typical HVAC by Building Type Controlled by Energy Management System |
| Faucet Aerator | Low-flow lavatory faucet aerator, flow rate: 1.0 gpm |
| Floating Head Pressure Controls | Medium-Temperature Refrigeration System with 5HP Compressor and Adjustable Condenser Head Pressure Control Valve |
| Floor Insulation | Increased Floor Insulation (R-19) |
| Geothermal Heat Pump | Geothermal Heat Pump |
| Green roof | Vegetated Roof Surface on top of Standard Roof |

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| HE Air Cooled Chiller - All Compressor Types - 100 Tons | HE Air Cooled Chiller - Air Compressor Types - 100 Tons |
| HE DX 11.25-20.0 Tons Elec Heat | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER |
| HE DX 11.25-20.0 Tons Other Heat | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER |
| HE DX 5.4-11.25 Tons Elect Heat | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER |
| HE DX 5.4-11.25 Tons Other Heat | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER |
| HE DX Less than 5.4 Tons Elect Heat | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER |
| HE DX Less than 5.4 Tons Other Heat | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER |
| HE Water Cooled Chiller - Centrifugal Compressor - 200 Tons | Water Cooled Centrifugal Chiller with Integral VFD, 200 Tons |
| HE Water Cooled Chiller - Centrifugal Compressor - 500 Tons | Water Cooled Centrifugal Chiller with Integral VFD, 500 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 175 Tons | Water Cooled Positive Displacement Chiller with Integral VFD, 175 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 50 Tons | Water Cooled Positive Displacement Chiller with Integral VFD, 50 Tons |
| Heat Pump Pool Heater Commercial | High Efficiency Pool Heater Eff. >=84% |
| Heat Pump Water Heater | Efficient 50 Gallon Electric Heat Pump Water Heater |
| High Efficiency Air Compressor | 20 HP VFD Air Compressor |
| High Efficiency Data Center Cooling | High Efficiency CRAC (computer room air conditioner) |
| High Efficiency PTAC | High Efficiency PTAC |
| High Efficiency PTHP | High Efficiency PTHP |
| High Efficiency Refrigeration Compressor_Discus | High Efficiency Refrigeration Compressors |
| High Efficiency Refrigeration Compressor_Scroll | High Efficiency Refrigeration Compressors |
| High Speed Fans | High Speed Fan, 24" - 35" Blade Diameter |
| Hot water pipe insulation | 1' of Insulated Pipe in Unconditioned Spaces, Insulation of R-4 |
| Hotel Card Energy Control Systems | Guest Room HVAC Unit Controlled by Hotel-Key-Card Activated Energy Control System |
| Indoor daylight sensor | Install Indoor Daylight Sensors, 500 Watts Controlled |
| Induction Cooktops | Efficient Induction Cooktop |
| Infiltration Reduction - Air Sealing | Reduced leakage through caulking, weather-stripping |
| Instantaneous Hot Water System Commercial | Instantaneous Hot Water System |
| LED - 14W_CFL Baseline | LED (assume 14W) replacing CFL |
| LED - 9W Flood_CFL Baseline | LED (assume 9W) replacing CFL |
| LED Canopy Lighting (Exterior) | One 67.2W LED Canopy Light |
| LED Display Lighting (Exterior) | One Letter of LED Signage, < 2ft in Height |
| LED Display Lighting (Interior) | One Letter of LED Signage, < 2ft in Height |
| LED Exit Sign | One 5W Single-Sided LED Exit Sign |
| LED Exterior Wall Packs | One 35W LED Wall Pack |
| LED High Bay_HID Baseline | One 140W High Bay LED Fixture |
| LED High Bay_LF Baseline | One 140W High Bay LED Fixture |
| LED Linear - Fixture Replacement | 2x4 LED Troffer |
| LED Linear - Lamp Replacement | Linear LED (16W) |
| LED Parking Lighting | One 160W LED Area Light |
| LEED New Construction Whole Building | LEED New Construction Whole Building |

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| Light Tube | One 14" Light Tube, Delivering light to 250 S.F. of Commercial Space |
| Low Flow Shower Head | Low-Flow Handheld Showerhead, Flow Rate: 1.50 gpm |
| Low-Flow Pre-Rinse Sprayers | Low-Flow Pre-Rinse Sprayer with Flow Rate of 1.6 gpm |
| Network PC Power Management | One computer and monitor attached to centralized energy management system that controls when desktop computers and monitors plugged into a n |
| Networked Lighting Controls | Install Networked Lighting Controls System on Interior Lighting, 500 Watts Controlled |
| Night Covers for Display Cases | One Open Vertical Case with Night Covers |
| Occupancy Sensors, Ceiling Mounted | Ceiling Mounted Occupancy Sensor, 500 Watts Controlled |
| Occupancy Sensors, Switch Mounted | Switch Mounted Occupancy Sensor, 500 Watts Controlled |
| Outdoor Lighting Controls | Install Exterior Photocell Dimming Controls, 500 Watts Controlled |
| Outdoor motion sensor | Install Exterior Motion Sensor, 500 Watts Controlled |
| Ozone Laundry Commercial | Add a new ozone laundry system onto a commercial clothes washer |
| Programmable thermostat | Pre-set programmable thermostat that replaces manual thermostat |
| PSC to ECM Evaporator Fan Motor (Reach-In) | Medium Temperature Reach-In Case with equivalent size Electronically Commutated Evaporator Fan Motor |
| PSC to ECM Evaporator Fan Motor (Walk-In, Refrigerator) | Medium Temperature Walk-In Case with Electronically Commutated Evaporator Fan Motor |
| Q-Sync Evaporator Fan Motor | Medium Temperature Reach-In Case with equivalent size Q-Sync Evaporator Fan Motor |
| Reflective Roof Treatment | Reflective Roof Treatment |
| Refrigerated Display Case LED Lighting | 60" Refrigerated Case LED Strip |
| Refrigerated Display Case Lighting Controls | Occupancy Sensors for Refrigerated Case Lighting to reduce run time |
| Refrigeration Commissioning | Commissioned Refrigeration System |
| Refrigeration Economizer | Walk-in refrigerator with economizer |
| Regenerative Drive Elevator Motor | Regenerative drive produced energy when motor in overhaul condition |
| Retro-Commissioning (Existing Construction) | Perform facility retro-commissioning, including assessment, process improvements, and optimization of energy-consuming equipment and systems |
| Roof Insulation | Roof Insulation (built-up roof applicable to flat/low slope roofs) |
| Server Virtualization | 2 Virtual Host Server |
| Smart Strip Plug Outlet | One Smart Strip Plug Outlet |
| Smart thermostat | Thermostats that include "smart" features such as occupancy sensors, geo-fencing, multi-zone sensors |
| Solar Pool Heater Commercial | Solar Swimming Pool Heater |
| Solar Powered Pool Pump | Solar Powered Pool Pump Motor |
| Solar Thermal Water Heating System Commercial | Solar Thermal System with Electric Backup |
| Strip Curtains - Freezers | Walk-in freezer with strip curtains at least 0.06 inches thick covering the entire area of the doorway |
| Strip Curtains - Refrigerators | Walk-in cooler with strip curtains at least 0.06 inches thick covering the entire area of the doorway |
| Suction Pipe Insulation - Freezers | Suction Pipe Insulation - Freezers |
| Suction Pipe Insulation - Refrigerators | Suction Pipe Insulation - Refrigerators |
| Thermal Energy Storage | Deploy thermal energy storage technology (ice harvester, etc.) to shift load |
| Thermostatic Shower Restriction Valve Commercial | Hot Water Loop with 50 Gallon Electric Resistance Heater and Pressure Balance Shower Valves |
| Time Clock Control | Time Clock Controlled Lighting, 500 Watts Controlled |
| Variable Refrigerant Flow (VRF) HVAC Systems | Variable Refrigerant Flow (VRF) HVAC Systems |
| VAV System | Variable Air Volume Distribution System |
| VFD on Cooling Tower Fans | Cooling Tower Fans with VFD Control |

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|---|---|
| VFD on HVAC Pump | VFD on HVAC Pump |
| VSD Controlled Compressor | Refrigeration System with VSD Control |
| Wall Insulation | Increased Exterior Above-Grade Wall Insulation |
| Warehouse Loading Dock Seals | Seals to reduce infiltration losses at loading dock |
| Water Cooled Refrigeration Heat Recovery | The heat reclaim system transfers waste heat from refrigeration system to space heating or hot water |
| Water Heater Setback | A 50 gallon electric hot water tank with a thermostat setting reduced to no lower than 120 degrees. |
| Water source heat pump | Water Source Heat Pump, 2.5 Tons, 17.4 EER, 4.4 COP |
| Waterside Economizer | Waterside Economizer |
| Window shade film | Window Film with SHGC of 0.35 Applied to Standard Window |
| Zero Energy Doors | Install zero energy doors for a reach-in refrigerated cooler or freezer |

**Industrial EE Measures**

| Measure | Description |
| --- | --- |
| 1.5HP Open Drip-Proof (ODP) Motor | High Efficiency 1.5 HP Open-Drip Proof Motor |
| 10HP Open Drip-Proof (ODP) Motor | High Efficiency 10 HP Open-Drip Proof Motor |
| 20HP Open Drip-Proof (ODP) Motor | High Efficiency 20 HP Open-Drip Proof Motor |
| 3-phase High Frequency Battery Charger - 1 shift | 3-phase High Frequency Battery Charger |
| Advanced Rooftop Controller | Advanced Rooftop Controller |
| Air Compressor Optimization | Performing Routine Maintenance on 20HP Inlet Modulation Fixed-Speed Compressor |
| Air curtains | Air Curtain across door opening |
| Airside economizer | Airside Economizer |
| Auto Closer on Refrigerator Door | One Medium Temperature Walk-In Refrigerator Door with Auto-Closer |
| Auto Off Time Switch | Auto-Off Time Switch on Interior Lighting, 500 Watts Controlled |
| Bi-Level Lighting Control (Exterior) | Install Exterior Bi-Level Lighting Control, 500 Watts Controlled |
| Bi-Level Lighting Control (Interior) | Bi-Level Controls on Interior Lighting, 500 Watts Controlled |
| Chilled Water Reset | One Chiller with Reset of Chilled Water Temperature Setpoint |
| Cogged Belt on 15hp ODP Motor | 15HP ODP Motor with Cogged Belts Installed on Supply and/or Return Air Fans |
| Cogged Belt on 40hp ODP Motor | 40HP ODP Motor with Cogged Belts Installed on Supply and/or Return Air Fans |
| Compressed Air Desiccant Dryer | heated regenerative desiccant dryer without dew point demand controls |
| Compressed Air No-Loss Condensate Drains | Install no-loss condensate drains |
| Compressed Air Storage Tank | 20 HP Inlet Modulation Fixed-Speed Compressor with Receiver Tank |
| Custom Measure - Non-Lighting | Custom Improvement to Facility's Operations |
| Dairy Refrigeration Heat Recovery | refrigeration equipment with refrigeration heat recovery tank installed |
| Dedicated Outside Air System (DOAS) | Install Dedicated Outside Air System (DOAS) |
| Demand Controlled Ventilation | Return Air System with CO2 Sensors |
| Demand Defrost | Walk-In Freezer System with Demand-Controlled Electric Defrost Cycle |
| Dew Point Sensor Control for Dessicant CA Dryer | 1000 CFM Heated Desicant Air Dryer with Dew Point Controls |
| Drip Irrigation Nozzles | Flow Control Nozzles |
| Dual Enthalpy Economizer | Standard HVAC Unit with an economizer and dual enthalpy differential control |
| DX Coil Cleaning | DX Coil Cleaning |
| Efficient Compressed Air Nozzles | 1/4" Engineered Air Nozzle |
| Efficient New Construction Lighting | Efficient New Construction Lighting, 15% Better than Code |
| Electric Actuators | Electric Actuator |
| Energy Efficient Laboratory Fume Hood | Variable Air Volume High Performance Fume Hood |
| Energy Efficient Transformers | Energy Efficient Dry Type Transformer (CSL-3) |
| Energy Recovery Ventilation System | Unitary Cooling Equipment that Incorporates Energy Recovery |
| Energy Star LED Directional Lamp | Energy Star 7.6W Directional LED lamp |
| Energy Star room ac | Room AC meeting current ENERGY STAR standards |
| Energy Star windows | 100ft2 of Window meeting Energy Star Version 6.0 Requirements (U-Value: 0.27, SHGC: 0.21) |
| Engine Block Timer | An engine block heater operated by an outdoor plug-in timer |
| Facility Commissioning | Perform facility commissioning |

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|---|---|
| Facility Energy Management System | Typical HVAC by Building Type Controlled by Energy Management System |
| Fan Thermostat Controller | Typical HVAC by Building Type with Fan Thermostat Controller Installed |
| Floating Head Pressure Controller | Medium-Temperature Refrigeration System with 5HP Compressor and Adjustable Condenser Head Pressure Control Valve |
| Grain Bin Aeration Control System | Grain Storage Fan System with Automatic Controls |
| HE Air Cooled Chiller - All Compressor Types - 100 Tons | HE Air Cooled Chiller - All Compressor Types - 100 Tons |
| HE Air Cooled Chiller - All Compressor Types - 300 Tons | Air Cooled Positive Displacement Chiller with Integral VFD, 300 Tons, 13.7 EER |
| HE DX 11.25-20.0 Tons Elec Heat | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER |
| HE DX 11.25-20.0 Tons Other Heat | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER |
| HE DX 5.4-11.25 Tons Elect Heat | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER |
| HE DX 5.4-11.25 Tons Other Heat | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER |
| HE DX Less than 5.4 Tons Elect Heat | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER |
| HE DX Less than 5.4 Tons Other Heat | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER |
| HE Water Cooled Chiller - Centrifugal Compressor - 200 Tons | Water Cooled Centrifugal Chiller with Integral VFD, 200 Tons |
| HE Water Cooled Chiller - Centrifugal Compressor - 500 Tons | Water Cooled Centrifugal Chiller with Integral VFD, 500 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 175 Tons | Water Cooled Positive Displacement Chiller with Integral VFD, 175 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 50 Tons | Water Cooled Positive Displacement Chiller with Integral VFD, 50 Tons |
| High Bay Occupancy Sensors, Ceiling Mounted | Ceiling Mounted Occupancy Sensor, 800 Watts Controlled |
| High Efficiency Air Compressor | 20 HP VFD Air Compressor |
| High Efficiency Refrigeration Compressor - Discus | High Efficiency Refrigeration Compressors |
| High Efficiency Refrigeration Compressor - Scroll | High Efficiency Refrigeration Compressors |
| High Efficiency Welder | High Efficiency Welder |
| High Speed Fans | High Speed Fan, 24" - 35" Blade Diameter |
| High Volume Low Speed Fan (HVLS) | 20' High Volume Low Speed Fan |
| Indoor Agriculture - LED Grow Lights | LED grow light |
| Indoor daylight sensor | Install Indoor Daylight Sensors, 500 Watts Controlled |
| Industrial Duct Sealing | Standard Electric Heating and Central AC with Improved Duct Sealing |
| Injection Mold and Extruder Barrel Wraps | 2' Diameter, 20' Long Machine Barrel with 1" Insulation |
| Insulated Pellet Dryer Tanks and Ducts | Insulation for Pellet Tank and Duct |
| LED - 14W_CFL Baseline | LED (assume 14W) replacing CFL |
| LED Canopy Lighting (Exterior) | One 67.2W LED Canopy Light |
| LED Display Lighting (Exterior) | One Letter of LED Signage, < 2ft in Height |
| LED Display Lighting (Interior) | One Letter of LED Signage, < 2ft in Height |
| LED exit sign | One 5W Single-Sided LED Exit Sign |
| LED Exterior Wall Packs | One 35W LED Wall Pack |
| LED High Bay_HID Baseline | One 140W High Bay LED Fixture |
| LED High Bay_LF Baseline | One 140W High Bay LED Fixture |
| LED Linear - Fixture Replacement | 2x4 LED Troffer Fixture |
| LED Linear - Lamp Replacement | Linear LED |
| LED Parking Lighting | One 160W LED Area Light |

| | |
|---|---|
| LEED New Construction Whole Building | LEED Qualifying New Construction |
| Light Tube | One 14" Light Tube, Delivering light to 250 S.F. of Industrial Space |
| Low Energy Livestock Waterer | Install Thermostatically Controlled Livestock Watering System |
| Low Pressure Sprinkler Nozzles | Low Pressure Irrigation Nozzles operate at 35 psi or lower |
| Low Pressure-drop Filters | 20 HP Inlet Modulation Fixed-Speed Compressor with Low Pressure Drop Filter |
| Milk Pre-Cooler | Installed pre-cooler heat exchanger |
| Networked Lighting Controls | Install Networked Lighting Controls System on Interior Lighting, 500 Watts Controlled |
| Occupancy Sensors, Ceiling Mounted | Ceiling Mounted Occupancy Sensor, 500 Watts Controlled |
| Occupancy sensors, switch mounted | Switch Mounted Occupancy Sensor, 500 Watts Controlled |
| Outdoor Lighting Controls | Install Exterior Photocell Dimming Controls, 500 Watts Controlled |
| Outdoor motion sensor | Install Exterior Motion Sensor, 500 Watts Controlled |
| Packaged Terminal AC | High Efficiency Packaged Terminal AC |
| Process Cooling Ventilation Reduction | Standard Process Cooling with Reduced Ventilation |
| Programmable thermostat | Standard Heating and Cooling System with Programmable Thermostat |
| Reflective Roof Treatment | Reflective Roof Treatment |
| Refrigeration Commissioning | Commissioned Refrigeration System |
| Retro-Commissioning (Existing Construction) | Perform Facility Retro-commissioning |
| Roof insulation | Roof Insulation (built-up roof applicable to flat/low slope roofs) |
| Smart thermostat | Standard Heating and Cooling System with Smart Thermostat |
| Strategic Energy Management | SEM goal setting and tracking |
| Synchronous Belt on 15hp ODP Motor | 15 HP Open-Drip Proof Motor with Synchronous Belts Installed on Supply and/or Return Air Fans |
| Synchronous Belt on 5hp ODP Motor | 5 HP Open-Drip Proof Motor with Synchronous Belts Installed on Supply and/or Return Air Fans |
| Synchronous Belt on 75hp ODP Motor | 75 HP Open-Drip Proof Motor with Synchronous Belts Installed on Supply and/or Return Air Fans |
| Thermal energy storage | Deploy thermal energy storage technology (ice harvester, etc.) to shift load |
| Time Clock Control | Time Clock Controlled Lighting, 500 Watts Controlled |
| VAV System | Variable Air Volume Distribution System |
| VFD on Air Compressor | 20 HP VFD Air Compressor |
| VFD on Cooling Tower Fans | Cooling Tower Fans with VFD Control |
| VFD on HVAC Fan | 5 HP HVAC Fan Motor, with VFD Control |
| VFD on HVAC Pump | VFD on HVAC Pump |
| VFD on process pump | 20 HP Process Pump Equipped with VFD Control |
| VSD Controlled Compressor | Refrigeration System with VSD Control |
| Water source heat pump | Water Source Heat Pump, 2.5 Tons, 17.4 EER, 4.4 COP |
| Waterside economizer | Waterside Economizer |
| Window shade film | Window Film with SHGC of 0.35 Applied to Standard Window |

**Residential DR Measures**

| Measure | Description |
|---|---|
| Central air conditioner - Load Shed | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central Heating - Load Shed | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central air conditioner - 50% cycling | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Central Heating - 50% cycling | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Smart thermostats - Utility Installation | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| Smart thermostats – BYOT | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| CPP + Tech | Electricity rate that varies based on time of day. Can be same rate schedule for every day during a given season (time of use, or TOU) and with critical peak pricing (CPP) days when peak period rates are substantially higher for a limited number of days per year (customers receive advance notification of CPP event). Customers also receive technology that they can pre-program to curtail load when an event is called. |
| Water heater control | Load control installed on a water heater (integrated or external switch) |
| Pool pump switches | Load control program with switch installed on pool pump |
| Room AC | Load control program that is focused on room AC units rather than central AC |
| Managed EV Charging – switch | Load control switch that is installed on an EV charger |
| Managed EV Charging – telematics | Direct load control program leveraging EV smart charging software |
| Battery Storage with PV | PV charges battery and battery discharges to grid |

**Small/Medium Business DR Measures**

| Measure | Description |
|---|---|
| Central air conditioner - Load Shed | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central Heating - Load Shed* | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central air conditioner - 50% cycling | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Central Heating - 50% cycling* | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Smart thermostats - Utility Installation* | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| Smart thermostats – BYOT* | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| CPP + Tech | Electricity rate that varies based on time of day. Can be same rate schedule for every day during a given season (time of use, or TOU) and with critical peak pricing (CPP) days when peak period rates are substantially higher for a limited number of days per year (customers receive advance notification of CPP event). Customers also receive technology that they can pre-program to curtail load when an event is called. |
| Managed EV Charging – switch | Load control switch that is installed on an EV charger |
| Managed EV Charging – telematics | Direct load control program leveraging EV smart charging software |
| Battery Storage with PV | PV charges battery and battery discharges to grid |

**Large Commercial & Industrial DR Measures**

| Measure | Description |
| --- | --- |
| CPP + Tech | Electricity rate that varies based on time of day. Can be same rate schedule for every day during a given season (time of use, or TOU) and with critical peak pricing (CPP) days when peak period rates are substantially higher for a limited number of days per year (customers receive advance notification of CPP event). Customers also receive technology that they can pre-program to curtail load when an event is called. |
| Auto DR | Custom load control of specific end-uses/processes that is triggered by utility signal to building management system; customer can sometimes opt-out of specific events |
| Firm Service Level | Customer commits to a maximum usage level during peak periods and, when notified by the utility, agrees to cut usage to that level. |
| Guaranteed Load Drop | Customer agrees to reduce usage by an agreed upon amount when notified |

**Residential DSRE Measures**

| Measure | Description |
|---|---|
| PV System | Roof-mounted system, including multiple panels, AC/DC inverter, racking system, and electrical system interconnections |
| Battery Storage from PV System | Lithium-ion battery system designed to integrate with an on-site PV system to store and discharge excess energy from PV generation |

**Non-Residential DSRE Measures**

| Measure | Description |
|---|---|
| PV System | Roof-mounted system, including multiple panels, AC/DC inverter, racking system, and electrical system interconnections |
| Battery Storage from PV System | Lithium-ion battery system designed to integrate with an on-site PV system to store and discharge excess energy from PV generation |
| CHP – Fuel Cell | An electrochemical cell-based generator that reacts hydrogen fuel with oxygen |
| CHP – Micro Turbine | Small combustion turbine that burns gaseous or liquid fuel to drive a generator |
| CHP – Gas Turbine | A combustion turbine that burns gaseous or liquid fuel to drive a generator |
| CHP – Reciprocating Engine | An engine that uses one or more pistons to convert pressure into rotational motion |
| CHP - Steam Turbine | A turbine that extracts thermal energy from pressured steam to drive a generator |

**RIM**

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | Cumulative |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Summer MW** | | | | | | | | | | | |
| Residential | 10.45 | 11.10 | 11.84 | 12.23 | 12.61 | 13.00 | 13.40 | 13.80 | 14.20 | 14.62 | 127.26 |
| Commercial/Industrial | 9.10 | 9.01 | 8.92 | 6.43 | 6.37 | 6.31 | 6.25 | 6.20 | 6.14 | 6.09 | 70.81 |
| Total[1] | 19.54 | 20.11 | 20.76 | 18.66 | 18.98 | 19.31 | 19.65 | 19.99 | 20.34 | 20.71 | 198.06 |
| **Winter MW** | | | | | | | | | | | |
| Residential | 10.33 | 11.32 | 12.50 | 13.00 | 13.52 | 14.06 | 14.63 | 15.21 | 15.82 | 16.47 | 136.87 |
| Commercial/Industrial | 4.85 | 4.80 | 4.75 | 3.24 | 3.21 | 3.18 | 3.15 | 3.12 | 3.08 | 3.05 | 36.43 |
| Total[1] | 15.18 | 16.12 | 17.25 | 16.25 | 16.73 | 17.24 | 17.77 | 18.33 | 18.91 | 19.52 | 173.30 |
| **Annual GWh** | | | | | | | | | | | |
| Residential | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 |
| Commercial/Industrial | 0.15 | 0.15 | 0.15 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 1.32 |
| Total[1] | 0.15 | 0.15 | 0.15 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.12 | 0.12 | 1.34 |
| Rate Impact ($/1,000 kwh)[2] | $0.35 | $0.34 | $0.33 | $0.32 | $0.32 | $0.31 | $0.30 | $0.29 | $0.28 | $0.27 | |

**TRC**

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | Cumulative |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Summer MW** | | | | | | | | | | | |
| Residential | 28.85 | 29.41 | 30.18 | 30.70 | 31.29 | 31.93 | 32.56 | 33.23 | 33.90 | 34.62 | 316.67 |
| Commercial/Industrial | 20.08 | 20.21 | 20.39 | 18.28 | 18.61 | 18.95 | 19.24 | 19.48 | 19.64 | 19.71 | 194.60 |
| Total[1] | 48.94 | 49.62 | 50.57 | 48.98 | 49.91 | 50.87 | 51.81 | 52.71 | 53.54 | 54.33 | 511.27 |
| **Winter MW** | | | | | | | | | | | |
| Residential | 24.64 | 26.86 | 29.49 | 31.61 | 33.77 | 35.82 | 37.67 | 39.30 | 40.71 | 41.96 | 341.85 |
| Commercial/Industrial | 16.58 | 16.71 | 16.86 | 15.69 | 15.94 | 16.24 | 16.52 | 16.76 | 16.91 | 16.99 | 165.19 |
| Total[1] | 41.22 | 43.57 | 46.36 | 47.29 | 49.71 | 52.06 | 54.19 | 56.06 | 57.63 | 58.96 | 507.04 |
| **Annual GWh** | | | | | | | | | | | |
| Residential | 57.31 | 59.32 | 61.94 | 65.05 | 68.36 | 71.54 | 74.33 | 76.78 | 78.82 | 80.62 | 694.08 |
| Commercial/Industrial | 73.19 | 74.33 | 75.75 | 78.07 | 80.51 | 82.98 | 85.21 | 87.04 | 88.37 | 89.18 | 814.63 |
| Total[1] | 130.50 | 133.65 | 137.69 | 143.12 | 148.87 | 154.51 | 159.54 | 163.82 | 167.19 | 169.80 | 1,508.71 |
| Rate Impact ($/1,000 kwh)[2] | $0.51 | $0.51 | $0.50 | $0.50 | $0.50 | $0.49 | $0.48 | $0.47 | $0.46 | $0.45 | |

**PROPOSED**

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | Cumulative |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Summer MW** | | | | | | | | | | | |
| Residential | 25.19 | 25.42 | 25.80 | 25.80 | 25.92 | 26.07 | 26.26 | 26.49 | 26.75 | 27.05 | 260.76 |
| Commercial/Industrial | 16.24 | 16.26 | 16.28 | 13.89 | 13.94 | 14.00 | 14.05 | 14.11 | 14.17 | 14.23 | 147.17 |
| Total[1] | 41.43 | 41.68 | 42.08 | 39.70 | 39.86 | 40.06 | 40.31 | 40.60 | 40.92 | 41.28 | 407.93 |
| **Winter MW** | | | | | | | | | | | |
| Residential | 19.73 | 20.61 | 21.70 | 22.09 | 22.55 | 23.04 | 23.57 | 24.13 | 24.73 | 25.38 | 227.53 |
| Commercial/Industrial | 9.65 | 9.68 | 9.71 | 8.28 | 8.33 | 8.38 | 8.43 | 8.48 | 8.54 | 8.59 | 88.06 |
| Total[1] | 29.38 | 30.29 | 31.41 | 30.36 | 30.87 | 31.42 | 32.00 | 32.61 | 33.27 | 33.97 | 315.59 |
| **Annual GWh** | | | | | | | | | | | |
| Residential | 39.31 | 38.55 | 37.90 | 36.88 | 36.41 | 36.03 | 35.71 | 35.46 | 35.26 | 35.12 | 366.63 |
| Commercial/Industrial | 48.40 | 49.13 | 49.87 | 50.60 | 51.37 | 52.15 | 52.95 | 53.76 | 54.58 | 55.42 | 518.24 |
| Total[1] | 87.71 | 87.68 | 87.77 | 87.48 | 87.79 | 88.18 | 88.66 | 89.22 | 89.85 | 90.54 | 884.88 |
| Rate Impact ($/1,000 kwh)[2] | $0.46 | $0.45 | $0.44 | $0.43 | $0.42 | $0.41 | $0.40 | $0.39 | $0.38 | $0.37 | |

1) May not add due to rounding

2) ECCR rate impact does not include survey programs, CILC/CDR program, CRD program and common expenses

**Goals Scenario:** RIM

**Program:** Residential Load Management (On Call®)
**Summary Program Description:** Monthly bill credits for direct load control of HVAC, water heating and pool pumps

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 3,492 | 3,580 | 3,665 | 3,747 | 3,825 | 3,899 | 3,967 | 4,031 | 4,088 | 4,141 |
| Summer MW* | 9.84 | 10.09 | 10.33 | 10.56 | 10.78 | 10.99 | 11.18 | 11.36 | 11.52 | 11.67 |
| Winter MW* | 9.18 | 9.41 | 9.63 | 9.85 | 10.06 | 10.25 | 10.43 | 10.60 | 10.75 | 10.89 |
| Annual GWh* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Program Cost Estimate | $ 36,096,985 | $ 36,892,908 | $ 36,575,978 | $ 36,226,577 | $ 36,076,647 | $ 35,743,139 | $ 35,394,142 | $ 34,775,464 | $ 34,458,901 | $ 34,169,780 |

**Program Measures**
HVAC
Water Heater
Pool Pump

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 49,599 | 49,599 | 23,046 |
| NPV Cost | 39,338 | 16,293 | 0 |
| Ratio | 1.26 | 3.04 | INFINITE |

* Values are @ Generator

**Goals Scenario:** RIM

**Program:** Residential Load Management (On Call®)
**Summary Program Description:** HVAC on bill with direct load control

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 300 | 500 | 750 | 825 | 908 | 998 | 1,098 | 1,208 | 1,329 | 1,462 |
| Summer MW* | 0.60 | 1.01 | 1.51 | 1.66 | 1.83 | 2.01 | 2.21 | 2.44 | 2.68 | 2.95 |
| Winter MW* | 1.15 | 1.91 | 2.87 | 3.15 | 3.47 | 3.81 | 4.20 | 4.62 | 5.08 | 5.58 |
| Annual GWh* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Program Cost Estimate** | $ 1,094,767 | $ 1,046,738 | $ 983,119 | $ 882,810 | $ 751,076 | $ 595,062 | $ 425,137 | $ (21,112) | $ (170,438) | $ (294,583) |

**<u>Program Measures</u>**
HVAC

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 9,434 | 9,434 | 3,815 |
| NPV Cost | 6,582 | 3,013 | 3,013 |
| Score | 1.43 | 3.13 | 1.27 |

* Values are @ Generator
** Program costs net of program revenues

**Goals Scenario:** RIM

**Program:** Business On Call®
**Summary Program Description:** Monthly bill credits for direct load control of HVAC

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 1,090 | 1,081 | 1,072 | 1,065 | 1,058 | 1,052 | 1,046 | 1,041 | 1,036 | 1,032 |
| Summer MW* | 1.15 | 1.14 | 1.13 | 1.12 | 1.12 | 1.11 | 1.10 | 1.10 | 1.09 | 1.09 |
| Winter MW* | - | - | - | - | - | - | - | - | - | - |
| Annual GWh* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Program Cost Estimate | $ 2,758,904 | $ 2,749,796 | $ 2,738,657 | $ 2,726,489 | $ 2,713,294 | $ 2,700,835 | $ 2,687,582 | $ 2,674,571 | $ 2,661,746 | $ 2,648,824 |

**Program Measures**

HVAC

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 4,495 | 4,495 | 2,943 |
| NPV Cost | 4,292 | 1,351 | 0 |
| Ratio | 1.05 | 3.33 | INFINITE |

* Values are @ Generator

**Goals Scenario:** RIM

**Program:** CDR

**Summary Program Description:** Bill credits for control of customer loads >200 kW

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 7,500 | 7,425 | 7,351 | 5,000 | 4,950 | 4,901 | 4,851 | 4,803 | 4,755 | 4,707 |
| Summer MW* | 7.92 | 7.84 | 7.76 | 5.28 | 5.23 | 5.17 | 5.12 | 5.07 | 5.02 | 4.97 |
| Winter MW* | 4.82 | 4.78 | 4.73 | 3.22 | 3.18 | 3.15 | 3.12 | 3.09 | 3.06 | 3.03 |
| Annual GWh* | 0.09 | 0.09 | 0.09 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 |
| Program Cost Estimate | $ 37,511,423 | $ 37,733,106 | $ 37,951,050 | $ 37,939,285 | $ 37,934,424 | $ 37,925,002 | $ 37,911,063 | $ 37,892,653 | $ 37,869,816 | $ 37,842,597 |

**<u>Program Measures</u>**

Controllable Load

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 27,621 | 27,621 | 37,483 |
| NPV Cost | 38,101 | 690 | 0 |
| Ratio | 0.72 | 40.06 | INFINITE |

* Values are @ Generator

**Goals Scenario:** RIM

**Program:** Business Custom Incentive
**Summary Program Description:** Customized incentives for qualifying energy efficiency projects

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| Summer MW* | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| Winter MW* | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| Annual GWh* | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 |
| Program Cost Estimate | $ 20,000 | $ 20,000 | $ 20,000 | $ 20,000 | $ 20,000 | $ 20,000 | $ 20,000 | $ 20,000 | $ 20,000 | $ 20,000 |

**Program Measures**
Non-Specified

* Values are @ Generator

**Goals Scenario:** TRC

**Program:** Residential HVAC Plus
**Summary Program Description:** Tiered upfront incentives for installation of energy efficient HVAC equipment and duct sealing

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 24,913 | 25,778 | 26,729 | 27,749 | 28,795 | 29,812 | 30,779 | 31,704 | 32,591 | 33,464 |
| Summer MW* | 4.26 | 4.52 | 4.82 | 5.15 | 5.50 | 5.85 | 6.18 | 6.51 | 6.82 | 7.14 |
| Winter MW* | 9.69 | 11.00 | 12.48 | 14.07 | 15.65 | 17.11 | 18.36 | 19.40 | 20.24 | 20.93 |
| Annual GWh* | 22.71 | 25.03 | 27.64 | 30.49 | 33.37 | 36.07 | 38.48 | 40.58 | 42.41 | 44.03 |
| Program Cost Estimate | $ 6,492,727 | $ 6,898,655 | $ 7,354,392 | $ 7,846,675 | $ 8,349,026 | $ 8,750,742 | $ 9,183,455 | $ 9,575,341 | $ 9,930,186 | $ 10,260,076 |

**Program Measures**

ASHP - CEE Tier 2: 16.8 SEER/16 SEER2; 9.0 HSPF (from elec resistance)
Properly Sized CAC
Duct Repair
ASHP - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 (from elect resistance)
ASHP - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2, 9.0 HSPF
Central AC - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 192,512 | 192,512 | 543,304 |
| NPV Cost | 436,911 | 95,290 | 83,046 |
| Score | 0.44 | 2.02 | 6.54 |

* Values are @ Generator

**Goals Scenario:** TRC

**Program:** Residential Building Envelope
**Summary Program Description:** Upfront incentives for installation of qualifying ceiling insulation and windows

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 3,131 | 2,881 | 2,673 | 2,507 | 2,373 | 2,258 | 2,143 | 2,008 | 1,837 | 1,634 |
| Summer MW* | 5.14 | 4.63 | 4.17 | 3.76 | 3.40 | 3.07 | 2.77 | 2.50 | 2.25 | 2.03 |
| Winter MW* | 1.90 | 1.72 | 1.55 | 1.41 | 1.28 | 1.16 | 1.05 | 0.95 | 0.86 | 0.77 |
| Annual GWh* | 10.46 | 9.43 | 8.51 | 7.68 | 6.94 | 6.28 | 5.68 | 5.13 | 4.63 | 4.16 |
| Program Cost Estimate | $ 1,148,314 | $ 1,084,933 | $ 1,041,752 | $ 1,020,174 | $ 1,013,556 | $ 999,822 | $ 987,315 | $ 950,930 | $ 879,780 | $ 776,472 |

**Program Measures**
Energy Star Windows
Ceiling Insulation(R2 to R30)
Ceiling Insulation(R2 to R38)

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 68,177 | 68,177 | 118,366 |
| NPV Cost | 94,012 | 30,429 | 27,580 |
| Score | 0.73 | 2.24 | 4.29 |

* Values are @ Generator

**Goals Scenario:** TRC

**Program:** Residential Low Income Weatherization
**Summary Program Description:** Direct installation of energy saving measures

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 11,000 | 11,110 | 11,221 | 11,333 | 11,447 | 11,561 | 11,677 | 11,793 | 11,911 | 12,031 |
| Summer MW* | 5.57 | 5.63 | 5.68 | 5.74 | 5.80 | 5.86 | 5.92 | 5.97 | 6.03 | 6.09 |
| Winter MW* | 0.85 | 0.85 | 0.86 | 0.87 | 0.88 | 0.89 | 0.90 | 0.91 | 0.92 | 0.92 |
| Annual GWh* | 10.21 | 10.31 | 10.41 | 10.52 | 10.62 | 10.73 | 10.84 | 10.94 | 11.05 | 11.16 |
| Program Cost Estimate | $ 4,719,000 | $ 4,766,190 | $ 4,813,852 | $ 4,861,990 | $ 4,910,610 | $ 4,959,716 | $ 5,009,314 | $ 5,059,407 | $ 5,110,001 | $ 5,161,101 |

**Program Measures**

Weatherization (Caulking/Stripping)
Duct Testing & Repair
Air Conditioning Unit Maintenance
Air Conditioning Outdoor Coil Cleaning
Faucet Aerators - Kitchen and Bathroom
Low-Flow Showerhead
Water Heater Pipe Wrap
Ceiling Insulation
LED

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 100,966 | 100,966 | 172,224 |
| NPV Cost | 163,620 | 29,729 | 0 |
| Score | 0.62 | 3.40 | INFINITE |

* Values are @ Generator

**Goals Scenario:** TRC

**Program:** Residential Whole Home Plus
**Summary Program Description:** Tiered upfront incentives for energy efficient new home construction

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 4,748 | 4,775 | 4,817 | 4,868 | 4,923 | 4,984 | 5,045 | 5,123 | 5,223 | 5,348 |
| Summer MW* | 2.83 | 2.84 | 2.86 | 2.90 | 2.94 | 2.99 | 3.04 | 3.12 | 3.22 | 3.36 |
| Winter MW* | 1.31 | 1.30 | 1.30 | 1.30 | 1.32 | 1.33 | 1.34 | 1.37 | 1.41 | 1.47 |
| Annual GWh* | 10.15 | 10.14 | 10.21 | 10.32 | 10.47 | 10.64 | 10.81 | 11.09 | 11.48 | 12.02 |
| Program Cost Estimate | $ 1,299,337 | $ 1,294,909 | $ 1,303,232 | $ 1,318,526 | $ 1,337,201 | $ 1,336,974 | $ 1,359,586 | $ 1,396,384 | $ 1,450,709 | $ 1,525,898 |

**Program Measures**

New Construction - Whole Home Improvements - Tier 1
New Construction - Whole Home Improvements - Tier 2
BuildSmart® - Non-Specified

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 71,449 | 71,449 | 165,023 |
| NPV Cost | 131,383 | 35,684 | 31,005 |
| Score | 0.54 | 2.00 | 5.32 |

* Values are @ Generator

**Goals Scenario:** TRC

**Program:** Residential Retail Products
**Summary Program Description:** Incentives for various retail energy efficiency products

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 258,515 | 269,535 | 282,315 | 297,308 | 313,420 | 328,996 | 342,750 | 354,091 | 361,889 | 366,831 |
| Summer MW* | 0.61 | 0.70 | 0.80 | 0.92 | 1.04 | 1.16 | 1.26 | 1.33 | 1.37 | 1.38 |
| Winter MW* | 0.57 | 0.68 | 0.80 | 0.96 | 1.12 | 1.27 | 1.39 | 1.46 | 1.46 | 1.40 |
| Annual GWh* | 3.77 | 4.40 | 5.16 | 6.03 | 6.95 | 7.82 | 8.53 | 9.03 | 9.25 | 9.25 |
| Program Cost Estimate | $ 413,210 | $ 466,969 | $ 530,029 | $ 600,957 | $ 674,347 | $ 653,738 | $ 706,122 | $ 752,034 | $ 791,178 | $ 825,673 |

**Program Measures**
Energy Star Clothes Washer
Hot Water Pipe Insulation
LED Specialty Lamps-5W Chandelier
Smart Thermostat

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 34,504 | 34,504 | 102,784 |
| NPV Cost | 83,899 | 32,695 | 27,341 |
| Score | 0.41 | 1.06 | 3.76 |

* Values are @ Generator

**Goals Scenario:** TRC

**Program:** Residential Load Management (On Call®)
**Summary Program Description:** Monthly bill credits for direct load control of HVAC, water heating and pool pumps

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 3,492 | 3,580 | 3,665 | 3,747 | 3,825 | 3,899 | 3,967 | 4,031 | 4,088 | 4,141 |
| Summer MW* | 9.84 | 10.09 | 10.33 | 10.56 | 10.78 | 10.99 | 11.18 | 11.36 | 11.52 | 11.67 |
| Winter MW* | 9.18 | 9.41 | 9.63 | 9.85 | 10.06 | 10.25 | 10.43 | 10.60 | 10.75 | 10.89 |
| Annual GWh* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Program Cost Estimate | $ 36,096,985 | $ 36,892,908 | $ 36,575,978 | $ 36,226,577 | $ 36,076,647 | $ 35,743,139 | $ 35,394,142 | $ 34,775,464 | $ 34,458,901 | $ 34,169,780 |

**<u>Program Measures</u>**
HVAC
Water Heater
Pool Pump

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 49,599 | 49,599 | 23,046 |
| NPV Cost | 39,338 | 16,293 | 0 |
| Ratio | 1.26 | 3.04 | INFINITE |

* Values are @ Generator

**Goals Scenario:** TRC

**Program:** Residential Load Management (On Call®)
**Summary Program Description:** HVAC on bill with direct load control

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 300 | 500 | 750 | 825 | 908 | 998 | 1,098 | 1,208 | 1,329 | 1,462 |
| Summer MW[1] | 0.60 | 1.01 | 1.51 | 1.66 | 1.83 | 2.01 | 2.21 | 2.44 | 2.68 | 2.95 |
| Winter MW[1] | 1.15 | 1.91 | 2.87 | 3.15 | 3.47 | 3.81 | 4.20 | 4.62 | 5.08 | 5.58 |
| Annual GWh[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Program Cost Estimate[2] | $ 1,094,767 | $ 1,046,738 | $ 983,119 | $ 882,810 | $ 751,076 | $ 595,062 | $ 425,137 | $ (21,112) | $ (170,438) | $ (294,583) |

1) Values are @ Generator
2) Program costs net of program revenues

**Program Measures**
HVAC

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 9,434 | 9,434 | 3,815 |
| NPV Cost | 6,582 | 3,013 | 3,013 |
| Score | 1.43 | 3.13 | 1.27 |

**Goals Scenario:** TRC

**Program:** Business HVAC Plus

**Summary Program Description:** Tiered upfront incentives for installation of energy efficient HVAC equipment

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 5,863 | 5,958 | 6,070 | 6,235 | 6,398 | 6,571 | 6,731 | 6,868 | 6,968 | 7,025 |
| Summer MW* | 6.19 | 6.29 | 6.41 | 6.58 | 6.76 | 6.94 | 7.11 | 7.25 | 7.36 | 7.42 |
| Winter MW* | 7.37 | 7.41 | 7.46 | 7.56 | 7.61 | 7.73 | 7.85 | 7.97 | 8.06 | 8.12 |
| Annual GWh* | 35.90 | 36.21 | 36.62 | 37.41 | 38.23 | 39.12 | 39.96 | 40.70 | 41.25 | 41.57 |
| Program Cost Estimate | $ 4,201,770 | $ 4,298,865 | $ 4,417,284 | $ 4,593,701 | $ 4,774,134 | $ 4,889,388 | $ 5,065,042 | $ 5,210,049 | $ 5,305,495 | $ 5,338,554 |

**Program Measures**

Commercial Duct Sealing
Smart Thermostat
ECM Motors on Furnaces
Waterside Economizer
VFD on Cooling Tower Fans
Chilled Water Reset
VAV System
Facility Energy Management System_VT
Efficient Exhaust Hood
Energy Star Room AC
Facility Energy Management System_SC
Facility Energy Management System_SH
VFD on HVAC Fan
Strategic Energy Management
Industrial Duct Sealing
Airside Economizer
High Volume Low Speed Fan (HVLS)
Infiltration Reduction - Air Sealing
Custom Measure - Non-Lighting
HE Water Cooled Chiller - Centrifugal Compressor - 200 Tons
HE Water Cooled Chiller - Centrifugal Compressor - 500 Tons
HE DX Less than 5.4 Tons Elect Heat
HE DX Less than 5.4 Tons Other Heat
High Efficiency PTAC
High Efficiency PTHP
Water Source Heat Pump
VFD on HVAC Pump

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 208,555 | 208,555 | 537,863 |
| NPV Cost | 460,073 | 146,722 | 137,637 |
| Score | 0.45 | 1.42 | 3.91 |

* Values are @ Generator

**Goals Scenario:** TRC

**Program:** Business Lighting Plus

**Summary Program Description:** Upfront incentives for installation of energy efficiency lighting products

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 3,535 | 3,586 | 3,639 | 3,700 | 3,759 | 3,823 | 3,889 | 3,956 | 4,024 | 4,093 |
| Summer MW* | 3.73 | 3.79 | 3.84 | 3.91 | 3.97 | 4.04 | 4.11 | 4.18 | 4.25 | 4.32 |
| Winter MW* | 3.29 | 3.34 | 3.39 | 3.44 | 3.50 | 3.55 | 3.61 | 3.68 | 3.74 | 3.80 |
| Annual GWh* | 28.85 | 29.27 | 29.70 | 30.20 | 30.67 | 31.19 | 31.73 | 32.28 | 32.83 | 33.39 |
| Program Cost Estimate | $ 606,054 | $ 607,817 | $ 609,319 | $ 613,980 | $ 616,288 | $ 618,661 | $ 624,163 | $ 629,882 | $ 635,343 | $ 640,143 |

**<u>Program Measures</u>**

Occupancy Sensors, Ceiling Mounted
LED Exterior Wall Packs
Outdoor Motion Sensor
LED Parking Lighting
LED High Bay_HID Baseline
LED High Bay_LF Baseline
LED Linear - Fixture Replacement

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 148,236 | 148,236 | 415,653 |
| NPV Cost | 346,766 | 103,687 | 102,559 |
| Score | 0.43 | 1.43 | 4.05 |

* Values are @ Generator

**Goals Scenario:** TRC

**Program:** Business Water Heating
**Summary Program Description:** Upfront incentives for installation of energy efficient water heating equipment

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 225 | 291 | 366 | 447 | 526 | 597 | 652 | 686 | 698 | 692 |
| Summer MW* | 0.24 | 0.31 | 0.39 | 0.47 | 0.56 | 0.63 | 0.69 | 0.72 | 0.74 | 0.73 |
| Winter MW* | 0.37 | 0.48 | 0.60 | 0.73 | 0.85 | 0.97 | 1.05 | 1.11 | 1.13 | 1.12 |
| Annual GWh* | 2.00 | 2.56 | 3.19 | 3.88 | 4.55 | 5.15 | 5.61 | 5.90 | 6.00 | 5.95 |
| Program Cost Estimate | $ 488,288 | $ 618,067 | $ 766,814 | $ 929,264 | $ 1,086,673 | $ 1,169,504 | $ 1,273,049 | $ 1,334,278 | $ 1,349,107 | $ 1,325,934 |

**Program Measures**

Demand Controlled Circulating Systems
Drain Water Heat Recovery
Faucet Aerator
Heat Pump Water Heater
Solar Thermal Water Heating System Commercial
Thermostatic Shower Restriction Valve Commercial

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 19,566 | 19,566 | 57,789 |
| NPV Cost | 51,001 | 15,775 | 13,510 |
| Score | 0.38 | 1.24 | 4.28 |

* Values are @ Generator

**Goals Scenario:** TRC

**Program:** Business Refrigeration
**Summary Program Description:** Upfront incentives for installation of energy efficient refrigeration equipment

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 83 | 84 | 84 | 86 | 86 | 86 | 87 | 88 | 89 | 90 |
| Summer MW* | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.10 |
| Winter MW* | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.08 |
| Annual GWh* | 0.58 | 0.58 | 0.59 | 0.60 | 0.60 | 0.60 | 0.61 | 0.62 | 0.62 | 0.63 |
| Program Cost Estimate | $ 131,773 | $ 133,391 | $ 134,722 | $ 136,489 | $ 136,630 | $ 131,115 | $ 132,681 | $ 134,338 | $ 135,819 | $ 136,966 |

**Program Measures**

Anti-Sweat Controls
Refrigerated Display Case LED Lighting
VSD Controlled Compressor

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 3,036 | 3,036 | 8,791 |
| NPV Cost | 7,813 | 2,631 | 2,238 |
| Score | 0.39 | 1.15 | 3.93 |

* Values are @ Generator

**Goals Scenario:** TRC

**Program:** Business Motors and Drives
**Summary Program Description:** Upfront incentives for installation of energy efficient motors and drives

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 580 | 536 | 499 | 505 | 523 | 541 | 556 | 563 | 558 | 544 |
| Summer MW* | 0.61 | 0.57 | 0.53 | 0.53 | 0.55 | 0.57 | 0.59 | 0.59 | 0.59 | 0.57 |
| Winter MW* | 0.55 | 0.50 | 0.47 | 0.47 | 0.49 | 0.51 | 0.52 | 0.53 | 0.53 | 0.51 |
| Annual GWh* | 4.79 | 4.42 | 4.11 | 4.16 | 4.32 | 4.48 | 4.62 | 4.67 | 4.63 | 4.50 |
| Program Cost Estimate | $ 929,369 | $ 865,690 | $ 811,712 | $ 817,704 | $ 841,539 | $ 814,523 | $ 833,541 | $ 842,521 | $ 838,574 | $ 821,676 |

**Program Measures**

Escalator Motor Efficiency Controller
High Efficiency Air Compressor
VFD on Process Pump
Synchronous Belt on 75hp ODP Motor
Synchronous Belt on 15hp ODP Motor
Synchronous Belt on 5hp ODP Motor

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 21,641 | 21,641 | 64,583 |
| NPV Cost | 57,270 | 17,249 | 14,304 |
| Score | 0.38 | 1.25 | 4.52 |

* Values are @ Generator

**Goals Scenario:** TRC

**Program:** Business Cooking
**Summary Program Description:** Upfront incentives for installation of energy efficient cooking equipment

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 75 | 104 | 136 | 170 | 201 | 230 | 253 | 270 | 281 | 289 |
| Summer MW* | 0.08 | 0.11 | 0.14 | 0.18 | 0.21 | 0.24 | 0.27 | 0.28 | 0.30 | 0.30 |
| Winter MW* | 0.04 | 0.06 | 0.07 | 0.09 | 0.11 | 0.13 | 0.14 | 0.15 | 0.15 | 0.16 |
| Annual GWh* | 0.43 | 0.59 | 0.77 | 0.96 | 1.14 | 1.31 | 1.44 | 1.53 | 1.60 | 1.64 |
| Program Cost Estimate | $ 40,758 | $ 56,137 | $ 73,377 | $ 91,643 | $ 108,803 | $ 109,136 | $ 120,036 | $ 128,188 | $ 133,751 | $ 137,277 |

**Program Measures**

Energy Star Convection Oven
Energy Star Steamer

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 5,372 | 5,372 | 13,421 |
| NPV Cost | 11,827 | 3,416 | 2,761 |
| Score | 0.45 | 1.57 | 4.86 |

* Values are @ Generator

**Goals Scenario:** TRC

**Program:** Commercial/Industrial Demand Reduction
**Summary Program Description:** Bill credits for control of customer loads >200 kW

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 7,500 | 7,425 | 7,351 | 5,000 | 4,950 | 4,901 | 4,851 | 4,803 | 4,755 | 4,707 |
| Summer MW* | 7.92 | 7.84 | 7.76 | 5.28 | 5.23 | 5.17 | 5.12 | 5.07 | 5.02 | 4.97 |
| Winter MW* | 4.82 | 4.78 | 4.73 | 3.22 | 3.18 | 3.15 | 3.12 | 3.09 | 3.06 | 3.03 |
| Annual GWh* | 0.09 | 0.09 | 0.09 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 |
| Program Cost Estimate | $ 37,511,423 | $ 37,733,106 | $ 37,951,050 | $ 37,939,285 | $ 37,934,424 | $ 37,925,002 | $ 37,911,063 | $ 37,892,653 | $ 37,869,816 | $ 37,842,597 |

**Program Measures**
Controllable Load

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 27,621 | 27,621 | 37,483 |
| NPV Cost | 38,101 | 690 | 0 |
| Ratio | 0.72 | 40.06 | INFINITE |

* Values are @ Generator

**Goals Scenario:** TRC

**Program:** Business On Call®
**Summary Program Description:** Monthly bill credits for direct load control of HVAC

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 1,090 | 1,081 | 1,072 | 1,065 | 1,058 | 1,052 | 1,046 | 1,041 | 1,036 | 1,032 |
| Summer MW* | 1.15 | 1.14 | 1.13 | 1.12 | 1.12 | 1.11 | 1.10 | 1.10 | 1.09 | 1.09 |
| Winter MW* | - | - | - | - | - | - | - | - | - | - |
| Annual GWh* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Program Cost Estimate | $ 2,758,904 | $ 2,749,796 | $ 2,738,657 | $ 2,726,489 | $ 2,713,294 | $ 2,700,835 | $ 2,687,582 | $ 2,674,571 | $ 2,661,746 | $ 2,648,824 |

**Program Measures**
HVAC

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 4,495 | 4,495 | 2,943 |
| NPV Cost | 4,292 | 1,351 | 0 |
| Ratio | 1.05 | 3.33 | INFINITE |

* Values are @ Generator

**Goals Scenario:** TRC

**Program:** Business Custom Incentive
**Summary Program Description:** Customized incentives for qualifying energy efficiency projects

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 73 | 82 | 93 | 109 | 128 | 146 | 162 | 176 | 188 | 198 |
| Summer MW* | 0.08 | 0.09 | 0.10 | 0.12 | 0.14 | 0.15 | 0.17 | 0.19 | 0.20 | 0.21 |
| Winter MW* | 0.07 | 0.08 | 0.09 | 0.10 | 0.12 | 0.13 | 0.15 | 0.16 | 0.18 | 0.18 |
| Annual GWh* | 0.55 | 0.61 | 0.68 | 0.80 | 0.94 | 1.07 | 1.18 | 1.29 | 1.38 | 1.45 |
| Program Cost Estimate | $ 123,666 | $ 139,873 | $ 158,845 | $ 188,734 | $ 221,937 | $ 241,096 | $ 267,860 | $ 290,568 | $ 309,174 | $ 324,050 |

**Program Measures**

Ceiling Insulation(R2 to R30)
Reflective Roof Treatment
Efficient Battery Charger
Ozone Laundry Commercial
LEED New Construction Whole Building
Grain Bin Aeration Control System
Energy Efficient Transformers
Low Pressure-Drop Filters
Dairy Refrigeration Heat Recovery
Milk Pre-Cooler
Other

**Cost Effectiveness**

| | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 4,341 | 4,341 | 12,651 |
| NPV Cost | 11,213 | 3,705 | 3,169 |
| Score | 0.39 | 1.17 | 3.99 |

* Values are @ Generator

**Goals Scenario:** Proposed

**Program:** Residential HVAC
**Summary Program Description:** Upfront incentives for installation of energy efficient HVAC systems

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 20,000 | 20,200 | 20,402 | 20,606 | 20,812 | 21,020 | 21,230 | 21,443 | 21,657 | 21,874 |
| Summer MW* | 2.53 | 2.56 | 2.58 | 2.61 | 2.64 | 2.66 | 2.69 | 2.72 | 2.74 | 2.77 |
| Winter MW* | 6.12 | 6.18 | 6.25 | 6.31 | 6.37 | 6.44 | 6.50 | 6.57 | 6.63 | 6.70 |
| Annual GWh* | 14.11 | 14.25 | 14.40 | 14.54 | 14.69 | 14.83 | 14.98 | 15.13 | 15.28 | 15.43 |
| Program Cost Estimate | $ 4,892,820 | $ 4,941,748 | $ 4,991,166 | $ 5,041,078 | $ 5,091,488 | $ 5,142,403 | $ 5,193,827 | $ 5,245,766 | $ 5,298,223 | $ 5,351,205 |

**Program Measures**

ASHP - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 (from elect resistance)
ASHP - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2, 9.0 HSPF
Central AC - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 87,280 | 87,280 | 249,559 |
| NPV Cost | 205,047 | 32,886 | 24,404 |
| Score | 0.43 | 2.65 | 10.23 |

* Values are @ Generator

**Goals Scenario:** Proposed

**Program:** Residential Ceiling Insulation
**Summary Program Description:** Upfront incentives for installation of ceiling insulation in qualifying homes

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 3,000 | 2,700 | 2,430 | 2,187 | 1,968 | 1,771 | 1,594 | 1,435 | 1,291 | 1,162 |
| Summer MW* | 5.12 | 4.61 | 4.15 | 3.74 | 3.36 | 3.03 | 2.72 | 2.45 | 2.21 | 1.99 |
| Winter MW* | 1.89 | 1.70 | 1.53 | 1.38 | 1.24 | 1.12 | 1.01 | 0.90 | 0.81 | 0.73 |
| Annual GWh* | 10.43 | 9.39 | 8.45 | 7.60 | 6.84 | 6.16 | 5.54 | 4.99 | 4.49 | 4.04 |
| Program Cost Estimate | $ 1,045,624 | $ 941,061 | $ 846,955 | $ 762,260 | $ 686,034 | $ 617,430 | $ 555,687 | $ 500,119 | $ 450,107 | $ 405,096 |

**Program Measures**

Ceiling Insulation(R2 to R30)
Ceiling Insulation(R2 to R38)

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 69,736 | 69,736 | 119,449 |
| NPV Cost | 94,006 | 27,039 | 24,601 |
| Score | 0.74 | 2.58 | 4.86 |

* Values are @ Generator

**Goals Scenario:** Proposed

**Program:** Residential Low Income Weatherization
**Summary Program Description:** Direct installation of energy saving measures

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 11,000 | 11,110 | 11,221 | 11,333 | 11,447 | 11,561 | 11,677 | 11,793 | 11,911 | 12,031 |
| Summer MW* | 5.57 | 5.63 | 5.68 | 5.74 | 5.80 | 5.86 | 5.92 | 5.97 | 6.03 | 6.09 |
| Winter MW* | 0.85 | 0.85 | 0.86 | 0.87 | 0.88 | 0.89 | 0.90 | 0.91 | 0.92 | 0.92 |
| Annual GWh* | 10.21 | 10.31 | 10.41 | 10.52 | 10.62 | 10.73 | 10.84 | 10.94 | 11.05 | 11.16 |
| Program Cost Estimate | $ 4,719,000 | $ 4,766,190 | $ 4,813,852 | $ 4,861,990 | $ 4,910,610 | $ 4,959,716 | $ 5,009,314 | $ 5,059,407 | $ 5,110,001 | $ 5,161,101 |

**Program Measures**

Weatherization (Caulking/Stripping)
Duct Testing & Repair
Air Conditioning Unit Maintenance
Air Conditioning Outdoor Coil Cleaning
Faucet Aerators - Kitchen and Bathroom
Low-Flow Showerhead
Water Heater Pipe Wrap
Ceiling Insulation
LED

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 100,966 | 100,966 | 172,224 |
| NPV Cost | 163,620 | 29,729 | 0 |
| Score | 0.62 | 3.40 | INFINITE |

* Values are @ Generator

**Goals Scenario:** Proposed

**Program:** Residential Low Income Renter Pilot
**Summary Program Description:** Landlord incentive for high efficiency HVAC equipment

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 500 | 500 | 500 | - | - | - | - | - | - | - |
| Summer MW* | 0.06 | 0.06 | 0.06 | - | - | - | - | - | - | - |
| Winter MW* | 0.04 | 0.04 | 0.04 | - | - | - | - | - | - | - |
| Annual GWh* | 0.46 | 0.46 | 0.46 | - | - | - | - | - | - | - |
| Program Cost Estimate | $ 500,000 | $ 500,000 | $ 500,000 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |

**<u>Program Measures</u>**
ASHP - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 (from elect resistance)
ASHP - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2, 9.0 HSPF
Central AC - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 880 | 880 | 3,131 |
| NPV Cost | 2,930 | 608 | 256 |
| Score | 0.30 | 1.45 | 12.25 |

* Values are @ Generator

**Goals Scenario:** Proposed

**Program:** Residential New Construction (BuildSmart®)

**Summary Program Description:** Incentives to encourage builders to design and construct energy efficient new homes

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 3,700 | 3,737 | 3,774 | 3,812 | 3,850 | 3,889 | 3,928 | 3,967 | 4,007 | 4,047 |
| Summer MW* | 1.45 | 1.46 | 1.47 | 1.49 | 1.50 | 1.52 | 1.53 | 1.55 | 1.57 | 1.58 |
| Winter MW* | 0.51 | 0.51 | 0.52 | 0.52 | 0.53 | 0.53 | 0.54 | 0.54 | 0.55 | 0.56 |
| Annual GWh* | 4.09 | 4.13 | 4.18 | 4.22 | 4.26 | 4.30 | 4.35 | 4.39 | 4.43 | 4.48 |
| Program Cost Estimate | $ 412,893 | $ 417,022 | $ 421,193 | $ 425,405 | $ 429,659 | $ 433,955 | $ 438,295 | $ 442,678 | $ 447,104 | $ 451,575 |

**<u>Program Measures</u>**

Non-Specified

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 32,226 | 32,226 | 64,133 |
| NPV Cost | 52,338 | 17,317 | 13,740 |
| Score | 0.62 | 1.86 | 4.67 |

* Values are @ Generator

**Goals Scenario:** Proposed

**Program:** Residential Load Management (On Call®)
**Summary Program Description:** Monthly bill credits for direct load control of HVAC, water heating and pool pumps

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 3,492 | 3,580 | 3,665 | 3,747 | 3,825 | 3,899 | 3,967 | 4,031 | 4,088 | 4,141 |
| Summer MW* | 9.84 | 10.09 | 10.33 | 10.56 | 10.78 | 10.99 | 11.18 | 11.36 | 11.52 | 11.67 |
| Winter MW* | 9.18 | 9.41 | 9.63 | 9.85 | 10.06 | 10.25 | 10.43 | 10.60 | 10.75 | 10.89 |
| Annual GWh* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Program Cost Estimate | $ 36,096,985 | $ 35,846,170 | $ 35,592,860 | $ 35,343,767 | $ 35,325,571 | $ 35,148,077 | $ 34,969,005 | $ 34,796,576 | $ 34,629,339 | $ 34,464,362 |

**Program Measures**

HVAC
Water Heater
Pool Pump

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 49,599 | 49,599 | 23,046 |
| NPV Cost | 39,338 | 16,293 | 0 |
| Ratio | 1.26 | 3.04 | INFINITE |

* Values are @ Generator

**Goals Scenario:** Proposed

**Program:** Residential Load Management (On Call®)
**Summary Program Description:** HVAC on bill with direct load control

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 300 | 500 | 750 | 825 | 908 | 998 | 1,098 | 1,208 | 1,329 | 1,462 |
| Summer MW[1] | 0.60 | 1.01 | 1.51 | 1.66 | 1.83 | 2.01 | 2.21 | 2.44 | 2.68 | 2.95 |
| Winter MW[1] | 1.15 | 1.91 | 2.87 | 3.15 | 3.47 | 3.81 | 4.20 | 4.62 | 5.08 | 5.58 |
| Annual GWh[1] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Program Cost Estimate[2] | $ 1,094,767 | $ 1,046,738 | $ 983,119 | $ 882,810 | $ 751,076 | $ 595,062 | $ 425,137 | $ (21,112) | $ (170,438) | $ (294,583) |

1) Values are @ Generator
2) Program costs net of program revenues

**Program Measures**
HVAC

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 9,434 | 9,434 | 3,815 |
| NPV Cost | 6,582 | 3,013 | 3,013 |
| Score | 1.43 | 3.13 | 1.27 |

**Goals Scenario:** Proposed

**Program:** Business Heating, Ventilating, & Air Conditioning (HVAC)
**Summary Program Description:** Upfront incentives for installation of energy efficient HVAC systems

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 3,700 | 3,737 | 3,774 | 3,812 | 3,850 | 3,889 | 3,928 | 3,967 | 4,007 | 4,047 |
| Summer MW* | 3.91 | 3.95 | 3.98 | 4.02 | 4.07 | 4.11 | 4.15 | 4.19 | 4.23 | 4.27 |
| Winter MW* | 1.98 | 2.00 | 2.02 | 2.04 | 2.06 | 2.08 | 2.11 | 2.13 | 2.15 | 2.17 |
| Annual GWh* | 23.24 | 23.48 | 23.71 | 23.95 | 24.19 | 24.43 | 24.67 | 24.92 | 25.17 | 25.42 |
| Program Cost Estimate | $ 2,228,473 | $ 2,250,758 | $ 2,273,266 | $ 2,295,998 | $ 2,318,958 | $ 2,342,148 | $ 2,365,569 | $ 2,389,225 | $ 2,413,117 | $ 2,437,248 |

**Program Measures**

HE Water Cooled Chiller - Centrifugal Compressor - 200 Tons
HE Water Cooled Chiller - Centrifugal Compressor - 500 Tons
HE DX Less than 5.4 Tons Elect Heat
HE DX Less than 5.4 Tons Other Heat
High Efficiency PTAC
High Efficiency PTHP
Water Source Heat Pump
VFD on HVAC Pump

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 125,588 | 125,588 | 337,589 |
| NPV Cost | 287,119 | 89,854 | 84,937 |
| Ratio | 0.44 | 1.40 | 3.97 |

* Values are @ Generator

**Goals Scenario:** Proposed

**Program:** Business Lighting
**Summary Program Description:** Upfront incentives for installation of energy efficient LED lighting

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 3,070 | 3,132 | 3,194 | 3,258 | 3,323 | 3,390 | 3,458 | 3,527 | 3,597 | 3,669 |
| Summer MW* | 3.24 | 3.31 | 3.37 | 3.44 | 3.51 | 3.58 | 3.65 | 3.72 | 3.80 | 3.87 |
| Winter MW* | 2.82 | 2.88 | 2.93 | 2.99 | 3.05 | 3.11 | 3.18 | 3.24 | 3.30 | 3.37 |
| Annual GWh* | 25.00 | 25.50 | 26.01 | 26.53 | 27.06 | 27.60 | 28.15 | 28.72 | 29.29 | 29.88 |
| Program Cost Estimate | $ 312,761 | $ 319,017 | $ 325,397 | $ 331,905 | $ 338,543 | $ 345,314 | $ 352,220 | $ 359,265 | $ 366,450 | $ 373,779 |

**Program Measures**
LED High Bay_HID Baseline
LED High Bay_LF Baseline
LED Linear - Fixture Replacement

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 130,380 | 130,380 | 363,775 |
| NPV Cost | 303,224 | 94,022 | 93,040 |
| Ratio | 0.43 | 1.39 | 3.91 |

* Values are @ Generator

**Goals Scenario:** Proposed

**Program:** Commercial/Industrial Demand Reduction
**Summary Program Description:** Bill credits for control of customer loads >200 kW

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 7,500 | 7,425 | 7,351 | 5,000 | 4,950 | 4,901 | 4,851 | 4,803 | 4,755 | 4,707 |
| Summer MW* | 7.92 | 7.84 | 7.76 | 5.28 | 5.23 | 5.17 | 5.12 | 5.07 | 5.02 | 4.97 |
| Winter MW* | 4.82 | 4.78 | 4.73 | 3.22 | 3.18 | 3.15 | 3.12 | 3.09 | 3.06 | 3.03 |
| Annual GWh* | 0.09 | 0.09 | 0.09 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 |
| Program Cost Estimate | $ 37,511,423 | $ 37,733,106 | $ 37,951,050 | $ 37,939,285 | $ 37,934,424 | $ 37,925,002 | $ 37,911,063 | $ 37,892,653 | $ 37,869,816 | $ 37,842,597 |

**Program Measures**
Controllable Load

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 27,621 | 27,621 | 37,483 |
| NPV Cost | 38,101 | 690 | 0 |
| Ratio | 0.72 | 40.06 | INFINITE |

* Values are @ Generator

**Goals Scenario:** Proposed

**Program:** Business Custom Incentive
**Summary Program Description:** Customized incentives for qualifying energy efficiency projects

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| Summer MW* | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| Winter MW* | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| Annual GWh* | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 |
| Program Cost Estimate | $ 20,000 | $ 20,000 | $ 20,000 | $ 20,000 | $ 20,000 | $ 20,000 | $ 20,000 | $ 20,000 | $ 20,000 | $ 20,000 |

**<u>Program Measures</u>**
Non-Specified

* Values are @ Generator

**Goals Scenario:** Proposed

**Program:** Business On Call®
**Summary Program Description:** Monthly bill credits for direct load control of HVAC

| | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Participants | 1,090 | 1,081 | 1,072 | 1,065 | 1,058 | 1,052 | 1,046 | 1,041 | 1,036 | 1,032 |
| Summer MW* | 1.15 | 1.14 | 1.13 | 1.12 | 1.12 | 1.11 | 1.10 | 1.10 | 1.09 | 1.09 |
| Winter MW* | - | - | - | - | - | - | - | - | - | - |
| Annual GWh* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Program Cost Estimate | $ 2,758,904 | $ 2,749,796 | $ 2,738,657 | $ 2,726,489 | $ 2,713,294 | $ 2,700,835 | $ 2,687,582 | $ 2,674,571 | $ 2,661,746 | $ 2,648,824 |

**Program Measures**

HVAC

**Cost Effectiveness**

| $(000) | RIM | TRC | Participant |
|---|---|---|---|
| NPV Benefits | 3,036 | 3,036 | 8,791 |
| NPV Cost | 7,813 | 2,631 | 2,238 |
| Score | 0.39 | 1.15 | 3.93 |

* Values are @ Generator

| Comparison of Current and Proposed DSM Programs | | | |
|---|---|---|---|
| Current Programs | Proposed Programs | Differences | |
| | | Measures Removed | Measures Added |
| **Residential Sector Programs** | **Residential Sector Programs** | | |
| Residential Home Energy Survey | Residential Home Energy Survey | None | None |
| Residential Load Management (On Call®) | Residential Load Management (On Call®) | None | HVAC On Bill Option |
| Residential Air Conditioning | Residential Air Conditioning | None | None |
| Residential New Construction (BuildSmart®) | Residential New Construction (BuildSmart®) | None | None |
| Residential Ceiling Insulation | Residential Ceiling Insulation | None | None |
| Residential Low Income | Residential Low Income | None | Ceiling Insulation |
| | Residential Low Income Renter (Pilot) | New | New |
| **Business Sector Programs** | **Business Sector Programs** | | |
| Business Energy Survey | Business Energy Survey | None | None |
| Business On Call | Business On Call | None | None |
| Commercial/Industrial Demand Reduction | Commercial/Industrial Demand Reduction | None | None |
| Commercial/Industrial Load Control (CILC) | Commercial/Industrial Load Control (CILC) | None | None |
| Business Heating, Ventilating, & Air Conditioning (HVAC) | Business Heating, Ventilating, & Air Conditioning (HVAC) | **1.** Thermal Energy Storage (TES)<br>**2.** Glycol cooled computer room units (with & w/o economizer)<br>**3.** Demand Control Ventilation (DCV)<br>Energy Recovery Ventilation (ERV) | **1.** VFD on HVAC pump |
| Business Lighting | Business Lighting | **1.** Premium linear fluorescent lamps with high-efficiency ballasts<br>**2.** Compact fluorescent lamp (CFL) fixtures<br>**3.** Pulse-start metal halide (PSMH) | **1.** LED Linear Fixture Replacement |
| Business Custom Incentive (BCI) | Business Custom Incentive (BCI) | None | None |
| **Other Programs** | **Other Programs** | | |
| Conservation Research & Development (CRD) | Conservation Research & Development (CRD) | None | None |

**BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION**

**FLORIDA POWER & LIGHT COMPANY**

**DIRECT TESTIMONY OF ANDREW W. WHITLEY**

**DOCKET NO. 20240012-EG**

**APRIL 2, 2024**

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## I. INTRODUCTION

**Q. Please state your name, business address, employer and position.**

A. My name is Andrew W. Whitley. My business address is 700 Universe Blvd., Juno Beach, Florida 33408. I am employed by Florida Power & Light Company (FPL) as Engineering Manager in the Integrated Resource Planning department of FPL's Finance Business Unit.

**Q. Please describe your duties and responsibilities in that position.**

A. In my current position as Engineering Manager of Integrated Resource Planning, I am responsible for the management and coordination of economic analyses of alternatives to meet FPL's resource needs and maintain system reliability. These analyses are designed to determine the magnitude and timing of resource needs for the FPL system and then develop the integrated resource plan with which those resource needs will be met. The analyses are also designed to identify potential opportunities to improve system economics and/or enhance system reliability for customers.

**Q. Please describe your educational background and professional experience.**

A. I graduated from Lehigh University in 2004 with a Bachelor of Science in Mechanical Engineering. I joined FPL in 2004 as part of FPL's Distribution Business Unit (now part of the Power Delivery business unit) and performed various engineering tasks related to providing new service as well as maintaining the reliability of existing services to FPL's customers. In 2007, I joined the team now known as the Integrated Resource Planning (IRP) group. Since that time, I have been involved in and supported a variety of resource planning projects for FPL, including FPL's Ten Year Site Plans (TYSP), Solar Base Rate Adjustments (SoBRA), need determination proceedings for new power plants under the Florida Power Plant Siting Act, (including the Okeechobee Clean Energy Center in 2015 and the Dania Beach Clean Energy Center in 2018), Base Rate proceedings, and the Demand-Side Management (DSM) goals proceedings. I became the Manager of the IRP group in 2022 and have served as the project leader for FPL's TYSPs since 2022.

**Q. Have you previously testified on resource planning issues before the Florida Public Service Commission (FPSC or the Commission)?**

A. Yes. I testified in FPL's 2019 DSM goals proceeding (Docket No. 20190015-EG). My testimony in that docket focused on FPL's resource planning process and how it related to the development of demand-side management portfolios. I also provided testimony on resource planning topics in FPL's 2024 Fuel and Purchased Power Cost-Recovery Clause Docket (Docket No. 20230001-EI). In addition, I appeared before the Commission at its 2022 and 2023 workshops on the Florida utilities' TYSPs.

**Q. Are you sponsoring any exhibits in this case?**

A. Yes. I am sponsoring Exhibits AWW-1 through AWW-17, which are attached to my testimony:

- Exhibit AWW-1 – Economic Elements Accounted for in DSM Preliminary Screening Tests: Benefits & Costs
- Exhibit AWW-2 – Summary Results of Preliminary Economic Screening of Individual DSM Measures

- Exhibit AWW-3 – Summary Results of Preliminary Economic Screening of Individual DSM Measures: Sensitivity Cases
- Exhibit AWW-4 – Forecasted Fuel and Environmental Compliance Costs
- Exhibit AWW-5 – Projection of FPL's Resource Needs for 2024 - 2035 with No Incremental DSM Signups After 2024
- Exhibit AWW-6 – Comparison of DSM Reasonably Achievable Summer MW Values with FPL's Projected Summer Resource Needs
- Exhibit AWW-7 – Overview of Supply Only and With DSM Resource Plans
- Exhibit AWW-8 – Levelized System Average Electric Rate Calculation for the Supply Only Resource Plan
- Exhibit AWW-9 – Levelized System Average Electric Rate Calculation for the RIM Resource Plan
- Exhibit AWW-10 – Levelized System Average Electric Rate Calculation for the FPL Proposed Resource Plan
- Exhibit AWW-11 – Levelized System Average Electric Rate Calculation for the TRC Resource Plan
- Exhibit AWW-12 – Comparison of the Resource Plans: Economic Analyses Results
- Exhibit AWW-13 – Additional Cost Needed to be Added to the RIM Plan to Increase its Levelized System Average Electric Rate to That of the TRC Plan

- Exhibit AWW-14 – Additional Cost Needed to be Added to the FPL Proposed Plan to Increase its Levelized System Average Electric Rate to That of the TRC Plan
- Exhibit AWW-15 – Comparison of the Resource Plans: Projection of System Average Electric Rates and Customer Bills (Assuming 1,000 kWh Usage)
- Exhibit AWW-16 – Comparison of the Resource Plans: Projection of System Emissions
- Exhibit AWW-17 – Comparison of the Resource Plans: Projection of System Oil and Natural Gas Usage

**Q. Please summarize your testimony.**

A. Using FPL's resource planning process and the latest forecasts, assumptions, and cost estimates, FPL's proposed DSM goals are 408 megawatts (MW) Summer demand, 316 MW Winter demand, and 885 gigawatt-hours (GWh) energy reduction for the period 2025 through 2034. In my testimony, I explain:

- FPL's resource planning process, how it applies to DSM options, and how it treats DSM and supply options equally;
- A review of the relevant assumptions used in FPL's resource planning process;
- The various tests used in the preliminary cost-effectiveness screening and the results of this screening of DSM measures;

- How the projected portfolios of DSM compare to FPL's resource needs in the 2025-2034 timeframe;
- The Supply Only Resource Plan, With DSM Resource Plans, and how all of these plans compare on both economic and non-economic bases; and
- How the final resource plan based on FPL's proposed DSM goals will continue to provide reliable electric service for FPL's customers at low electric rates.

## II. FPL'S RESOURCE PLANNING PROCESS

**Q. Are FPL's proposed DSM goals based on FPL's most recent resource planning process?**

A. Yes. Beginning in 2023, and continuing into the first quarter of 2024, FPL undertook a months-long process to determine its resource plan for use in the 2024 DSM goals filing, as well as all other 2024 analyses, including the 2024 TYSP. The assumptions used in FPL's planning process were developed in late 2023 and early 2024 and accurately represent a current projection of FPL's system for the ten-year planning period of 2025 through 2034.

**Q. Why did FPL develop its proposed DSM goals based upon its most recent planning process?**

A. There are two important reasons FPL used its most recent planning process to develop its DSM goals. First, it is required by the Commission's DSM Goals Rule 25-17.0021(3), Florida Administrative Code. Second, it is important for a utility to use its own resource planning process while setting DSM goals, or performing the analysis of any resource option, because each utility's system has its own specific characteristics that can alter the timing and magnitude of its resource needs and influence the cost-effectiveness of resource options.

**Q. What are the objectives of FPL's integrated resource planning process?**

A. There are three main goals of FPL's resource planning process:

1. Identify the timing of FPL's resource needs. The timing of future resource needs is largely determined by reliability standards (such as reserve margins and loss-of-load probability requirements).
2. Identify the magnitude of these resource needs, *i.e.*, how many MW of capacity are needed to satisfy reliability criteria.
3. Identify the type of resources, either supply-side or demand-side, that can meet these capacity needs. On an economic basis, this selection is determined by the option that is projected to result in the lowest electric rates for FPL's customers.

**Q. Please provide an overview of FPL's IRP process.**

A. An overview of FPL's IRP process is presented annually in FPL's TYSP. FPL's IRP process can be summarized by the following four tasks:

- Task 1: Determine the magnitude and timing of FPL's new resource needs.
- Task 2: Identify the resource options and resource plans that are available to meet the determined magnitude and timing of FPL's resource needs (*i.e.*, identify the available competing options and resource plans).
- Task 3: Evaluate the competing resource options and resource plans based on system economics and non-economic factors.
- Task 4: Select a resource plan, as needed, to meet nearer-term options.

**Q. How does FPL apply its IRP process to the specific analyses that are needed to develop DSM goals?**

A. To develop proposed DSM goals for the Commission's review, FPL freezes DSM additions in its assumptions before the start of the next DSM goals period. FPL assumes no incremental DSM and, "starting from scratch," projects how much DSM should be implemented for the next ten years. FPL approaches that task by applying its IRP process through a well-established six-step analysis. This same basic process has been used by FPL in prior DSM goals dockets.

**Q. When evaluating the economics of supply-side or demand-side resource options to meet its reliability criteria, does FPL select these resources on the basis of lowest cumulative present value of revenue requirements (CPVRR)?**

A. No. When evaluating the economics among supply-side and demand-side resource alternatives, FPL bases its evaluation on the system average electric rates. If, for example, two resource plans satisfy all of FPL's reliability requirements, the more economic plan for all of FPL's customers is the plan that results in the lowest Levelized System Average Electric Rate. This calculation is performed by dividing a utility's annual revenue requirements for that year by the utility's Net Electric Load (NEL) for that year. This same calculation is performed for each year of the analysis, then the results for all years are summed on a present value basis. This cumulative present value is then converted into a Levelized System Average Electric Rate for the period of the analysis.

Note that if one were comparing two resource plans that have the same level of DSM, the two plans will have the same NEL. Therefore, the plan with the lower CPVRR in that scenario also would have the lower Levelized System Average Electric Rate. However, when comparing plans with different DSM portfolios, those plans will have different NELs and cannot be evaluated on CPVRR alone. Therefore, in order to compare plans with different DSM portfolios on an economic basis, it is appropriate to analyze each plan based on the Levelized System Average Electric Rate.

**Q. Please summarize the six-step resource planning process for developing DSM goals.**

A. The process can be summarized as follows:

Step 1: The Technical Potential for DSM is determined in which practical considerations of cost, market forces, the utility's resource needs, and other factors are all ignored. The end result of this step is a list of individual DSM measures that are theoretically available in a utility's service territory. Witness Herndon with Resource Innovations describes in his direct testimony the development of the projected Technical Potential values for FPL that were used in the rest of FPL's analyses.

Step 2: Assuming no incremental DSM signups occur after December 31, 2024, FPL's projected resource needs for 2025 through 2034 were determined. Two determinations of resource needs are made: one if the resource needs are theoretically met solely by Supply options; and one if the resource needs are theoretically met solely by DSM options. These two projections are different because of FPL's 20% total reserve margin criterion. For example, if the resource need to be met solely by DSM options for a given year is 100 MW, the resource need to be met solely by Supply options for the same year is 100 MW x (1 + 0.2) = 120 MW.

The results of these determinations are used in two ways. First, using the projected resource needs, if the needs are met solely by Supply options, a generation addition is selected for use in the preliminary economic screening of DSM measures, which occurs in Step 3. Second, these determinations are used later in Step 5 to create a "Supply Only" Resource Plan and "With DSM" Resource Plans, which are then used for the detailed system economic and non-economic analyses that occur in Step 6.

Step 3: In this step, each individual DSM measure identified in the Step 1 Technical Potential work is analyzed using a series of preliminary economic screening evaluations against a single Supply option that DSM could potentially avoid or defer. The screening evaluations divide into two separate paths depending on the primary cost-effectiveness test used in the analysis. Consistent with the Commission's DSM Goals Rule 25-17.0021, one path utilizes both the Rate Impact Measure (RIM) test and the Participant test, while the other path utilizes the Total Resource Cost (TRC) test and the Participant test. At the end of the screening for both of these paths, two more steps are conducted on both of the screening paths. First, the remaining measures are screened for free riders based on a "years-to-payback" test. Second, the maximum incentive the utility can offer and preserve cost-effectiveness for each remaining DSM measure is calculated.

Step 4: The remaining DSM measures that pass the respective economic screening tests in Step 3, together with their accompanying maximum incentive levels, are then analyzed to develop potential DSM programs and portfolios over the 2025 through 2034 DSM goals period. Again, this step is divided into two separate paths of analysis depending on the cost-effectiveness screening tests that are being applied. The resulting projection for each DSM program represents the projected maximum annual signups for each year of the ten-year DSM goals period. Cumulatively, the sum of these projected maximum annual signups for each DSM program identifies how many MW of DSM resources are projected to be available each year to potentially meet FPL's projected annual resource needs. FPL witness Floyd addresses the process of evaluating the DSM program portfolios from the remaining DSM measures, using program-specific administrative costs, incentives, and adoption projections to determine the reasonably achievable DSM program potential over the period 2025-2034 in his direct testimony.

Step 5: In this step, the projections of resource needs developed previously in Step 2 are used again in several ways. First, FPL uses the projection of resource needs, if the needs are met solely by Supply options, to develop a resource plan in which only Supply options are added. This resource plan is referred to as the "Supply Only"

Resource Plan. Next, FPL compares the projected maximum annual DSM MW signups identified in Step 4 to the projected annual resource needs if those needs are met solely by DSM options. From this comparison, the "With DSM" Resource Plans are developed. These resource plans may consist solely of DSM measures, or a combination of DSM and Supply options, for the ten-year period. At the conclusion of Step 5, the Supply Only and the With DSM Resource Plans have been developed for more detailed system analyses in Step 6.

Step 6: The resource plans from Step 5 are analyzed from both economic and non-economic perspectives. The recommended resource plan based on these perspectives is identified, and the amount of incremental DSM included in that plan is selected as FPL's proposed DSM goals for the 2025 - 2034 time period.

**Q. Does FPL's six-step analytical resource planning process outlined above result in Supply and DSM resource options being evaluated on a level playing field?**

A. Yes. FPL's analyses evaluate both Supply and DSM resource options in terms of each resource option's ability to meet FPL's resource needs. In addition, these analyses allow the resources to be fully evaluated from both economic and non-economic perspectives, using an identical set of evaluation metrics. For the economic analyses, all projected cost impacts on the electric rate levels of FPL's customers are accounted for in these analyses.

**Q. Which of the six steps outlined above will you be addressing in your testimony?**

A. My testimony addresses Steps 2, 3, 5, and 6 of this process, along with other topics. Witness Herndon addresses Step 1, and witness Floyd addresses Step 4 and portions of Step 5 along with other topics.

## III. STEP 2 OF FPL'S PLANNING PROCESS: METHODS AND ASSUMPTIONS USED TO PROJECT FPL'S RESOURCE NEEDS

**Q. How does FPL determine its projected future resource needs?**

A. FPL uses three reliability criteria in projecting its future resource needs. One criterion is a minimum total reserve margin of 20% for both Summer and Winter peak hours. The 20% total reserve margin criterion was approved by the FPSC in Order No. PSC-99-2507-S-EU issued in Docket No. 981890-EU.

The second reliability criterion used by FPL is a Loss-of-Load-Probability (LOLP) criterion. LOLP is a projection of how well an electric utility system may be able to meet its firm demand (*i.e.*, a measure of how often firm load may exceed available resources). In contrast to a reserve margin approach that looks at the one Summer peak hour and the one Winter peak hour, the LOLP approach looks at the peak hourly demand for each day of the year. The LOLP approach takes into consideration the probability of individual generators being out-of-service due to scheduled maintenance or forced outages. LOLP is typically expressed in terms of "numbers of times per year" that the system firm demand could not be served. FPL's LOLP criterion is a maximum of 0.1 days per year. This LOLP criterion is commonly used throughout the electric utility industry.

The third reliability criterion used by FPL is a minimum generation-only reserve margin (GRM) of 10%. The issue of having a sufficient generation component of the projected total reserve margin has been discussed annually in FPL's TYSP beginning in 2011, and the GRM was adopted by FPL as a reliability criterion beginning in 2014. The GRM must be applied only after evaluating the amount of DSM in a resource plan to determine whether the resource plan is too dependent upon DSM.

**Q. What forecasts and assumptions did FPL use in its 2024 planning process?**

A. Every year, FPL updates its forecasts as part of its IRP process and in support of filing its yearly TYSP, including considerations of supply-side efficiencies. In its 2024 resource planning work, including the DSM portfolio analyses for this docket, FPL is using the following forecasts:

1. A forecast of fuel prices (natural gas, coal, and oil), dated September 1, 2023;
2. A forecast of projected hourly load, dated November 1, 2023; and

3. A forecast of carbon dioxide ($CO_2$) compliance costs, dated September 28, 2022.[1]

As discussed in FPL's 2024 TYSP, FPL made a number of actions regarding its resource mix that affected its projected resource needs in the 2024 planning process. These actions include:

- The retirement of Plant Daniel Units 1 & 2 in 2024;
- The transition of Gulf Clean Energy Center Units 4 and 5 to "extreme weather reserve" status by the end of 2024 and 2026, respectively;
- The retirement of FPL's ownership portion of Scherer Unit 3 by the end of 2028;
- The cumulative addition of approximately 21,000 MW (nameplate) of solar by the end of 2033, which is the last year addressed in the 2024 TYSP; and
- The cumulative addition of approximately 4,000 MW (nameplate) of battery storage by the end of 2033.

**Q. Does the load forecast used in the analysis account for the projected energy-efficiency impacts of Florida Building Code and federal equipment manufacturing standards (collectively, Codes and Standards)?**

A. Yes. FPL's current projection of the impact of Codes and Standards on the 2034 Net Energy for Load (NEL) is 11,438,429 megawatt-hours (MWh). This means that very significant amounts of energy efficiency will still be delivered to FPL's customers by Codes and Standards alone. To provide

[1] Use of this forecast in one of the sensitivity analyses is explained later in my testimony.

context, FPL's 2024 NEL forecast for the year 2034 is 155,677,526 MWh, which means that the energy reduction delivered through Codes and Standards represents more than 7% of the total of FPL's projected NEL.

**Q. From a resource planning perspective, does the energy-efficiency impact of Codes and Standards differ at all from energy efficiency resulting from utility DSM programs?**

A. No. Both types of energy efficiency act to reduce FPL's peak demand and energy on the customer side of the meter. One kW of peak demand reduction will avoid or defer new generation whether it comes from Codes and Standards or from a utility-sponsored DSM program. Likewise, the associated fuel and emission impacts from one kWh of energy reduction will be realized regardless of the impetus for that energy reduction.

**Q. Once all of these forecasts and assumptions were developed, how did FPL develop the resource plans you discuss in this docket?**

A. FPL developed these resource plans using the AURORA planning model. The AURORA model utilizes dynamic programming to conduct an extensive evaluation of all possible resource plans that can meet a utility's reliability requirements. FPL and the Commission have relied upon this model in numerous prior proceedings, and it was used to develop FPL's 2024 TYSP. AURORA incorporated a number of FPL forecasts and assumptions into its analysis including the following:

- The 20% total Reserve Margin reliability criterion described earlier;

- Forecasts for peak load, energy, fuel prices, and environmental compliance costs;
- The existing capabilities of the units on FPL's systems, and any planned changes to those units; and
- Projections of fixed and variable costs, and the operating characteristics, of a variety of generation options to meet FPL's resource needs in the future.

After incorporating all of these parameters, AURORA evaluated hundreds of possible resource plans that met FPL's future resource needs using only generation or supply options. At the end of this evaluation, the resource plan with the lowest projected electric rate and best reliability for FPL's customers was identified as FPL's Supply Only Plan.

**Q. What Supply option was selected for use in the preliminary cost-effectiveness screening?**

A. A 1,991 MW (Summer) combined-cycle (CC) unit with a projected in-service year of 2033 was selected as the unit to be considered potentially avoidable for the preliminary screening work. As much of the screening work was conducted in 2023 (before the 2024 TYSP was finalized), the screening analysis was based on the 2033 CC unit that was in FPL's resource plan from the 2023 TYSP.

**Q. Why did FPL select the 2033 CC unit as its avoided unit?**

A. This unit was selected based on several factors. First, as part of the 2023 TYSP, it was one of the most economic generation additions available.

Second, it was located far enough in the future to allow DSM additions a meaningful chance to potentially avoid or defer it. Finally, selection of a fossil unit conforms to the legislative policy in Section 366.82(2), Florida Statutes, to design DSM goals that increase the conservation of expensive resources, such as petroleum fuels, as well as the legislative policy in Section 366.92, Florida Statutes, to promote the development of renewable energy and lessen Florida's dependence on natural gas and fuel oil for the production of electricity.[2]

## IV. STEP 3 OF FPL'S PLANNING PROCESS: OVERVIEW OF PRELIMINARY ECONOMIC SCREENING TESTS FOR DSM

**Q. Which preliminary screening tests for DSM were used in this step of FPL's DSM goals development analyses?**

A. FPL used four DSM screening tests in these analyses. Three of these screening tests address cost-effectiveness: the Participant screening test, the RIM preliminary screening test, and the TRC preliminary screening test. The fourth screening test addresses an evaluation of free ridership, the years-to-payback screening test using a two-year criterion. All four tests are designed

[2] *See also In re: Commission review of numeric conservation goals (Florida Power & Light Company)*, Docket Nos. 130199-EI *et al.*, Order No. PSC-14-0696-FOF-EU, p. 14 (FPSC Dec. 16, 2014) ("Demand-side management is an alternate resource to generation driven by economic and reliability considerations for Florida's electric utilities. The economics of demand-side management are similar to generation, with a focus on fixed capacity and avoidable fossil fuel cost. The reliability considerations of demand-side management are significantly different, however, as measures tend to be implemented in small increments over time, rely upon voluntary participation of customers, and are typically not dispatchable by the utility.")

to provide preliminary economic screening information regarding the individual DSM measures being evaluated. The intent of the Participant test is to determine if it makes economic sense for an individual customer to participate in a specific DSM measure. The intent of the RIM test is to measure the effect of a DSM measure on FPL's electric rates, which impact both participants and non-participants. The intent of the TRC test is to measure the cost of a DSM measure to both the utility and its customers, without consideration of the impact to rates. The intent of the years-to-payback test is to address the "free rider" issue so the utility and all of its customers are not making incentive payments and incurring administrative costs for DSM measures that customers likely would install even without an incentive payment.

**Q. Is FPL accounting for any projected environmental compliance costs in the screening tests in the current analyses?**

A. Yes, but only for two types of emissions. FPL is accounting for projected compliance costs for sulfur dioxide ($SO_2$) and nitrogen oxides ($NO_x$) in both the RIM and TRC preliminary screening tests. However, consistent with the direction provided in the Order Establishing Procedure for this docket (Order No. PSC-2024-0022-PCO-EG), FPL is not accounting for projected $CO_2$ compliance costs in these screening tests. Rather, because FPL considers $CO_2$ compliance costs in all of its other resource planning analyses, FPL analyzed the impact of projected $CO_2$ compliance costs in a sensitivity screening analysis. In order to indicate whether $CO_2$ costs are included in the screening analyses, I will use the terminology of "w/ $CO_2$" and "w/o $CO_2$" for the different analyses.

**Q. Have the four preliminary screening tests been used by FPL in prior DSM goals filings?**

A. Yes, all four tests have been used in prior filings. However, the goals proposed in FPL's prior DSM goals dockets have been based on the RIM and Participant tests and a years-to-payback screen of two years.

**Q. Please discuss the primary differences between the Participant, RIM, and TRC preliminary screening tests.**

A. A summary of the costs and benefits considered by each test during the cost-effectiveness screening is provided in Exhibit AWW-1. As shown in Exhibit AWW-1, the primary differences between these three tests result from the perspective that each test attempts to capture. FPL witness Floyd provides a more detailed description of the different cost-effectiveness tests and what each one does and does not account for.

**Q. What is the objective of the preliminary economic screening of individual DSM measures with the Commission's DSM cost-effectiveness tests that is carried out in Step 3 of FPL's resource planning process?**

A. The objective of the economic screening of DSM measures with the Commission's cost-effectiveness tests (Participant, TRC, and RIM tests) is to identify all of the measures that are potentially cost-effective (in that their benefits are higher than their associated costs). These measures that are potentially cost-effective can be combined first into DSM programs and then into one or more DSM portfolios that meet some or all FPL's projected resource needs. The resource plans can then be compared on an economic basis to the Supply Only Plan established earlier.

**Q. Please provide an overview of how the preliminary economic screening of individual DSM measures was conducted.**

A. The economic screening process begins when the Technical Potential study is complete. That study describes all the prospective individual DSM measures and their associated characteristics, such as life of measure, kW reduction, and kWh savings. These measures are then screened to develop two DSM portfolios: (1) a RIM portfolio that is comprised of all measures that pass the RIM and Participant cost-effectiveness tests and the years-to-payback screen; and (2) a TRC portfolio that passes the TRC test, the Participant test and the years-to-payback screen. Based on the results of these screens, the passing measures have their maximum incentives determined.

**Q. Why does the screening process differ depending on the tests used for cost-effectiveness?**

A. The paths of the cost-effectiveness screening diverge depending on if the RIM or the TRC test is used as the primary determinant of cost-effectiveness. In both cases, there are four overall steps in the screening process. The details of these steps and how they differ from test to test are provided below:

Step 1: For the RIM path, the benefits of the measure are compared to the unrecovered revenue requirements. For the TRC path, the benefits of the measure are compared to the participants' incremental cost.

Step 2: For both the RIM and TRC paths, the benefits of the measure are compared to the administrative costs being added to the costs already accounted for in Step 1.

Step 3: For the RIM path only, the incentive payments needed for the measure to pass the Participant test are now accounted for.

Step 4: For both the RIM and TRC paths, any measures that do not pass the years-to-payback test for free riders are screened out.

**Q. How does a years-to-payback screening test account for free riders?**

A. A years-to-payback screening with a two-year criterion assumes that a customer would adopt an energy-efficiency measure with no additional incentive if the economic payback for that measure was less than two years. This screening test recognizes that "rational" customers will act in their own economic interest and engage in energy efficiency measures that reduce their energy consumption, if it is economic to do so even without incentives. This ensures that incentives (and their associated impact to the electric rates of both participants and non-participants) will not be provided unnecessarily. FPL witness Floyd provides further details on the use of the two-year payback screening to account for free ridership.

**Q. What were the results of the preliminary economic screening?**

A. The results of the economic screening are provided in Exhibit AWW-2. In summary, of the 20,068 measure permutations that came out of the Technical Potential study, 20 passed the RIM and Participant tests and the two years-to-payback screen path, and 3,433 measures passed the TRC test, the Participant test, and the two years-to-payback screening path. The difference in the number of measures that pass under the RIM path versus the TRC path is a result of the different costs that are included in each cost-effectiveness screening test as explained above and in the testimony of FPL witness Floyd.

**Q. Did FPL perform any additional sensitivity case screening analyses of the DSM measures?**

A. Yes. Sensitivities were developed for High and Low forecasts of fuel prices, longer and shorter years-to-payback criteria, and inclusion of compliance costs for $CO_2$. The results of these sensitivities can be seen in Exhibit AWW-3 (and the results with $CO_2$ are also presented in Exhibit AWW-2).

**Q. How were the various fuel cost sensitivity forecasts and years-to-payback sensitivity periods developed?**

A. FPL followed its usual practice in the development of the High and Low fuel cost forecasts. A Medium fuel cost forecast was first developed. Then FPL adjusted the Medium fuel cost forecast upwards (for the High fuel cost forecast sensitivity) and downwards (for the Low fuel cost forecast sensitivity), by multiplying the annual cost values from the Medium fuel cost forecast by a factor of (1 plus the historical volatility in the 12-month forward price, one year ahead) for the High fuel cost forecast sensitivity, and by a factor of (1 minus the historical volatility of the 12-month forward price, one year ahead) for the Low fuel cost forecast sensitivity.

For the development of years-to-payback criterion sensitivity values, FPL added or subtracted one year to or from its base case two years-to-payback criterion, resulting in three years-to-payback, and one year-to-payback, sensitivity case criteria. FPL believes that this variation is sufficient to illustrate the sensitivity of the screening process to differences in the years-to-payback criterion.

**Q. What fuel cost forecast is FPL basing its proposed DSM goals on and why?**

A. FPL is basing its proposed 2025-2034 DSM goals on its Medium fuel forecast that is presented in Exhibit AWW-4. The Medium fuel forecast represents a middle ground of fuel scenarios and is consistent with the methodology used in all of FPL's recent filings before the Commission.

**Q. Please discuss the $CO_2$ compliance cost forecast values in Column (8) of Exhibit AWW-4.**

A. Since 2007, FPL has evaluated potential $CO_2$ regulation and/or legislation and has used projected compliance costs for $CO_2$ emissions from the consultant ICF in its resource planning work. The values for $CO_2$ compliance costs in Exhibit AWW-4 represent the latest forecast FPL received from ICF in October of 2022.

**Q. Does FPL use a $CO_2$ compliance cost forecast in all of its other resource planning analyses?**

A. Yes, FPL has consistently used a forecast of $CO_2$ compliance in all of its resource plan analyses for more than fifteen years.

**Q. Earlier you stated that, at the conclusion of the cost-effectiveness screening, maximum incentives were calculated for each passing measure. How were these maximum incentives calculated?**

A. For the RIM path of cost-effectiveness testing, the maximum incentives for measures that pass all four steps were calculated based on two parameters:

1. How much incentive can be offered and still allow the measure to pass the RIM and Participant tests?
2. How much incentive can be offered and still allow the measure to pass the years-to-payback test?

The smaller of these two incentives is the maximum incentive that could be offered for measures that pass the RIM path of cost-effectiveness testing. For example, assume that a measure passes all four screening steps in the RIM path. The one-time payment that can be offered for this measure that still allows a RIM test result greater than 1.005 is $1,000. The one-time payment that can be offered for this measure while still allowing it to pass the years-to-payback test is $500. Based on these two values, the maximum incentive that could be offered is $500 – offering a larger incentive would cause the measure to fail the years-to-payback test.

For the TRC path of cost-effectiveness testing, only the years-to-payback criterion was used to determine the maximum incentive, as the TRC test does not include the consideration of incentive payments as a cost. For example, a particular measure could pass the TRC test and have a one-time payment of

$500 that still passes the two-year payback screen. Lowering this one-time payment below $500 would have no effect on the outcome of the TRC test.

**Q. How were these maximum incentives used in the overall DSM analysis?**

A. The two sets (RIM path and TRC path) of passing measures and their associated maximum incentives developed in Step 3 are used in Step 4 to develop the programs for each of the goals scenarios required by the rule. This process is described in detail by FPL witness Floyd. The goals and programs developed in Step 4 for FPL's recommended portfolio and for each of the cost-effectiveness scenarios are used in Step 5 to develop the associated resource plans, which I describe next, to accurately compare all of the impacts of the DSM goals in Step 6.

## V. STEP 5 OF FPL'S PLANNING PROCESS: DEVELOPMENT OF THE RESOURCE PLANS

**Q. What are FPL's resource needs during the 2025-2034 DSM goals timeframe?**

A. Exhibit AWW-5 details FPL's resource needs for this timeframe and two additional years using the resource planning process I previously described.

**Q. What were the reasonably achievable DSM program values and how does this DSM program potential match up with FPL's projected resource needs?**

A. The results of the evaluation of reasonably achievable DSM, which are discussed in detail in FPL witness Floyd's direct testimony, were used as inputs for the resource planning process. Exhibit AWW-6 presents the projected total annual Summer MW for DSM programs identified in each of FPL's goals scenarios in Columns 1 through 3. These annual DSM Summer MW values are also compared to the annual resource need projections in Exhibit AWW-5 and presented in Column 4 of Exhibit AWW-6.

**Q. Please describe the "Supply Only" Resource Plan and the "With DSM" Resource Plans that were developed for further analyses.**

A. A summary of these four plans is presented in Exhibit AWW-7. For the "Supply Only" plan, DSM additions were assumed to be "frozen" after 2024. All of the resource needs identified in Exhibit AWW-6 were met with future supply-side resource options, including battery storage units.

A total of three "With DSM" resource plans were developed for further analysis. The first "With DSM" plan is the RIM Resource Plan. This plan is based on the measures that passed both the RIM and Participant tests, as well as passing the two-year payback screening for free riders. The second "With DSM" plan is the TRC Resource Plan. This plan is based on measures that passed the TRC test and Participant test for cost-effectiveness and the two-year payback screening for free riders. The final "With DSM" plan is the FPL Proposed Resource Plan. This plan was developed based on FPL's recommended DSM portfolio that largely continues the currently offered DSM programs with notable enhancements as further described by FPL witness Floyd. The DSM additions in the FPL Proposed Resource Plan are essentially an approach that results in DSM goals that have demand and energy impacts in between those under the RIM Resource Plan and the TRC Resource Plan. The economic and non-economic impacts of each of these plans are analyzed in Step 6, which I describe next.

## VI. STEP 6 OF FPL'S PLANNING PROCESS: ANALYSES OF THE RESOURCE PLANS

**Q. Please describe how the economic analysis of the Supply Only and "With DSM" Resource Plans is conducted.**

A. The economic analysis of the resource plans compares the Levelized System Average Electric Rate for each plan. Exhibits AWW-8 through AWW-11 present the calculations of the Levelized System Average Electric Rate and the fixed and variable costs that comprise the projected annual revenue requirements from which the rate is derived for each resource plan evaluated. The calculation consists of three basic steps. First, the projected annual revenue requirements and annual GWh served are used to calculate a projected system average electric rate for each year as shown in Column 9 of

Exhibits AWW-8 through AWW-11. Second, each of these projected annual electric rates is converted to a present value, and these present values are summed in Column 10. Third, an annual electric rate value is developed in Column 11 that, when held constant in each year, with these values converted to a present value and summed, has an identical net present value sum in Column 12 to that of the present value sum in Column 10. This constant electric rate value is the Levelized System Average Electric Rate for this resource plan.

**Q. What were the results of the economic analysis of the resource plans?**

A. The results of the economic analysis of the resource plans are presented in Exhibit AWW-12, which provides the projected Levelized System Average Electric Rate for each resource plan. As shown on Exhibit AWW-12, the RIM Resource Plan provides the lowest Levelized System Average Electric Rate for FPL's customers, while the TRC Resource Plan provides the highest Levelized System Average Electric Rate for FPL's customers. The Levelized System Average Electric Rate for the FPL Proposed Resource Plan is between those of the RIM and TRC Resource Plans.

**Q. Are the differences in the Levelized System Average Electric Rates between the three resource plans presented in Exhibit AWW-12 meaningful?**

A. Yes. This is demonstrated in Exhibit AWW-13. This exhibit compares the levelized rates for the RIM Resource Plan, the TRC Resource Plan, and the FPL Proposed Resource Plan. As shown in the exhibit, the seemingly modest differential in levelized rates between the RIM-based and TRC-based plans equates to a very large one-time cost of approximately $2.3 billion in year 2034 being added to the RIM-based DSM plan. Exhibit AWW-14 shows a similar comparison between the FPL Proposed Plan and the TRC Plan.

**Q. Were electric rates and customer bills projected and compared for the ten-year goal-setting period for each resource plan?**

A. Yes. Exhibit AWW-15 provides a comparison of electric rates and customer bills for the "Supply Only Resource Plan and the three "With DSM" Resource Plans. In comparing the three "With DSM" Resource Plans during 2025-2034, the RIM Resource Plan is projected to result in the lowest electric rates and average customer bills in each year. The TRC Resource Plan is projected to result in the highest electric rates and the highest average customer bills in each year. The FPL Proposed Resource Plan falls in between the RIM and TRC Resource Plans.

**Q. How would you summarize the economic analyses results?**

A. Two results from the economic analyses are noteworthy. First, the RIM Resource Plan helps meet FPL's resource needs through 2034 while providing the lowest Levelized System Average Electric Rates over the analysis period and the lowest electric rates of the "With DSM" Resource Plans for each year in the 2025-2034 time period. The FPL Proposed Resource plan also meets all of FPL's resource needs through 2034, and while the FPL Proposed Resource Plan raises customer electric rates relative to the RIM Resource Plan, it results in minimal incremental rate impact beyond what customers are incurring under FPL's current approved DSM goals. The TRC Resource Plan meets FPL's resource needs through 2034 and increases customer electric rates relative to both the RIM Resource Plan and FPL Proposed Resource Plan.

**Q. What different perspectives of the FPL system were considered in the non-economic analyses?**

A. The non-economic analyses focused on two perspectives that address the years 2025-2034. The first perspective is a direct comparison of projected annual $SO_2$, $NO_x$, and $CO_2$ emissions for the FPL system for each of the resource plans. The second perspective is a direct comparison of projected annual FPL system oil and natural gas usage for the resource plans.

**Q. Would you please present the results of the non-economic analyses?**

A. Yes. The results of the non-economic analyses are presented in Exhibits AWW-16 and AWW-17. There is very little difference among the four resource plans for these non-economic factors.

**Q. Does FPL's 10% GRM requirement impact FPL's proposed DSM goals?**

A. No. The GRM criterion does not impact FPL's proposed DSM goals.

**Q. What are the proposed DSM goals under the FPL Proposed Resource Plan?**

A. The proposed DSM goals based on the FPL Proposed Resource Plan are 408 MW Summer demand, 316 MW Winter demand, and 885 GWh energy reduction for the period 2025 through 2034, which are further explained by FPL witness Floyd.

**Q. From a resource planning perspective, are the DSM goals based on the FPL Proposed Resource Plan reasonable?**

A. Yes. The resource plan associated with FPL's proposed DSM goals fulfills the primary drivers of FPL's resource planning process:

- The timing and magnitude of resource needs: via a combination of DSM and supply resources, the FPL Proposed Resource Plan ensures that all of FPL's resources needs are met throughout the time period of the analysis and all of FPL's reliability criteria are satisfied.
- The FPL Proposed Resource Plan is consistent with the Commission's DSM Goals Rule 25-17.0021, which was recently amended to require utilities to submit DSM goals based on programs developed under both the RIM and TRC cost-effectiveness tests.
- The rate impact to FPL's customers: the FPL Proposed Resource Plan has minimal incremental rate impact to customers beyond what they are currently paying under the existing DSM goals, which have been in place for the last ten years.

FPL witness Floyd further explains why FPL believes the proposed DSM goals are reasonable and appropriate.

**Q. Does this conclude your direct testimony?**

A. Yes.

# Economic Elements Accounted for in DSM Preliminary Screening Tests: Benefits & Costs

| Economic Elements | Participant-Incurred Economic Impacts | Included in the Participant Screening Test? | Utility-Incurred Economic Impacts | Included in the RIM Screening Test? | Included in the TRC Screening Test? |
|---|---|---|---|---|---|
| **Benefits** | | | | | |
| Generation Capital and O&M | | | X | Yes | Yes |
| Transmission Capital and O&M | | | X | Yes | Yes |
| Distribution Capital and O&M | | | X | Yes | Yes |
| Net System Fuel Impacts | | | X | Yes | Yes |
| Bill Savings by Participants | X | Yes | | | |
| Incentives Received by Participants | X | Yes | | | |
| Tax Credits Received by Participants | X | Yes | | | |
| **Costs** | | | | | |
| Utility Equipment & Administration | | | X | Yes | Yes |
| Incentives Paid to Participants | | | X | Yes | **No** |
| Unrecovered Revenue Requirements | | | X | Yes | **No** |
| Equipment Capital and O&M | X | Yes | | | Yes |

Notes: - "X" indicates that this economic element is a potential benefit or cost that may result from a DSM measure.
- "Yes" indicates that this economic element is accounted for in the DSM preliminary screening test.

## Summary Results of Preliminary Economic Screening of Individual DSM Measures
**(w/o and w/ $CO_2$ Costs)**

**Number of DSM Measures* Evaluated in Preliminary Economic Screening = 20,068**

| Screening Step | w/o $CO_2$ Costs: RIM Test Preliminary Economic Screening | w/o $CO_2$ Costs: TRC Test Preliminary Economic Screening | w/ $CO_2$ Costs: RIM Test Preliminary Economic Screening | w/ $CO_2$ Costs: TRC Test Preliminary Economic Screening | Notes |
|---|---|---|---|---|---|
| Step (1) Total Number of DSM Measures at Starting Point = | 20,068 | 20,068 | 20,068 | 20,068 | |
| a) Number of DSM Measures Removed After Accounting for Unrecovered Revenue Requirements = | 19,969 | N.A. | 19,953 | N.A. | (1) |
| b) Number of DSM Measures Removed After Accounting for Participant Costs = | N.A. | 12,134 | N.A. | 11,662 | (2) |
| c) Number of DSM Measures Remaining After Screening Step 1 = | 99 | 7,934 | 115 | 8,406 | |
| Step (2) Number of DSM Measures Removed After Also Accounting for Administrative Costs = | 35 | 968 | 29 | 754 | |
| Number of DSM Measures Remaining After Screening Step 2 = | 64 | 6,966 | 86 | 7,652 | |
| Step (3) Number of DSM Measures Removed After Also Accounting Incentive Payments Needed to Bring the Participant Test Ratio Up to 1.00 for Certain Measures = | 24 | N.A. | 46 | N.A. | (3) |
| Number of DSM Measures Remaining After Screening Step 3 = | 40 | 6,966 | 40 | 7,652 | |
| Step (4) Number of DSM Measures Removed If Participant Payback is Less Than 2 Years Without Incentive Payments = | 20 | 4,151 | 20 | 4,219 | |
| Number of DSM Measures Remaining After Screening Step 4 = | 20 | 2,815 | 20 | 3,433 | |
| **Final Number of DSM Measures Remaining After the Preliminary Economic Screening =** | **20** | **2,815** | **20** | **3,433** | |

**Notes:**

*** "DSM Measures" refers to the unique permutations of each measure - for example, different building types for a business lighting measure**

(1) Unrecovered revenue requirements affect all customers in regard to electric rates. The RIM test accounts for this cost impact on all customers. However, the TRC Test does not account for this cost impact to all customers.

(2) Participant costs are not costs that all customers of an electric utility pay for through electric rates. Therefore, these costs are not accounted for in the RIM test that accounts for all costs incurred by all utility customers through electric rates. However, despite the fact that these costs are already accounted for in the Participant Test, the TRC test includes these costs.

(3) Incentive payments by a utility to participating customers are costs that all customers of an electric utility pay for through electric rates. Therefore, incentive payments are accounted for in the RIM Test. However, the TRC Test does not account for these costs.

# Summary Results of Preliminary Economic Screening of Individual DSM Measures: Sensitivity Cases

| Base or Sensitivity Case | Fuel Cost Forecast | w/ or w/o $CO_2$ Compliance Costs | Years -to- Payback Test Criterion (Years) | Number of DSM Measures** | |
|---|---|---|---|---|---|
| | | | | Surviving RIM Path Screening | Surviving TRC Path Screening |
| Base Case w/o $CO_2$ * | Medium | w/o | 2 | 20 | 2,815 |
| Base Case w/ $CO_2$ * | Medium | w/ | 2 | 20 | 3,433 |
| Sensitivity Case 1 | High | w/o | 2 | 20 | 3,433 |
| Sensitivity Case 2 | Low | w/o | 2 | 20 | 2,197 |
| Sensitivity Case 3 | Medium | w/o | 1 | 34 | 4,010 |
| Sensitivity Case 4 | Medium | w/o | 3 | 20 | 1,684 |

* These results were previously presented in Exhibit AWW-2.

** "DSM Measures" refers to the unique permutations of each measure - for example, different building types for a business lighting measure.

Docket No. 20240012-EG
Summary Results of Preliminary Economic Screening
of Individual DSM Measures: Sensitivity Cases
Exhibit AWW-3, Page 1 of 1

## Forecasted Fuel and Environmental Compliance Costs

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | Fuel Costs * | | | | | Environmental Compliance Costs | | |
| Year | Natural Gas Medium (Nominal $ per mmBtu) | Light Oil Medium (Nominal $ per mmBtu) | Coal Medium (Nominal $ per mmBtu) | Natural Gas High (Nominal $ per mmBtu) | Natural Gas Low (Nominal $ per mmBtu) | $SO_2$ (Nominal $ per ton) | $NO_X$ (Nominal $ per ton) | $CO_2$ ** (Nominal $ per ton) |
| 2024 | $3.81 | $21.26 | $3.41 | $4.42 | $3.20 | $0 | $125 | $0 |
| 2025 | $4.30 | $19.88 | $3.49 | $4.99 | $3.62 | $0 | $125 | $0 |
| 2026 | $5.06 | $19.48 | $3.76 | $5.87 | $4.25 | $0 | $125 | $0 |
| 2027 | $4.97 | $19.27 | $3.92 | $5.77 | $4.18 | $0 | $125 | $0 |
| 2028 | $5.37 | $18.92 | $3.93 | $6.23 | $4.51 | $0 | $125 | $0 |
| 2029 | $5.54 | $19.09 | $3.99 | $6.43 | $4.66 | $0 | $125 | $0 |
| 2030 | $5.33 | $19.33 | $4.05 | $6.18 | $4.47 | $0 | $125 | $0 |
| 2031 | $5.32 | $19.58 | $4.11 | $6.18 | $4.47 | $0 | $125 | $0 |
| 2032 | $5.38 | $19.88 | $4.17 | $6.24 | $4.52 | $0 | $125 | $0 |
| 2033 | $5.59 | $20.09 | $4.23 | $6.48 | $4.69 | $0 | $125 | $0 |
| 2034 | $5.81 | $20.26 | $4.28 | $6.74 | $4.88 | $0 | $125 | $0 |
| 2035 | $6.10 | $20.54 | $4.33 | $7.08 | $5.12 | $0 | $125 | $0 |
| 2036 | $6.29 | $20.81 | $4.38 | $7.29 | $5.28 | $0 | $125 | $3 |
| 2037 | $6.54 | $21.22 | $4.45 | $7.59 | $5.50 | $0 | $125 | $7 |
| 2038 | $6.82 | $21.71 | $4.51 | $7.91 | $5.73 | $0 | $125 | $10 |
| 2039 | $7.03 | $22.25 | $4.58 | $8.16 | $5.91 | $0 | $125 | $14 |
| 2040 | $7.53 | $22.80 | $4.67 | $8.73 | $6.33 | $0 | $125 | $18 |
| 2041 | $7.91 | $23.36 | $4.74 | $9.17 | $6.64 | $0 | $125 | $21 |
| 2042 | $8.11 | $23.92 | $4.82 | $9.40 | $6.81 | $0 | $125 | $24 |
| 2043 | $8.40 | $24.50 | $4.90 | $9.75 | $7.06 | $0 | $125 | $27 |
| 2044 | $9.01 | $24.80 | $4.98 | $10.45 | $7.57 | $0 | $125 | $31 |
| 2045 | $9.52 | $25.08 | $5.08 | $11.04 | $8.00 | $0 | $125 | $36 |
| 2046 | $9.77 | $25.41 | $5.17 | $11.33 | $8.21 | $0 | $125 | $40 |
| 2047 | $10.22 | $25.73 | $5.26 | $11.86 | $8.59 | $0 | $125 | $45 |
| 2048 | $10.76 | $26.06 | $5.36 | $12.48 | $9.04 | $0 | $125 | $50 |
| 2049 | $11.37 | $26.40 | $5.46 | $13.18 | $9.55 | $0 | $125 | $56 |
| 2050 | $12.30 | $26.75 | $5.57 | $14.26 | $10.33 | $0 | $125 | $62 |
| 2051 | $12.24 | $26.83 | $5.68 | $14.20 | $10.28 | $0 | $125 | $63 |
| 2052 | $12.19 | $26.91 | $5.79 | $14.14 | $10.24 | $0 | $125 | $65 |
| 2053 | $12.14 | $26.99 | $5.90 | $14.08 | $10.20 | $0 | $125 | $66 |
| 2054 | $12.09 | $27.07 | $6.00 | $14.02 | $10.15 | $0 | $125 | $67 |
| 2055 | $12.04 | $27.15 | $4.68 | $13.96 | $10.11 | $0 | $125 | $69 |
| 2056 | $11.99 | $27.23 | $6.22 | $13.90 | $10.07 | $0 | $125 | $70 |
| 2057 | $11.94 | $27.31 | $6.33 | $13.85 | $10.03 | $0 | $125 | $72 |
| 2058 | $11.89 | $27.39 | $6.43 | $13.79 | $9.98 | $0 | $125 | $73 |
| 2059 | $11.84 | $27.47 | $6.54 | $13.73 | $9.94 | $0 | $125 | $75 |
| 2060 | $11.79 | $27.55 | $6.65 | $13.67 | $9.90 | $0 | $125 | $76 |
| 2061 | $11.74 | $27.63 | $6.76 | $13.61 | $9.86 | $0 | $125 | $78 |
| 2062 | $11.69 | $27.72 | $6.87 | $13.56 | $9.82 | $0 | $125 | $80 |
| 2063 | $11.64 | $27.80 | $6.97 | $13.50 | $9.77 | $0 | $125 | $81 |
| 2064 | $11.59 | $27.88 | $7.08 | $13.44 | $9.73 | $0 | $125 | $83 |
| 2065 | $11.54 | $27.96 | $7.19 | $13.38 | $9.69 | $0 | $125 | $85 |
| 2066 | $11.49 | $28.05 | $7.30 | $13.33 | $9.65 | $0 | $125 | $87 |
| 2067 | $11.44 | $28.13 | $7.41 | $13.27 | $9.61 | $0 | $125 | $88 |
| 2068 | $11.39 | $28.21 | $7.51 | $13.22 | $9.57 | $0 | $125 | $90 |
| 2069 | $11.34 | $28.30 | $7.62 | $13.16 | $9.53 | $0 | $125 | $92 |
| 2070 | $11.30 | $28.38 | $7.73 | $13.10 | $9.49 | $0 | $125 | $94 |

* The forecasted fuel cost values shown above are a subset of the numerous forecasted fuel cost values for delivery to different plants, from different pipelines, etc. The natural gas price represents the weighted average FGT Firm price forecast, the oil price represents the Light Oil price forecast, and the coal price represents the Scherer 3 price forecast.
** The $CO_2$ compliance costs shown above were used with the "w/$CO_2$ cost" sensitivity screening analysis.

**Projection of FPL's Resource Needs for 2024 - 2035 with No Incremental DSM Signups After 2024**
**(MW at Generator)**

**Summer**

| | (1) | (2) | (3) = (1)+(2) | (4) | (5) | (6) = (4)-(5) | (7) = (3)-(6) | (8) = (7)/(6) | (9) = ((3)-(4))/(4) | (10) = ((6)*1.20)-(3) | (11) = (10)/1.20 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| August of the Year | Projections of FPL Unit Capability * (MW) | Projections of Firm Purchases (MW) | Projection of Total Capacity (MW) | Peak Load Forecast * * (MW) | Summer DSM Forecast * * * (MW) | Forecast of Firm Peak (MW) | Forecast of Summer Reserves (MW) | Forecast of Summer Reserve Margins w/o Additions (%) | Forecast of Summer Generation Only Reserve Margins w/o Additions (%) | MW Needed to Meet 20% Reserve Margin if Provided by Supply Options Only (MW) | MW Needed to Meet 20% Reserve Margin if Supplied by DSM Options Only (MW) |
| 2024 | 31,575 | 240 | 31,814 | 27,785 | 1,846 | 25,939 | 5,876 | 22.7% | 14.5% | (688) | (573) |
| 2025 | 32,059 | 239 | 32,299 | 28,039 | 1,865 | 26,174 | 6,125 | 23.4% | 15.2% | (890) | (742) |
| 2026 | 32,841 | 239 | 33,080 | 28,273 | 1,853 | 26,420 | 6,660 | 25.2% | 17.0% | (1,376) | (1,147) |
| 2027 | 33,158 | 239 | 33,397 | 28,477 | 1,833 | 26,644 | 6,753 | 25.3% | 17.3% | (1,424) | (1,186) |
| 2028 | 33,466 | 239 | 33,705 | 28,819 | 1,815 | 27,004 | 6,701 | 24.8% | 17.0% | (1,300) | (1,083) |
| 2029 | 33,579 | 239 | 33,817 | 29,160 | 1,799 | 27,361 | 6,456 | 23.6% | 16.0% | (984) | (820) |
| 2030 | 33,893 | 238 | 34,132 | 29,544 | 1,785 | 27,759 | 6,373 | 23.0% | 15.5% | (821) | (684) |
| 2031 | 34,205 | 238 | 34,443 | 29,998 | 1,769 | 28,229 | 6,214 | 22.0% | 14.8% | (568) | (474) |
| 2032 | 34,481 | 198 | 34,679 | 30,644 | 1,754 | 28,890 | 5,788 | 20.0% | 13.2% | (10) | (9) |
| 2033 | 34,756 | 198 | 34,954 | 31,278 | 1,740 | 29,538 | 5,415 | 18.3% | 11.8% | **492** | **410** |
| 2034 | 34,741 | 127 | 34,869 | 31,917 | 1,726 | 30,191 | 4,678 | 15.5% | 9.2% | **1,360** | **1,133** |
| 2035 | 34,726 | 127 | 34,854 | 32,573 | 1,726 | 30,847 | 4,007 | 13.0% | 7.0% | **2,163** | **1,802** |

**Winter**

| | (1) | (2) | (3) = (1)+(2) | (4) | (5) | (6) = (4)-(5) | (7) = (3)-(6) | (8) = (7)/(6) | (9) = ((3)-(4))/(4) | (10) = ((6)*1.20)-(3) | (11) = (10)/1.20 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| January of the Year | Projections of FPL Unit Capability * (MW) | Projections of Firm Purchases (MW) | Projection of Total Capacity (MW) | Peak Load Forecast * * (MW) | Winter DSM Forecast * * * (MW) | Forecast of Firm Peak (MW) | Forecast of Winter Reserves (MW) | Forecast of Winter Reserve Margins w/o Additions (%) | Forecast of Winter Generation Only Reserve Margins w/o Additions (%) | MW Needed to Meet 20% Reserve Margin if Provided by Supply Options Only (MW) | MW Needed to Meet 20% Reserve Margin if Supplied by DSM Options Only (MW) |
| 2024 | 29,677 | 223 | 29,899 | 22,486 | 1,382 | 21,105 | 8,795 | 41.7% | 33.0% | (4,574) | (3,811) |
| 2025 | 29,737 | 223 | 29,959 | 22,715 | 1,402 | 21,313 | 8,646 | 40.6% | 31.9% | (4,383) | (3,653) |
| 2026 | 30,364 | 223 | 30,587 | 23,049 | 1,397 | 21,651 | 8,935 | 41.3% | 32.7% | (4,605) | (3,838) |
| 2027 | 30,729 | 219 | 30,948 | 23,375 | 1,383 | 21,991 | 8,956 | 40.7% | 32.4% | (4,558) | (3,798) |
| 2028 | 31,061 | 219 | 31,280 | 23,711 | 1,369 | 22,342 | 8,938 | 40.0% | 31.9% | (4,470) | (3,725) |
| 2029 | 31,214 | 219 | 31,433 | 24,037 | 1,359 | 22,678 | 8,755 | 38.6% | 30.8% | (4,219) | (3,516) |
| 2030 | 31,579 | 219 | 31,798 | 24,436 | 1,348 | 23,088 | 8,710 | 37.7% | 30.1% | (4,092) | (3,410) |
| 2031 | 31,947 | 219 | 32,166 | 24,737 | 1,338 | 23,399 | 8,766 | 37.5% | 30.0% | (4,086) | (3,405) |
| 2032 | 32,314 | 219 | 32,533 | 25,211 | 1,327 | 23,884 | 8,649 | 36.2% | 29.0% | (3,873) | (3,227) |
| 2033 | 32,681 | 179 | 32,860 | 25,685 | 1,317 | 24,368 | 8,492 | 34.9% | 27.9% | (3,619) | (3,016) |
| 2034 | 32,679 | 179 | 32,858 | 26,163 | 1,307 | 24,856 | 8,003 | 32.2% | 25.6% | (3,031) | (2,526) |
| 2035 | 32,677 | 109 | 32,786 | 26,658 | 1,307 | 25,351 | 7,436 | 29.3% | 23.0% | **(2,366)** | **(1,971)** |

* FPL generating unit capability values shown above assume the following major changes to the FPL system:
- Addition of a cumulative 21,009 MW (nameplate) of solar by 2033
- Addition of a cumulative 4,022 MW (nameplate) of battery storage by 2033
- Retirement of FPL's ownership portion of the Daniel 1 &2 units in 2024 and the Scherer 3 unit in 2028

** The Peak Load Forecast is FPL's November 2023 load forecast.

* * * DSM values shown represent no incremental DSM signups after December 2024 and attrition of participants in FPL's load control programs

# Comparison of DSM Reasonably Achievable Summer MW Values with FPL's Projected Summer Resource Needs

## (Assuming the Resource Needs are Met Solely by DSM)

**(MW at Generator)**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Year<br>----- | **FPL Proposed Plan**<br>Cumulative DSM Reasonably Achievable MW (Summer MW)<br>----- | **RIM Plan**<br>Cumulative DSM Reasonably Achievable MW (Summer MW)<br>----- | **TRC Plan**<br>Cumulative DSM Reasonably Achievable MW (Summer MW)<br>----- | Projected FPL Resource Needs if Resource Needs are Met Solely by DSM * (Summer MW)<br>----- |
| 2024 | --- | --- | --- | --- |
| 2025 | 41 | 20 | 49 | --- |
| 2026 | 83 | 40 | 99 | --- |
| 2027 | 125 | 60 | 149 | --- |
| 2028 | 165 | 79 | 198 | --- |
| 2029 | 205 | 98 | 248 | --- |
| 2030 | 245 | 117 | 299 | (684) |
| 2031 | 285 | 137 | 351 | (474) |
| 2032 | 326 | 157 | 403 | (9) |
| 2033 | 367 | 177 | 457 | 410 |
| 2034 | 408 | 198 | 511 | 1,133 |

* The projected Summer resource need values in Column (4) are from Exhibit AWW-5, Column 11.

# Overview of Supply Only and With DSM Resource Plans

| Year | Supply Only Resource Plan | | | FPL Proposed DSM Resource Plan | | | RIM Resource Plan | | | TRC Resource Plan | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Generation Additions (MW) | Cumulative DSM Additions (MW) | Total Reserve Margin (%) | Generation Additions (MW) | Cumulative DSM Additions (MW) | Total Reserve Margin (%) | Generation Additions (MW) | Cumulative DSM Additions (MW) | Total Reserve Margin (%) | Generation Additions (MW) | Cumulative DSM Additions (MW) | Total Reserve Margin (%) |
| Year | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2025 | 1,490 MW Solar | 0 | 23.4% | 1,490 MW Solar | 41 | 23.6% | 1,490 MW Solar | 20 | 23.5% | 1,490 MW Solar | 49 | 23.6% |
| 2026 | 2,235 MW Solar<br>522 MW Battery Storage | 0 | 25.2% | 2,235 MW Solar<br>522 MW Battery Storage | 83 | 25.7% | 2,235 MW Solar<br>522 MW Battery Storage | 40 | 25.5% | 2,235 MW Solar<br>522 MW Battery Storage | 99 | 25.7% |
| 2027 | 2,235 MW Solar<br>300 MW Battery Storage | 0 | 25.3% | 2,235 MW Solar<br>300 MW Battery Storage | 125 | 26.1% | 2,235 MW Solar<br>300 MW Battery Storage | 60 | 25.8% | 2,235 MW Solar<br>300 MW Battery Storage | 149 | 26.1% |
| 2028 | 2,235 MW Solar<br>300 MW Battery Storage | 0 | 24.8% | 2,235 MW Solar<br>300 MW Battery Storage | 165 | 25.8% | 2,235 MW Solar<br>300 MW Battery Storage | 79 | 25.4% | 2,235 MW Solar<br>300 MW Battery Storage | 198 | 25.9% |
| 2029 | 2,235 MW Solar<br>300 MW Battery Storage | 0 | 23.6% | 2,235 MW Solar<br>300 MW Battery Storage | 205 | 24.8% | 2,235 MW Solar<br>300 MW Battery Storage | 98 | 24.3% | 2,235 MW Solar<br>300 MW Battery Storage | 248 | 25.0% |
| 2030 | 2,235 MW Solar<br>300 MW Battery Storage | 0 | 23.0% | 2,235 MW Solar<br>300 MW Battery Storage | 245 | 24.4% | 2,235 MW Solar<br>300 MW Battery Storage | 117 | 23.8% | 2,235 MW Solar<br>300 MW Battery Storage | 299 | 24.6% |
| 2031 | 2,235 MW Solar<br>300 MW Battery Storage | 0 | 22.0% | 2,235 MW Solar<br>300 MW Battery Storage | 285 | 23.7% | 2,235 MW Solar<br>300 MW Battery Storage | 137 | 23.0% | 2,235 MW Solar<br>300 MW Battery Storage | 351 | 23.9% |
| 2032 | 2,235 MW Solar<br>300 MW Battery Storage | 0 | 20.0% | 2,235 MW Solar<br>300 MW Battery Storage | 326 | 21.9% | 2,235 MW Solar<br>300 MW Battery Storage | 157 | 21.2% | 2,235 MW Solar<br>300 MW Battery Storage | 403 | 22.1% |
| 2033 | 2,235 MW Solar<br>1,700 MW Battery Storage | 0 | 20.0% | 2,235 MW Solar<br>400 MW Battery Storage | 367 | 20.5% | 2,235 MW Solar<br>500 MW Battery | 177 | 20.0% | 2,235 MW Solar<br>300 MW Battery Storage | 457 | 20.6% |
| 2034 | 3x1 Martin CC, (1,991 MW)<br>700 MW Battery Storage | 0 | 24.4% | 3x1 Martin CC, (1,991 MW)<br>3,000 MW Battery Storage | 408 | 27.5% | 3x1 Martin CC, (1,991 MW)<br>1,000 MW Battery Storage | 198 | 25.0% | 3x1 Martin CC, (1,991 MW)<br>2,300 MW Battery Storage | 511 | 27.3% |
| 2035 | -- | 0 | 21.7% | -- | 408 | 24.7% | -- | 198 | 22.3% | -- | 511 | 24.5% |
| 2036 | 1 x 660 MW Filler | 0 | 21.0% | -- | 408 | 21.7% | 1 x 660 MW Filler | 198 | 21.5% | -- | 511 | 21.5% |

Docket No. 20240012-EG
Levelized System Average Electric Rate
Calculation for the Supply Only Resource Plan
Exhibit AWW-8, Page 1 of 1

**Levelized System Average Electric Rate Calculation for the Supply Only Resource Plan**

| Year | (1)<br><br>Annual Discount Factor 8.14% | (2)<br><br>Resource Plan Variable Costs ($000, Nom) | (3)<br><br>Resource Plan Fixed Costs ($000, Nom) | (4)<br><br>Non-Resource Plan Other System Costs * ($000, Nom) | (5)<br>= (2)+(3)+(4)<br>System Revenue Requirements ($000, Nom) | (6)<br><br>Load Forecast NEL (GWh) | (7)<br><br>DSM Energy Reduction ** (GWh) | (8)<br>= (6) - (7)<br>Load Forecast NEL Adjusted by DSM (GWh) | (9)<br>= ((5)/(8))/10<br>Annual Electric Rate (cents/kWh, Nom) | (10)<br>= (9) *(1)<br>Annual Electric Rate (cents/kWh, NPV) | (11)<br><br>Nominal Levelized System Average Rate (cents/kWh) | (12)<br>= (11) * (1)<br>NPV Levelized System Average Rate (cents/kWh) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2024 | 1.000 | 2,699,850 | 172,690 | 10,999,155 | 13,871,695 | 140,469 | 113 | 140,356 | 9.88323 | 9.88323 | 14.8366 | 14.8366 |
| 2025 | 0.925 | 2,848,020 | 365,030 | 11,341,613 | 14,554,663 | 141,761 | 113 | 141,647 | 10.27528 | 9.50148 | 14.8366 | 13.7193 |
| 2026 | 0.855 | 2,961,460 | 1,002,080 | 12,295,173 | 16,258,713 | 142,991 | 113 | 142,878 | 11.37945 | 9.73010 | 14.8366 | 12.6862 |
| 2027 | 0.791 | 2,540,160 | 1,518,440 | 12,929,870 | 16,988,470 | 144,053 | 113 | 143,940 | 11.80248 | 9.33184 | 14.8366 | 11.7308 |
| 2028 | 0.731 | 2,362,320 | 2,000,230 | 13,205,678 | 17,568,228 | 145,101 | 113 | 144,988 | 12.11703 | 8.85907 | 14.8366 | 10.8474 |
| 2029 | 0.676 | 2,090,560 | 2,470,100 | 13,583,744 | 18,144,404 | 146,551 | 113 | 146,438 | 12.39053 | 8.37684 | 14.8366 | 10.0305 |
| 2030 | 0.625 | 1,575,410 | 2,883,600 | 13,965,737 | 18,424,747 | 148,290 | 113 | 148,177 | 12.43430 | 7.77337 | 14.8366 | 9.2752 |
| 2031 | 0.578 | 1,185,080 | 3,299,350 | 14,380,921 | 18,865,351 | 149,578 | 113 | 149,464 | 12.62196 | 7.29647 | 14.8366 | 8.5767 |
| 2032 | 0.535 | 936,640 | 3,710,650 | 14,833,351 | 19,480,641 | 151,677 | 113 | 151,564 | 12.85306 | 6.87053 | 14.8366 | 7.9308 |
| 2033 | 0.494 | 731,060 | 4,287,900 | 15,335,275 | 20,354,235 | 153,686 | 113 | 153,573 | 13.25379 | 6.55122 | 14.8366 | 7.3336 |
| 2034 | 0.457 | 954,850 | 4,507,900 | 15,885,233 | 21,347,983 | 155,678 | 113 | 155,564 | 13.72293 | 6.27230 | 14.8366 | 6.7813 |
| 2035 | 0.423 | 1,345,050 | 4,357,860 | 16,474,398 | 22,177,308 | 157,715 | 113 | 157,602 | 14.07171 | 5.94737 | 14.8366 | 6.2706 |
| 2036 | 0.391 | 1,793,290 | 4,302,150 | 17,097,488 | 23,192,928 | 159,679 | 113 | 159,565 | 14.53506 | 5.68058 | 14.8366 | 5.7984 |
| 2037 | 0.361 | 2,359,780 | 4,306,120 | 17,738,625 | 24,404,525 | 161,502 | 113 | 161,388 | 15.12162 | 5.46477 | 14.8366 | 5.3618 |
| 2038 | 0.334 | 2,978,310 | 4,577,900 | 18,392,981 | 25,949,191 | 163,154 | 113 | 163,041 | 15.91575 | 5.31862 | 14.8366 | 4.9580 |
| 2039 | 0.309 | 3,583,160 | 4,688,090 | 19,054,555 | 27,325,805 | 164,627 | 113 | 164,514 | 16.61004 | 5.13264 | 14.8366 | 4.5846 |
| 2040 | 0.286 | 4,317,100 | 4,719,150 | 19,731,595 | 28,767,845 | 165,935 | 113 | 165,822 | 17.34867 | 4.95718 | 14.8366 | 4.2394 |
| 2041 | 0.264 | 4,895,780 | 4,597,180 | 20,129,144 | 29,622,104 | 164,919 | 113 | 164,805 | 17.97399 | 4.74909 | 14.8366 | 3.9201 |
| 2042 | 0.244 | 5,548,330 | 4,595,060 | 20,560,205 | 30,703,595 | 166,511 | 113 | 166,398 | 18.45195 | 4.50823 | 14.8366 | 3.6249 |
| 2043 | 0.226 | 6,251,270 | 4,640,360 | 20,998,118 | 31,889,748 | 168,119 | 113 | 168,006 | 18.98132 | 4.28833 | 14.8366 | 3.3519 |
| 2044 | 0.209 | 6,878,170 | 4,526,300 | 21,442,987 | 32,847,457 | 169,744 | 113 | 169,631 | 19.36412 | 4.04537 | 14.8366 | 3.0995 |
| 2045 | 0.193 | 7,509,390 | 4,511,410 | 21,894,920 | 33,915,720 | 171,385 | 113 | 171,272 | 19.80231 | 3.82537 | 14.8366 | 2.8661 |
| 2046 | 0.179 | 7,926,610 | 4,562,800 | 22,354,026 | 34,843,436 | 173,042 | 113 | 172,929 | 20.14896 | 3.59922 | 14.8366 | 2.6503 |
| 2047 | 0.165 | 8,563,890 | 4,400,420 | 22,820,413 | 35,784,723 | 174,717 | 113 | 174,604 | 20.49484 | 3.38531 | 14.8366 | 2.4507 |
| 2048 | 0.153 | 9,276,650 | 4,446,050 | 23,294,195 | 37,016,895 | 176,408 | 113 | 176,295 | 20.99715 | 3.20710 | 14.8366 | 2.2661 |
| 2049 | 0.141 | 10,044,640 | 4,512,200 | 23,775,485 | 38,332,325 | 178,116 | 113 | 178,003 | 21.53461 | 3.04150 | 14.8366 | 2.0955 |
| 2050 | 0.131 | 11,130,570 | 4,551,140 | 24,264,398 | 39,946,108 | 179,842 | 113 | 179,729 | 22.22574 | 2.90272 | 14.8366 | 1.9377 |
| 2051 | 0.121 | 11,389,100 | 4,403,360 | 24,761,053 | 40,553,513 | 181,585 | 113 | 181,472 | 22.34696 | 2.69876 | 14.8366 | 1.7918 |
| 2052 | 0.112 | 11,908,140 | 4,672,400 | 25,265,567 | 41,846,107 | 183,346 | 113 | 183,233 | 22.83765 | 2.55033 | 14.8366 | 1.6568 |
| 2053 | 0.103 | 13,002,440 | 4,898,800 | 25,778,064 | 43,679,304 | 185,125 | 113 | 185,012 | 23.60895 | 2.43792 | 14.8366 | 1.5321 |
| 2054 | 0.095 | 13,533,740 | 4,964,980 | 26,297,115 | 44,795,835 | 186,921 | 113 | 186,808 | 23.97958 | 2.28972 | 14.8366 | 1.4167 |
| 2055 | 0.088 | 13,791,510 | 5,034,670 | 26,824,370 | 45,650,550 | 188,736 | 113 | 188,623 | 24.20199 | 2.13693 | 14.8366 | 1.3100 |
| 2056 | 0.082 | 14,728,870 | 5,314,670 | 27,359,953 | 47,403,493 | 190,569 | 113 | 190,456 | 24.88944 | 2.03213 | 14.8366 | 1.2114 |
| 2057 | 0.075 | 15,135,450 | 5,441,640 | 27,903,994 | 48,481,084 | 192,421 | 113 | 192,308 | 25.21012 | 1.90331 | 14.8366 | 1.1201 |
| 2058 | 0.070 | 15,366,340 | 5,366,860 | 28,456,622 | 49,189,822 | 194,292 | 113 | 194,179 | 25.33227 | 1.76851 | 14.8366 | 1.0358 |
| 2059 | 0.065 | 15,735,930 | 5,366,670 | 29,017,971 | 50,120,571 | 196,181 | 113 | 196,068 | 25.56286 | 1.65021 | 14.8366 | 0.9578 |
| 2060 | 0.060 | 16,046,140 | 5,479,550 | 29,588,175 | 51,113,865 | 198,090 | 113 | 197,977 | 25.81814 | 1.54118 | 14.8366 | 0.8857 |
| 2061 | 0.055 | 16,312,930 | 5,487,090 | 30,167,371 | 51,967,391 | 200,018 | 113 | 199,904 | 25.99612 | 1.43494 | 14.8366 | 0.8190 |
| 2062 | 0.051 | 16,676,750 | 5,464,980 | 30,755,697 | 52,897,427 | 201,965 | 113 | 201,852 | 26.20606 | 1.33760 | 14.8366 | 0.7573 |
| 2063 | 0.047 | 17,470,080 | 5,731,390 | 31,353,296 | 54,554,766 | 203,932 | 113 | 203,819 | 26.76628 | 1.26331 | 14.8366 | 0.7003 |
| 2064 | 0.044 | 17,985,910 | 5,863,770 | 31,353,296 | 55,202,976 | 205,919 | 113 | 205,806 | 26.82281 | 1.17064 | 14.8366 | 0.6475 |
| 2065 | 0.040 | 18,343,360 | 5,572,390 | 31,353,296 | 55,269,046 | 207,926 | 113 | 207,813 | 26.59553 | 1.07331 | 14.8366 | 0.5988 |
| 2066 | 0.037 | 18,731,970 | 5,646,590 | 31,353,296 | 55,731,856 | 209,954 | 113 | 209,841 | 26.55911 | 0.99113 | 14.8366 | 0.5537 |
| 2067 | 0.035 | 19,086,260 | 5,770,750 | 31,353,296 | 56,210,306 | 212,002 | 113 | 211,889 | 26.52819 | 0.91542 | 14.8366 | 0.5120 |
| 2068 | 0.032 | 19,374,440 | 5,918,470 | 31,353,296 | 56,646,206 | 214,071 | 113 | 213,958 | 26.47541 | 0.84480 | 14.8366 | 0.4734 |
| 2069 | 0.030 | 19,795,570 | 6,108,000 | 31,353,296 | 57,256,866 | 216,161 | 113 | 216,048 | 26.50196 | 0.78197 | 14.8366 | 0.4378 |
| 2070 | 0.027 | 20,206,000 | 6,380,150 | 31,353,296 | 57,939,446 | 218,272 | 113 | 218,159 | 26.55840 | 0.72462 | 14.8366 | 0.4048 |
| | | | | | | | | | | 192.04661 | | 192.04661 |

* Includes system costs not affected by the resource plan such as existing generation, T&D, staff, and DSM costs not tied directly to new DSM signups (such as rebates to existing load management participants, etc.).

** DSM energy reductions are incremental from 2024.

**Levelized System Average Electric Rate (cents/kWh) = 14.8366**

# Levelized System Average Electric Rate Calculation for the RIM Resource Plan

| Year | (1)<br><br>Annual Discount Factor 8.14% | (2)<br><br>Resource Plan Variable Costs ($000, Nom) | (3)<br><br>Resource Plan Fixed Costs ($000, Nom) | (4)<br><br>Non-Resource Plan Other System Costs * ($000, Nom) | (5)<br>= (2)+(3)+(4)<br>System Revenue Requirements ($000, Nom) | (6)<br><br>Load Forecast NEL (GWh) | (7)<br><br>DSM Energy Reduction ** (GWh) | (8)<br>= (6) - (7)<br>Load Forecast NEL Adjusted by DSM (GWh) | (9)<br>= ((5)/(8))/10<br>Annual Electric Rate (cents/kWh, Nom) | (10)<br>= (9) *(1)<br>Annual Electric Rate (cents/kWh, NPV) | (11)<br><br>Nominal Levelized System Average Rate (cents/kWh) | (12)<br>= (11) * (1)<br>NPV Levelized System Average Rate (cents/kWh) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2024 | 1.000 | 2,699,246 | 172,693 | 10,999,155 | 13,871,093 | 140,469 | 113 | 140,356 | 9.88280 | 9.88280 | 14.8311 | 14.8311 |
| 2025 | 0.925 | 2,847,613 | 366,493 | 11,341,613 | 14,555,719 | 141,761 | 113 | 141,647 | 10.27603 | 9.50218 | 14.8311 | 13.7142 |
| 2026 | 0.855 | 2,961,980 | 1,004,777 | 12,296,936 | 16,263,693 | 142,991 | 113 | 142,878 | 11.38296 | 9.73310 | 14.8311 | 12.6815 |
| 2027 | 0.791 | 2,534,978 | 1,522,352 | 12,934,262 | 16,991,592 | 144,053 | 114 | 143,939 | 11.80469 | 9.33359 | 14.8311 | 11.7265 |
| 2028 | 0.731 | 2,353,351 | 2,005,256 | 13,212,472 | 17,571,079 | 145,101 | 114 | 144,987 | 12.11904 | 8.86054 | 14.8311 | 10.8434 |
| 2029 | 0.676 | 2,086,767 | 2,476,150 | 13,591,962 | 18,154,878 | 146,551 | 114 | 146,437 | 12.39775 | 8.38171 | 14.8311 | 10.0268 |
| 2030 | 0.625 | 1,569,627 | 2,890,450 | 13,974,533 | 18,434,610 | 148,290 | 114 | 148,176 | 12.44103 | 7.77758 | 14.8311 | 9.2717 |
| 2031 | 0.578 | 1,186,025 | 3,307,007 | 14,390,022 | 18,883,054 | 149,578 | 114 | 149,464 | 12.63389 | 7.30337 | 14.8311 | 8.5735 |
| 2032 | 0.535 | 932,796 | 3,719,112 | 14,842,757 | 19,494,666 | 151,677 | 114 | 151,563 | 12.86240 | 6.87553 | 14.8311 | 7.9279 |
| 2033 | 0.494 | 812,095 | 4,123,196 | 15,344,989 | 20,280,280 | 153,686 | 114 | 153,572 | 13.20574 | 6.52747 | 14.8311 | 7.3309 |
| 2034 | 0.457 | 987,075 | 4,408,393 | 15,895,257 | 21,290,726 | 155,678 | 115 | 155,563 | 13.68624 | 6.25553 | 14.8311 | 6.7788 |
| 2035 | 0.423 | 1,374,102 | 4,265,690 | 16,484,421 | 22,124,213 | 157,715 | 115 | 157,601 | 14.03814 | 5.93318 | 14.8311 | 6.2683 |
| 2036 | 0.391 | 1,844,494 | 4,215,201 | 17,107,511 | 23,167,207 | 159,679 | 115 | 159,564 | 14.51906 | 5.67433 | 14.8311 | 5.7963 |
| 2037 | 0.361 | 2,412,485 | 4,213,275 | 17,748,649 | 24,374,409 | 161,502 | 115 | 161,387 | 15.10308 | 5.45808 | 14.8311 | 5.3598 |
| 2038 | 0.334 | 3,031,481 | 4,502,938 | 18,403,005 | 25,937,424 | 163,154 | 115 | 163,040 | 15.90866 | 5.31626 | 14.8311 | 4.9562 |
| 2039 | 0.309 | 3,635,852 | 4,491,492 | 19,064,579 | 27,191,924 | 164,627 | 115 | 164,512 | 16.52879 | 5.10753 | 14.8311 | 4.5829 |
| 2040 | 0.286 | 4,371,817 | 4,512,871 | 19,741,619 | 28,626,306 | 165,935 | 115 | 165,820 | 17.26346 | 4.93283 | 14.8311 | 4.2378 |
| 2041 | 0.264 | 4,954,973 | 4,539,708 | 20,139,168 | 29,633,849 | 164,919 | 115 | 164,804 | 17.98127 | 4.75101 | 14.8311 | 3.9187 |
| 2042 | 0.244 | 5,607,834 | 4,545,868 | 20,570,229 | 30,723,931 | 166,511 | 115 | 166,396 | 18.46432 | 4.51125 | 14.8311 | 3.6236 |
| 2043 | 0.226 | 6,312,067 | 4,428,547 | 21,008,142 | 31,748,756 | 168,119 | 115 | 168,005 | 18.89755 | 4.26941 | 14.8311 | 3.3507 |
| 2044 | 0.209 | 6,941,810 | 4,482,669 | 21,453,011 | 32,877,491 | 169,744 | 115 | 169,629 | 19.38198 | 4.04910 | 14.8311 | 3.0984 |
| 2045 | 0.193 | 7,581,281 | 4,476,140 | 21,904,944 | 33,962,365 | 171,385 | 115 | 171,270 | 19.82970 | 3.83067 | 14.8311 | 2.8650 |
| 2046 | 0.179 | 7,991,831 | 4,376,717 | 22,364,049 | 34,732,597 | 173,042 | 115 | 172,928 | 20.08502 | 3.58780 | 14.8311 | 2.6493 |
| 2047 | 0.165 | 8,630,540 | 4,376,952 | 22,830,437 | 35,837,929 | 174,717 | 115 | 174,602 | 20.52547 | 3.39037 | 14.8311 | 2.4498 |
| 2048 | 0.153 | 9,344,055 | 4,432,045 | 23,304,219 | 37,080,319 | 176,408 | 115 | 176,294 | 21.03328 | 3.21262 | 14.8311 | 2.2653 |
| 2049 | 0.141 | 10,121,546 | 4,489,324 | 23,785,509 | 38,396,378 | 178,116 | 115 | 178,002 | 21.57076 | 3.04660 | 14.8311 | 2.0947 |
| 2050 | 0.131 | 11,201,318 | 4,375,839 | 24,274,422 | 39,851,579 | 179,842 | 115 | 179,728 | 22.17331 | 2.89587 | 14.8311 | 1.9370 |
| 2051 | 0.121 | 11,471,454 | 4,391,153 | 24,771,076 | 40,633,683 | 181,585 | 115 | 181,471 | 22.39130 | 2.70412 | 14.8311 | 1.7911 |
| 2052 | 0.112 | 11,992,264 | 4,676,253 | 25,275,591 | 41,944,108 | 183,346 | 115 | 183,232 | 22.89130 | 2.55632 | 14.8311 | 1.6562 |
| 2053 | 0.103 | 13,079,727 | 4,933,238 | 25,788,088 | 43,801,052 | 185,125 | 115 | 185,010 | 23.67493 | 2.44473 | 14.8311 | 1.5315 |
| 2054 | 0.095 | 13,601,306 | 4,983,412 | 26,307,139 | 44,891,857 | 186,921 | 115 | 186,807 | 24.03115 | 2.29464 | 14.8311 | 1.4162 |
| 2055 | 0.088 | 13,850,868 | 4,847,019 | 26,834,393 | 45,532,280 | 188,736 | 115 | 188,622 | 24.13946 | 2.13140 | 14.8311 | 1.3095 |
| 2056 | 0.082 | 14,801,911 | 5,372,049 | 27,369,977 | 47,543,937 | 190,569 | 115 | 190,455 | 24.96335 | 2.03816 | 14.8311 | 1.2109 |
| 2057 | 0.075 | 15,203,330 | 5,260,021 | 27,914,017 | 48,377,369 | 192,421 | 115 | 192,307 | 25.15636 | 1.89925 | 14.8311 | 1.1197 |
| 2058 | 0.070 | 15,425,469 | 5,370,422 | 28,466,646 | 49,262,536 | 194,292 | 115 | 194,177 | 25.36989 | 1.77113 | 14.8311 | 1.0354 |
| 2059 | 0.065 | 15,797,078 | 5,438,062 | 29,027,995 | 50,263,134 | 196,181 | 115 | 196,067 | 25.63574 | 1.65492 | 14.8311 | 0.9574 |
| 2060 | 0.060 | 16,102,643 | 5,513,827 | 29,598,199 | 51,214,668 | 198,090 | 115 | 197,975 | 25.86924 | 1.54423 | 14.8311 | 0.8853 |
| 2061 | 0.055 | 16,382,860 | 5,499,767 | 30,177,395 | 52,060,022 | 200,018 | 115 | 199,903 | 26.04263 | 1.43751 | 14.8311 | 0.8187 |
| 2062 | 0.051 | 16,733,724 | 5,271,060 | 30,765,721 | 52,770,505 | 201,965 | 115 | 201,851 | 26.14336 | 1.33440 | 14.8311 | 0.7570 |
| 2063 | 0.047 | 17,540,730 | 5,530,457 | 31,363,319 | 54,434,507 | 203,932 | 115 | 203,818 | 26.70745 | 1.26053 | 14.8311 | 0.7000 |
| 2064 | 0.044 | 18,051,284 | 5,658,466 | 31,363,319 | 55,073,069 | 205,919 | 115 | 205,805 | 26.75986 | 1.16790 | 14.8311 | 0.6473 |
| 2065 | 0.040 | 18,407,589 | 5,636,875 | 31,363,319 | 55,407,783 | 207,926 | 115 | 207,812 | 26.66246 | 1.07602 | 14.8311 | 0.5985 |
| 2066 | 0.037 | 18,777,128 | 5,739,538 | 31,363,319 | 55,879,985 | 209,954 | 115 | 209,840 | 26.62987 | 0.99377 | 14.8311 | 0.5535 |
| 2067 | 0.035 | 19,137,348 | 5,826,643 | 31,363,319 | 56,327,311 | 212,002 | 115 | 211,888 | 26.58358 | 0.91733 | 14.8311 | 0.5118 |
| 2068 | 0.032 | 19,461,212 | 6,006,689 | 31,363,319 | 56,831,221 | 214,071 | 115 | 213,956 | 26.56205 | 0.84757 | 14.8311 | 0.4732 |
| 2069 | 0.030 | 19,839,088 | 5,831,846 | 31,363,319 | 57,034,254 | 216,161 | 115 | 216,046 | 26.39909 | 0.77893 | 14.8311 | 0.4376 |
| 2070 | 0.027 | 20,246,974 | 6,144,812 | 31,363,319 | 57,755,106 | 218,272 | 115 | 218,157 | 26.47406 | 0.72232 | 14.8311 | 0.4047 |
| | | | | | | | | | | 191.97550 | | 191.97550 |

* Includes system costs not affected by the resource plan such as existing generation, T&D, staff, and DSM costs not tied directly to new DSM signups (such as rebates to existing load management participants, etc.).

** DSM energy reductions are incremental from 2024.

**Levelized System Average Electric Rate (cents/kWh) =** **14.8311**

**Levelized System Average Electric Rate Calculation for the FPL Proposed Resource Plan**

| Year | (1) Annual Discount Factor 8.14% | (2) Resource Plan Variable Costs ($000, Nom) | (3) Resource Plan Fixed Costs ($000, Nom) | (4) Non-Resource Plan Other System Costs * ($000, Nom) | (5) = (2)+(3)+(4) System Revenue Requirements ($000, Nom) | (6) Load Forecast NEL (GWh) | (7) DSM Energy Reduction ** (GWh) | (8) = (6) - (7) Load Forecast NEL Adjusted by DSM (GWh) | (9) = ((5)/(8))/10 Annual Electric Rate (cents/kWh, Nom) | (10) = (9) *(1) Annual Electric Rate (cents/kWh, NPV) | (11) Nominal Levelized System Average Rate (cents/kWh) | (12) = (11) * (1) NPV Levelized System Average Rate (cents/kWh) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2024 | 1.000 | 2,698,824 | 172,693 | 10,999,155 | 13,870,672 | 140,469 | 113 | 140,356 | 9.88250 | 9.88250 | 14.8485 | 14.8485 |
| 2025 | 0.925 | 2,844,460 | 378,968 | 11,341,613 | 14,565,041 | 141,761 | 201 | 141,560 | 10.28897 | 9.51415 | 14.8485 | 13.7303 |
| 2026 | 0.855 | 2,955,492 | 1,015,395 | 12,296,936 | 16,267,824 | 142,991 | 289 | 142,702 | 11.39982 | 9.74752 | 14.8485 | 12.6964 |
| 2027 | 0.791 | 2,531,108 | 1,531,236 | 12,934,262 | 16,996,606 | 144,053 | 376 | 143,677 | 11.82976 | 9.35341 | 14.8485 | 11.7402 |
| 2028 | 0.731 | 2,340,043 | 2,012,082 | 13,212,472 | 17,564,597 | 145,101 | 464 | 144,637 | 12.14389 | 8.87871 | 14.8485 | 10.8561 |
| 2029 | 0.676 | 2,068,999 | 2,481,309 | 13,591,962 | 18,142,269 | 146,551 | 552 | 145,999 | 12.42628 | 8.40100 | 14.8485 | 10.0386 |
| 2030 | 0.625 | 1,550,197 | 2,893,964 | 13,974,533 | 18,418,694 | 148,290 | 640 | 147,650 | 12.47455 | 7.79853 | 14.8485 | 9.2826 |
| 2031 | 0.578 | 1,163,233 | 3,308,892 | 14,390,022 | 18,862,146 | 149,578 | 728 | 148,849 | 12.67198 | 7.32539 | 14.8485 | 8.5836 |
| 2032 | 0.535 | 909,703 | 3,719,379 | 14,842,757 | 19,471,839 | 151,677 | 818 | 150,860 | 12.90724 | 6.89950 | 14.8485 | 7.9372 |
| 2033 | 0.494 | 799,057 | 4,098,843 | 15,344,989 | 20,242,889 | 153,686 | 908 | 152,779 | 13.24982 | 6.54926 | 14.8485 | 7.3395 |
| 2034 | 0.457 | 846,719 | 4,696,437 | 15,895,257 | 21,438,413 | 155,678 | 998 | 154,679 | 13.85989 | 6.33490 | 14.8485 | 6.7868 |
| 2035 | 0.423 | 1,235,907 | 4,506,974 | 16,484,421 | 22,227,302 | 157,715 | 998 | 156,717 | 14.18306 | 5.99443 | 14.8485 | 6.2757 |
| 2036 | 0.391 | 1,722,448 | 4,321,798 | 17,107,511 | 23,151,757 | 159,679 | 998 | 158,681 | 14.59017 | 5.70212 | 14.8485 | 5.8031 |
| 2037 | 0.361 | 2,293,857 | 4,186,624 | 17,748,649 | 24,229,130 | 161,502 | 998 | 160,503 | 15.09570 | 5.45541 | 14.8485 | 5.3661 |
| 2038 | 0.334 | 2,904,770 | 4,485,667 | 18,403,005 | 25,793,442 | 163,154 | 998 | 162,156 | 15.90655 | 5.31555 | 14.8485 | 4.9620 |
| 2039 | 0.309 | 3,502,023 | 4,450,104 | 19,064,579 | 27,016,706 | 164,627 | 998 | 163,629 | 16.51096 | 5.10202 | 14.8485 | 4.5883 |
| 2040 | 0.286 | 4,224,490 | 4,461,454 | 19,741,619 | 28,427,563 | 165,935 | 998 | 164,937 | 17.23544 | 4.92482 | 14.8485 | 4.2428 |
| 2041 | 0.264 | 4,799,755 | 4,499,155 | 20,139,168 | 29,438,079 | 164,919 | 998 | 163,920 | 17.95875 | 4.74507 | 14.8485 | 3.9233 |
| 2042 | 0.244 | 5,454,498 | 4,481,986 | 20,570,229 | 30,506,713 | 166,511 | 998 | 165,513 | 18.43164 | 4.50327 | 14.8485 | 3.6278 |
| 2043 | 0.226 | 6,148,262 | 4,504,729 | 21,008,142 | 31,661,132 | 168,119 | 998 | 167,121 | 18.94503 | 4.28013 | 14.8485 | 3.3546 |
| 2044 | 0.209 | 6,772,594 | 4,457,055 | 21,453,011 | 32,682,660 | 169,744 | 998 | 168,746 | 19.36800 | 4.04618 | 14.8485 | 3.1020 |
| 2045 | 0.193 | 7,393,400 | 4,405,548 | 21,904,944 | 33,703,892 | 171,385 | 998 | 170,387 | 19.78082 | 3.82122 | 14.8485 | 2.8684 |
| 2046 | 0.179 | 7,807,402 | 4,450,236 | 22,364,049 | 34,621,688 | 173,042 | 998 | 172,044 | 20.12370 | 3.59471 | 14.8485 | 2.6524 |
| 2047 | 0.165 | 8,445,471 | 4,319,912 | 22,830,437 | 35,595,819 | 174,717 | 998 | 173,719 | 20.49050 | 3.38459 | 14.8485 | 2.4527 |
| 2048 | 0.153 | 9,145,723 | 4,339,017 | 23,304,219 | 36,788,959 | 176,408 | 998 | 175,410 | 20.97312 | 3.20343 | 14.8485 | 2.2680 |
| 2049 | 0.141 | 9,906,850 | 4,391,602 | 23,785,509 | 38,083,960 | 178,116 | 998 | 177,118 | 21.50197 | 3.03689 | 14.8485 | 2.0972 |
| 2050 | 0.131 | 10,978,179 | 4,305,484 | 24,274,422 | 39,558,085 | 179,842 | 998 | 178,844 | 22.11875 | 2.88874 | 14.8485 | 1.9392 |
| 2051 | 0.121 | 11,240,533 | 4,282,113 | 24,771,076 | 40,293,722 | 181,585 | 998 | 180,587 | 22.31260 | 2.69461 | 14.8485 | 1.7932 |
| 2052 | 0.112 | 11,759,395 | 4,560,642 | 25,275,591 | 41,595,629 | 183,346 | 998 | 182,348 | 22.81111 | 2.54736 | 14.8485 | 1.6582 |
| 2053 | 0.103 | 12,860,981 | 4,836,349 | 25,788,088 | 43,485,418 | 185,125 | 998 | 184,127 | 23.61711 | 2.43876 | 14.8485 | 1.5333 |
| 2054 | 0.095 | 13,391,506 | 4,828,110 | 26,307,139 | 44,526,756 | 186,921 | 998 | 185,923 | 23.94898 | 2.28680 | 14.8485 | 1.4178 |
| 2055 | 0.088 | 13,654,207 | 4,864,268 | 26,834,393 | 45,352,869 | 188,736 | 998 | 187,738 | 24.15751 | 2.13300 | 14.8485 | 1.3111 |
| 2056 | 0.082 | 14,595,288 | 5,194,695 | 27,369,977 | 47,159,960 | 190,569 | 998 | 189,571 | 24.87715 | 2.03113 | 14.8485 | 1.2123 |
| 2057 | 0.075 | 14,996,865 | 5,295,014 | 27,914,017 | 48,205,896 | 192,421 | 998 | 191,423 | 25.18290 | 1.90125 | 14.8485 | 1.1210 |
| 2058 | 0.070 | 15,219,363 | 5,214,789 | 28,466,646 | 48,900,799 | 194,292 | 998 | 193,294 | 25.29871 | 1.76616 | 14.8485 | 1.0366 |
| 2059 | 0.065 | 15,594,296 | 5,273,132 | 29,027,995 | 49,895,423 | 196,181 | 998 | 195,183 | 25.56339 | 1.65025 | 14.8485 | 0.9585 |
| 2060 | 0.060 | 15,921,899 | 5,354,935 | 29,598,199 | 50,875,033 | 198,090 | 998 | 197,092 | 25.81288 | 1.54087 | 14.8485 | 0.8864 |
| 2061 | 0.055 | 16,175,609 | 5,374,204 | 30,177,395 | 51,727,208 | 200,018 | 998 | 199,020 | 25.99102 | 1.43466 | 14.8485 | 0.8196 |
| 2062 | 0.051 | 16,519,169 | 5,138,209 | 30,765,721 | 52,423,099 | 201,965 | 998 | 200,967 | 26.08543 | 1.33144 | 14.8485 | 0.7579 |
| 2063 | 0.047 | 17,349,218 | 5,636,001 | 31,363,319 | 54,348,538 | 203,932 | 998 | 202,934 | 26.78137 | 1.26402 | 14.8485 | 0.7008 |
| 2064 | 0.044 | 17,861,299 | 5,551,696 | 31,363,319 | 54,776,315 | 205,919 | 998 | 204,921 | 26.73043 | 1.16661 | 14.8485 | 0.6480 |
| 2065 | 0.040 | 18,219,167 | 5,508,714 | 31,363,319 | 55,091,201 | 207,926 | 998 | 206,928 | 26.62331 | 1.07444 | 14.8485 | 0.5992 |
| 2066 | 0.037 | 18,608,157 | 5,576,712 | 31,363,319 | 55,548,188 | 209,954 | 998 | 208,956 | 26.58368 | 0.99205 | 14.8485 | 0.5541 |
| 2067 | 0.035 | 18,961,075 | 5,693,950 | 31,363,319 | 56,018,344 | 212,002 | 998 | 211,004 | 26.54846 | 0.91612 | 14.8485 | 0.5124 |
| 2068 | 0.032 | 19,254,978 | 5,820,945 | 31,363,319 | 56,439,243 | 214,071 | 998 | 213,073 | 26.48823 | 0.84521 | 14.8485 | 0.4738 |
| 2069 | 0.030 | 19,645,491 | 6,016,986 | 31,363,319 | 57,025,797 | 216,161 | 998 | 215,163 | 26.50356 | 0.78201 | 14.8485 | 0.4381 |
| 2070 | 0.027 | 20,055,695 | 5,979,662 | 31,363,319 | 57,398,677 | 218,272 | 998 | 217,274 | 26.41767 | 0.72078 | 14.8485 | 0.4051 |
| | | | | | | | | | | 192.20101 | | 192.20101 |

* Includes system costs not affected by the resource plan such as existing generation, T&D, staff, and DSM costs not tied directly to new DSM signups (such as rebates to existing load management participants, etc.).

** DSM energy reductions are incremental from 2024.

**Levelized System Average Electric Rate (cents/kWh) = 14.8485**

## Levelized System Average Electric Rate Calculation for the TRC Resource Plan

| Year | (1)<br>Annual Discount Factor 8.14% | (2)<br>Resource Plan Variable Costs ($000, Nom) | (3)<br>Resource Plan Fixed Costs ($000, Nom) | (4)<br>Non-Resource Plan Other System Costs * ($000, Nom) | (5)<br>= (2)+(3)+(4)<br>System Revenue Requirements ($000, Nom) | (6)<br>Load Forecast NEL (GWh) | (7)<br>DSM Energy Reduction ** (GWh) | (8)<br>= (6) - (7)<br>Load Forecast NEL Adjusted by DSM (GWh) | (9)<br>= ((5)/(8))/10<br>Annual Electric Rate (cents/kWh, Nom) | (10)<br>= (9) *(1)<br>Annual Electric Rate (cents/kWh, NPV) | (11)<br>Nominal Levelized System Average Rate (cents/kWh) | (12)<br>= (11) * (1)<br>NPV Levelized System Average Rate (cents/kWh) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2024 | 1.000 | 2,698,623 | 172,693 | 10,999,155 | 13,870,471 | 140,469 | 113 | 140,356 | 9.88236 | 9.88236 | 14.8849 | 14.8849 |
| 2025 | 0.925 | 2,844,400 | 386,766 | 11,341,613 | 14,572,779 | 141,761 | 244 | 141,517 | 10.29755 | 9.52208 | 14.8849 | 13.7640 |
| 2026 | 0.855 | 2,952,245 | 1,022,625 | 12,296,936 | 16,271,806 | 142,991 | 377 | 142,614 | 11.40971 | 9.75597 | 14.8849 | 12.7275 |
| 2027 | 0.791 | 2,521,157 | 1,537,980 | 12,934,262 | 16,993,399 | 144,053 | 515 | 143,538 | 11.83896 | 9.36068 | 14.8849 | 11.7690 |
| 2028 | 0.731 | 2,333,739 | 2,018,815 | 13,212,472 | 17,565,026 | 145,101 | 658 | 144,443 | 12.16053 | 8.89087 | 14.8849 | 10.8827 |
| 2029 | 0.676 | 2,058,457 | 2,487,622 | 13,591,962 | 18,138,040 | 146,551 | 807 | 145,744 | 12.44516 | 8.41377 | 14.8849 | 10.0632 |
| 2030 | 0.625 | 1,538,779 | 2,899,752 | 13,974,533 | 18,413,064 | 148,290 | 962 | 147,328 | 12.49797 | 7.81317 | 14.8849 | 9.3054 |
| 2031 | 0.578 | 1,148,079 | 3,313,983 | 14,390,022 | 18,852,083 | 149,578 | 1,121 | 148,457 | 12.69872 | 7.34084 | 14.8849 | 8.6046 |
| 2032 | 0.535 | 895,360 | 3,723,571 | 14,842,757 | 19,461,688 | 151,677 | 1,285 | 150,393 | 12.94059 | 6.91733 | 14.8849 | 7.9566 |
| 2033 | 0.494 | 792,534 | 4,086,542 | 15,344,989 | 20,224,064 | 153,686 | 1,452 | 152,234 | 13.28486 | 6.56657 | 14.8849 | 7.3575 |
| 2034 | 0.457 | 865,797 | 4,579,193 | 15,895,257 | 21,340,247 | 155,678 | 1,622 | 154,056 | 13.85230 | 6.33143 | 14.8849 | 6.8034 |
| 2035 | 0.423 | 1,249,219 | 4,390,428 | 16,484,421 | 22,124,069 | 157,715 | 1,622 | 156,093 | 14.17361 | 5.99044 | 14.8849 | 6.2911 |
| 2036 | 0.391 | 1,737,042 | 4,215,341 | 17,107,511 | 23,059,895 | 159,679 | 1,622 | 158,057 | 14.58964 | 5.70191 | 14.8849 | 5.8173 |
| 2037 | 0.361 | 2,298,608 | 4,201,430 | 17,748,649 | 24,248,688 | 161,502 | 1,622 | 159,880 | 15.16684 | 5.48112 | 14.8849 | 5.3792 |
| 2038 | 0.334 | 2,912,005 | 4,501,895 | 18,403,005 | 25,816,905 | 163,154 | 1,622 | 161,532 | 15.98251 | 5.34093 | 14.8849 | 4.9741 |
| 2039 | 0.309 | 3,512,284 | 4,475,560 | 19,064,579 | 27,052,423 | 164,627 | 1,622 | 163,005 | 16.59606 | 5.12832 | 14.8849 | 4.5996 |
| 2040 | 0.286 | 4,239,091 | 4,488,825 | 19,741,619 | 28,469,535 | 165,935 | 1,622 | 164,313 | 17.32642 | 4.95082 | 14.8849 | 4.2532 |
| 2041 | 0.264 | 4,813,004 | 4,526,809 | 20,139,168 | 29,478,982 | 164,919 | 1,622 | 163,297 | 18.05241 | 4.76981 | 14.8849 | 3.9329 |
| 2042 | 0.244 | 5,462,500 | 4,532,499 | 20,570,229 | 30,565,229 | 166,511 | 1,622 | 164,889 | 18.53686 | 4.52898 | 14.8849 | 3.6367 |
| 2043 | 0.226 | 6,158,485 | 4,414,237 | 21,008,142 | 31,580,863 | 168,119 | 1,622 | 166,497 | 18.96780 | 4.28528 | 14.8849 | 3.3629 |
| 2044 | 0.209 | 6,779,633 | 4,491,689 | 21,453,011 | 32,724,333 | 169,744 | 1,622 | 168,122 | 19.46465 | 4.06637 | 14.8849 | 3.1096 |
| 2045 | 0.193 | 7,405,588 | 4,464,300 | 21,904,944 | 33,774,833 | 171,385 | 1,622 | 169,763 | 19.89530 | 3.84334 | 14.8849 | 2.8754 |
| 2046 | 0.179 | 7,814,333 | 4,356,646 | 22,364,049 | 34,535,028 | 173,042 | 1,622 | 171,420 | 20.14639 | 3.59876 | 14.8849 | 2.6589 |
| 2047 | 0.165 | 8,444,184 | 4,374,245 | 22,830,437 | 35,648,866 | 174,717 | 1,622 | 173,095 | 20.59499 | 3.40185 | 14.8849 | 2.4587 |
| 2048 | 0.153 | 9,148,518 | 4,406,143 | 23,304,219 | 36,858,880 | 176,408 | 1,622 | 174,786 | 21.08798 | 3.22097 | 14.8849 | 2.2735 |
| 2049 | 0.141 | 9,872,287 | 4,472,492 | 23,785,509 | 38,130,287 | 178,116 | 1,622 | 176,495 | 21.60422 | 3.05133 | 14.8849 | 2.1023 |
| 2050 | 0.131 | 10,940,222 | 4,362,777 | 24,274,422 | 39,577,421 | 179,842 | 1,622 | 178,220 | 22.20702 | 2.90027 | 14.8849 | 1.9440 |
| 2051 | 0.121 | 11,203,080 | 4,357,553 | 24,771,076 | 40,331,710 | 181,585 | 1,622 | 179,963 | 22.41105 | 2.70650 | 14.8849 | 1.7976 |
| 2052 | 0.112 | 11,724,902 | 4,629,925 | 25,275,591 | 41,630,419 | 183,346 | 1,622 | 181,724 | 22.90856 | 2.55824 | 14.8849 | 1.6622 |
| 2053 | 0.103 | 12,812,669 | 4,901,020 | 25,788,088 | 43,501,777 | 185,125 | 1,622 | 183,503 | 23.70631 | 2.44797 | 14.8849 | 1.5370 |
| 2054 | 0.095 | 13,345,004 | 4,912,309 | 26,307,139 | 44,564,452 | 186,921 | 1,622 | 185,300 | 24.04995 | 2.29644 | 14.8849 | 1.4213 |
| 2055 | 0.088 | 13,598,544 | 4,758,942 | 26,834,393 | 45,191,879 | 188,736 | 1,622 | 187,114 | 24.15201 | 2.13251 | 14.8849 | 1.3143 |
| 2056 | 0.082 | 14,542,736 | 5,298,583 | 27,369,977 | 47,211,296 | 190,569 | 1,622 | 188,948 | 24.98645 | 2.04005 | 14.8849 | 1.2153 |
| 2057 | 0.075 | 14,937,463 | 5,181,290 | 27,914,017 | 48,032,770 | 192,421 | 1,622 | 190,799 | 25.17450 | 1.90062 | 14.8849 | 1.1238 |
| 2058 | 0.070 | 15,170,736 | 5,294,757 | 28,466,646 | 48,932,139 | 194,292 | 1,622 | 192,670 | 25.39689 | 1.77302 | 14.8849 | 1.0391 |
| 2059 | 0.065 | 15,538,477 | 5,399,931 | 29,027,995 | 49,966,402 | 196,181 | 1,622 | 194,559 | 25.68184 | 1.65789 | 14.8849 | 0.9609 |
| 2060 | 0.060 | 15,840,759 | 5,456,667 | 29,598,199 | 50,895,626 | 198,090 | 1,622 | 196,468 | 25.90532 | 1.54638 | 14.8849 | 0.8885 |
| 2061 | 0.055 | 16,125,402 | 5,457,524 | 30,177,395 | 51,760,320 | 200,018 | 1,622 | 198,396 | 26.08943 | 1.44009 | 14.8849 | 0.8216 |
| 2062 | 0.051 | 16,479,221 | 5,242,035 | 30,765,721 | 52,486,977 | 201,965 | 1,622 | 200,343 | 26.19854 | 1.33722 | 14.8849 | 0.7597 |
| 2063 | 0.047 | 17,284,456 | 5,487,346 | 31,363,319 | 54,135,122 | 203,932 | 1,622 | 202,310 | 26.75846 | 1.26294 | 14.8849 | 0.7025 |
| 2064 | 0.044 | 17,791,700 | 5,645,792 | 31,363,319 | 54,800,811 | 205,919 | 1,622 | 204,297 | 26.82404 | 1.17070 | 14.8849 | 0.6496 |
| 2065 | 0.040 | 18,147,909 | 5,610,127 | 31,363,319 | 55,121,355 | 207,926 | 1,622 | 206,305 | 26.71843 | 1.07827 | 14.8849 | 0.6007 |
| 2066 | 0.037 | 18,528,442 | 5,693,293 | 31,363,319 | 55,585,054 | 209,954 | 1,622 | 208,332 | 26.68098 | 0.99568 | 14.8849 | 0.5555 |
| 2067 | 0.035 | 18,880,307 | 5,787,747 | 31,363,319 | 56,031,373 | 212,002 | 1,622 | 210,380 | 26.63338 | 0.91905 | 14.8849 | 0.5136 |
| 2068 | 0.032 | 19,188,003 | 5,968,639 | 31,363,319 | 56,519,962 | 214,071 | 1,622 | 212,449 | 26.60400 | 0.84891 | 14.8849 | 0.4750 |
| 2069 | 0.030 | 19,580,059 | 5,777,783 | 31,363,319 | 56,721,161 | 216,161 | 1,622 | 214,539 | 26.43863 | 0.78010 | 14.8849 | 0.4392 |
| 2070 | 0.027 | 19,998,477 | 6,097,445 | 31,363,319 | 57,459,241 | 218,272 | 1,622 | 216,650 | 26.52170 | 0.72362 | 14.8849 | 0.4061 |
| | | | | | | | | | | 192.67180 | | 192.67180 |

* Includes system costs not affected by the resource plan such as existing generation, T&D, staff, and DSM costs not tied directly to new DSM signups (such as rebates to existing load management participants, etc.).

** DSM energy reductions are incremental from 2024.

**Levelized System Average Electric Rate (cents/kWh) = 14.8849**

## Comparison of the Resource Plans:
## Economic Analyses Results

| Resource Plan<br>---------- | Levelized<br>System Average<br>Electric Rate<br>(cents/kWh)<br>---------- |
|---|---|
| RIM Plan | 14.8311 |
| Supply Only Plan | 14.8366 |
| Proposed Plan | 14.8485 |
| TRC Plan | 14.8849 |

**Additional Cost Needed to be Added to the RIM Plan to Increase its Levelized System Average Electric Rate to That of the TRC Plan**

| Year | (1)<br>Annual Discount Factor 8.14% | (2)<br>Resource Plan Variable Costs ($000, Nom) | (3)<br>Resource Plan Fixed Costs ($000, Nom) | (4)<br>Non-Resource Plan Other System Costs * ($000, Nom) | (5)<br>"What If" One-Time Cost ($000, Nom) | (6)<br>= (2)+(3)+(4)+(5)<br>System Revenue Requirements ($000, Nom) | (7)<br>Load Forecast NEL (GWh) | (8)<br>DSM Energy Reduction ** (GWh) | (9)<br>= (7) - (8)<br>Load Forecast NEL Adjusted by DSM (GWh) | (10)<br>= ((6)/(9))/10<br>Annual Electric Rate (cents/kWh, Nom) | (11)<br>= (10) *(1)<br>Annual Electric Rate (cents/kWh, NPV) | (12)<br>Nominal Levelized System Average Rate (cents/kWh) | (13)<br>= (12) * (1)<br>NPV Levelized System Average Rate (cents/kWh) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2024 | 1.000 | 2,699,246 | 172,693 | 10,999,155 | 0 | 13,871,093 | 140,469 | 113 | 140,356 | 9.88280 | 9.88280 | 14.8849 | 14.8849 |
| 2025 | 0.925 | 2,847,613 | 366,493 | 11,341,613 | 0 | 14,555,719 | 141,761 | 113 | 141,647 | 10.27603 | 9.50218 | 14.8849 | 13.7640 |
| 2026 | 0.855 | 2,961,980 | 1,004,777 | 12,296,936 | 0 | 16,263,693 | 142,991 | 113 | 142,878 | 11.38296 | 9.73310 | 14.8849 | 12.7275 |
| 2027 | 0.791 | 2,534,978 | 1,522,352 | 12,934,262 | 0 | 16,991,592 | 144,053 | 114 | 143,939 | 11.80469 | 9.33359 | 14.8849 | 11.7690 |
| 2028 | 0.731 | 2,353,351 | 2,005,256 | 13,212,472 | 0 | 17,571,079 | 145,101 | 114 | 144,987 | 12.11904 | 8.86054 | 14.8849 | 10.8827 |
| 2029 | 0.676 | 2,086,767 | 2,476,150 | 13,591,962 | 0 | 18,154,878 | 146,551 | 114 | 146,437 | 12.39775 | 8.38171 | 14.8849 | 10.0632 |
| 2030 | 0.625 | 1,569,627 | 2,890,450 | 13,974,533 | 0 | 18,434,610 | 148,290 | 114 | 148,176 | 12.44103 | 7.77758 | 14.8849 | 9.3054 |
| 2031 | 0.578 | 1,186,025 | 3,307,007 | 14,390,022 | 0 | 18,883,054 | 149,578 | 114 | 149,464 | 12.63389 | 7.30337 | 14.8849 | 8.6046 |
| 2032 | 0.535 | 932,796 | 3,719,112 | 14,842,757 | 0 | 19,494,666 | 151,677 | 114 | 151,563 | 12.86240 | 6.87553 | 14.8849 | 7.9566 |
| 2033 | 0.494 | 812,095 | 4,123,196 | 15,344,989 | 0 | 20,280,280 | 153,686 | 114 | 153,572 | 13.20574 | 6.52747 | 14.8849 | 7.3575 |
| 2034 | 0.457 | 987,075 | 4,408,393 | 15,895,257 | **2,369,877** | 23,660,602 | 155,678 | 115 | 155,563 | 15.20966 | 6.95184 | 14.8849 | 6.8034 |
| 2035 | 0.423 | 1,374,102 | 4,265,690 | 16,484,421 | 0 | 22,124,213 | 157,715 | 115 | 157,601 | 14.03814 | 5.93318 | 14.8849 | 6.2911 |
| 2036 | 0.391 | 1,844,494 | 4,215,201 | 17,107,511 | 0 | 23,167,207 | 159,679 | 115 | 159,564 | 14.51906 | 5.67433 | 14.8849 | 5.8173 |
| 2037 | 0.361 | 2,412,485 | 4,213,275 | 17,748,649 | 0 | 24,374,409 | 161,502 | 115 | 161,387 | 15.10308 | 5.45808 | 14.8849 | 5.3792 |
| 2038 | 0.334 | 3,031,481 | 4,502,938 | 18,403,005 | 0 | 25,937,424 | 163,154 | 115 | 163,040 | 15.90866 | 5.31626 | 14.8849 | 4.9741 |
| 2039 | 0.309 | 3,635,852 | 4,491,492 | 19,064,579 | 0 | 27,191,924 | 164,627 | 115 | 164,512 | 16.52879 | 5.10753 | 14.8849 | 4.5996 |
| 2040 | 0.286 | 4,371,817 | 4,512,871 | 19,741,619 | 0 | 28,626,306 | 165,935 | 115 | 165,820 | 17.26346 | 4.93283 | 14.8849 | 4.2532 |
| 2041 | 0.264 | 4,954,973 | 4,539,708 | 20,139,168 | 0 | 29,633,849 | 164,919 | 115 | 164,804 | 17.98127 | 4.75101 | 14.8849 | 3.9329 |
| 2042 | 0.244 | 5,607,834 | 4,545,868 | 20,570,229 | 0 | 30,723,931 | 166,511 | 115 | 166,396 | 18.46432 | 4.51125 | 14.8849 | 3.6367 |
| 2043 | 0.226 | 6,312,067 | 4,428,547 | 21,008,142 | 0 | 31,748,756 | 168,119 | 115 | 168,005 | 18.89755 | 4.26941 | 14.8849 | 3.3629 |
| 2044 | 0.209 | 6,941,810 | 4,482,669 | 21,453,011 | 0 | 32,877,491 | 169,744 | 115 | 169,629 | 19.38198 | 4.04910 | 14.8849 | 3.1096 |
| 2045 | 0.193 | 7,581,281 | 4,476,140 | 21,904,944 | 0 | 33,962,365 | 171,385 | 115 | 171,270 | 19.82970 | 3.83067 | 14.8849 | 2.8754 |
| 2046 | 0.179 | 7,991,831 | 4,376,717 | 22,364,049 | 0 | 34,732,597 | 173,042 | 115 | 172,928 | 20.08502 | 3.58780 | 14.8849 | 2.6589 |
| 2047 | 0.165 | 8,630,540 | 4,376,952 | 22,830,437 | 0 | 35,837,929 | 174,717 | 115 | 174,602 | 20.52547 | 3.39037 | 14.8849 | 2.4587 |
| 2048 | 0.153 | 9,344,055 | 4,432,045 | 23,304,219 | 0 | 37,080,319 | 176,408 | 115 | 176,294 | 21.03328 | 3.21262 | 14.8849 | 2.2735 |
| 2049 | 0.141 | 10,121,546 | 4,489,324 | 23,785,509 | 0 | 38,396,378 | 178,116 | 115 | 178,002 | 21.57076 | 3.04660 | 14.8849 | 2.1023 |
| 2050 | 0.131 | 11,201,318 | 4,375,839 | 24,274,422 | 0 | 39,851,579 | 179,842 | 115 | 179,728 | 22.17331 | 2.89587 | 14.8849 | 1.9440 |
| 2051 | 0.121 | 11,471,454 | 4,391,153 | 24,771,076 | 0 | 40,633,683 | 181,585 | 115 | 181,471 | 22.39130 | 2.70412 | 14.8849 | 1.7976 |
| 2052 | 0.112 | 11,992,264 | 4,676,253 | 25,275,591 | 0 | 41,944,108 | 183,346 | 115 | 183,232 | 22.89130 | 2.55632 | 14.8849 | 1.6622 |
| 2053 | 0.103 | 13,079,727 | 4,933,238 | 25,788,088 | 0 | 43,801,052 | 185,125 | 115 | 185,010 | 23.67493 | 2.44473 | 14.8849 | 1.5370 |
| 2054 | 0.095 | 13,601,306 | 4,983,412 | 26,307,139 | 0 | 44,891,857 | 186,921 | 115 | 186,807 | 24.03115 | 2.29464 | 14.8849 | 1.4213 |
| 2055 | 0.088 | 13,850,868 | 4,847,019 | 26,834,393 | 0 | 45,532,280 | 188,736 | 115 | 188,622 | 24.13946 | 2.13140 | 14.8849 | 1.3143 |
| 2056 | 0.082 | 14,801,911 | 5,372,049 | 27,369,977 | 0 | 47,543,937 | 190,569 | 115 | 190,455 | 24.96335 | 2.03816 | 14.8849 | 1.2153 |
| 2057 | 0.075 | 15,203,330 | 5,260,021 | 27,914,017 | 0 | 48,377,369 | 192,421 | 115 | 192,307 | 25.15636 | 1.89925 | 14.8849 | 1.1238 |
| 2058 | 0.070 | 15,425,469 | 5,370,422 | 28,466,646 | 0 | 49,262,536 | 194,292 | 115 | 194,177 | 25.36989 | 1.77113 | 14.8849 | 1.0391 |
| 2059 | 0.065 | 15,797,078 | 5,438,062 | 29,027,995 | 0 | 50,263,134 | 196,181 | 115 | 196,067 | 25.63574 | 1.65492 | 14.8849 | 0.9609 |
| 2060 | 0.060 | 16,102,643 | 5,513,827 | 29,598,199 | 0 | 51,214,668 | 198,090 | 115 | 197,975 | 25.86924 | 1.54423 | 14.8849 | 0.8885 |
| 2061 | 0.055 | 16,382,860 | 5,499,767 | 30,177,395 | 0 | 52,060,022 | 200,018 | 115 | 199,903 | 26.04263 | 1.43751 | 14.8849 | 0.8216 |
| 2062 | 0.051 | 16,733,724 | 5,271,060 | 30,765,721 | 0 | 52,770,505 | 201,965 | 115 | 201,851 | 26.14336 | 1.33440 | 14.8849 | 0.7597 |
| 2063 | 0.047 | 17,540,730 | 5,530,457 | 31,363,319 | 0 | 54,434,507 | 203,932 | 115 | 203,818 | 26.70745 | 1.26053 | 14.8849 | 0.7025 |
| 2064 | 0.044 | 18,051,284 | 5,658,466 | 31,363,319 | 0 | 55,073,069 | 205,919 | 115 | 205,805 | 26.75986 | 1.16790 | 14.8849 | 0.6496 |
| 2065 | 0.040 | 18,407,589 | 5,636,875 | 31,363,319 | 0 | 55,407,783 | 207,926 | 115 | 207,812 | 26.66246 | 1.07602 | 14.8849 | 0.6007 |
| 2066 | 0.037 | 18,777,128 | 5,739,538 | 31,363,319 | 0 | 55,879,985 | 209,954 | 115 | 209,840 | 26.62987 | 0.99377 | 14.8849 | 0.5555 |
| 2067 | 0.035 | 19,137,348 | 5,826,643 | 31,363,319 | 0 | 56,327,311 | 212,002 | 115 | 211,888 | 26.58358 | 0.91733 | 14.8849 | 0.5136 |
| 2068 | 0.032 | 19,461,212 | 6,006,689 | 31,363,319 | 0 | 56,831,221 | 214,071 | 115 | 213,956 | 26.56205 | 0.84757 | 14.8849 | 0.4750 |
| 2069 | 0.030 | 19,839,088 | 5,831,846 | 31,363,319 | 0 | 57,034,254 | 216,161 | 115 | 216,046 | 26.39909 | 0.77893 | 14.8849 | 0.4392 |
| 2070 | 0.027 | 20,246,974 | 6,144,812 | 31,363,319 | 0 | 57,755,106 | 218,272 | 115 | 218,157 | 26.47406 | 0.72232 | 14.8849 | 0.4061 |
| | | | | | | | | | | | 192.67180 | | 192.67180 |

* Includes system costs not affected by the resource plan such as existing generation, T&D, staff, and DSM costs not tied directly to new DSM signups (such as rebates to existing load management participants, etc.).

** DSM energy reductions are incremental from August 2019.

**Levelized System Average Electric Rate (cents/kWh) =** **14.8849**

**Additional Cost Needed to be Added to the FPL Proposed Plan to Increase its Levelized System Average Electric Rate to That of the TRC Plan**

| Year | (1) Annual Discount Factor 8.14% | (2) Resource Plan Variable Costs ($000, Nom) | (3) Resource Plan Fixed Costs ($000, Nom) | (4) Non-Resource Plan Other System Costs * ($000, Nom) | (5) "What If" One-Time Cost ($000, Nom) | (6) = (2)+(3)+(4)+(5) System Revenue Requirements ($000, Nom) | (7) Load Forecast NEL (GWh) | (8) DSM Energy Reduction ** (GWh) | (9) = (7) - (8) Load Forecast NEL Adjusted by DSM (GWh) | (10) = ((6)/(9))/10 Annual Electric Rate (cents/kWh, Nom) | (11) = (10) *(1) Annual Electric Rate (cents/kWh, NPV) | (12) Nominal Levelized System Average Rate (cents/kWh) | (13) = (12) * (1) NPV Levelized System Average Rate (cents/kWh) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2024 | 1.000 | 2,698,824 | 172,693 | 10,999,155 | 0 | 13,870,672 | 140,469 | 113 | 140,356 | 9.88250 | 9.88250 | 14.8849 | 14.8849 |
| 2025 | 0.925 | 2,844,460 | 378,968 | 11,341,613 | 0 | 14,565,041 | 141,761 | 201 | 141,560 | 10.28897 | 9.51415 | 14.8849 | 13.7640 |
| 2026 | 0.855 | 2,955,492 | 1,015,395 | 12,296,936 | 0 | 16,267,824 | 142,991 | 289 | 142,702 | 11.39982 | 9.74752 | 14.8849 | 12.7275 |
| 2027 | 0.791 | 2,531,108 | 1,531,236 | 12,934,262 | 0 | 16,996,606 | 144,053 | 376 | 143,677 | 11.82976 | 9.35341 | 14.8849 | 11.7690 |
| 2028 | 0.731 | 2,340,043 | 2,012,082 | 13,212,472 | 0 | 17,564,597 | 145,101 | 464 | 144,637 | 12.14389 | 8.87871 | 14.8849 | 10.8827 |
| 2029 | 0.676 | 2,068,999 | 2,481,309 | 13,591,962 | 0 | 18,142,269 | 146,551 | 552 | 145,999 | 12.42628 | 8.40100 | 14.8849 | 10.0632 |
| 2030 | 0.625 | 1,550,197 | 2,893,964 | 13,974,533 | 0 | 18,418,694 | 148,290 | 640 | 147,650 | 12.47455 | 7.79853 | 14.8849 | 9.3054 |
| 2031 | 0.578 | 1,163,233 | 3,308,892 | 14,390,022 | 0 | 18,862,146 | 149,578 | 728 | 148,849 | 12.67198 | 7.32539 | 14.8849 | 8.6046 |
| 2032 | 0.535 | 909,703 | 3,719,379 | 14,842,757 | 0 | 19,471,839 | 151,677 | 818 | 150,860 | 12.90724 | 6.89950 | 14.8849 | 7.9566 |
| 2033 | 0.494 | 799,057 | 4,098,843 | 15,344,989 | 0 | 20,242,889 | 153,686 | 908 | 152,779 | 13.24982 | 6.54926 | 14.8849 | 7.3575 |
| 2034 | 0.457 | 846,719 | 4,696,437 | 15,895,257 | **1,593,230** | 23,031,643 | 155,678 | 998 | 154,679 | 14.88991 | 6.80569 | 14.8849 | 6.8034 |
| 2035 | 0.423 | 1,235,907 | 4,506,974 | 16,484,421 | 0 | 22,227,302 | 157,715 | 998 | 156,717 | 14.18306 | 5.99443 | 14.8849 | 6.2911 |
| 2036 | 0.391 | 1,722,448 | 4,321,798 | 17,107,511 | 0 | 23,151,757 | 159,679 | 998 | 158,681 | 14.59017 | 5.70212 | 14.8849 | 5.8173 |
| 2037 | 0.361 | 2,293,857 | 4,186,624 | 17,748,649 | 0 | 24,229,130 | 161,502 | 998 | 160,503 | 15.09570 | 5.45541 | 14.8849 | 5.3792 |
| 2038 | 0.334 | 2,904,770 | 4,485,667 | 18,403,005 | 0 | 25,793,442 | 163,154 | 998 | 162,156 | 15.90655 | 5.31555 | 14.8849 | 4.9741 |
| 2039 | 0.309 | 3,502,023 | 4,450,104 | 19,064,579 | 0 | 27,016,706 | 164,627 | 998 | 163,629 | 16.51096 | 5.10202 | 14.8849 | 4.5996 |
| 2040 | 0.286 | 4,224,490 | 4,461,454 | 19,741,619 | 0 | 28,427,563 | 165,935 | 998 | 164,937 | 17.23544 | 4.92482 | 14.8849 | 4.2532 |
| 2041 | 0.264 | 4,799,755 | 4,499,155 | 20,139,168 | 0 | 29,438,079 | 164,919 | 998 | 163,920 | 17.95875 | 4.74507 | 14.8849 | 3.9329 |
| 2042 | 0.244 | 5,454,498 | 4,481,986 | 20,570,229 | 0 | 30,506,713 | 166,511 | 998 | 165,513 | 18.43164 | 4.50327 | 14.8849 | 3.6367 |
| 2043 | 0.226 | 6,148,262 | 4,504,729 | 21,008,142 | 0 | 31,661,132 | 168,119 | 998 | 167,121 | 18.94503 | 4.28013 | 14.8849 | 3.3629 |
| 2044 | 0.209 | 6,772,594 | 4,457,055 | 21,453,011 | 0 | 32,682,660 | 169,744 | 998 | 168,746 | 19.36800 | 4.04618 | 14.8849 | 3.1096 |
| 2045 | 0.193 | 7,393,400 | 4,405,548 | 21,904,944 | 0 | 33,703,892 | 171,385 | 998 | 170,387 | 19.78082 | 3.82122 | 14.8849 | 2.8754 |
| 2046 | 0.179 | 7,807,402 | 4,450,236 | 22,364,049 | 0 | 34,621,688 | 173,042 | 998 | 172,044 | 20.12370 | 3.59471 | 14.8849 | 2.6589 |
| 2047 | 0.165 | 8,445,471 | 4,319,912 | 22,830,437 | 0 | 35,595,819 | 174,717 | 998 | 173,719 | 20.49050 | 3.38459 | 14.8849 | 2.4587 |
| 2048 | 0.153 | 9,145,723 | 4,339,017 | 23,304,219 | 0 | 36,788,959 | 176,408 | 998 | 175,410 | 20.97312 | 3.20343 | 14.8849 | 2.2735 |
| 2049 | 0.141 | 9,906,850 | 4,391,602 | 23,785,509 | 0 | 38,083,960 | 178,116 | 998 | 177,118 | 21.50197 | 3.03689 | 14.8849 | 2.1023 |
| 2050 | 0.131 | 10,978,179 | 4,305,484 | 24,274,422 | 0 | 39,558,085 | 179,842 | 998 | 178,844 | 22.11875 | 2.88874 | 14.8849 | 1.9440 |
| 2051 | 0.121 | 11,240,533 | 4,282,113 | 24,771,076 | 0 | 40,293,722 | 181,585 | 998 | 180,587 | 22.31260 | 2.69461 | 14.8849 | 1.7976 |
| 2052 | 0.112 | 11,759,395 | 4,560,642 | 25,275,591 | 0 | 41,595,629 | 183,346 | 998 | 182,348 | 22.81111 | 2.54736 | 14.8849 | 1.6622 |
| 2053 | 0.103 | 12,860,981 | 4,836,349 | 25,788,088 | 0 | 43,485,418 | 185,125 | 998 | 184,127 | 23.61711 | 2.43876 | 14.8849 | 1.5370 |
| 2054 | 0.095 | 13,391,506 | 4,828,110 | 26,307,139 | 0 | 44,526,756 | 186,921 | 998 | 185,923 | 23.94898 | 2.28680 | 14.8849 | 1.4213 |
| 2055 | 0.088 | 13,654,207 | 4,864,268 | 26,834,393 | 0 | 45,352,869 | 188,736 | 998 | 187,738 | 24.15751 | 2.13300 | 14.8849 | 1.3143 |
| 2056 | 0.082 | 14,595,288 | 5,194,695 | 27,369,977 | 0 | 47,159,960 | 190,569 | 998 | 189,571 | 24.87715 | 2.03113 | 14.8849 | 1.2153 |
| 2057 | 0.075 | 14,996,865 | 5,295,014 | 27,914,017 | 0 | 48,205,896 | 192,421 | 998 | 191,423 | 25.18290 | 1.90125 | 14.8849 | 1.1238 |
| 2058 | 0.070 | 15,219,363 | 5,214,789 | 28,466,646 | 0 | 48,900,799 | 194,292 | 998 | 193,294 | 25.29871 | 1.76616 | 14.8849 | 1.0391 |
| 2059 | 0.065 | 15,594,296 | 5,273,132 | 29,027,995 | 0 | 49,895,423 | 196,181 | 998 | 195,183 | 25.56339 | 1.65025 | 14.8849 | 0.9609 |
| 2060 | 0.060 | 15,921,899 | 5,354,935 | 29,598,199 | 0 | 50,875,033 | 198,090 | 998 | 197,092 | 25.81288 | 1.54087 | 14.8849 | 0.8885 |
| 2061 | 0.055 | 16,175,609 | 5,374,204 | 30,177,395 | 0 | 51,727,208 | 200,018 | 998 | 199,020 | 25.99102 | 1.43466 | 14.8849 | 0.8216 |
| 2062 | 0.051 | 16,519,169 | 5,138,209 | 30,765,721 | 0 | 52,423,099 | 201,965 | 998 | 200,967 | 26.08543 | 1.33144 | 14.8849 | 0.7597 |
| 2063 | 0.047 | 17,349,218 | 5,636,001 | 31,363,319 | 0 | 54,348,538 | 203,932 | 998 | 202,934 | 26.78137 | 1.26402 | 14.8849 | 0.7025 |
| 2064 | 0.044 | 17,861,299 | 5,551,696 | 31,363,319 | 0 | 54,776,315 | 205,919 | 998 | 204,921 | 26.73043 | 1.16661 | 14.8849 | 0.6496 |
| 2065 | 0.040 | 18,219,167 | 5,508,714 | 31,363,319 | 0 | 55,091,201 | 207,926 | 998 | 206,928 | 26.62331 | 1.07444 | 14.8849 | 0.6007 |
| 2066 | 0.037 | 18,608,157 | 5,576,712 | 31,363,319 | 0 | 55,548,188 | 209,954 | 998 | 208,956 | 26.58368 | 0.99205 | 14.8849 | 0.5555 |
| 2067 | 0.035 | 18,961,075 | 5,693,950 | 31,363,319 | 0 | 56,018,344 | 212,002 | 998 | 211,004 | 26.54846 | 0.91612 | 14.8849 | 0.5136 |
| 2068 | 0.032 | 19,254,978 | 5,820,945 | 31,363,319 | 0 | 56,439,243 | 214,071 | 998 | 213,073 | 26.48823 | 0.84521 | 14.8849 | 0.4750 |
| 2069 | 0.030 | 19,645,491 | 6,016,986 | 31,363,319 | 0 | 57,025,797 | 216,161 | 998 | 215,163 | 26.50356 | 0.78201 | 14.8849 | 0.4392 |
| 2070 | 0.027 | 20,055,695 | 5,979,662 | 31,363,319 | 0 | 57,398,677 | 218,272 | 998 | 217,274 | 26.41767 | 0.72078 | 14.8849 | 0.4061 |
| | | | | | | | | | | | 192.67180 | | 192.67180 |

* Includes system costs not affected by the resource plan such as existing generation, T&D, staff, and DSM costs not tied directly to new DSM signups (such as rebates to existing load management participants, etc.).

** DSM energy reductions are incremental from August 2019.

**Levelized System Average Electric Rate (cents/kWh) = 14.8849**

# Comparison of the Resource Plans: Projection of System Average Electric Rates and Customer Bills (Assuming 1,000 kWh Usage)

**1) Projection of System Average Electric Rates & Customer Bills:**

| | Supply Only Resource Plan | | FPL Proposed Resource Plan | | RIM Resource Plan | | TRC Resource Plan | |
|---|---|---|---|---|---|---|---|---|
| Year | Projected Electric Rate (cents/kWh) | Projected Customer Bill ($/1,000 kWh) | Projected Electric Rate (cents/kWh) | Projected Customer Bill ($/1,000 kWh) | Projected Electric Rate (cents/kWh) | Projected Customer Bill ($/1,000 kWh) | Projected Electric Rate (cents/kWh) | Projected Customer Bill ($/1,000 kWh) |
| 2024 | 9.883 | $98.83 | 9.883 | $98.83 | 9.883 | $98.83 | 9.882 | $98.82 |
| 2025 | 10.275 | $102.75 | 10.289 | $102.89 | 10.276 | $102.76 | 10.298 | $102.98 |
| 2026 | 11.379 | $113.79 | 11.400 | $114.00 | 11.383 | $113.83 | 11.410 | $114.10 |
| 2027 | 11.802 | $118.02 | 11.830 | $118.30 | 11.805 | $118.05 | 11.839 | $118.39 |
| 2028 | 12.117 | $121.17 | 12.144 | $121.44 | 12.119 | $121.19 | 12.161 | $121.61 |
| 2029 | 12.391 | $123.91 | 12.426 | $124.26 | 12.398 | $123.98 | 12.445 | $124.45 |
| 2030 | 12.434 | $124.34 | 12.475 | $124.75 | 12.441 | $124.41 | 12.498 | $124.98 |
| 2031 | 12.622 | $126.22 | 12.672 | $126.72 | 12.634 | $126.34 | 12.699 | $126.99 |
| 2032 | 12.853 | $128.53 | 12.907 | $129.07 | 12.862 | $128.62 | 12.941 | $129.41 |
| 2033 | 13.254 | $132.54 | 13.250 | $132.50 | 13.206 | $132.06 | 13.285 | $132.85 |
| 2034 | 13.723 | $137.23 | 13.860 | $138.60 | 13.686 | $136.86 | 13.852 | $138.52 |

**2) Projection of Average Customer Bill Differentials:**

| | Bill Differentials for Each Plan Compared to the Supply Only Plan | | | |
|---|---|---|---|---|
| Year | Supply Only Resource Plan | FPL Proposed Resource Plan | RIM Resource Plan | TRC Resource Plan |
| 2024 | $0.00 | ($0.01) | ($0.00) | ($0.01) |
| 2025 | $0.00 | $0.14 | $0.01 | $0.22 |
| 2026 | $0.00 | $0.20 | $0.04 | $0.30 |
| 2027 | $0.00 | $0.27 | $0.02 | $0.36 |
| 2028 | $0.00 | $0.27 | $0.02 | $0.43 |
| 2029 | $0.00 | $0.36 | $0.07 | $0.55 |
| 2030 | $0.00 | $0.40 | $0.07 | $0.64 |
| 2031 | $0.00 | $0.50 | $0.12 | $0.77 |
| 2032 | $0.00 | $0.54 | $0.09 | $0.88 |
| 2033 | $0.00 | ($0.04) | ($0.48) | $0.31 |
| 2034 | $0.00 | $1.37 | ($0.37) | $1.29 |

# Comparison of the Resource Plans: Projection of System Emissions

| $SO_2$ (thousand tons) | | | | |
|---|---|---|---|---|
| Year | Supply Only Resource Plan | FPL Proposed Resource Plan | RIM Resource Plan | TRC Resource Plan |
| ------ | ------ | ------ | ------ | ------ |
| 2024 | 0.2 | 0.2 | 0.2 | 0.2 |
| 2025 | 0.2 | 0.2 | 0.2 | 0.2 |
| 2026 | 0.2 | 0.2 | 0.2 | 0.2 |
| 2027 | 0.2 | 0.2 | 0.2 | 0.2 |
| 2028 | 0.2 | 0.2 | 0.2 | 0.2 |
| 2029 | 0.2 | 0.2 | 0.2 | 0.2 |
| 2030 | 0.2 | 0.2 | 0.2 | 0.2 |
| 2031 | 0.1 | 0.2 | 0.2 | 0.2 |
| 2032 | 0.1 | 0.2 | 0.1 | 0.1 |
| 2033 | 0.1 | 0.2 | 0.2 | 0.1 |
| 2034 | 0.1 | 0.1 | 0.1 | 0.1 |

| $NO_x$ (thousand tons) | | | | |
|---|---|---|---|---|
| Year | Supply Only Resource Plan | FPL Proposed Resource Plan | RIM Resource Plan | TRC Resource Plan |
| ------ | ------ | ------ | ------ | ------ |
| 2024 | 4.4 | 4.3 | 4.3 | 4.3 |
| 2025 | 4.4 | 4.4 | 4.5 | 4.4 |
| 2026 | 4.2 | 4.2 | 4.2 | 4.2 |
| 2027 | 4.1 | 4.1 | 4.1 | 4.1 |
| 2028 | 3.8 | 3.8 | 3.8 | 3.8 |
| 2029 | 3.4 | 3.4 | 3.4 | 3.4 |
| 2030 | 3.2 | 3.2 | 3.3 | 3.2 |
| 2031 | 3.2 | 3.2 | 3.2 | 3.2 |
| 2032 | 3.2 | 3.2 | 3.2 | 3.2 |
| 2033 | 3.0 | 3.1 | 3.1 | 3.1 |
| 2034 | 2.8 | 2.8 | 2.9 | 2.8 |

| $CO_2$ (million tons) | | | | |
|---|---|---|---|---|
| Year | Supply Only Resource Plan | FPL Proposed Resource Plan | RIM Resource Plan | TRC Resource Plan |
| ------ | ------ | ------ | ------ | ------ |
| 2024 | 38.9 | 38.9 | 38.9 | 38.9 |
| 2025 | 37.8 | 37.8 | 37.8 | 37.8 |
| 2026 | 36.0 | 35.9 | 36.0 | 35.9 |
| 2027 | 34.3 | 34.2 | 34.3 | 34.1 |
| 2028 | 32.1 | 32.0 | 32.1 | 31.9 |
| 2029 | 30.6 | 30.5 | 30.6 | 30.3 |
| 2030 | 29.2 | 29.0 | 29.2 | 28.9 |
| 2031 | 27.9 | 27.7 | 28.0 | 27.6 |
| 2032 | 27.2 | 27.0 | 27.2 | 26.8 |
| 2033 | 26.2 | 26.3 | 26.5 | 26.2 |
| 2034 | 26.4 | 25.8 | 26.6 | 25.8 |

# Comparison of the Resource Plans:
# Projection of System Oil and Natural Gas Usage

| Oil (million mmBtu) | | | | |
|---|---|---|---|---|
| Year | **Supply Only Resource Plan** | **FPL Proposed Resource Plan** | **RIM Resource Plan** | **TRC Resource Plan** |
| ------ | ------ | ------ | ------ | ------ |
| 2024 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2025 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2026 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2027 | 0.1 | 0.1 | 0.1 | 0.1 |
| 2028 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2029 | 0.2 | 0.1 | 0.1 | 0.1 |
| 2030 | 0.0 | 0.0 | 0.1 | 0.0 |
| 2031 | 0.0 | 0.0 | 0.1 | 0.1 |
| 2032 | 0.0 | 0.1 | 0.0 | 0.1 |
| 2033 | 0.0 | 0.1 | 0.1 | 0.1 |
| 2034 | 0.0 | 0.0 | 0.0 | 0.0 |

| Natural Gas (million mmBtu) | | | | |
|---|---|---|---|---|
| Year | **Supply Only Resource Plan** | **FPL Proposed Resource Plan** | **RIM Resource Plan** | **TRC Resource Plan** |
| ------ | ------ | ------ | ------ | ------ |
| 2024 | 650.1 | 650.2 | 650.2 | 650.1 |
| 2025 | 630.1 | 629.4 | 630.0 | 629.1 |
| 2026 | 597.6 | 596.4 | 597.5 | 595.8 |
| 2027 | 570.3 | 568.8 | 570.1 | 567.3 |
| 2028 | 533.1 | 530.9 | 533.5 | 529.7 |
| 2029 | 514.9 | 512.4 | 515.3 | 510.6 |
| 2030 | 490.8 | 487.9 | 491.3 | 485.8 |
| 2031 | 469.7 | 466.6 | 470.6 | 464.2 |
| 2032 | 457.6 | 453.7 | 457.9 | 451.1 |
| 2033 | 440.4 | 442.4 | 446.1 | 440.2 |
| 2034 | 443.4 | 434.4 | 447.6 | 434.0 |

**BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION**

**IN RE: COMMISSION REVIEW OF NUMERIC CONSERVATION GOALS**

**DIRECT TESTIMONY OF JIM HERNDON**

**DOCKET NO. 20240012-EG (Florida Power & Light Company)**

**DOCKET NO. 20240013-EG (Duke Energy Florida, LLC)**

**DOCKET NO. 20240014-EG (Tampa Electric Company)**

**DOCKET NO. 20240015-EG (Florida Public Utilities Company)**

**DOCKET NO. 20240016-EG (JEA)**

**DOCKET NO. 20240017-EG (Orlando Utilities Commission)**

**APRIL 2, 2024**

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## I. INTRODUCTION

**Q. Please state your name, position of employment, and business address.**

A. My name is Jim Herndon. I am Vice President in the Advisory Services Practice within the Utility Services business unit of Resource Innovations, Inc. (RI). My business address is 2500 Regency Parkway, Suite 220, Cary, North Carolina 27518. A statement of my background and qualifications is attached as Exhibit No. JH-1.

**Q. Please discuss your areas of responsibility.**

A. I am responsible for providing consulting services for RI clients in the field of Demand-Side Management (DSM) initiatives, which include energy efficiency (EE), demand response (DR), and demand-side renewable energy (DSRE). In this capacity, I primarily focus on DSM planning, including analysis of DSM market impacts, and assisting utilities in the identification of DSM opportunities and the development and design of DSM program initiatives. This includes the development of market baseline and potential studies, cost-benefit analyses, and design of comprehensive DSM programs and portfolios.

**Q. Please describe RI including its history, organization, and services provided.**

A. RI was founded in 2016, and is a globally recognized consulting, software, and services firm that provides innovative DSM solutions to utilities, energy enterprises, and government entities worldwide. RI merged with Nexant, Inc., in 2021, which provided similar DSM consulting services since its founding in 2000. RI's Utility Services business unit provides DSM engineering and consulting services to government agencies and utilities, and helps residential, commercial, and industrial facility owners manage energy consumption and reduce costs in their facilities. RI also conducts development and implementation services of DSM programs for public and investor-owned utilities, governments, and end-use customers. Our range of experience in the field of EE includes, but is not limited to:

- Market potential studies
- Program design
- Program implementation
- Marketing
- Vendor outreach, education, and training
- Incentive processing and fulfillment
- Turnkey customer service
- Online program tracking and reporting
- Evaluation, measurement and verification (EM&V)

**Q. What specific projects or studies has RI done to assess DSM potential?**

A. RI has conducted over 50 Market Potential Studies (MPS) to identify opportunities for DSM in the United States and Canada. Examples of recent clients include New York Power Authority (NYPA), Duke Energy (Indiana, North Carolina, and South Carolina), Santee Cooper, El Paso Electric, the Independent Electricity System Operator (IESO) of Ontario, Canada, and Sacramento Municipal Utility District (SMUD). In addition, Nexant performed the market potential study for the Florida Energy Efficiency and Conservation

Act (FEECA) utilities in the DSM goals proceeding conducted in 2019 before this Commission.

**Q. Please summarize your experience with studies assessing DSM potential.**

A. I have been involved in conducting or managing over 30 DSM potential studies over the past 17 years. In addition to these studies, I have led the development of numerous DSM programs and portfolios, managed implementation of residential, commercial, and industrial DSM programs, and conducted third-party evaluations of utility DSM programs, providing extensive experience and expertise regarding market analyses, DSM measures and technologies, and utility program structures and best practices that inform the assessment of DSM potential.

**Q. Have you previously testified before the Florida Public Service Commission or in other state regulatory proceedings?**

A. Yes, I provided testimony in the 2019 DSM goals proceeding before this Commission in support of our market potential studies for each FEECA utility in that case. I have also submitted testimony before the Virginia State Corporation Commission, the North Carolina Utilities Commission, the South Carolina Public Service Commission, the Public Utilities Commission of Ohio, and the New Jersey Board of Public Utilities.

**Q. What is the purpose of your testimony in this proceeding?**

A. The purpose of my testimony is to introduce and summarize the methodology and findings of the Technical Potential Study (TPS) we conducted for each of the six utilities subject to the requirements of FEECA, collectively the FEECA

Utilities, as well as the additional DSM planning support we provided for a subset of the FEECA Utilities.

**Q. Please describe your role and responsibilities with respect to RI's work for this proceeding.**

A. I served as the project manager for RI's work, directly overseeing all phases of our analysis.

**Q. Are you sponsoring any exhibits in this case?**

A. Yes. I am sponsoring Exhibits No. JH-1 through No. JH-16, which are attached to my testimony:

- Exhibit No. JH-1 – Herndon Background and Qualifications
- Exhibit No. JH-2 – TPS for Florida Power & Light
- Exhibit No. JH-3 – TPS for Duke Energy Florida
- Exhibit No. JH-4 – TPS for Tampa Electric Company
- Exhibit No. JH-5 – TPS for Florida Public Utilities Company
- Exhibit No. JH-6 – TPS for JEA
- Exhibit No. JH-7 – TPS for Orlando Utilities Commission
- Exhibit No. JH-8 – 2024 Measure Lists
- Exhibit No. JH-9 – Comparison of Comprehensive 2019 Measure Lists to the 2024 Comprehensive Measure Lists
- Exhibit No. JH-10 – DEF Measure Screening and Economic Sensitivities
- Exhibit No. JH-11 – FPUC Measure Screening and Economic Sensitivities

- Exhibit No. JH-12 – JEA Measure Screening and Economic Sensitivities
- Exhibit No. JH-13 – OUC Measure Screening and Economic Sensitivities
- Exhibit No. JH-14 – FPUC Program Development Summary
- Exhibit No. JH-15 – JEA Program Development Summary
- Exhibit No. JH-16 – OUC Program Development Summary

**Q. What was the scope of work for which RI was retained?**

A. As described in Section 2 of RI's TPS report for each utility, RI was retained by the FEECA Utilities to independently analyze the Technical Potential (TP) for EE, DR, and DSRE across their residential, commercial, and industrial retail customer classes. This work included disaggregation of the current utility load forecasts into their constituent customer-class and end-use components, development of a comprehensive set of DSM measures and quantification of the measures' impacts, and calculation of potential energy and demand savings at the technology, end-use, customer class, and system levels.

In addition, RI was retained by four of the six utilities to conduct an economic analysis of EE, DR, and DSRE measures, designed to determine which measures are cost-effective from different test perspectives and to develop estimates of potential impacts if these measures were adopted in each of these four utility service areas. RI also supported three of the six utilities in developing DSM proposed goals through bundling individual DSM measures into preliminary program concepts and estimating the impacts, including participation, savings, and utility budgets, for these programs.

**Q. How, if at all, did the work performed by RI differ across the six FEECA Utilities?**

A. The assessment of TP, including the utility forecast disaggregation and customer segmentation, and development of a DSM measure list, was the same for all six FEECA Utilities. The subsequent economic analysis, measure adoption forecasts and development of proposed DSM goals varied in the work RI conducted for individual FEECA Utilities, as follows:

- Tampa Electric Company (TECO) conducted their own economic analysis and DSM goal development.
- Florida Power & Light (FPL) conducted their own economic analysis and provided RI with the results. RI then developed measure adoption estimates, and FPL conducted their own DSM goal development.
- Duke Energy Florida (DEF) contracted with RI to conduct the economic analysis and measure adoption forecast, and DEF conducted its own DSM goal development.
- JEA, Orlando Utilities Commission (OUC), and Florida Public Utilities Company (FPUC) contracted with RI to conduct the economic analysis and measure adoption forecast, and RI worked collaboratively with each utility to develop the proposed DSM goals.

**Q. What reports have been produced in the scope of RI's work?**

A. RI has produced six separate TPS reports, one for each FEECA Utility under this scope of work.

**Q. What were the major steps in the analytical work RI performed?**

A. The two major steps in RI's scope of work included development of technical potential and, for applicable utilities, creation of proposed DSM goals that aligned with utility program concepts. These steps included the following tasks:

Step 1: Technical Potential. The TP analysis established the basis for the development of proposed DSM goals. As summarized in Section 2 of each utility's TPS report, and illustrated in Figure 1 of each report, the key tasks in assessing the technical potential consisted of the following:

- *Load Forecast Disaggregation*. To disaggregate the load forecast, RI collected utility load forecast data, relevant customer segmentation and end-use consumption data, and supplemented this with existing secondary data to create a disaggregated utility load forecast broken out by customer sector and segment as well as by end-use and equipment type, and calibrated to the overall utility forecast.
- *Comprehensive Measure Development*. RI worked collaboratively with the FEECA Utilities, who also sought input from various external stakeholders, to develop a comprehensive list of DSM technologies that are currently commercially available in Florida.

For all measures included in the study, RI developed estimates of energy and demand savings, useful life, and incremental cost.

- *TP Analysis*. Using the disaggregated utility load forecast and the DSM measure impacts, RI analyzed the TP for the application of all measures to each utility's retail customers.

<u>Step 2: Development of Proposed DSM Goals</u>. The development of proposed goals built on the TP analysis, and included several interim steps, as follows:

- *Economic Analysis*. For a subset of the FEECA Utilities, RI conducted an economic analysis to determine which measures and technologies were preliminarily cost-effective under a Rate Impact Measure (RIM) test scenario or the Total Resource Cost (TRC) test scenario. This step produced a set of measures, and associated energy and demand savings, for each scenario before applying program costs and adoption rates. Key tasks included the following:
    - Collect utility economic forecast data: RI received current and forecasted avoided energy and avoided capacity costs from each utility.
    - Apply measure impacts: including energy savings, summer and winter demand savings, incremental cost, and measure useful life to determine total avoided cost benefits, measure costs, and lost revenues.

- Determine measures passing RIM test scenario and TRC test scenario: measures with a benefit/cost ratio of less than 1.0 were screened from the economic analysis.
- RI also performed this economic screening analysis using a set of economic sensitivities.

- *Measure adoption forecasts*. For a subset of the FEECA Utilities, RI updated the economic analysis and developed market adoption estimates for passing measures under each cost-effectiveness test scenario. This step produced an updated "RIM Scenario" and a "TRC Scenario" of passing measures and associated energy and demand savings. Key tasks included:
  - Applying estimated representative program costs, based on current FEECA program data and other secondary sources, and rerunning the economic analysis for both the TRC and RIM scenarios, including screening these passing measures from the Participant Cost Test (PCT) perspective for each scenario.
  - Incorporating free ridership screening based on payback analysis, removing measures with a payback of less than two years.
  - Applying estimated market adoption rates for passing measures for each scenario, based on economic and market

parameters, including payback acceptance, maturity of DSM technology, and current utility offerings.

- *Measure bundling and program development*. For a subset of utilities, RI supported the development of program concepts that formed the basis for proposed DSM goals. Key tasks included:
  - Measure bundling: RI worked collaboratively with the FEECA Utilities to identify measures that aligned with current programs or logically made sense to offer as a program.
  - Estimating program metrics, including annual participation, savings, and utility budgets.

## II. MEASURE IDENTIFICATION AND SELECTION

**Q. Please explain the process by which DSM measures were identified.**

A. The starting point for measure identification was the list of measures included in the 2019 Florida TP Studies. Using this set of measures, the FEECA Utilities initially reviewed and added proposed measures, and provided the combined list to RI. RI compared the preliminary list to its DSM measure library, compiled from similar studies conducted in recent years, as well as from other utility DSM programs that RI has designed, implemented, or evaluated. The FEECA Utilities also reached out to interested parties and received input with recommendations on measure additions to the 2019 measure list. Their measure suggestions were reviewed and incorporated into the study, as appropriate, as detailed in Appendix D of each TPS report.

Through months of rigorous discussion with the FEECA Utilities, the parameters for measures to be considered were established. The evaluation of measures to include examined whether the measure was technically feasible and currently commercially available in Florida; additionally, behavioral measures without accompanying physical changes or utility-provided products and tools were excluded, as were fuel-switching measures, other than in the context of DSRE measures. The process to identify DSM measures is more fully described in Section 4 of each TPS report.

**Q. Was the process of measure identification and selection appropriate for the objectives of the study?**

A. Yes. The measure identification process was robust, comprehensive, and appropriate for the objectives of the study. The final measure list was developed to account for DSM measures that had been considered in prior Florida studies and took full account of current Florida Building Code and federal equipment standards, current FEECA Utilities' program offerings, and the incorporation of DSM measures considered in other potential study reports and other utility DSM program offerings around the country.

**Q. Did the process allow for the assessment of the full TP for FEECA Utilities?**

A. Yes. The thorough process for developing the list resulted in a comprehensive set of over 400 unique EE, DR, and DSRE measures that fully addressed DSM opportunities across all electric energy-consuming end-uses at residential, commercial, and industrial facilities in the FEECA Utilities' service areas. The final measure list is provided in Exhibit No. JH-8.

**Q. How does the final DSM measure list compare with the measures included in the 2019 TP Study?**

A. Exhibit No. JH-9 compares the comprehensive measure list for 2024 to the measure list for the Florida Public Service Commission (Commission) 2019 Goals Dockets (Docket Nos. 20190015-EG – 20190021-EG). Compared to the 2019 TP, the 2024 TP update added 191 unique measures and eliminated 24 unique measures.

**Q. What changes to the measure list were associated with changes to building code or appliance standards?**

A. The following measures changes were included in the 2024 TP study based on Florida Building Code and federal equipment standards updates:

- Residential central air conditioner and heat pump baseline efficiency was updated based on current U.S. Department of Energy, Energy Conservation Standards for Residential Central Air Conditioners and Heat Pumps
- Residential room air conditioner baseline efficiency was updated based on current U.S. Department of Energy, Energy Conservation Standards for Room Air Conditioners
- Two speed pool pump and variable speed pool pump measures were eliminated based on current Florida Building Code and U.S. Department

of Energy, Energy Conservation Standards for Dedicated-Purpose Pool Pump Motors.

**Q. Once measures were selected, what was the next step in RI's analysis?**

A. Once measures were selected, the next step in RI's analysis was to develop individual impacts for each measure. These impacts included quantifying summer demand (kW), winter demand (kW), and energy savings (kWh), equipment useful life, and incremental costs of the measure. The measure impacts were subsequently applied to the disaggregated utility load forecasts to estimate TP in each utility service area.

## III. TECHNICAL POTENTIAL

**Q. Please define Technical Potential.**

A. Section 366.82(3) of FEECA requires the Commission to "…evaluate the full technical potential of all available demand-side and supply-side conservation and efficiency measures, including demand-side renewable energy systems." Therefore, a TP analysis is the first in a series of steps in the DSM Goals development process. Its purpose is to identify the theoretical limit to reducing summer and winter electric peak demand and energy. The TP assumes every identified potential end-use measure is installed everywhere it is "technically" feasible to do so from an engineering standpoint, regardless of cost, customer acceptance, or any other real-world constraints (such as product availability, contractor/vendor capacity, cost-effectiveness, normal equipment replacement rates, or customer preferences).

Therefore, the TP does not reflect the MW and GWh savings that may be potentially achievable through real-world voluntary utility programs, but rather it establishes the theoretical upper bound for DSM potential.

**Q. Do RI's TPS reports provide a detailed description of RI's methodology, data, and assumptions for estimating TP?**

A. Yes. As stated earlier, RI developed individual TPS reports for each of the six FEECA Utilities. The reports described RI's overall methodology, data, and assumptions for disaggregating each utility's baseline load forecast, development of DSM measures, and determination of TP.

**Q. Do these TPS reports identify the full TP for the FEECA Utilities?**

A. Yes. Each utility report identifies the full TP for the DSM measures analyzed against the utility's baseline load forecast.

**Q. Please summarize the methodology, source of data, and assumptions used to develop the TP for EE measures for the FEECA Utilities.**

A. As stated above, TP ignores all non-technical constraints on electricity savings, such as cost-effectiveness and customer willingness to adopt EE. RI's methodology for estimating EE TP begins with the disaggregated utility load forecast. For the current analysis, RI used the 2023 load forecast from each FEECA Utility, which, for all except FPUC, was based on the most recent Ten-Year Site Plan available at the time the MPS was initiated, which were the 2023 Ten-Year Site Plans.

Next, all technically feasible measures are assigned to the appropriate customer segments and end-uses. The measure kW and kWh impact data collected during DSM measure development are then applied to the baseline forecast, as illustrated in the following equation for the residential sector:


The savings factor, or percentage reduction in electricity consumption resulting from application of the efficient technology, is applied to the baseline energy use intensity to determine the per-home impact, and the other factors listed in the equation above inform the total number of households where the measure is applicable, technically feasible, and has not already been installed. The result of this equation is the total TP for an EE measure or technology.

The final component of estimating overall TP is to account for the interaction between measures. In some situations, measures compete with each other, such as a 16 SEER air source heat pump and an 18 SEER air source heat pump. For TP, the measure with the highest savings factor is prioritized. The other interaction is measure overlap, where the impacts of one measure may affect the savings for a subsequent measure. An example of measure overlap would be the installation of an 18 SEER air source heat pump as well as a smart thermostat that optimizes the operation of the heat pump. To account for overlapping impacts, RI's model ranks measures that interact with one another and reduces the baseline consumption for the subsequent measure based on savings achieved by the preceding measure. For TP, interactive measures are ranked based on the total end-use energy savings percentage, with the measures having a greater savings treated as being implemented first.

**Q. Please summarize the methodology, source of data, and assumptions used to develop TP for DR measures for the FEECA Utilities.**

A. TP for DR is effectively the total of customer loads that could be curtailed during conditions when utilities need capacity reductions. Therefore, RI's approach to estimating DR TP focuses on the curtailable load available within the time period of interest. In particular, the analysis focuses on end-uses available for curtailment during peak periods and the magnitude of load within each of these end-uses, beyond that of existing DR enrollment for each utility.

Similar to the estimation of EE TP, the DR analysis begins with a disaggregation of the utility load forecast. RI's approach for load disaggregation to identify DR opportunities is more advanced than that used for most potential studies. Instead of disaggregating annual consumption or peak demand, RI produced end-use load disaggregation for all 8,760 hours of the year. This was needed because customer loads available at times when utility system needs arise can vary substantially. For this study, curtailable load opportunities, coincident with both the summer system peak and winter system peak, were analyzed. Additionally, instead of producing disaggregated loads for the average customer, the study produced loads for several customer segments. RI examined three residential segments based on customer housing type, four different small commercial and industrial (C&I) segments, and four different large C&I customer segments, for a total of 11 different customer segments. Next, RI identified the available load for the appropriate end-uses that can be curtailed. RI's approach assumed that large C&I customers would forego virtually all electric demand temporarily if the financial incentive was large enough. For residential and small C&I customers, TP for DR is limited by loads that can be controlled remotely at scale. For this study, it was assumed that summer DR capacity for residential customers was comprised of air conditioning (A/C), pool pumps, water heaters, and electric vehicle charging. For small C&I customers, summer capacity was based on A/C load and electric vehicle charging.

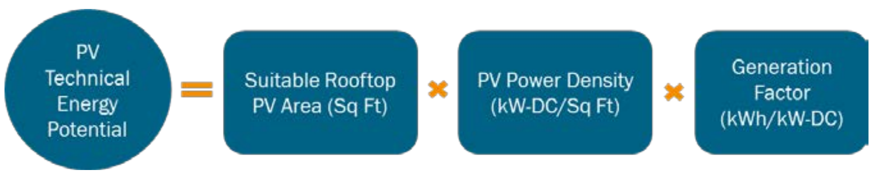
For winter capacity, residential DR capacity was based on electric heating loads, pool pumps, water heaters, and electric vehicle charging. For small C&I customers, winter capacity was based on heating load and electric vehicle charging. For eligible loads within these end-uses, the TP was defined as the amount coincident with system peak hours for each season. System peak hours were identified using 2023 system load data. For DR TP, no measure breakout was necessary because all measures targeted the end-uses estimated for TP.

Finally, RI accounted for existing DR by assuming that all customers currently enrolled in a DR program did not have additional load that could be curtailed. As a result, all currently-enrolled DR customers were excluded from the analysis.

**Q. Please summarize the methodology, source of data, and assumptions used to develop TP for DSRE measures for the FEECA Utilities.**

A. TP for DSRE measures was developed using three separate models for each category of DSRE: rooftop photovoltaic (PV); battery storage systems charged from PV systems; and combined heat and power (CHP).

For PV systems, RI's approach estimated the square footage of residential and commercial rooftops in the FEECA Utilities' service areas suitable for hosting PV technology, and applied the following formula to estimate overall TP:




The analysis was conducted in five steps, as follows:

Step 1: Building stock characterization: Output of data from the forecast disaggregation conducted for the EE and DR TP analysis were used to characterize residential, commercial, and industrial building stocks.

Step 2: Estimate of feasible roof area: Total available roof area feasible for installing PV systems was calculated using relevant parameters, such as unusable area due to other rooftop equipment and setback requirements, shading from trees, and limitations of roof orientation.

Step 3: Expected power density: A power density of 200 watts per square meter ($W/m^2$) was assumed for estimating technical potential, which corresponds to a panel with roughly 20 percent conversion efficiency, a typical value for current PV installations.

Step 4: Hourly PV generation profile: Hourly generation profiles were estimated using the U.S. Department of Energy National Renewal Energy Laboratory's solar estimation calculator, PVWatts©.

Step 5: Calculate total energy and coincident peak demand potential: RI's Spatial Penetration and Integration of Distributed Energy Resources (SPIDER) Model was used to estimate total annual energy and summer and winter peak demand potential by sector.

For battery storage systems, the TP analysis considered the fact that battery systems on their own do not generate power or create efficiency improvements; they simply store energy for use at different times. Therefore, battery systems energized directly from the grid do not produce additional energy savings, but may be used to shift or curtail load from one period for use in another. Because the DR potential analysis focused on curtailable load opportunities, RI concluded that no additional TP should be claimed. Similarly, battery systems connected to rooftop PV systems do not produce additional energy savings; they do, however, create the opportunity to store excess PV-generated energy during hours where the PV system generates more than the home or business consumes, then uses the stored power during peak periods.

Therefore, to determine additional peak demand reduction available from PV-connected battery storage systems, RI used the following methodology:

- Assumed that every PV system included in the PV TP analysis was installed with a paired storage system.

- Sized the storage system to peak PV generation and assumed energy storage duration of three hours.
- Applied RI's hourly dispatch optimization model in SPIDER to create an hourly storage dispatch profile that flattened the individual customer's load profile to the greatest extent possible, accounting for (a) a customer's hourly load profile; (b) hourly PV generation profile; and (c) battery peak demand, energy capacity, and roundtrip charge/discharge efficiency.
- Calculated the effective hourly impact for the utility using the above storage dispatch profile, aligned with the utility's peak hour (calculated separately for summer and winter).

TP for CHP systems was based on identifying non-residential customer segments with thermal load profiles that allow for the application of CHP, where the waste heat generated can be fully utilized. First, minimum size thresholds were determined for each non-residential segment using a segment-specific thermal factor that considered the power-to-heat ratio of a typical facility in each segment. Next, utility customers were segmented into industry classifications and screened against the size thresholds. Premises with annual kWh consumption that met or exceeded the thresholds were retained in the analysis. Finally, facilities of sufficient size were matched with the appropriately sized CHP technology. RI assigned CHP technologies to customers in a top-down fashion, starting with the largest CHP generators, which yielded the estimated quantity of CHP TP in each utility's service area.

**Q. Did your TP analysis account for interaction among EE, DR, and DSRE technologies?**

A. Yes. While TP was estimated using separate models for EE, DR, and DSRE, RI did recognize that interaction occurs among the TP for each, similar to the interactions between EE measures applied to the same end-use. For example, the installation of more efficient A/C would reduce the peak consumption available for DR curtailment. Therefore, to account for this interaction, RI incorporated the following assumptions and adjustments to the identified TP:

- EE TP was assumed to be implemented first, and therefore was not adjusted for interaction with DR and DSRE.
- DR TP was applied next, and to account for the impact of EE TP, the baseline load forecast for applicable end-uses was adjusted by the EE TP, reducing the available load for curtailment.
- DSRE technologies were applied last and incorporated EE TP and DR TP. For PV systems, the EE potential and DR potential did not impact the amount of PV TP. However, for PV-connected battery systems, the reduced baseline due to EE TP resulted in more PV-generated power available from storage and usable during peak periods. For CHP systems, the reduced baseline, as a result of EE, resulted in a reduction in the number of facilities that met the annual energy threshold for CHP. Installed DR capacity was assumed to not impact CHP potential as CHP system feasibility was determined based on the energy consumption and thermal parameters at the facility.

**Q. Once TP estimates were developed, what was the next step in your analysis?**

A. Upon completion of the TP estimates, the next analysis step for a subset of the utilities was to apply the measure economics (incremental cost) and utility system economics (avoided supply cost, utility electric revenues, and customer bill impacts) to conduct the economic analysis.

## IV. ECONOMIC ANALYSIS

**Q. For which FEECA Utilities did RI conduct economic analyses?**

A. RI worked collaboratively with DEF, OUC, JEA, and FPUC on the economic analysis, as follows:

Each utility provided RI with utility-specific economic forecast data, including avoided supply costs and retail rate forecasts. RI incorporated these data into our economic screening module to analyze the cost-effectiveness for individual measures under the cost-effectiveness tests required by the Commission's Order Consolidating Dockets and Establishing Procedure (Order No. PSC-2024-0022-PCO-EG).

**Q. What cost-effectiveness tests were included in the economic analysis?**

A. When analyzing DSM measures, different cost-effectiveness tests are considered to reflect the perspectives of different stakeholders. The Ratepayer Impact Measure (RIM) test addresses an electric utility customer perspective, which considers the net impact on electric utility rates associated with a measure or program. The Total Resource Cost (TRC) test addresses a societal perspective, which considers costs of a DSM measure or program relative to the benefits of avoided utility supply costs. The Participant Cost Test (PCT) addresses a participant perspective, which considers net benefits to those participating in a DSM program.

The calculations were conducted consistent with the Cost Effectiveness Manual for Demand Side Management and Self Service Wheeling Proposals; Florida Public Service Commission, Tallahassee, FL; adopted June 11, 1991. Specific costs and benefits allocated within each cost-effectiveness test (RIM, TRC, and PCT), include the following:

| **Ratepayer Impact Measure (RIM) Test** | |
|---|---|
| **Component** | **Definition** |
| Benefit | Increase in utility electric revenues<br>Decrease in avoided electric utility supply costs |
| Cost | Decrease in utility electric revenues<br>Increase in avoided electric utility supply costs<br>Utility program costs, if applicable<br>Utility incentives, if applicable |

| Total Resource Cost (TRC) Test | |
|---|---|
| **Component** | **Definition** |
| Benefit | Decrease in avoided electric utility supply costs |
| Cost | Increase in avoided electric utility supply costs<br>Customer incremental costs (less any tax incentives)<br>Utility program costs, if applicable |

| Participant Cost Test (PCT) | |
|---|---|
| **Component** | **Definition** |
| Benefit | Decrease in electric bill<br>Utility incentives, if applicable |
| Cost | Increase in electric bill<br>Customer incremental costs (less any tax incentives) |

**Q. What economic screening criteria were applied for this study?**

A. For this study, economic screening was conducted for two Base Case scenarios: the RIM Scenario and TRC Scenario. In both scenarios, all measures that achieved a cost-effectiveness ratio of 1.0 or higher were considered cost-effective from that test's perspective.

For RI's cost-effectiveness screening for DEF, JEA, OUC, and FPUC, additional considerations included the following:

- Individual measures did not include any utility program costs (program administrative or incentive costs), and therefore were evaluated on the basis of measure cost-effectiveness without any utility intervention.

- Both scenarios required the measures to pass the PCT. Similar to the TRC and RIM perspectives, the PCT screening was conducted without any utility's incentive costs applied to the measure.

**Q. What was the next step in the economic analysis?**

A. Once the list of passing measures was identified under each Base Case scenario, the measures were reanalyzed in RI's TEA-POT model to estimate demand and energy savings for each utility. The updated modeling included updated measure rankings to account for changes in measure interaction and overlap. For the economic analysis, the ranking was based on the applicable test perspective in each scenario (RIM or TRC), with the more cost-effective measures being ranked first.

**Q. Were any additional economic sensitivities considered?**

A. Yes. As specified in Appendix B of the Order Consolidating Dockets and Establishing Procedure (Order No. PSC-2024-0022-PCO-EG) in this docket, economic sensitivities were performed as follows:

- Avoided fuel cost sensitivity, analyzing the number of measures passing the economic screening based on higher and lower fuel prices.
- Payback period sensitivity, analyzing the number of measures passing the economic screening based on shorter (one year) and longer (three year) free ridership exclusion periods.
- For OUC, RI performed an additional sensitivity that reflected the number of measures passing the economic screening when including costs associated with carbon dioxide emissions.

The methodology for each sensitivity was consistent with the analysis of the Base Case scenarios.  DEF, JEA, OUC, and FPUC provided RI with avoided supply cost forecasts for the higher and lower fuel price scenarios. The results of these sensitivities are provided in Exhibits No. JH-10 through No. JH-13.

**Q. After these additional screenings were performed, what was the next major activity?**

A. After the economic screening was conducted for the Base Case scenarios and the sensitivities for each utility, the next step in the study was to develop measure adoption estimates for a subset of the utilities.

## V. MEASURE ADOPTION FORECASTS

**Q. Were any additional economic screening criteria applied for estimating measure adoption forecasts?**

A. Yes.  The associated program costs, including program administrative costs and customer incentives, were included in the economic analysis used for estimating measure adoption forecasts.  Because this step occurred prior to each utility developing specific programs aligned with their proposed goals, representative administrative costs were developed using average FEECA Utility program cost data, where available from current programs, and supplemented with other utility program cost data where needed. In order to evenly apply these representative costs to measures with a variety of savings impacts, typical costs were estimated on a variable basis per kWh saved.

In addition, consistent with prior DSM analyses in Florida, free ridership was addressed by applying a two-year payback criterion, which eliminated measures having a simple payback of less than two years.

All measures were rescreened for the RIM Scenario and TRC Scenario with the inclusion of these parameters.

**Q. How were measure incentives determined for this study?**

A. Measure incentives were developed for both the RIM Scenario and TRC Scenario. Under each of these scenarios, the maximum incentive that could be applied while remaining cost-effective was calculated for each measure.

- For the RIM Scenario, the RIM net benefit for each measure was calculated based on total RIM benefits minus total RIM costs. Next, the amount required to result in a simple payback period of two years for each measure was calculated. The maximum incentive was based on the lower of these two values.
- For the TRC Scenario, since the TRC test does not include utility incentives as a cost or benefit, the maximum incentive was based on the amount required to result in a simple payback period of two years for each measure.

**Q. Please explain the methodology used by RI to develop measure adoption forecast estimates for the cost-effective EE measures.**

A. RI's methodology consisted of applying estimates of market adoption, based on utility-sponsored program incentives for all cost-effective EE measures in each Base Case scenario. RI's market adoption estimates used a payback acceptance criterion to estimate long-run market shares for measures as a function of measure incremental costs and expected bill savings over the measures' effective useful life (inclusive of utility incentives). Incremental adoption estimates were based on the Bass Diffusion Model, which is a mathematical description of how the rate of new product diffusion changes over time. For this study, adoption curve input parameters were developed for each measure based on specific criteria, including measure maturity in the market, overall measure cost, and whether the measure was currently offered through a utility program. RI's TEA-POT model then calculated demand and energy savings by applying these adoption curves to each cost-effective measure.

**Q. Please explain the methodology used by RI to develop adoption forecast estimates for the cost-effective DR measures.**

A. Similar to EE measures, RI's methodology for DR included calculating market adoption as a function of the incentives offered to each customer group. For DR measures currently offered by each utility, RI used the current incentive level offered to estimate market adoption. For measures not currently offered by a utility, RI used representative incentive levels offered for similar measures in other markets to estimate market adoption. The utility-specific incentive rates for each DR measure, along with participation rates collected by RI for DR programs around the country, were used to calibrate DR market adoption curves for each technology and customer segment. The calibrated adoption rates were applied to the baseline load forecast to estimate the forecasted adoption estimates for cost-effective DR technologies.

**Q. Please explain the methodology used by RI to develop adoption forecast estimates for the cost-effective DSRE measures.**

A. RI did not produce estimates of adoption forecasts for DSRE measures as none of the measures passed the cost-effectiveness screening for either the RIM or TRC scenarios.

**Q. After estimating measure adoption forecasts, what was the next major activity?**

A. The next step in the study was to develop proposed DSM goals for a subset of the utilities.

## VI. DSM GOAL DEVELOPMENT

**Q. What additional support did RI provide in development of proposed DSM goals?**

A. For JEA, OUC, and FPUC, RI assisted with the development of three scenarios: 1) potential DSM programs that contribute to proposed DSM goals (Proposed Goals Scenario), 2) potential DSM programs that pass the Participant and Rate Impact Measure Tests (RIM Scenario), and 3) potential DSM programs that pass the Participant and Total Resource Cost Tests (TRC Scenario). The proposed DSM goal development process and results for each scenario is described in more detail in Exhibit No. JH-14, No. JH-15, and No. JH-16, and consisted of the following steps:

Step 1: Program Review and Measure Bundling. For each scenario, Resource Innovations identified cost-effective measures from the economic analysis described above and reviewed existing utility program offerings to identify and align measures included in the TP study analysis with current programs. Measures included in existing programs but not part of the TRC Scenario or RIM Scenario determined in the economic analysis were identified. In addition, measures that were cost-effective for the TRC Scenario or RIM Scenario but were not currently offered in a utility program were also identified. Based on the program review and measure alignment, measures in each scenario were bundled into preliminary program concepts that might align with current programs or become new program offerings for the utility.

Step 2: Program Refinement and Modeling. Preliminary program concepts and measure bundles were refined into proposed program offerings and incentive and non-incentive budgets, participation estimates, and impacts were developed using RI's TEA-POT model. The modeling results were exported into RI's Program Planner workbook that aggregated the program and portfolio impacts for each scenario. For the TRC Scenario and RIM Scenario no further refinements to the programs were made. For the Proposed Goals scenario, RI continued to work collaboratively with each utility to identify the measures and program concepts that comprise the proposed DSM goals.

**Q. Was the DSM program development process limited to measures passing the economic screening?**

A. No. In addition to measures that passed the TRC Scenario or RIM Scenario screening, the measure bundling and program development process for the Proposed Goals Scenario included additional measures, such as measures that may be included in current programs or could be complementary additions to current programs.

**Q. For measures currently offered by each utility, was the analysis limited to the continuation of current programs?**

A. No. While continuity in program offerings is typically beneficial for customer and contractor awareness and education, RI and each utility (JEA, OUC, and FPUC) worked collaboratively to identify programs that are of interest to continue and those that may need refinement. RI also provided our expertise in utility program design from around the country to help guide the program development process.

## VII. REASONABLENESS OF RI'S ANALYSES

**Q. Are the methodology and models RI employed to develop TP estimates, economic analysis, measure adoption forecasts, and proposed DSM goals for the FEECA Utilities analytically sound?**

A. Yes. RI's approach is aligned with industry-standard methods and has been applied and externally reviewed in numerous regulated jurisdictions. RI's

TEA-POT and SPIDER modeling tools have been specifically developed to accommodate and calibrate to individual utility load forecast data, and they enable the application of individual DSM measures and analysis of market potential at a high resolution—by segment, end-use, equipment type, measure, vintage, and year for each scenario analyzed.

The methodology and rigor of the measure development, technical potential, and economic analysis is also consistent with the analysis conducted for the 2019 energy conservation goals proceedings before this Commission.

**Q. Have these methodologies and models been relied upon by other commissions or governmental agencies?**

A. Yes. RI's methodology and the TEA-POT and SPIDER modeling tools have been used in numerous studies in the United States and Canada. RI's tools and results have undergone extensive regulatory review and have been used for the establishment of utility DSM targets in multiple jurisdictions, including North Carolina, South Carolina, Georgia, California, Pennsylvania, Texas, and Ontario.

**Q. Are the estimates of the TP developed by RI analytically sound and reasonable?**

A. Yes. The TP was performed under my direction and resulted in a thorough and wide-ranging analysis of DSM opportunities technically feasible in the FEECA Utilities' service areas. The TP process aligned with industry standards and included a greater level of analytic detail than that of comparable models and methodologies.

The process included extensive iterative analytical work and continuous collaboration with the FEECA Utilities to ensure that it was comprehensive and aligned with the characteristics of their service areas and forecasted loads.

**Q. Is the economic analysis conducted by RI analytically sound and reasonable?**

A. Yes. The economic analysis was based on applying defined economic screening metrics to each TP measure to determine cost-effectiveness. The analysis included utility-provided economic forecasts to ensure alignment with other aspects of utility resource planning and to determine an accurate assessment of cost-effective DSM measures for each utility.

**Q. Are the proposed DSM goals that RI helped develop based on reasonable and appropriate analysis of DSM measures and programs?**

A. Yes. RI's estimated measure adoption forecasts identified cost-effective DSM opportunities for FEECA Utilities, based on the test perspectives included in each scenario analyzed. These forecasts provided the foundation of the DSM planning process that included a robust analysis of current utility programs, bundling, and alignment of measures analyzed in the potential study as well as the development of cost-effective programs. These programs collectively sum to the sector-level and overall proposed DSM goals for each utility. This process represents a reasonable and appropriate approach to the development of utility DSM goals.

**Q. Does this conclude your direct testimony?**

A. Yes.

resource innovations

# Jim Herndon

Vice President

Jim Herndon is a Vice President in the Advisory Services group, focusing on strategic planning and program design to more effectively implement demand-side management (DSM) programs. His work is informed by 22 years of experience performing market assessments, planning portfolios, managing program design and implementation, conducting technical project reviews and analyses, and delivering third-party program evaluations across a variety of sectors. Jim leads potential and market characterization studies, program portfolio development and cost-effectiveness analyses, and provides regulatory support and expert witness testimony for program filings and integrated resource planning (IRP) activities. In these capacities, he serves many electric and natural gas utilities, including Duke Energy, Dominion Energy, Georgia Power Company, Florida Power and Light, Santee Cooper, Columbia Gas of Virginia, and Washington Gas. In each consulting engagement, Jim strives to understand his client's objectives and tailor his team's analyses to leverage best practices, while providing strategic insights with the client's specific needs in mind.

## EXPERIENCE

**Vice President | Principal Consultant,** Resource Innovations / Nexant (2013 - Present)

As an account executive and team leader in the Advisory Services Group, Jim ensures compliance with regulatory and energy program rules and coordinates staff workload and budgets. He works directly with clients, service providers, and customers to provide quality assurance on projects. Jim also manages regional and national client planning and benchmarking studies, as well as third-party impact and process evaluations.

**Sr. Project Manager | Project Manager,** Resource Innovations / Nexant (2007 - 2012)

As a Senior Project Manager and Southeast regional lead, Jim oversaw design and implementation of utility-sponsored DSM programs, including management of program design, administration, engineering, trade ally, and marketing program teams in NC and SC.

**Sr. Project Engineer | Project Engineer,** Resource Innovations / Nexant (2002 - 2006)

As a Project Engineer, Jim performed energy audits and analyses on facilities to identify, provide implementation support for, and verify the effectiveness of energy efficiency improvements. He was a Certified Home Energy Report (HERS) rater and supported the implementation of publicly funded energy efficiency and load management programs, including due diligence reviews of energy efficiency projects installed in California, New York, and Utah.

## EDUCATION, CERTIFICATIONS, AND LICENSING

M.S. in Engineering Management – Duke University

B.S. in Civil and Environmental Engineering – Duke University

## AFFILIATIONS

Southeast Energy Efficiency Alliance (SEEA) – Former Member of the Board of Directors (2014 - 2019)

## AREAS OF EXPERTISE

Integrated Resource Planning (IRP) Support • Energy Analysis and Market Characterization • DSM & DER Market Potential Studies • Portfolio Planning, Program Design, and Evaluation • Regulatory Support and Expert Witness • Program Management

## REPRESENTATIVE PROJECTS

**Florida Power & Light Company – Florida Statewide DSM Technical Potential Study** (2017 – 2019, and 2022 - Present)

Jim is leading the Resource Innovations team that was retained by Florida Power & Light in the state of Florida to complete technical potential studies of Demand Side Management (DSM) measures and renewable energy systems on behalf of six utilities. The six electric utilities subject to the Florida Energy Efficiency and Conservation Act (FEECA) include four Florida investor-owned utilities (IOUs): Florida Power & Light Company (FPL), Duke Energy Florida, LLC (DEF), Tampa Electric Company (TECO), and Florida Public Utilities Company (FPUC) that are regulated by the Florida Public Service Commission (FPSC) and two municipal utilities: JEA and Orlando Utilities Commission (OUC) that are not regulated by the FPSC. The FPSC establishes goals for the FEECA utilities to reduce the growth of Florida's peak electric demand and energy consumption and reviews the progress towards those goals frequently (every five years at a minimum). The scope of the studies includes Energy Efficiency (EE), Demand Response (DR), and Distributed Energy Resources (DER) opportunities across the residential, commercial, and industrial sectors, including interaction between these categories of DSM to account for overlapping impacts. In addition to the technical potential analysis, Jim and his team are assessing the economic and achievable opportunities for a subset of the six utilities. The results of this study will be used as the basis of the utilities' DSM goal-setting process for 2025-2034 in the 2024 Florida Goals Proceeding. Following the completion of the studies, Jim will provide regulatory support for these proceedings, including the preparation of direct written testimony, deposition, and support for the discovery process by preparing required responses to data requests and regulatory interrogatories.

Jim also led Resource Innovations' team that conducted the technical potential study and provided regulatory support for the 2019 FEECA goalsetting proceedings.

**Duke Energy – Market Potential Studies** (2015 - Present)

Jim has directed multiple DSM market potential studies for Duke Energy's North Carolina, South Carolina, Indiana, and Ohio service territories. The studies for each service territory integrated both energy efficiency and demand response opportunities across Duke Energy's residential, commercial, and industrial customer classes; and determined the technical, economic, and program potential. Resource Innovations conducts the studies in close coordination with Duke Energy's IRP team, as well as program design and delivery teams, to provide an accurate assessment of market potential that can be directly applied to Duke Energy's current and future DSM planning efforts.

**Duke Energy – Program Evaluations** (2014 - Present)

Jim currently serves as the Project Manager for the evaluation, measurement, and verification (EM&V) of six DSM program offerings, which include Duke Energy's Residential HVAC program, MyHER program, EE Education program, Save Energy & Water Kits program, Non-Residential Custom program, and Power Manager program. The evaluation activities include separate impact and process evaluations across Duke Energy's five service territories to assess program performance, adherence to best practices, and opportunities for program improvements. Jim provides daily project management oversight of project staff, coordination of resources, and quality control oversight of project deliverables.

**Santee Cooper – Market Assessment, DSM Program Design, and Implementation** (2009 - Present)

Jim provides strategic program design support activities for Santee Cooper's suite of energy efficiency programs across the residential and commercial market segments, as well as strategic program advisory services for Santee Cooper's long-term energy reduction goals. Jim also led the market assessment and market potential study that Resource Innovations conducted for Santee Cooper's service territory in 2019 and updated in 2023. The study included primary data collection to benchmark equipment efficiency and saturation in the service territory and incorporate this data into the development of future market potential. Previously, Jim managed the initial development, rollout, and management of Santee Cooper's commercial energy efficiency programs.

**Columbia Gas of Virginia (CVA) – DSM Program Design, Cost-Benefit Analysis, and Implementation** (2010 - Present)

Jim is the technical lead for the program design and regulatory support services team assisting CVA's WarmWise program offerings. This support includes portfolio planning and regulatory support for CVA's residential and commercial energy efficiency programs, as well as providing rebate processing and other support services to assist CVA in the implementation of their programs. Jim led portfolio planning efforts, including market characterization analysis, technical analysis of proposed programs and portfolio, development of annual program budgets and savings targets, and regulatory support of CVA's program filings with the Virginia State Corporation Commission, including providing written testimony supporting the analysis.

**Dominion Energy – DSM Program Design and Implementation** (2020 - Present)

Jim oversees DSM portfolio planning and program design projects for Dominion Energy's natural gas utilities in North Carolina, South Carolina, and Ohio. In each of these service territories, Jim and his team worked collaboratively with Dominion Energy to identify applicable DSM measures, quantify measure impacts, create logical program offerings, and analyze the cost-effectiveness of the offerings. Jim also supported the DSM regulatory process in each jurisdiction through the development of expert witness testimony and assistance with responses to regulatory data requests.

**Virginia Natural Gas – DSM Program Design, Cost-Benefit Analysis, and Regulatory Support** (2014 - Present)

On behalf of Virginia Natural Gas, Jim leads technical and regulatory support for the residential DSM portfolio. Support activities include program cost-effectiveness analysis and preparation of regulatory filings including annual status updates to the Virginia State Corporation Commission, and technical analysis and testimony for regulatory approval of program updates and modifications.

**Georgia Power Company – DSM Program Analysis and IRP Support** (2005 - 2019)

Jim provided technical and regulatory support for Georgia Power Company's DSM program analysis in the residential and commercial markets for their 2007, 2010, 2013, 2016, and 2019 IRP filings. The program analysis support included comprehensive compilation and assessment of applicable DSM measures and technologies across the residential, commercial, and industrial sectors, as well as the determination of the overall market potential through four separate technical potential studies (completed in 2007, 2012, 2015, and 2018). Jim also led the portfolio planning efforts that included developing preliminary program designs, savings targets, and budgets, along with supporting cost-effectiveness analysis to determine the feasibility of individual measures and program offerings for implementation.

**Elizabethtown Gas – DSM Program Design and Regulatory Support** (2016 - 2018)

In support of Elizabethtown Gas, Jim led technical and regulatory support to develop updated DSM program offerings for residential and commercial customers. He worked collaboratively with Elizabethtown Gas to develop cost-beneficial programs for eligible customers. Activities included program cost-effectiveness analysis and testimony preparation for regulatory program filing with the New Jersey Board of Public Utilities.

**Dominion Virginia Power – Program Development and Regulatory Support** (2014 - 2016)

Jim served as the program design lead and expert witness in support of Dominion Virginia Power's regulatory filing for three proposed DSM program offerings. He provided input on the delivery structure, eligibility criteria, and cost-effectiveness analysis in the development of program offerings.

Additionally, Jim provided written and oral testimony on behalf of Dominion Virginia Power in support of the technical analysis on the feasibility and cost-effectiveness of the programs to the Virginia State Corporation Commission.

**Los Angeles Department of Water and Power (LADWP) – Energy Efficiency Potential Study** (2013 - 2015)

Jim managed the development of an energy efficiency potential study for the LADWP. Under his direction, his team quantified the energy efficiency potential for LADWP's service territory, including collection of primary data through facility auditing to determine the energy efficiency potential of facilities owned by the City of Los Angeles. The study followed industry best practices to determine energy efficiency potential and undertook unique approaches to aggregate and bundle measures into program delivery channels to identify all possible achievable savings. The study informed LADWP's short-term program planning, as well as updates to their 10-year program planning targets.

**CPS Energy – Market Potential Study, DSM Program Design, and M&V** (2008 - 2014)

Jim provided technical expertise and support for DSM services to CPS Energy, which included: developing an energy efficiency market potential study, designing, and implementing DSM programs, and performing program measurement and verification (M&V). The comprehensive market potential study analyzed the economic and achievable energy and demand impacts of cost-effective DSM measures across CPS Energy's residential, commercial, and industrial customer segments. The program design utilized the identified market potential to enhance CPS Energy's existing DSM programs and provided recommendations on new programs that target CPS Energy's long-term energy efficiency goals. Jim and his team also provided annual M&V of CPS Energy's DSM programs.

**Danville Utilities – Residential Program Design and Implementation** (2011 - 2013)

Jim led the initial development of Danville Utilities' Home$ave program in Virginia. This residential program initiative included a suite of energy efficiency measures targeting Danville's residential customer base. Jim managed the rollout of the program offering that included rebate processing, trade ally outreach, marketing support, and verification of measure installation and achieved energy savings.

## CONFERENCE PRESENTATIONS

Herndon, J. (2023). "Foundations of Energy Efficiency: Program Planning & Delivery", Southeast Energy Summit, October 2023, Atlanta, GA.

Herndon, J.; Jacot, D. (2015). "LADWP EE Potential Study: Innovative Approach to Achievable Potential," International Energy Program Evaluation Conference (IEPEC), August 2015, Long Beach, CA.

resource innovations

# Technical Potential Study of Demand Side Management

## Florida Power & Light Company

Date: 03.07.2024

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# Executive Summary

In October 2022, the six electric utilities subject to the Florida Energy Efficiency and Conservation Act (FEECA Utilities) retained Resource Innovations, Inc. for the purpose of identifying and characterizing the market for demand-side management (DSM) opportunities, including energy efficiency (EE) improvement and building retrofits, peak load reductions from demand response (DR), and demand-side renewable energy (DSRE) systems.

The main objective of the study was to assess the technical potential of demand-side resources for reducing customer electric energy consumption and seasonal peak capacity demands.

This report provides the detailed methodology and results for the technical potential analysis of Florida Power & Light Company's (FPL) service area.

## 1.1 Methodology

Resource Innovations estimates DSM savings potential by applying an analytical framework that aligns baseline market conditions for energy consumption and demand with DSM opportunities. After describing the baseline condition, Resource Innovations applies estimated measure savings to disaggregated consumption and demand data. The approach varies slightly according to the type of DSM resources and available data; the specific approaches used for each type of DSM are described below.

### 1.1.1 EE Potential

This study utilized Resource Innovations' proprietary EE modeling tool, TEA-POT (Technical / Economic / Achievable POTential). This modeling tool was built on a platform that provides the ability to create and analyze multiple scenarios and recalculate potential savings based on variable inputs such as sales/load forecasts, electricity prices, discount rates, and actual program savings. The methodology for the EE potential assessment was based on a hybrid "top-down/bottom-up" approach, which started with the current utility load forecast, then disaggregated it into its constituent customer-class and end-use components. Our assessment examined the effect of the range of EE measures and practices on each end-use, taking into account current market saturations, and technical feasibility. These unique impacts were aggregated to produce estimates of potential at the end-use, customer class, and system levels for FPL.

### 1.1.2 DR Potential

The assessment of DR potential in FPL's service area was an analysis of mass market direct load control programs for residential and small commercial and industrial (C&I) customers, and an analysis of DR programs for large C&I customers. The direct load control program assessment focused on the potential for demand reduction through heating, ventilation, and air conditioning (HVAC), water heater, managed electric vehicle charging, and pool pump load control. These end-uses were of particular interest because of their large contribution to peak period system load. For this analysis, a range of direct load control measures were examined for each customer segment to highlight the range of potential. The assessment further accounted for existing DR programs for FPL when calculating the total DR potential.

### 1.1.3 DSRE Potential

The DSRE technologies included in this study are rooftop solar photovoltaic (PV) systems, battery storage systems charged from customers' PV systems, and combined heat and power (CHP) systems. The study leveraged the customer segmentation and load disaggregation data assembled for the EE and DR analyses, and applied our DSRE model, SPIDER™ (Spatial Penetration and Integration of Distributed Energy Resources), for economic and adoption analysis of solar and battery storage. This model dynamically responds to rapidly changing technologies and accounts for all key time-varying elements such as technology costs, incentives, tax credits, and electric rates. To estimate technical potential for CHP, the study utilized a series of unique distributed generation potential models for each primary market sector (commercial and industrial), calculating the average building consumption, assigning minimum facility size thresholds, and estimating building energy savings share percentage for each CHP technology based on its generation capacity.

## 1.2 Savings Potential

Technical potential for EE, DR, and DSRE are as follows:

### 1.2.1 EE Potential

EE technical potential describes the savings potential when all technically feasible EE measures are fully implemented, ignoring all non-technical constraints on electricity savings, such as cost-effectiveness and customer willingness to adopt EE.

The estimated EE technical potential results are summarized in Table 1.

Table 1. EE Technical Potential

| | Savings Potential | | |
|---|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) | Energy (GWh) |
| **Residential** | 5,257 | 3,983 | 22,839 |
| **Non-Residential**[1] | 2,831 | 2,493 | 15,299 |
| **Total** | 8,088 | 6,476 | 38,138 |

### 1.2.2 DR Potential

DR technical potential describes the magnitude of loads that can be managed during conditions when grid operators need peak capacity. For residential and small C&I customers where DR generally takes the form of direct utility control, technical potential for DR is limited by the loads that can be controlled remotely at scale such as heating, cooling, water heaters, managed electric vehicle charging, and pool pumps. For large C&I customers, this included their entire electric demand during a utility's system peak, as many of these types of customers will forego virtually all electric demand temporarily if the financial incentive is large enough.

The estimated DR technical potential results are summarized in Table 2.

Table 2. DR Technical Potential

| | Savings Potential | |
|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) |
| **Residential** | 14,527 | 7,650 |
| **Non-Residential** | 8,741 | 8,460 |
| **Total** | 23,268 | 16,110 |

[1] Non-Residential results include all commercial and industrial customer segments.

### 1.2.3 DSRE Potential

DSRE technical potential estimates quantify all technically feasible distributed generation opportunities from PV systems, battery storage systems charged from PV, and CHP technologies based on the customer characteristics of FPL's customer base.

The estimated DSRE technical potential results are summarized in Table 3.

Table 3. DSRE Technical Potential[2]

| | Savings Potential | | |
|---|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) | Energy (GWh) |
| **PV Systems** | | | |
| **Residential** | 9,142 | 1,438 | 71,354 |
| **Non-Residential** | 2,699 | 196 | 18,926 |
| **Total** | 11,841 | 1,634 | 90,280 |
| **Battery Storage charged from PV Systems** | | | |
| **Residential** | 1,456 | 4,811 | 0 |
| **Non-Residential** | 379 | 1,013 | 0 |
| **Total** | 1,835 | 5,824 | 0 |
| **CHP Systems** | | | |
| **Total** | 1,857 | 979 | 8,171 |

[2] PV systems and CHP systems were independently analyzed for technical potential without consideration of the competition between technologies or customer preference for DSRE system.

# 2 Introduction

In October, 2022, the six electric utilities subject to the Florida Energy Efficiency and Conservation Act (FEECA Utilities) retained Resource Innovations, Inc. for the purpose of identifying and characterizing the market for demand-side management (DSM) opportunities, including energy efficiency (EE) improvement and building retrofits, peak load reductions from demand response (DR), and demand-side renewable energy (DSRE) systems. The main objective of the study was:

- Assessing the technical potential of demand-side resources for reducing customer electric energy consumption and seasonal peak capacity demands.

This report provides the detailed methodology and results for the technical potential analysis of FPL's service territory.

The following deliverables were developed by Resource Innovations as part of the project and are addressed in this report:

- DSM measure list and detailed assumption workbooks
- Disaggregated baseline demand and energy use by year, sector, and end-use
- Baseline technology saturations, energy consumption, and demand
- Technical potential demand and energy savings
- Supporting calculation spreadsheets

## 2.1 Technical Potential Study Approach

Resource Innovations estimates technical potential according to the industry standard categorization, as follows:

> *Technical Potential is the theoretical maximum amount of energy and capacity that could be displaced by DSM, regardless of cost and other barriers that may prevent the installation or adoption of a DSM measure.*

For this study, technical potential included full application of commercially available DSM technologies to all residential, commercial, and industrial customers in the utility's service territory.

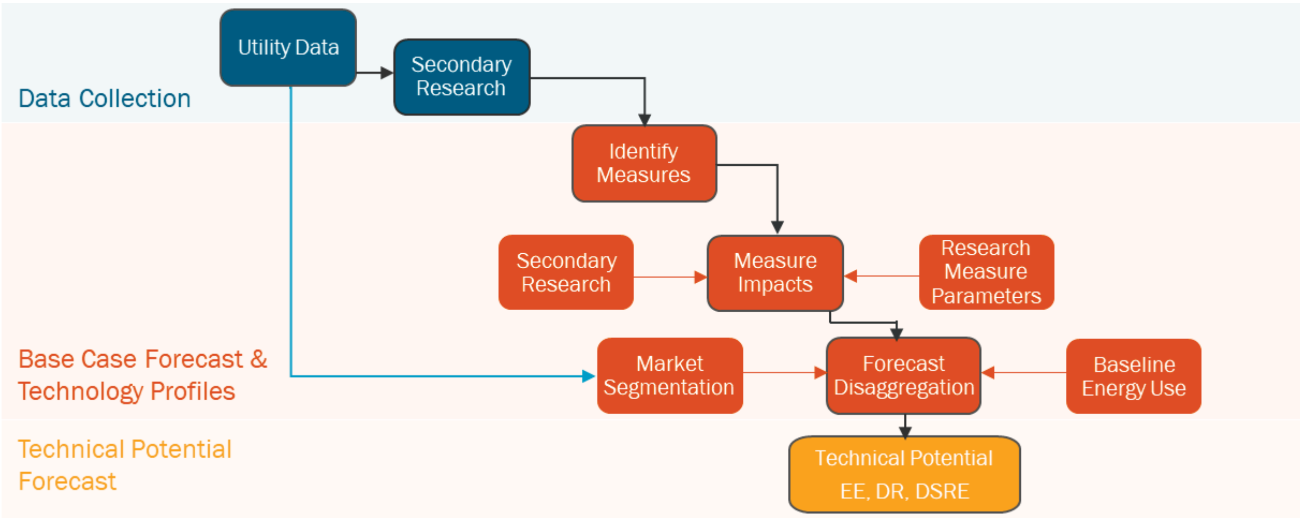
Quantifying DSM technical potential is the result of an analytical process that refines DSM opportunities that align with FPL's customers' electric consumption patterns. Resource Innovations' general methodology for estimating technical potential is a hybrid "top-

down/bottom-up" approach, which is described in detail in Sections 3 through 5 of this report and includes the following steps:

- Develop a baseline forecast: the study began with a disaggregation of the utility's official electric energy forecast to create a baseline electric energy forecast. This forecast does not include any utility-specific assumptions around DSM performance. Resource Innovations applied customer segmentation and consumption data from each utility and data from secondary sources to describe baseline customer-class and end-use components. Additional details on the forecast disaggregation are included in Section 3.
- Identify DSM opportunities: A comprehensive set of DSM opportunities applicable to FPL's climate and customers were analyzed to best depict DSM technical potential. Effects for a range of DSM technologies for each end-use could then be examined while accounting for current market saturations, technical feasibility, and impacts.
- Collect cost and impact data for measures: For those measures applicable to FPL's customers, Resource Innovations conducted primary and secondary research and estimated costs, energy savings, measure life, and demand savings. We differentiated between the type of cost (capital, installation labor, maintenance, etc.) to separately evaluate different implementation modes: retrofit (capital plus installation labor plus incremental maintenance); new construction (incremental capital and incremental maintenance); and burnout costs (incremental capital and incremental maintenance costs for replacement of appliances and equipment that has reached the end of its useful life). Additional details on measure development are included in Section 4.

Figure 1 provides an illustration of the technical potential modeling process conducted for FPL, with the assessment starting with the current utility load forecast, disaggregated into its constituent customer-class and end-use components, and calibrated to ensure consistency with the overall forecast.  Resource Innovations considered the range of DSM measures and practices application to each end-use, accounting for current market saturations, and technical feasibility. These unique impacts were aggregated to produce estimates of potential at the technology, end-use, customer class, and system levels.

Figure 1. Approach to Technical Potential Modeling




Resource Innovations estimated DSM technical potential based on a combination of market research, utility load forecasts and customer data, and measure impact analysis, all in coordination with FPL. Resource Innovations examined the technical potential for EE, DR, and DSRE opportunities; this report is organized to offer detail on each DSM category, with additional details on technical potential methodology presented in Section 5.

## 2.2 EE Potential Overview

To estimate EE potential, this study utilized Resource Innovations' modeling tool, TEA-POT (Technical / Economic / Achievable POTential). This modeling tool was built on a platform that provides the ability to create and analyze multiple scenarios and recalculate potential savings based on variable inputs such as sales/load forecasts, electricity prices, discount rates, and actual utility program savings, as described in Section 5.1.1 below. While the analysis estimates the impacts of individual EE measures, the model accounts for interactions and overlap of individual measure impacts within an end-use or equipment type. The model provides transparency into the assumptions and calculations for estimating EE potential.

## 2.3 DR Potential Overview

To estimate DR market potential, Resource Innovations considered customer demand during utility peaking conditions and projected customer response to DR measures. Customer demand was determined by looking at account-level interval data for a sample of customers within each segment. For each segment, Resource Innovations determined the portion of a customer's load that could be curtailed during the system peak.

## 2.4 DSRE Potential Overview

The DSRE technologies included in this study are rooftop solar photovoltaic (PV) systems, battery storage systems charged from PV, and combined heat and power (CHP) systems. The study leveraged the customer segmentation and load disaggregation data assembled for the EE and DR analyses, and applied our DSRE model, SPIDER™ (Spatial Penetration and Integration of Distributed Energy Resources), for economic and adoption analysis of solar and battery storage. This model dynamically responds to rapidly changing technologies and accounts for all key time-varying elements such as technology costs, incentives, tax credits, and electric rates. To estimate technical potential for CHP, the study utilized a series of unique distributed generation potential models for each primary market sector (commercial and industrial), calculating the average building consumption, assigning minimum facility size thresholds, and estimating building energy savings share percentage for each CHP technology based on its generation capacity.

# 3 Baseline Forecast Development

## 3.1 Market Characterization

The FPL base year energy use and sales forecast provided the reference point to determine potential savings. The end-use market characterization of the base year energy use and reference case forecast included customer segmentation and load forecast disaggregation. The characterization is described in this section, while the subsequent section addresses the measures and market potential energy and demand savings scenarios.

### 3.1.1 Customer Segmentation

In order to estimate EE, DR, and DSRE potential, the sales forecast and peak load forecasts were segmented by customer characteristics. As electricity consumption patterns vary by customer type, Resource Innovations segmented customers into homogenous groups to identify which customer groups are eligible to adopt specific DSM technologies, have similar building characteristics and load profiles, or are able to provide DSM grid services.

Resource Innovations segmented customers according to the following:

1) By Sector – how much of FPL's energy sales, summer and winter peak demand forecast is attributable to the residential, commercial, and industrial sectors?
2) By Customer – how much electricity does each customer typically consume annually and during system peaking conditions?
3) By End-Use – within a home or business, what equipment is using electricity during the system peak? How much energy does this end-use consume over the course of a year?

Table 4 summarizes the segmentation within each sector. In addition to the segmentation described here for the EE and DSRE analyses, the residential customer segments were further segmented by heating type (electric heat, gas heat, or unknown) and by annual consumption bins within each sub-segment for the DR analysis.

**Table 4. Customer Segmentation**

| Residential | Commercial | | Industrial | |
|---|---|---|---|---|
| Single Family | Assembly | Miscellaneous | Agriculture and Assembly | Primary Resources Industries |
| Multi-Family | College and University | Offices | Chemicals and Plastics | Stone/Glass/ Clay/Concrete |
| Manufactured Homes | Grocery | Restaurant | Construction | Textiles and Leather |
| | Healthcare | Retail | Electrical and Electronic Equipment | Transportation Equipment |
| | Hospitals | Schools K-12 | Lumber/Furniture/ Pulp/Paper | Water and Wastewater |
| | Institutional | Warehouse | Metal Products and Machinery | Other |
| | Lodging/ Hospitality | | Miscellaneous Manufacturing | |

From an equipment and energy use perspective, each segment has variation within each building type or sub-sector. For example, the energy consuming equipment in a convenience store will vary significantly from the equipment found in a supermarket. To account for this variation, the selected end-uses describe energy consumption patterns that are consistent with those typically studied in national or regional surveys, such as the U.S. Energy Information Administration's (EIA) Residential Energy Consumption Survey (RECS), Commercial Building Energy Consumption Survey (CBECS) and Manufacturing Energy Consumption Survey (MECS), among others. The end-uses selected for this study are listed in Table 5.

**Table 5. End-Uses**

| Residential End-Uses | Commercial End-Uses | Industrial End-Uses |
|---|---|---|
| Space heating[3] | Space heating[3] | Process heating |
| Space cooling[3] | Space cooling[3] | Process cooling |
| Domestic hot water | Domestic hot water | Compressed air |
| Ventilation and circulation | Ventilation and circulation | Motors/pumps |

[3] Includes the contribution of building envelope measures and efficiencies.

| Residential End-Uses | Commercial End-Uses | Industrial End-Uses |
|---|---|---|
| Lighting | Interior lighting | Fan, blower motors |
| Cooking | Exterior lighting | Process-specific |
| Appliances | Cooking | Industrial lighting |
| Electronics | Refrigeration | Exterior lighting |
| Miscellaneous | Office equipment | HVAC[3] |
| | Miscellaneous | Other |

For DR, the end-uses targeted were those with controllable load for residential customers (*i.e.*, HVAC, water heaters, pool pumps, and electric vehicles) and small C&I customers (HVAC and electric vehicles). For large C&I customers, all load during peak hours was included assuming these customers would potentially be willing to reduce electricity consumption for a limited time if offered a large enough incentive during temporary system peak demand conditions.

### 3.1.2 Forecast Disaggregation

A common understanding of the assumptions and granularity in the baseline load forecast was developed with input from FPL. Key discussion topics reviewed included:

- How current DSM offerings are reflected in the energy and demand forecast.
- Assumed weather conditions and hour(s) of the day when the system is projected to peak.
- Are there portions of the load forecast attributable to customers or equipment not eligible for DSM programs?
- How are projections of population increase, changes in appliance efficiency, and evolving distribution of end-use load shares accounted for in the peak demand forecast?

#### 3.1.2.1 Electricity Consumption (kWh) Forecast

Resource Innovations segmented FPL's electricity consumption forecast into electricity consumption load shares by customer class and end-use. The baseline customer segmentation represents the electricity market by describing how electricity was consumed within the service territory. Resource Innovations developed the forecast for the year 2025, and based it on data provided by FPL, primarily their 2023 Ten-Year Site Plan, which was the most recent plan available at the time the studies were initiated. The data addressed current baseline consumption, system load, and sales forecasts.

#### 3.1.2.2 Peak Demand (kW) Forecast

A fundamental component of DR potential was establishing a baseline forecast of what loads or operational requirements would be absent due to existing dispatchable DR or time varying rates. This baseline was necessary to assess how DR can assist in meeting specific planning and operational requirements. We utilized FPL's summer and winter peak demand forecast, which was developed for system planning purposes.

#### 3.1.2.3 Estimating Consumption by End-Use Technology

As part of the forecast disaggregation, Resource Innovations developed a list of electricity end-uses by sector (Table 5). To develop this list, Resource Innovations began with FPL's estimates of average end-use consumption by customer and sector. Resource Innovations combined these data with other information, such as utility residential appliance saturation surveys, as available, to develop estimates of customers' baseline consumption. Resource Innovations calibrated the utility-provided data with data available from public sources, such as the EIA's recurring data-collection efforts that describe energy end-use consumption for the residential, commercial, and manufacturing sectors.

To develop estimates of end-use electricity consumption by customer segment and end-use, Resource Innovations applied estimates of end-use and equipment-type saturation to the average energy consumption for each sector. The following data sources and adjustments were used in developing the base year 2025 sales by end-use:

**Residential Sector:**

- The disaggregation was based on FPL's rate class load shares and intensities.
- Baseline intensity was calibrated to account for differences in end-use saturation, fuel source, and equipment saturation as follows:
  - FPL rate class load share is based on average per customer.
  - Resource Innovations made conversions to usage estimates generated by applying EIA RECS data, residential end-use study data received from other FEECA utilities, and EIA's Annual Energy Outlook (AEO) 2023.

**Commercial Sector:**

- The disaggregation was based on FPL's rate class load shares, intensities, and EIA CBECS data.
- Segment data from EIA and FPL.
- Baseline intensity was calibrated to account for differences in end-use saturation, fuel source, and equipment saturation as follows:

  - Rate class load share based on EIA CBECS and end-use forecasts from FPL.

**Industrial Sector:**

- The disaggregation was based on rate class load shares, intensities, and EIA MECS data.
- Segment data from EIA and FPL.
- Baseline intensity was calibrated to account for differences in end-use saturation, fuel source, and equipment saturation as follows:
  - Rate class load share based on EIA MECS and end-use forecasts from FPL.

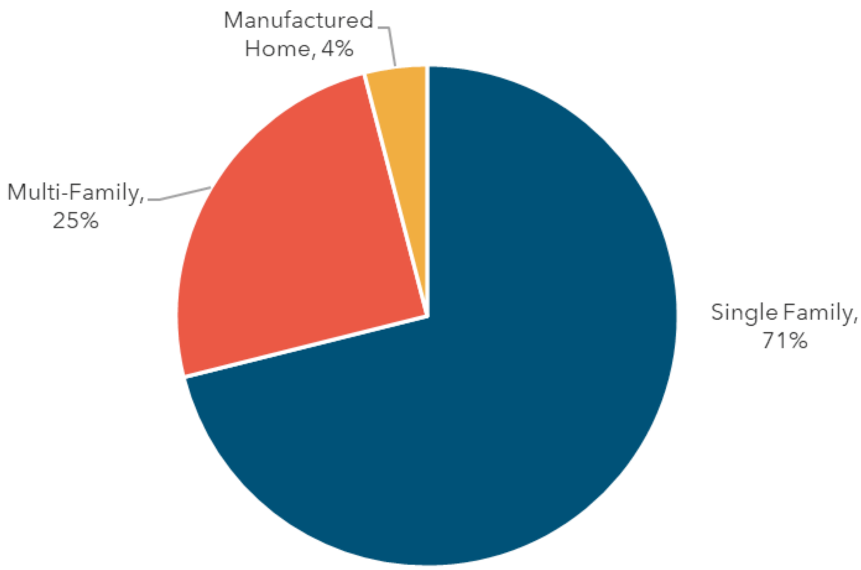
## 3.2 Analysis of Customer Segmentation

Customer segmentation is important to ensuring that a MPS examines DSM measure savings potential in a manner that reflects the diversity of energy savings opportunities existing across the utility's customer base. FPL provided Resource Innovations with data concerning the premise type and loads characteristics for all customers for the MPS analysis. Resource Innovations examined the provided data from multiple perspectives to identify customer segments. Resource Innovations' approach to segmentation varied slightly for non-residential and residential accounts, but the overall logic was consistent with the concept of expressing the accounts in terms that were relevant to DSM opportunities.

### 3.2.1 Residential Customers (EE, DR, and DSRE Analysis)

Segmentation of residential customer accounts enabled Resource Innovations to align DSM opportunities with appropriate DSM measures. Resource Innovations used utility customer data, supplemented with EIA data, to segment the residential sector by customer dwelling type (single family, multi-family, or manufactured home). The resulting distribution of customers according to dwelling unit type is presented in Figure 2.

**Figure 2. Residential Customer Segmentation**




### 3.2.2 Non-Residential (Commercial and Industrial) Customers (EE and DSRE Analysis)

For the EE and DSRE analysis, Resource Innovations segmented C&I accounts using the utility's North American Industry Classification System (NAICS) or Standard Industrial Classification (SIC) codes, supplemented by data produced by the EIA's CBECS and MECS. Resource Innovations classified the customers in this group as either commercial or industrial, on the basis of DSM measure information available and applicable to each. For example, agriculture and forestry DSM measures are commonly considered industrial savings opportunities. Resource Innovations based this classification on the types of DSM measures applicable by segment, rather than on the annual energy consumption or maximum instantaneous demand from the segment as a whole. The estimated energy sales distributions Resource Innovations applied are shown below in Figure 3 and Figure 4.

**Figure 3. Commercial Customer Segmentation**

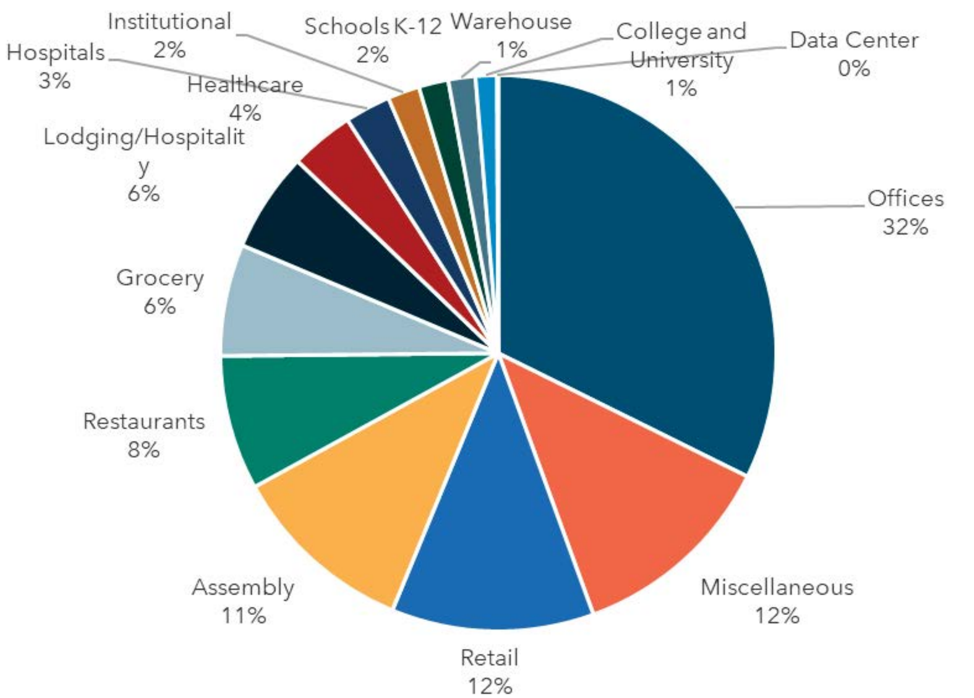
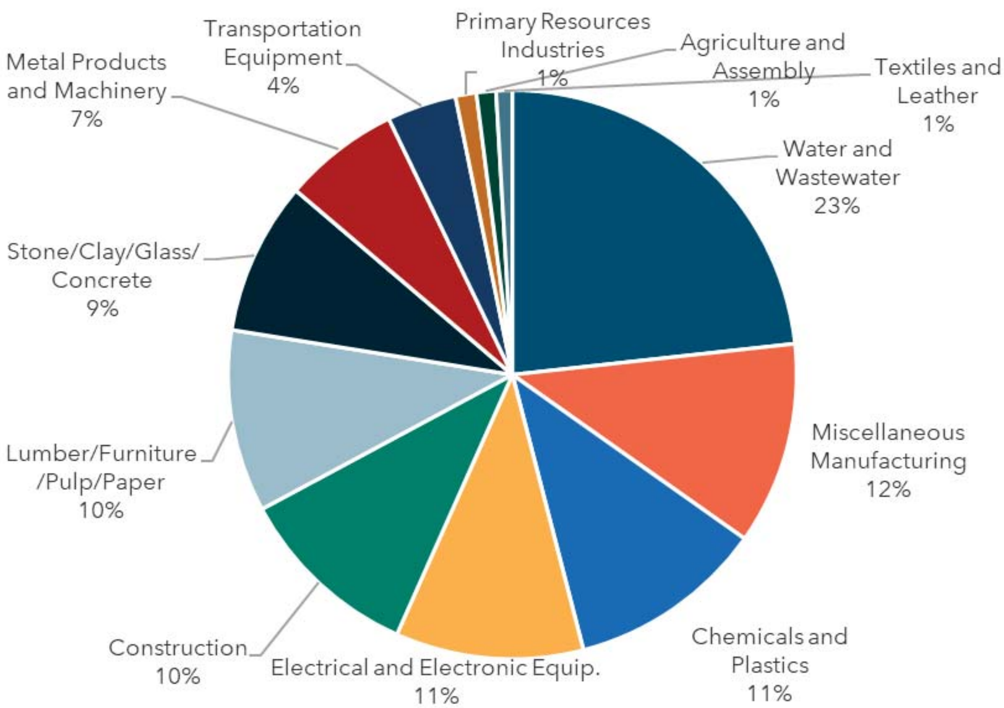



**Figure 4. Industrial Customer Segmentation**



### 3.2.3 Commercial and Industrial Accounts (DR Analysis)

For the DR analysis, Resource Innovations divided the non-residential customers into the two customer classes of small C&I and large C&I using rate class and annual consumption. For the purposes of this analysis, small C&I customers are those on the General Service (GS) tariff. Large C&I customers are all customers on the General Service Demand (GSD) tariff or on the General Service Large Demand (GSLD) tariff. Resource Innovations further segmented these two groups based on customer size. For small C&I, segmentation was determined using annual customer consumption and for large C&I the customer's maximum demand was used. Both customer maximum demand and customer annual consumption were calculated using billing data provided by FPL.

Table 6 shows the account breakout between small C&I and large C&I.

Table 6. Summary of Customer Classes for DR Analysis

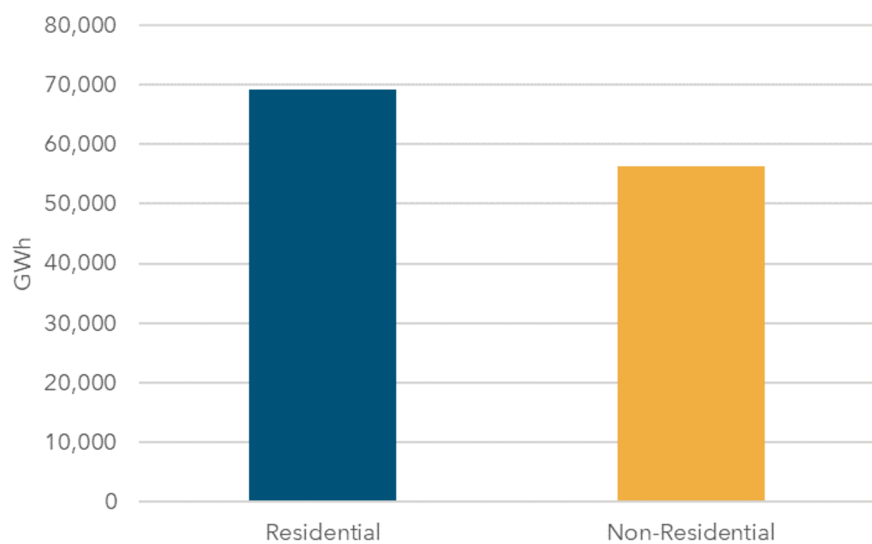
| Customer Class | Annual kWh | Estimated Number of Accounts |
|---|---|---|
| **Small C&I** | 0-15,000 kWh | 360,182 |
| | 15,001-25,000 kWh | 81,685 |
| | 25,001-50,000 kWh | 78,842 |
| | 50,001 kWh + | 36,567 |
| | Total | 557,276 |
| **Large C&I** | 0-50 kW | 64,699 |
| | 51-300 kW | 49,692 |
| | 301-500 kW | 5,141 |
| | 501 kW + | 4,332 |
| | Total | 123,864 |

## 3.3 Analysis of System Load

### 3.3.1 System Energy Sales

Technical potential is based on FPL's load forecast for the year 2025 from their 2023 Ten Year Site Plan, which is illustrated in Figure 5.

Figure 5. 2025 Electricity Sales Forecast by Sector




### 3.3.2 System Demand

To determine the technical potential for DR, Resource Innovations first established peaking conditions for each utility by looking at when each utility historically experienced its maximum demand. The primary data source used to determine when maximum DR impact was the historical system load for FPL. The data provided contained the system loads for all 8,760 hours of the most recent five years leading up to the study (2016-2021). The utility summer and winter peaks were then identified within the utility-defined peaking conditions. For FPL the summer peaking conditions were defined as August from 4:00-5:00 PM and the winter peaking conditions were defined as January from 7:00-8:00 AM. The seasonal peaks were then selected as the maximum demand during utility peaking conditions.

### 3.3.3 Load Disaggregation

The disaggregated annual electric loads[4] for the base year 2025 by sector and end-use are summarized in Figure 6, Figure 7, and Figure 8.

[4] Full disaggregation of system demand by end-use was not conducted, as DR potential for residential and small C&I customers focused on specific end-uses of particular interest because of their large contribution to peak period system load, and was not end-use specific for large C&I customers. A description of the end-use analysis for residential and small C&I customers is included in Section 5.1.2

**Figure 6. Residential Baseline (2025) Energy Sales by End-Use**

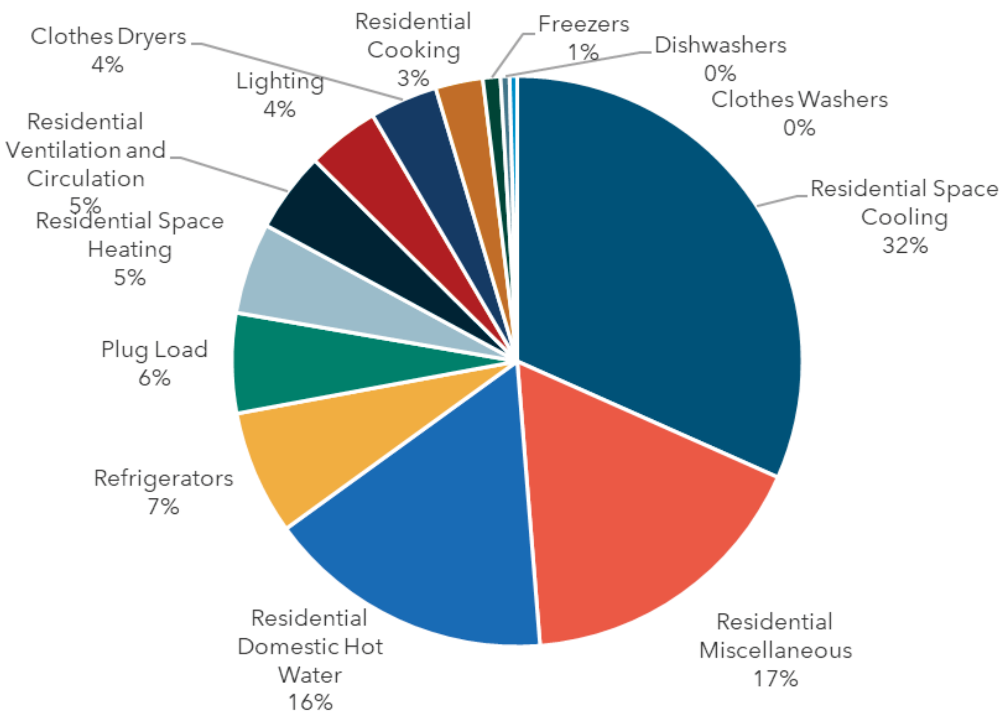
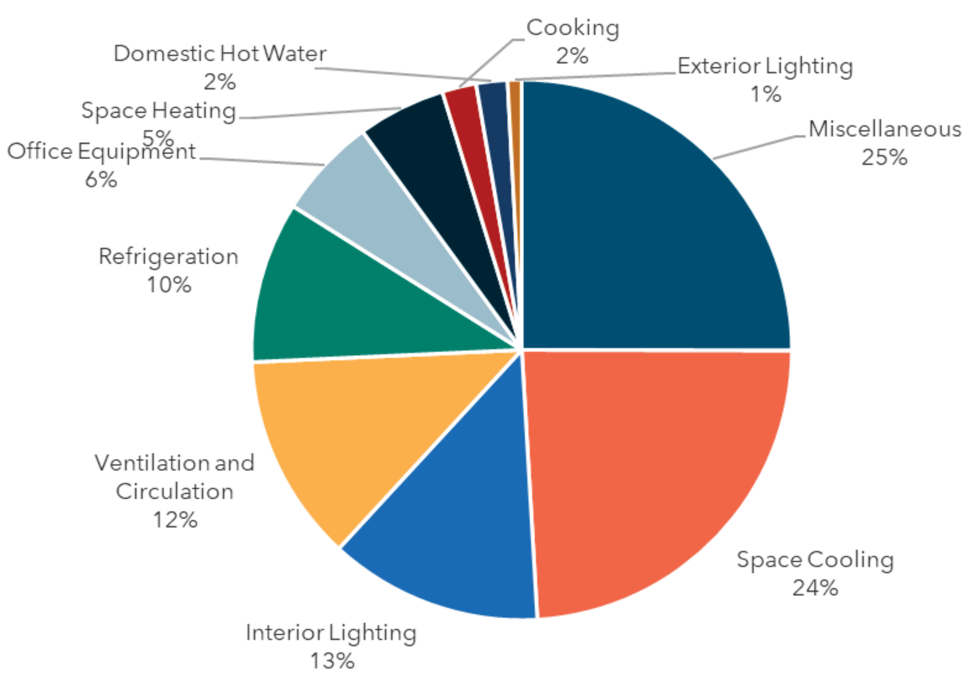
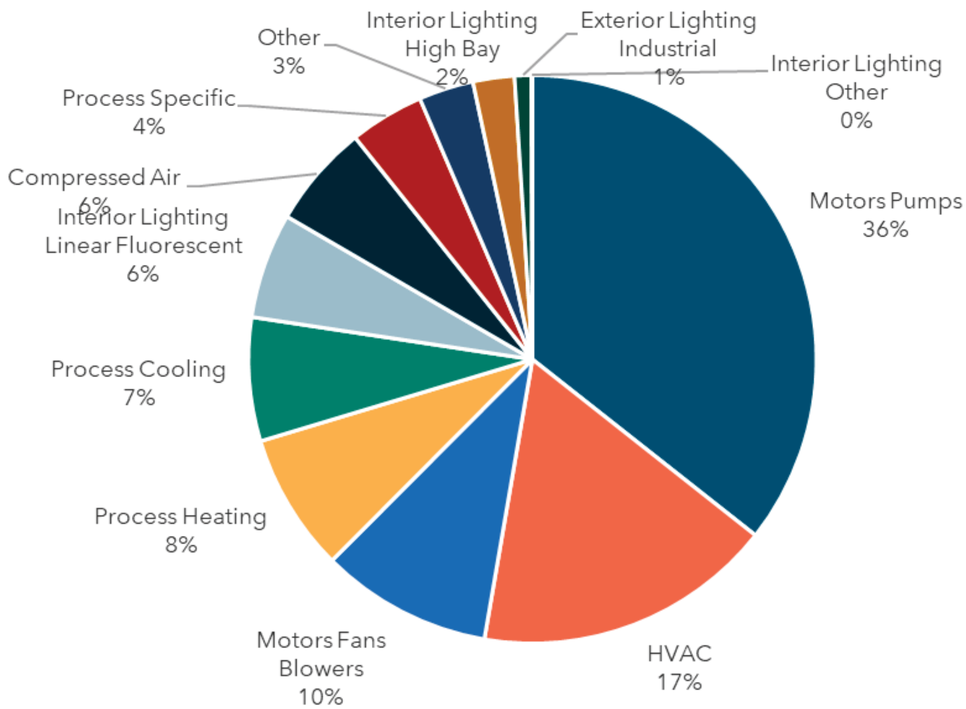



**Figure 7. Commercial Baseline (2025) Energy Sales by End-Use**




resource innovations

**Figure 8. Industrial Baseline (2025) Energy Sales by End-Use**



# 4 DSM Measure Development

DSM potential is described by comparing baseline market consumption with opportunities for savings. Describing these individual savings opportunities results in a list of DSM measures to analyze. This section presents the methodology to develop the EE, DR, and DSRE measure lists.

## 4.1 Methodology

Resource Innovations identified a comprehensive catalog of DSM measures for the study. The measure list is the same for all FEECA Utilities. The iterative vetting process with the utilities to develop the measure list began by initially examining the list of measures included in the 2019 Goals docket. This list was then adjusted based on proposed measure additions and revisions provided by the FEECA Utilities. Resource Innovations further refined the measure list based on reviews of Resource Innovations' DSM measure library, compiled from similar market potential studies conducted in recent years throughout the United States, as well as measures included in other utility programs where Resource Innovations is involved with program design, implementation, or evaluation. The FEECA Utilities also reached out to interested parties and received input with recommendations on measure additions to the 2019 measure list. Their measure suggestions were reviewed and incorporated into the study as appropriate. External measure suggestions and actions are summarized in Appendix D. The extensive, iterative review process involving multiple parties has ensured that the study included a robust and comprehensive set of DSM measures.

See Appendix A for the list of EE measures, Appendix B for the list of DR measures, and Appendix C for the list of DSRE measures analyzed in the study.

## 4.2 EE Measures

EE measures represent technologies applicable to the residential, commercial, and industrial customers in the FEECA Utilities' service territories. The development of EE measures included consideration of:

- EE technologies that are applicable to Florida and commercially available: Measures that are not applicable due to climate or customer characteristics were excluded, as were "emerging" technologies that are not currently commercially available to FEECA utility customers.
- Current and planned Florida Building Codes and Federal equipment standards (Codes & Standards) for baseline equipment: Measures included from prior studies

were adjusted to reflect current Codes & Standards as well as updated efficiency tiers, as appropriate.

- Eligibility for utility DSM offerings in Florida: For example, behavioral measures were excluded from consideration, as they historically have not been allowed to count towards utility DSM goals. Behavioral measures are intended to motivate customers to operate in a more energy-efficient manner (*e.g.*, setting an air-conditioner thermostat to a higher temperature) without accompanying: a) physical changes to more efficient end-use equipment or to their building envelope, b) utility-provided products and tools to facilitate the efficiency improvements, or c) permanent operational changes that improve efficiency which are not easily revertible to prior conditions. These types of behavioral measures were excluded because of the variability in forecasting the magnitude and persistence of energy and demand savings from the utility's perspective. Additionally, decoupling behavioral measure savings from the installation of certain EE technologies like smart thermostats can be challenging and could result in overlapping potential with other EE measures included in the study.

Upon development of the final EE measure list, utility-specific measure details were developed. RI maintains a proprietary online database of energy efficiency measures for MPS studies, which was used as a starting point for measure development for this study. Measures are added or updated at the request of project stakeholders or because of changes to the EE marketplace (for example, new codes and standards, or current practice in the market). Measure data are refined as new data or algorithms are developed for estimating measure impacts, and updated for each study to incorporate inputs parameters specific to the service territory being analyzed. The database contains the following information for each of the measures:

- Measure description: measure classification by type, end-use, and subsector, and description of the base-case and the efficient-case scenarios.
- kWh savings: Energy savings associated with each measure were developed through engineering algorithms or building simulation modeling, taking climate data and customer segments into consideration as appropriate. Reference sources used for developing residential, commercial, and industrial measure savings included a variety of Florida-specific, as well as regional and national sources, such as utility-specific measurement & verification (M&V) data, technical reference manuals (TRM) from other jurisdictions, ENERGY STAR calculators, and manufacturer or retailer specifications for particular products.
- Energy savings were applied in RI's TEA-POT model as a percentage of total baseline consumption. Peak demand savings were determined using utility-specific load shapes or coincidence factors.

- Measure Expected Useful Lifetime: Sources included the Database for Energy Efficient Resources (DEER), the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Handbook, TRMs, and other regional and national measure databases and EE program evaluations.
- Measure Costs: Per-unit costs (full or incremental, depending on the application) associated with measure installations. Sources included: TRMs, ENERGY STAR calculator, online market research, FEECA utility program data, and other secondary sources.

The measure details from the online measure library are exported for use in RI's TEA-POT model, accompanied by utility-specific estimates of measure applicability. Measure applicability is a general term encompassing an array of factors, including technical feasibility of installation, and the measure's current saturation as well as factors to allocate savings associated with competing measures. Information used was primarily derived from data in current regional and national databases, as well as FPL's program tracking data. These factors are described in Table 7.

**Table 7. Measure Applicability Factors**

| Measure Impact | Explanation | Sources |
|---|---|---|
| Technical Feasibility | The percentage of buildings that can have the measure physically installed. Various factors may affect this, including, but not limited to, whether the building already has the baseline measure (*e.g.*, dishwasher), and limitations on installation (*e.g.*, size of unit and space available to install the unit). | Various secondary sources and engineering experience. |
| Measure Incomplete Factor | The percentage of buildings without the specific measure currently installed. | Utility RASS; EIA RECS, CBECS; MECS; ENERGY STAR sales figures; and engineering experience. |
| Measure Share | Used to distribute the percentage of market shares for competing measures (*e.g.*, only blown-in ceiling insulation or spray foam insulation, not both would be installed in an attic). | Utility customer data, Various secondary sources and engineering experience. |

As shown in Table 8, the measure list includes 400 unique energy-efficiency measures. Expanding the measures to account for all appropriate installation scenarios resulted in

9,683 measure permutations, which are the application of individual measures to various customer segments, construction types, and end-uses (*i.e.*, a single air-source heat pump "measure" can be installed in single family, multi-family, and manufactured homes, as well as new and existing vintages of each home type, and impacts both space cooling and space heating end-uses, resulting in twelve separate measure "permutations" analyzed).

**Table 8. EE Measure Counts by Sector**

| Sector | Unique Measures | Permutations |
|---|---|---|
| **Residential** | 122 | 1,209 |
| **Commercial** | 166 | 5,910 |
| **Industrial** | 112 | 2,564 |

## 4.3 DR Measures

The DR measures included in the measure list utilize the following DR strategies:

- **Direct Load Control.** Utility control of selected equipment at the customer's home or business, such as HVAC or water heaters.
- **Critical Peak Pricing (CPP) with Technology.** Electricity rate structures that vary based on time of day. Includes CPP when the rate is substantially higher for a limited number of hours or days per year (customers receive advance notification of CPP event) coupled with technology that enables customer to lower their usage in a specific end-use in response to the event (e.g., HVAC via smart thermostat).
- **Contractual DR.** Customers receive incentive payments or a rate discount for committing to reduce load by a pre-determined amount or to a pre-determined firm service level upon utility request.
- **Automated DR.** Utility dispatched control of specific end-uses at a customer facility.

DR initiatives that do not rely on the installation of a specific device or technology to implement (such as a voluntary curtailment program or time of use rates) were not included.

A workbook was developed for each measure which included the same measure inputs as previously described for the EE measures. In addition, the DR workbook included expected load reduction from the measure, based on utility technical potential, existing utility DR programs, and other nationwide DR programs if needed.

For technical potential, Resource Innovations did not break out results by specific measure or control technology because all of the developed measures target the end-uses estimated

for technical potential (*i.e.*, potential is reported for space cooling end-use and not allocated to switches, smart thermostats, etc.).

## 4.4 DSRE Measures

The DSRE measure list includes rooftop PV systems, battery storage systems charged from PV systems, and CHP systems.

**PV Systems**

PV systems utilize solar panels (a packaged collection of PV cells) to convert sunlight into electricity. A system is constructed with multiple solar panels, a DC/AC inverter, a racking system to hold the panels, and electrical system interconnections. These systems are often roof-mounted systems that face south-west, south, and/or, south-east. The potential associated with roof-mounted systems installed on residential and commercial buildings was analyzed.

**Battery Storage Systems Charged from PV Systems**

Distributed battery storage systems included in this study consist of behind-the-meter battery systems installed in conjunction with an appropriately-sized PV system at residential and commercial customer facilities. These battery systems typically consist of a DC-charged battery, a DC/AC inverter, and electrical system interconnections to a PV system. On their own battery storage systems do not generate or conserve energy, but can collect and store excess PV generation to provide power during particular time periods, which for DSM purposes would be to offset customer demand during the utility's system peak.

**CHP Systems**

In most CHP applications, a heat engine creates shaft power that drives an electrical generator (fuel cells can produce electrical power directly from electrochemical reactions). The waste heat from the engine is then recovered to provide other on-site needs. Common prime mover technologies used in CHP applications and explored in this study include:

- Steam turbines
- Gas turbines
- Micro turbines
- Fuel Cells
- Internal combustion engines

A workbook was developed for each measure which included the inputs previously described for EE measures and prime mover operating parameters.

# 5 Technical Potential

In the previous sections, the approach for DSM measure development was summarized, and the 2025 base year load shares and reference-case load forecast were described. The outputs from these tasks provided the input for estimating the technical potential scenario, which is discussed in this section.

The technical potential scenario estimates the potential energy and demand savings when all technically feasible and commercially available DSM measures are implemented without regard for cost-effectiveness and customer willingness to adopt the most impactful EE, DR, or DSRE technologies. Since the technical potential does not consider the costs or time required to achieve these savings, the estimates provide a theoretical upper limit on electricity savings potential. Technical potential is only constrained by factors such as technical feasibility and applicability of measures. For this study, technical potential included full application of the commercially available DSM measures to all residential, commercial, and industrial customers in the utility's service territory.

## 5.1 Methodology

### 5.1.1 EE Technical Potential

EE technical potential refers to delivering less electricity to the same end-uses. In other words, technical potential might be summarized as "doing the same thing with less energy, regardless of the cost."

DSM measures were applied to the disaggregated utility electricity sales forecasts to estimate technical potential. This involved applying estimated energy savings from equipment and non-equipment measures to all electricity end-uses and customers. Technical potential consists of the total energy and demand that can be saved in the market which Resource Innovations reported as single numerical values for each utility's service territory.

The core equation used in the residential sector EE technical potential analysis for each individual efficiency measure is shown in Equation 1 below, while the core equation used in the nonresidential sector technical potential analysis for each individual efficiency measure is shown in Equation 2.

**Equation 1: Core Equation for Residential Sector EE Technical Potential**

$$\text{Technical Potential of Efficient Measures} = \text{Total Number of Households} \times \text{Base Case Equipment Energy Use Intensity (kWh/unit)} \times \text{Saturation Shares} \times \text{Percent Incomplete} \times \text{Feasibility Factor} \times \text{Savings Factor}$$

Where:

- **Baseline Equipment Energy Use Intensity** = the electricity used per customer per year by each baseline technology in each market segment. In other words, the baseline equipment energy-use intensity is the consumption of the electrical energy using equipment that the efficient technology replaces or affects.
- **Saturation Share** = the fraction of the end-use electrical energy that is applicable for the efficient technology in a given market segment. For example, for residential cooling, the saturation share would be the fraction of all residential electric customers that have central air conditioners in their household.
- **Percent Incomplete** = the fraction of equipment that is not considered to already be energy efficient. To extend the example above, the fraction of central air conditioners that is not already energy efficient.
- **Feasibility Factor** = the fraction of units that is technically feasible for conversion to the most efficient available technology from an engineering perspective (*i.e.*, it may not be possible to install LEDs in all light sockets in a home because the available styles may not fit in every socket).
- **Savings Factor** = the percentage reduction in electricity consumption resulting from the application of the efficient technology.

**Equation 2: Core Equation for Non-Residential Sector EE Technical Potential**

$$\text{Technical Potential of Efficient Measures} = \text{Total Stock Sq. Footage by Building Type by EDC} \times \text{Base Case Equipment Energy Use Intensity (kWh/unit)} \times \text{Saturation Shares} \times \text{Percent Incomplete} \times \text{Feasibility Factor} \times \text{Savings Factor}$$

Where:

- **Total Stock Square Footage by Segment** = the forecasted square footage level for a given building type (*e.g.*, square feet of office buildings).
- **Baseline Equipment Energy Use Intensity** = the electricity used per square foot per year by each baseline equipment type in each market segment.

- **Saturation Shares** = the fraction of total end-use energy consumption associated with the efficient technology in a given market segment. For example, for packaged terminal air-conditioner (PTAC), the saturation share would be the fraction of all space cooling kWh in a given market segment that is associated with PTAC equipment.
- **Percent Incomplete** = the fraction of equipment that is not considered to already be energy efficient.
- **Feasibility Factor** = the fraction of the equipment or practice that is technically feasible for conversion to the efficient technology from an engineering perspective (*i.e.*, it may not be possible to install Variable Frequency Drives (VFD) on all motors in a given market segment).
- **Savings Factor** = the percentage reduction in electricity consumption resulting from the application of the efficient technology.

It is important to note that the technical potential estimate represents electricity savings potential at a specific point in time. In other words, the technical potential estimate is based on data describing status quo customer electricity use and technologies known to exist today. As technology and electricity consumption patterns evolve over time, the baseline electricity consumption will also change accordingly. For this reason, technical potential is a discrete estimate of a dynamic market. Resource Innovations reported the technical potential for 2025, based on currently known DSM measures and observed electricity consumption patterns.

### Measure Interaction and Competition (Overlap)

While the technical potential equations listed above focus on the technical potential of a single measure or technology, Resource Innovations' modeling approach does recognize the overlap of individual measure impacts within an end-use or equipment type, and accounts for the following interactive effects:

- Measure interaction: Installing high-efficiency equipment could reduce energy savings in absolute terms (kWh) associated with non-equipment measures that impact the same end-use. For example, installing a high-efficiency heat pump will reduce heating and cooling consumption which will reduce the baseline against which attic insulation would be applied, thus reducing savings associated with installing insulation. To account for this interaction, Resource Innovations' TEA-POT model ranks measures that interact with one another and reduces the baseline consumption for the subsequent measure based on the savings achieved by the preceding measure. For technical potential, interactive measures are ranked based on total end-use energy savings percentage.
- Measure competition (overlap): The "measure share"—as defined above—accounted for competing measures, ensuring savings were not double-counted. This interaction

occurred when two or more measures "competed" for the same end-use. For example, a T-12 lamp could be replaced with a T-8 or linear LED lamp.

**Addressing Naturally-Occurring EE**

Naturally occurring energy efficiency includes actions taken by customers to improve the efficiency of their homes and businesses in the absence of utility program intervention. For the analysis of technical potential, Resource Innovations verified with FPL's forecasting group that the baseline sales forecasts incorporated two known sources of naturally-occurring efficiency:

- Codes and Standards: The sales forecasts already incorporated the impacts of known Code & standards changes.
- Baseline Measure Adoption: The sales forecast excluded the projected impacts of future DSM efforts but included already implemented DSM penetration.

By properly accounting for these factors, the technical potential analysis estimated the additional EE opportunities beyond what is already included in the utility sales forecast.

### 5.1.2 DR Technical Potential

The concept of technical potential applies differently to DR than for EE. Technical potential for DR is effectively the magnitude of loads that can be curtailed during conditions when utilities need peak capacity reductions. In evaluating this potential at peak capacity, the following were considered: which customers are consuming electricity at those times? What end-uses are in play? Can those end-use loads be managed? Large C&I accounts generally do not provide the utility with direct control over particular end-uses. Instead, many of these customers will forego electric demand temporarily if the financial incentive is large enough. For residential and small C&I customers where DR generally takes the form of direct utility control, technical potential for DR is limited by the loads that can be controlled remotely at scale.

This framework makes end-use disaggregation an important element for understanding DR potential, particularly in the residential and small C&I sectors. When done properly, end-use disaggregation not only provides insights into which loads are on and off when specific grid services are needed, it also provides insight concerning how key loads and end-uses, such as air conditioning use, vary across customers. Resource Innovations' approach used for load disaggregation is more advanced than what is used for most potential studies. Instead of disaggregating annual consumption or peak demand, Resource Innovations produced end-use load disaggregation for all 8,760 hours. This was needed because the loads available at times when different grid applications are needed can vary substantially. Instead

of producing disaggregated loads for the average customer, the study was produced for several customer segments. For FPL, Resource Innovations examined three residential segments based on customer housing type, four different small C&I segments based on customer size, and four different large C&I segments based on customer size, for a total of 11 different customer segments.

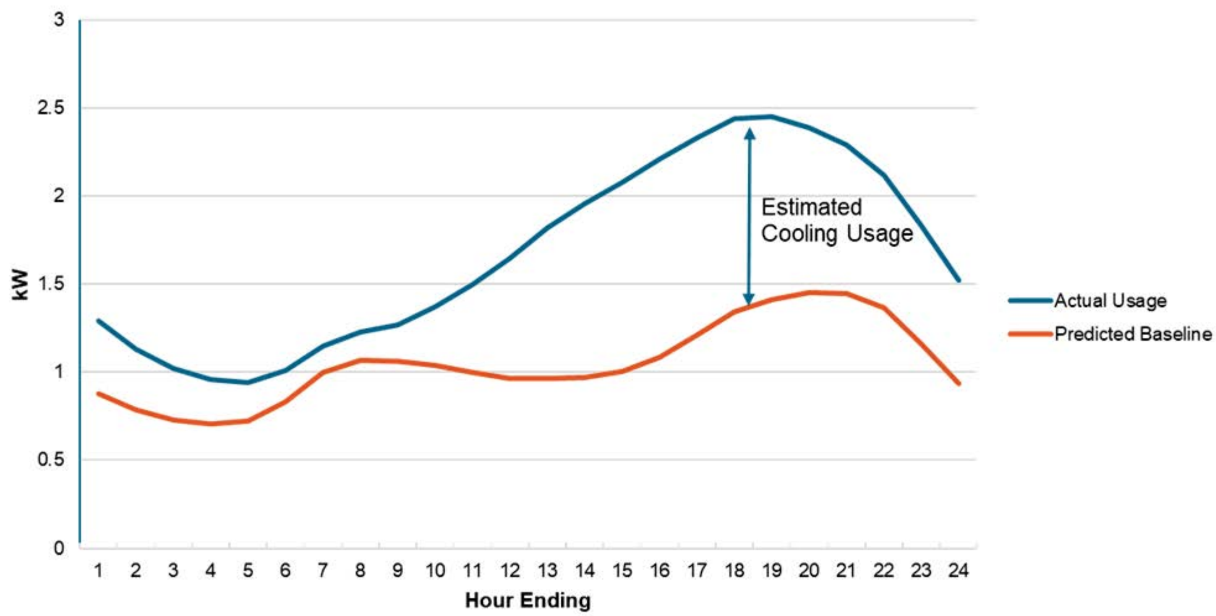
Technical potential, in the context of DR, is defined as the total amount of load available for reduction that is coincident with the period of interest; in this case, the system peak hour for the summer and winter seasons. Thus, two sets of capacity values are estimated: a summer capacity and a winter capacity.

As previously mentioned, for technical potential purposes, all coincident large C&I load is considered dispatchable, while residential and small C&I DR capacity is based on specific end-uses. Summer DR capacity for residential customers was comprised of air-conditioning (AC), pool pumps, water heaters, and managed electric vehicle charging. For small C&I customers, summer capacity was based on AC load. For winter DR capacity, residential was based on electric heating, pool pumps, and water heaters. For small C&I customers, winter capacity was based on electric heating.

AC and heating load profiles were generated for residential and small C&I customers using a sample of customer interval data provided by FPL. This sample included a customer breakout based on housing type for residential customers and size for small C&I customers. Resource Innovations then used the interval data from these customers to create an average load profile for each customer segment.

The average load profile for each customer segment was combined with historical weather data, and used to estimate hourly load as a function of weather conditions. AC and heating loads were estimated by first calculating the baseline load on days when cooling degree days (CDD) and heating degree days (HDD) were equal to zero, and then subtracting this baseline load. This methodology is illustrated by Figure 9 (a similar methodology was used to predict heating loads).

Figure 9: Methodology for Estimating Cooling Loads




This method was able to produce estimates for average AC/heating load profiles for the seven different customer segments within the residential and small C&I sectors.

Profiles for residential water heater and pool pump loads were estimated by utilizing end-use load data from NREL's residential end-use load profile database.

For all eligible loads, the technical potential was defined as the amount that was coincident with system peak hours for each season, which are August from 4:00-5:00 PM for summer, and January from 7:00-8:00 AM for winter. As mentioned in Section 4, for technical potential there was also no measure breakout needed, because all measures will target the end-uses' estimated total loads.

### 5.1.3 DSRE Technical Potential

#### 5.1.3.1 PV Systems

To determine technical potential for PV systems, RI estimated the percentage of rooftop square footage in Florida that is suitable for hosting PV technology. Our estimate of technical potential for PV systems in this report is based in part on the available roof area and consisted of the following steps:

- Step 1: Outcomes from the forecast disaggregation analysis were used to characterize the existing and new residential, commercial, and industrial building stocks.
  - To calculate the total roof area for residential buildings, the average roof area per household is multiplied by the number of households.
  - For commercial and industrial buildings, RI calculated the total roof area by first dividing the load forecast by the energy usage intensity, which provides an estimate of the total building square footage. This result is then divided by the average number of floors to derive the total roof area.
- Step 2: The total available roof area feasible for installing PV systems was calculated. Relevant parameters included unusable area due to other rooftop equipment and setback requirements, in addition to possible shading from trees and limitations of roof orientation (factored into a "technical suitability" multiplier).
- Step 3: Estimated the expected power density (kW per square foot of roof area).
- Step 4: Estimated the hourly PV generation profile using NREL's PV Watts Calculator
- Step 5: Calculated total energy and coincident peak demand potential by applying RI's Spatial Penetration and Integration of Distributed Energy Resources (SPIDER) Model.

The methodology presented in this report uses the following formula to estimate overall technical potential of PVs:

**Equation 3: Core Equation for Solar DSRE Technical Energy Potential**

$$\text{PV Technical Energy Potential} = \text{Suitable Rooftop PV Area (Sq Ft)} \times \text{PV Power Density (kW-DC/Sq Ft)} \times \text{Generation Factor (kWh/kW-DC)}$$

Where:

- **Suitable Rooftop PV Area for Residential [Square Feet]:** Number of Residential Buildings x Average Roof Area Per Building x Technical Suitability Factor
- **Suitable Rooftop PV Area for Commercial [Square Feet] :** Energy Consumption [kWh] / Energy Intensity [kWh / Square Feet] / Average No. of Stories Per Building x Technical Suitability Factor
- **PV Power Density [kW-DC/Square Feet]:** Maximum power generated in Watts per square foot of solar panel.
- **Generation Factor:** Annual Energy Generation Factor for PV, from PV Watts (dependent on local solar irradiance)

#### 5.1.3.2 Battery Storage Systems Charged from PV Systems

Battery storage systems on their own do not generate power or create efficiency improvements, but store power for use at different times. Therefore, in analyzing the technical potential for battery storage systems, the source of the stored power and overlap with technical potential identified in other categories was considered.

Battery storage systems that are powered directly from the grid do not produce annual energy savings but may be used to shift or curtail load during particular time periods. As the DR technical potential analyzes curtailment opportunities for the summer and winter peak period, and battery storage systems can be used as a DR technology, the study concluded that no additional technical potential should be claimed for grid-powered battery systems beyond that already attributed to DR.

Battery storage systems that are connected to on-site PV systems also do not produce additional energy savings beyond the energy produced from the PV system[5]. However, PV-connected battery systems do create the opportunity to store energy during period when the PV system is generating more than the home or business is consuming and use that stored power during utility system peak periods.

To determine the additional technical potential peak demand savings for "solar plus storage" systems, our methodology consisted of the following steps:

- Assume that every PV system included in PV Technical Potential is installed with a paired storage system.
- Size the storage system assuming peak storage power is equal to peak PV generation and energy storage duration is three hours.
- Apply RI's hourly dispatch optimization module in SPIDER to create an hourly storage dispatch profile that flattens the individual customer's load profile to the greatest extent possible accounting for a) customer hourly load profile, b) hourly PV generation profile, and c) battery peak demand, energy capacity, and roundtrip charge/discharge efficiency.
- Calculate the effective hourly impact for the utility using the above storage dispatch profile, aligned with the utility's peak hour (calculated separately for summer and winter)
- Report the output storage kW impact on utility coincident peak demand in summer and winter.

[5] PV-connected battery systems experience some efficiency loss due to storage, charging, and discharging. However, for this study, these losses were not quantified.

### 5.1.3.3 CHP Systems

The CHP analysis created a series of unique distributed generation potential models for each primary market sector (commercial and industrial).

Only non-residential customer segments whose electric and thermal load profiles allow for the application of CHP were considered. The technical potential analysis followed a three-step process. First, minimum facilities size thresholds were determined for each non-residential customer segment. Next, the full population of non-residential customers were segmented and screened based on the size threshold established for that segment. Finally, the facilities that were of sufficient size were matched with the appropriately sized CHP technology.

To determine the minimum threshold for CHP suitability, a thermal factor was applied to potential candidate customer loads to reflect thermal load considerations in CHP sizing. In most cases, on-site thermal energy demand is smaller than electrical demand. Thus, CHP size is usually dictated by the thermal load in order to achieve improved efficiencies.

The study collected electric and thermal intensity data from other recent CHP studies. For industrial customers, Resource Innovations assumed that the thermal load would primarily be used for process operations and was not modified from the secondary data sources for Florida climate conditions. For commercial customers, the thermal load is more commonly made up of water heating, space heating, and space cooling (through the use of an absorption chiller). Therefore, to account for the hot and humid climate in Florida, which traditionally limits weather-dependent internal heating loads, commercial customers' thermal loads were adjusted to incorporate a higher proportion of space cooling to space heating as available opportunities for waste heat recovery.

After determination of minimum kWh thresholds by segment, Resource Innovations used the utility-provided customer data with NAICS or SIC codes as well as annual consumption data. Non-residential customers were then categorized by segment and size. Customers with annual loads below the kWh thresholds are not expected to have the consistent electric and thermal loads necessary to support CHP and were eliminated from consideration.

In general, internal combustion engines are the prime mover for systems under 500kW with gas turbines becoming progressively more popular as system size increases above that. Based on the available load by customer, adjusted by the estimated thermal factor for each segment, CHP technologies were assigned to utility customers in a top-down fashion (*i.e.*, starting with the largest CHP generators).

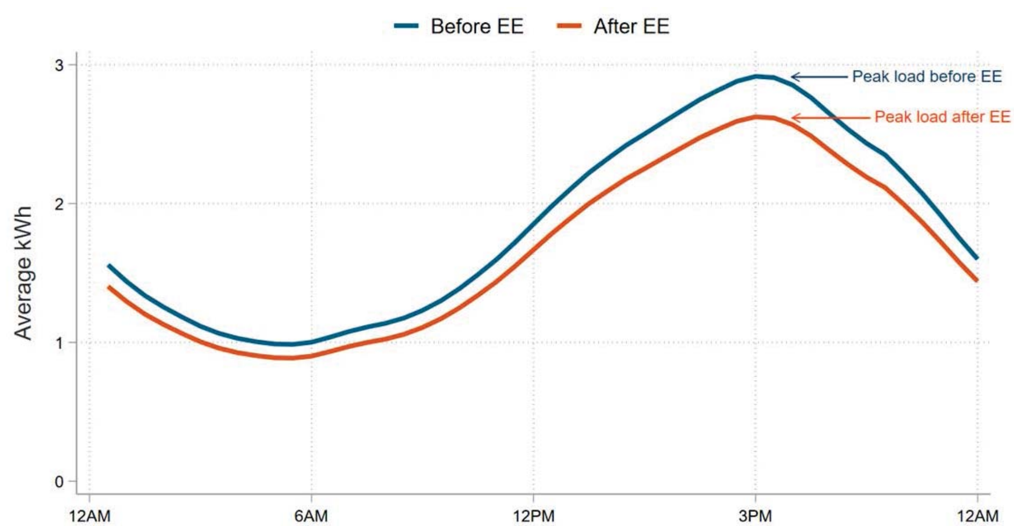
**Measure Interaction**

PV systems and battery storage charged from PV systems were analyzed collectively due to their common power generation source; and therefore, the identified technical potential for these systems is additive. However, CHP systems were independently analyzed for technical potential without consideration of the competition between DSRE technologies or customer preference for a particular DSRE system. Therefore, results for CHP technical potential should not be combined with PV systems or battery storage systems for overall DSRE potential but used as independent estimates.

### 5.1.4 Interaction of Technical Potential Impacts

As described above, the technical potential was estimated using separate models for EE, DR, and DSRE systems. However, there is interaction between these technologies; for example, a more efficient HVAC system would result in a reduced peak demand available for DR curtailment, as illustrated in Figure 10.

Figure 10: Illustration of EE Impacts on HVAC System Load Shape




Therefore, after development of the independent models, the interaction between EE, DR, and DSRE was incorporated as follows:

- The EE technical potential was assumed to be implemented first, followed by DR technical potential and DSRE technical potential.

- To account for the impact of EE technical potential on DR, the baseline load forecast for the applicable end-uses was adjusted by the EE technical potential, resulting in a reduction in baseline load available for curtailment.
- For DSRE systems, the EE and DR technical potential was incorporated in a similar fashion, adjusting the baseline load used to estimate DSRE potential.
    - For the PV analysis, this did not impact the results as the EE and DR technical potential did not affect the amount of PV that could be installed on available rooftops.
    - For the battery storage charged from PV systems, the reduced baseline load from EE resulted in additional PV-generated energy being available for the battery systems and for use during peak periods. The impact of DR events during the assumed curtailment hours was incorporated into the modeling of available battery storage and discharge loads.
- For CHP systems, the reduced baseline load from EE resulted in a reduction in the number of facilities that met the annual energy threshold needed for CHP installations. Installed DR capacity was assumed to not impact CHP potential as the CHP system feasibility was determined based on energy and thermal consumption at the facility. It should be noted that CHP systems not connected to the grid could impact the amount of load available for curtailment with utility-sponsored DR. Therefore, CHP technical potential should not be combined with DR potential but used as independent estimates.

## 5.2 EE Technical Potential

### 5.2.1 Summary

Table 9 summarizes the EE technical potential by sector:

Table 9. EE Technical Potential

| | Savings Potential | | |
|---|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) | Energy (GWh) |
| **Residential** | 5,257 | 3,983 | 22,839 |
| **Non-Residential**[6] | 2,831 | 2,493 | 15,299 |
| **Total** | 8,088 | 6,476 | 38,138 |

[6] Non-Residential results include all commercial and industrial customer segments.

### 5.2.2 Residential

Figure 11, Figure 12, and Figure 13 summarize the residential sector EE technical potential by end-use.

**Figure 11: Residential EE Technical Potential by End-Use (Summer Peak Savings)**

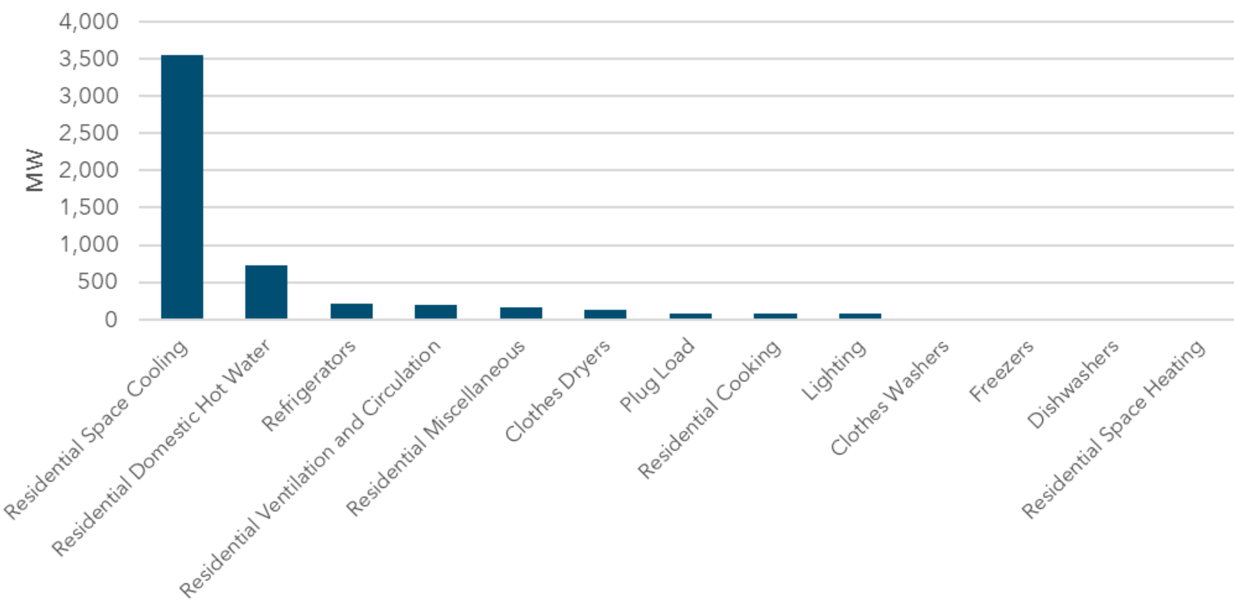


Figure 12: Residential EE Technical Potential by End-Use (Winter Peak Savings)

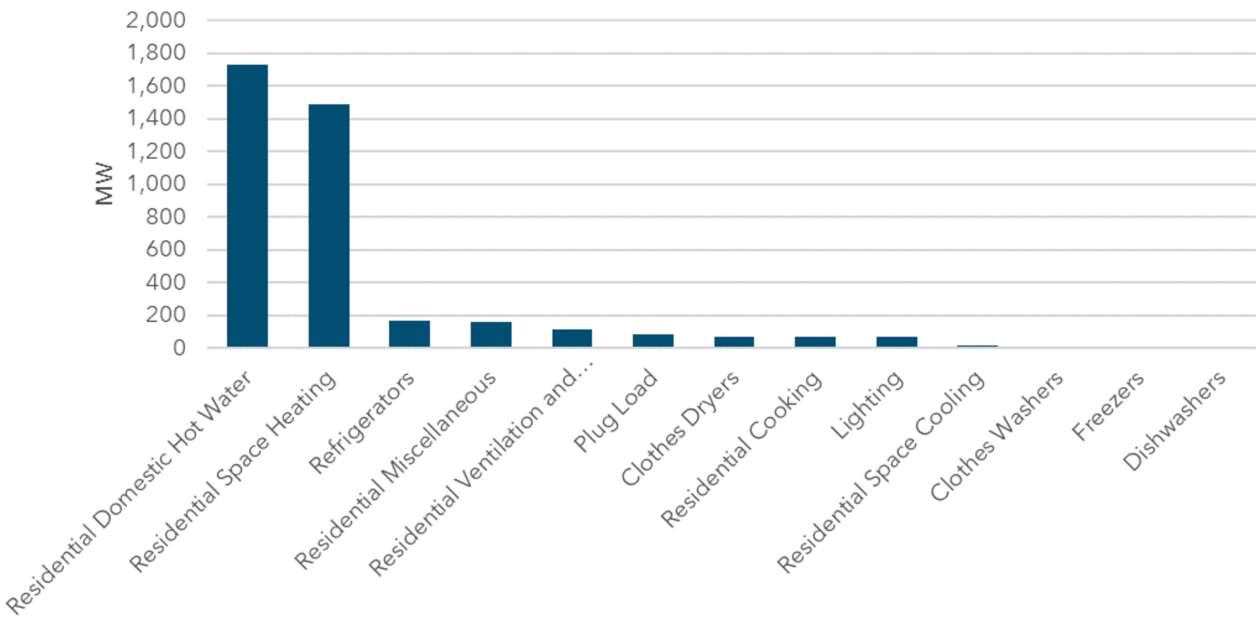
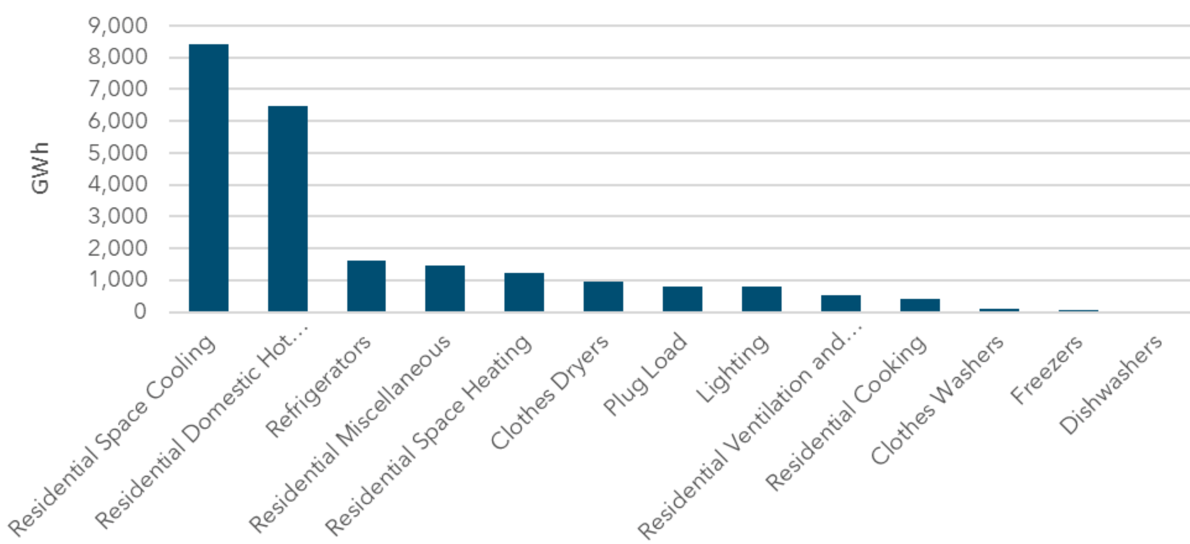



Figure 13: Residential EE Technical Potential by End-Use (Energy Savings)



### 5.2.3 Non-Residential

#### 5.2.3.1 Commercial Segments

Figure 14, Figure 15, and Figure 16 summarize the commercial sector EE technical potential by end-use.

Figure 14: Commercial EE Technical Potential by End-Use (Summer Peak Savings)

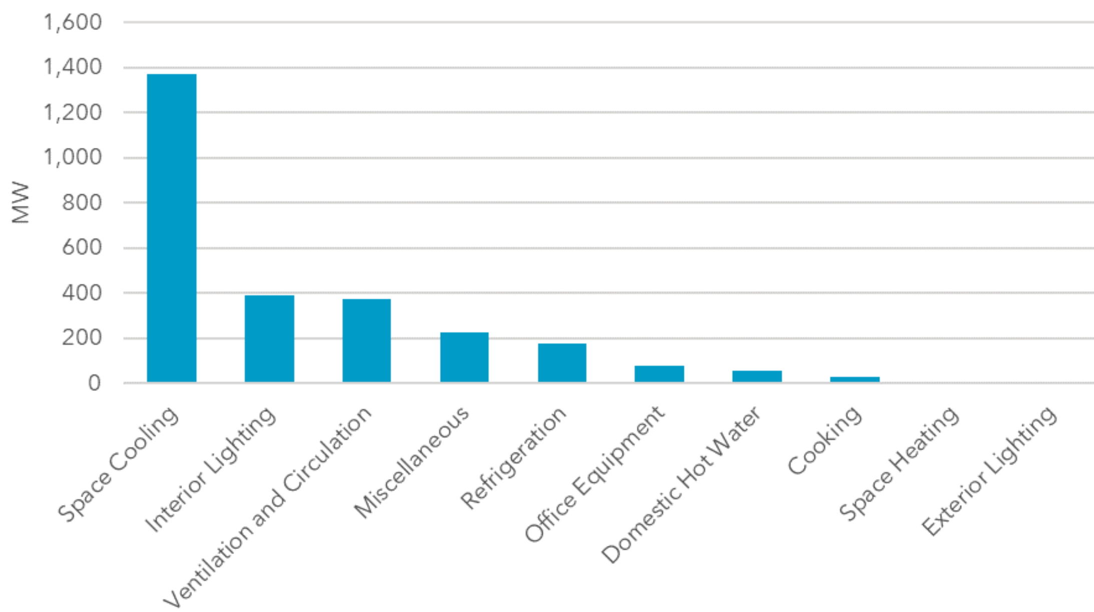


Figure 15: Commercial EE Technical Potential by End-Use (Winter Peak Savings)

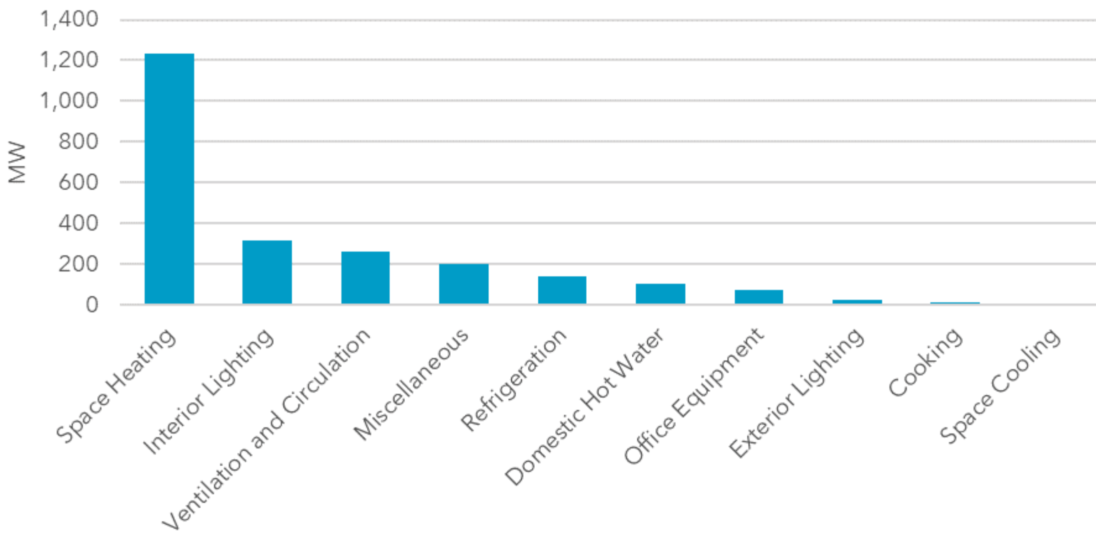
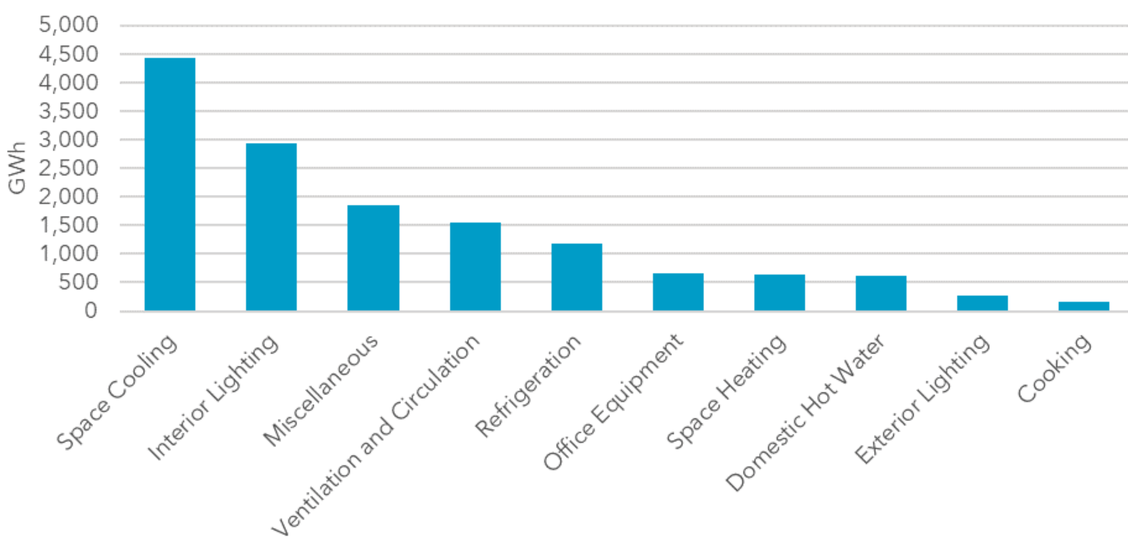



Figure 16: Commercial EE Technical Potential by End-Use (Energy Savings)




### 5.2.3.2 Industrial Segments

Figure 17, Figure 18, and Figure 19 summarize the industrial sector EE technical potential by end-use.

**Figure 17: Industrial EE Technical Potential by End-Use (Summer Peak Savings)**

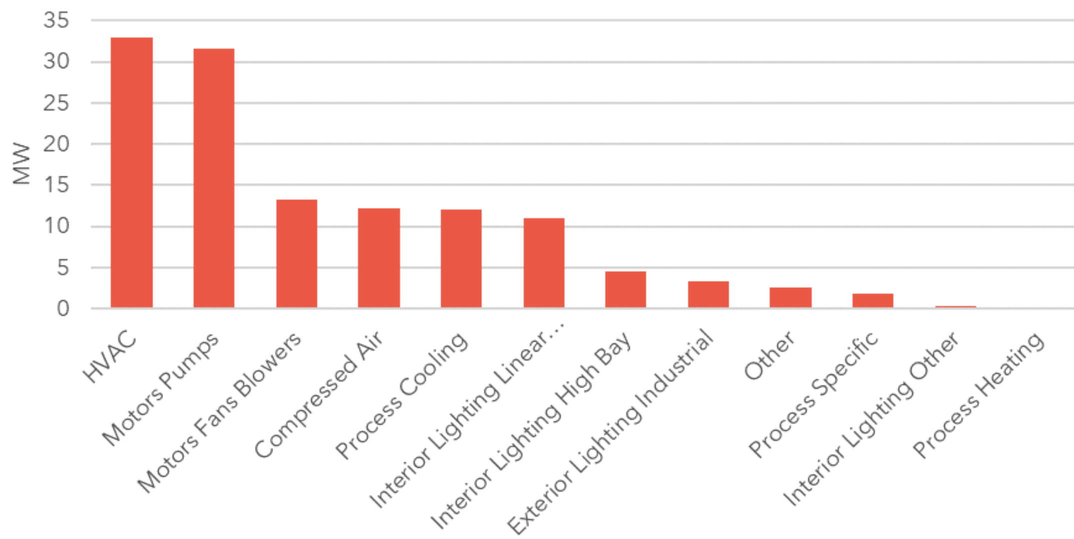



**Figure 18: Industrial EE Technical Potential by End-Use (Winter Peak Savings)**

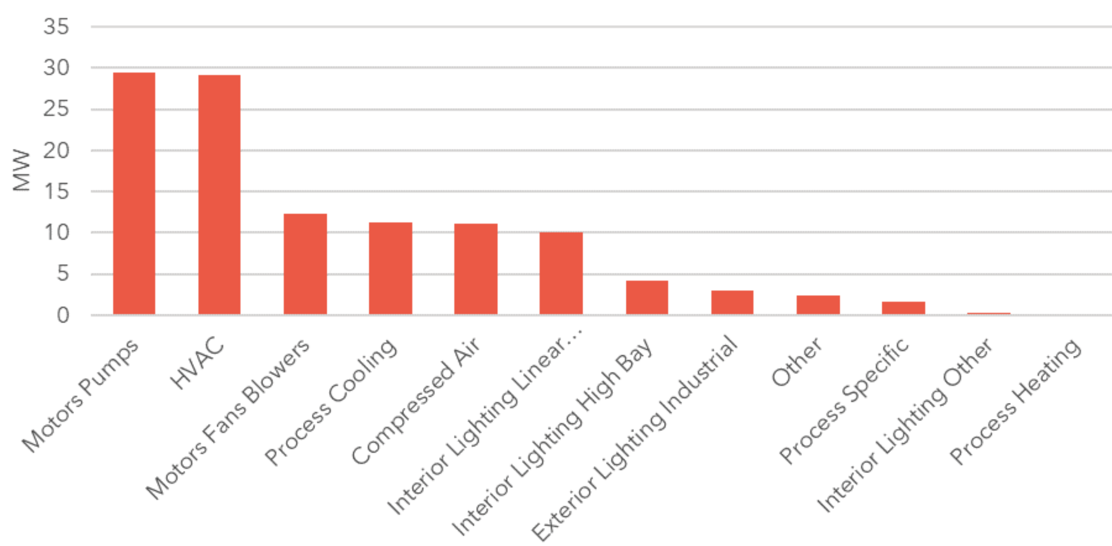
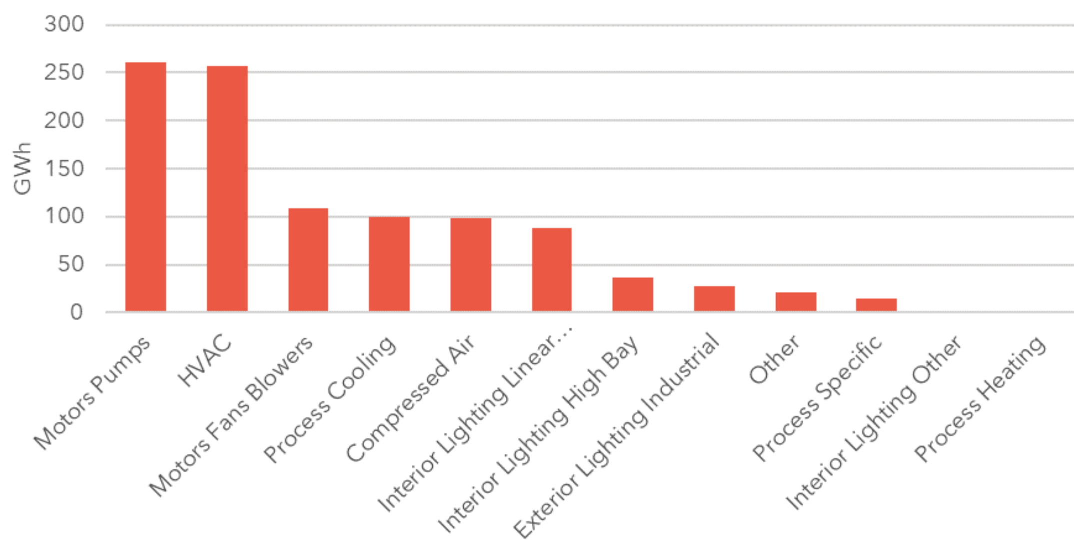


Figure 19: Industrial EE Technical Potential by End-Use (Energy Savings)




## 5.3 DR Technical Potential

Technical potential for DR is defined for each class of customers as follows:

- Residential & Small C&I customers – Technical potential is equal to the aggregate load for all end-uses that can participate in FPL's current programs plus DR measures not currently offered in which the utility uses specialized devices to control loads (*i.e.,* direct load control programs). This includes cooling and heating loads for residential and small C&I customers and water heater and pool pump loads for residential customers. Not all demand reductions are delivered via direct load control of end-uses. The magnitude of demand reductions from non-direct load control such as time varying pricing, peak time rebates and targeted notifications is linked to cooling and heating loads.
- Large C&I customers – Technical potential is equal to the total amount of load for each customer segment (*i.e.*, that customers reduce their total load to zero when called upon).

Table 10 summarizes the seasonal DR technical potential by sector:

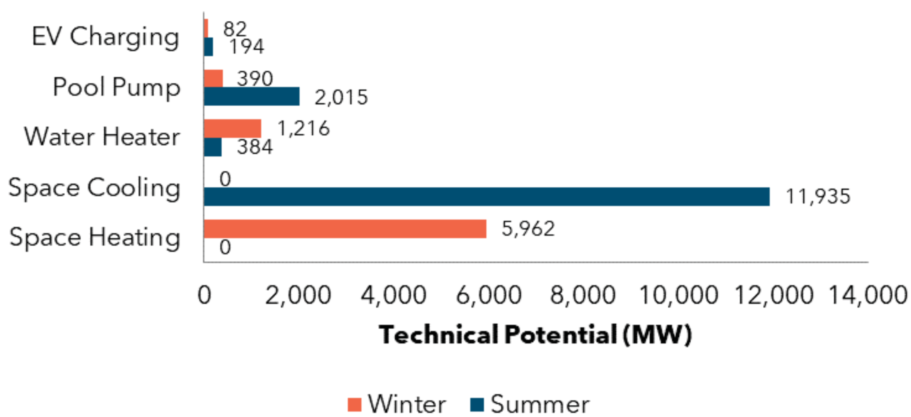
Table 10. DR Technical Potential

| | Savings Potential | |
|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) |
| **Residential** | 14,527 | 7,650 |
| **Non-Residential** | 8,741 | 8,460 |
| **Total** | 23,268 | 16,110 |

## 5.3.1 Residential

Residential technical potential is summarized in Figure 20.

Figure 20: Residential DR Technical Potential by End-Use

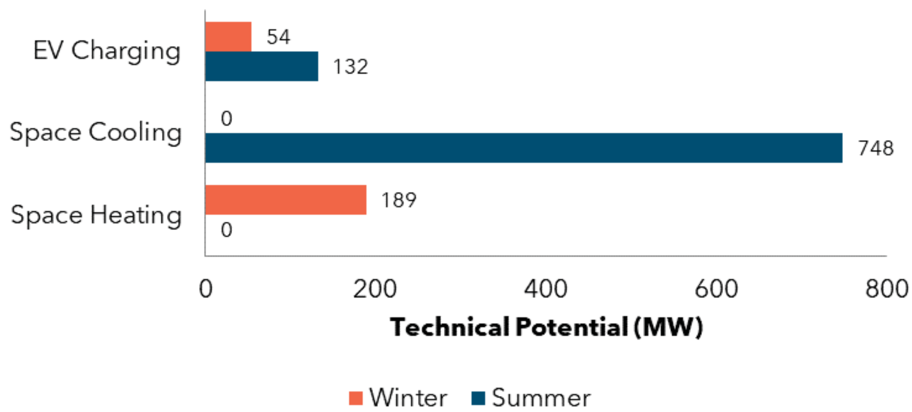



## 5.3.2 Non-Residential

### 5.3.2.1 Small C&I Customers

For small C&I technical potential, Resource Innovations looked at cooling and heating loads only. Small C&I technical potential is provided in Figure 21.

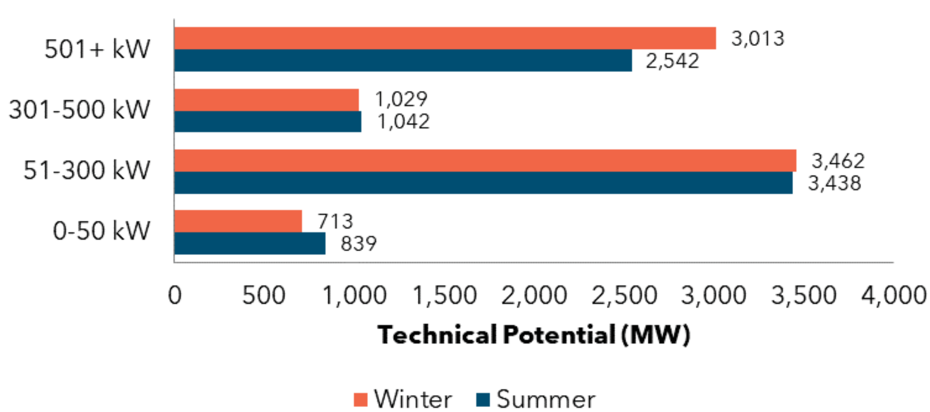
**Figure 21: Small C&I DR Technical Potential by End-Use**




#### 5.3.2.2 Large C&I Customers

Figure 22 provides the technical potential for large C&I customers, broken down by customer size.

**Figure 22: Large C&I DR Technical Potential by Segment**




## 5.4 DSRE Technical Potential

Table 11 provides the results of the DSRE technical potential for each customer segment:

Table 11. DSRE Technical Potential[7]

| | Savings Potential | | |
|---|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) | Energy (GWh) |
| **PV Systems** | | | |
| **Residential** | 9,142 | 1,438 | 71,354 |
| **Non-Residential** | 2,699 | 196 | 18,926 |
| **Total** | 11,841 | 1,634 | 90,280 |
| **Battery Storage charged from PV Systems** | | | |
| **Residential** | 1,456 | 4,811 | 0 |
| **Non-Residential** | 379 | 1,013 | 0 |
| **Total** | 1,835 | 5,824 | 0 |
| **CHP Systems** | | | |
| **Total** | 1,857 | 979 | 8,171 |

[7] PV systems and CHP systems were independently analyzed for technical potential without consideration of the competition between technologies or customer preference for DSRE system.

# Appendix A EE Measure List

For information on how Resource Innovations developed this list, please see Section 4.

**Table 12: Residential EE Measures**

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| 120v Heat Pump Water Heater 50 Gallons | Residential Domestic Hot Water | 120v Heat Pump Water Heater 50 Gallons | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Air Sealing-Infiltration Control | Residential Space Cooling, Residential Space Heating | Standard Heating and Cooling System with Improved Infiltration Control | Standard Heating and Cooling System with Standard Infiltration Control |
| Air-to-Water Heat Pump | Residential Space Cooling, Residential Space Heating | Energy Star Air-to-Water Heat Pump, 25 SEER, 13 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - 15 SEER/14.3 SEER2 from base electric resistance | Residential Space Cooling, Residential Space Heating | ASHP 15 SEER from base electric resistance | Base AC, 15 SEER, Electric resistance heating |
| ASHP - 24 SEER/22.9 SEER2 (from elec resistance) | Residential Space Cooling, Residential Space Heating | ASHP: 24/22.9 SEER/SEER2, 10.5 HSPF | Base AC, 15 SEER, Electric resistance heating |
| ASHP - 24 SEER/22.9 SEER2, 10.5 HSPF | Residential Space Cooling, Residential Space Heating | ASHP: 24/22.9 SEER/SEER2, 10.5 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - CEE Advanced Tier: 17.8 SEER/17 SEER2; 10.0 HSPF | Residential Space Cooling, Residential Space Heating | CEE Advanced Tier ASHP:17.8/17 SEER/SEER2; 10.0 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - CEE Advanced Tier: 17.8 SEER/17 SEER2; 10.0 HSPF (from elec resistance) | Residential Space Cooling, Residential Space Heating | CEE Advanced Tier ASHP:17.8/17 SEER/SEER2; 10.0 HSPF | Base AC, 15 SEER, Electric resistance heating |
| ASHP - CEE Tier 2: 16.8 SEER/16 SEER2; 9.0 HSPF | Residential Space Cooling, Residential Space Heating | CEE Tier 2 ASHP: 16.8/16 SEER/SEER2; 9.0 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - CEE Tier 2: 16.8 SEER/16 SEER2; 9.0 HSPF | Residential Space Cooling, | CEE Tier 2 ASHP: 16.8/16 SEER/SEER2; 9.0 HSPF | Base AC, 15 SEER, Electric resistance heating |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| (from elec resistance) | Residential Space Heating | | |
| ASHP - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 (from elect resistance) | Residential Space Cooling, Residential Space Heating | ENERGY STAR/CEE Tier 1 ASHP: 16/15.2 SEER/SEER2, 9.0 HSPF | Base AC, 15 SEER, Electric resistance heating |
| ASHP - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2, 9.0 HSPF | Residential Space Cooling, Residential Space Heating | ENERGY STAR/CEE Tier 1 ASHP: 16/15.2 SEER/SEER2, 9.0 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| Basement or Crawlspace Wall Insulation R-15 | Residential Space Cooling, Residential Space Heating | Increased Basement or Crawlspace Wall Insulation (R-15) | Code-Compliant Exterior Below-Grade Wall Insulation (R-10) |
| Bathroom Faucet Aerators | Residential Domestic Hot Water | Low-Flow Faucet Aerator with Flow Rate of 1.5 gpm | Faucet Aerator with Federal Standard Flow Rate of 2.2 gpm |
| CEE Advanced Tier Clothes Dryer | Clothes Dryers | CEE Advanced Tier Clothes Dryer | One Clothes Dryer meeting Federal Standard |
| CEE Advanced Tier Clothes Washer | Clothes Washers | Tier 3 CEE Clothes washer | One Clothes Washer meeting Federal Standard |
| CEE Tier 3 Refrigerator | Refrigerators | Residential Tier 3 Refrigerator | One Refrigerator meeting Federal Standard |
| Ceiling Insulation (R11 to R30) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-1985) homes, bring to current code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R11 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-1985) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R11 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-1985) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R19 to R30) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-2020) homes, bring to current code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R19 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-2020) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R19 to R49) | Residential Space Cooling, | Blown-in insulation in ceiling cavity/attic, existing (1982-2020) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| | Residential Space Heating | | |
| Ceiling Insulation (R2 to R30) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, older (pre-1982) homes, bring to current code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R2 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, older (pre-1982) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R2 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, older (pre-1982) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R30 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1986-2020) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R30 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1986-2020) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R38 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1986-2020) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Central AC - CEE Tier 2: 16.8 SEER/16 SEER2 | Residential Space Cooling | Central AC - CEE Tier 2: 16.8 SEER/16 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC - 24 SEER/22.9 SEER2 | Residential Space Cooling | Central AC - 24 SEER/22.9 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC - CEE Advanced Tier: 17.8 SEER/17 SEER2 | Residential Space Cooling | Central AC - CEE Advanced Tier: 17.8 SEER/17 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 | Residential Space Cooling | Central AC - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC Tune Up | Residential Space Cooling | System tune-up, including coil cleaning, refrigerant charging, and other diagnostics | Existing Typical Central AC without Regular Maintenance/tune-up |
| Dehumidifier Recycling | Plug Load | No dehumidifier | One Dehumidifier meeting Federal Standard |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Drain Water Heat Recovery | Residential Domestic Hot Water | 50 Gallon Electric Resistance Heater and Drain Water Heat Exchanger | 50 Gallon Electric Resistance Heater, No Drain Water Heat Recovery |
| Duct Insulation | Residential Space Cooling, Residential Space Heating | Standard Electric Heating and Central AC with Insulated Ductwork | Standard Electric Heating and Central AC with Uninsulated Ductwork |
| Duct Repair | Residential Space Cooling, Residential Space Heating | Duct Repair to eliminate/minimize leaks, includes testing and sealing | Standard Electric Heating and Central AC with typical duct leakage |
| ECM Circulator Pump | Residential Miscellaneous | Install ECM Circulator Pump | Install Standard Circulator Pump |
| Energy Star Air Purifier | Plug Load | One Air Purifier meeting ENERGY STAR 2.0 Standards | One Standard Conventional Air Purifier |
| Energy Star Audio-Video Equipment | Plug Load | One DVD/Blu-Ray Player meeting current ENERGY STAR Standards | One Market Average DVD/Blu-Ray Player |
| Energy Star Bathroom Ventilating Fan | Residential Ventilation and Circulation | Bathroom Exhaust Fan meeting current ENERGY STAR Standards | Bathroom Exhaust Fan meeting Federal Standard |
| Energy Star Ceiling Fan | Residential Miscellaneous | 60" Ceiling Fan Meeting ENERGY STAR 3.1 Standards | Standard 60" Ceiling Fan |
| Energy Star Clothes Dryer | Clothes Dryers | One Electric Resistance Clothes Dryer meeting ENERGY STAR 1.1 Standards | One Clothes Dryer meeting Federal Standard |
| Energy Star Clothes Washer | Clothes Washers | One Clothes Washer meeting ENERGY STAR 8.1 Standards | One Clothes Washer meeting Federal Standard |
| Energy Star Dehumidifier | Plug Load | One Dehumidifier meeting ENERGY STAR 5.0 Standards | One Dehumidifier meeting Federal Standard |
| Energy Star Dishwasher | Dishwashers | One Dishwasher meeting ENERGY STAR 7.0 Requirements (effective on July 19, 2023), electric water heating | One Dishwasher meeting Federal Standard |
| Energy Star Dishwasher (Gas Water Heating) | Dishwashers | One Dishwasher meeting ENERGY STAR 7.0 Requirements, gas water heating | One Dishwasher meeting Federal Standard; gas water heating |
| Energy Star Door | Residential Space Cooling, Residential Space Heating | 100ft2 of Opaque Door meeting Energy Star Version 6.0 Requirements (U-Value: 0.17) | 100ft2 of Opaque Door meeting current FL Code Requirements |
| ENERGY STAR EV supply equipment (level 2 charger) | Residential Miscellaneous | Level 2 Electric Vehicle Supply Equipment (EVSE) | Level 1 Electric Vehicle Supply Equipment (EVSE) |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Energy Star Freezer | Freezers | One Freezer meeting current ENERGY STAR 5.1 Standards | One Freezer meeting Federal Standard |
| Energy Star Ground Source Heat Pump | Residential Space Cooling, Residential Space Heating | Energy Star GSHP, 17.1 SEER, 12 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF |
| Energy Star Imaging Equipment | Plug Load | One imaging device meeting current ENERGY STAR Standards | One non-ENERGY STAR imaging device |
| Energy Star Monitor | Plug Load | One Monitor meeting ENERGY STAR 8.0 Standards | One Standard Monitor |
| Energy Star Personal Computer | Plug Load | One Personal Computer meeting ENERGY STAR 8.0 Standards | One Personal Computer meeting ENERGY STARÂ® 3.0 Standards |
| Energy Star Refrigerator | Refrigerators | One Refrigerator/Freezer meeting ENERGY STAR 5.1 Standards | One Refrigerator/Freezer meeting Federal Standard |
| Energy Star Room AC | Residential Space Cooling | Room AC meeting current ENERGY STAR standards | Code-Compliant Room AC |
| Energy Star Set-Top Receiver | Plug Load | One Set-top Box meeting ENERGY STAR 4.1 Standards | One Market Average Set-top Box |
| Energy Star TV | Plug Load | One Television meeting ENERGY STAR 9.0 Standards | One non-ENERGY STAR Television |
| Energy Star Windows | Residential Space Cooling, Residential Space Heating | 100ft2 of Window meeting Energy Star Version 6.0 Requirements (U-Value: 0.27, SHGC: 0.21) | 100ft2 of Window current FL energy code requirements |
| Exterior Wall Insulation | Residential Space Cooling, Residential Space Heating | Increased Exterior Above-Grade Wall Insulation (R-13) | Market Average Existing Exterior Above-Grade Wall Insulation |
| Filter Whistle | Residential Ventilation and Circulation | Install the Furnace Filter Alarm | No Furnace Filter Alarm on a Central Forced-Air Furnace |
| Floor Insulation | Residential Space Heating | Increased Floor Insulation (R-30) | Code-Compliant Floor Insulation |
| Freezer Recycling | Freezers | No Freezer | Current Market Freezer |
| Green Roof | Residential Space Cooling | Vegetated Roof Surface on top of Standard Roof | Standard Black Roof |
| Heat Pump Clothes Dryer | Clothes Dryers | One Heat Pump Clothes Dryer | One Clothes Dryer meeting Federal Standard |
| Heat Pump Pool Heater | Residential Miscellaneous | Heat Pump Swimming Pool Heater | Electric Resistance Swimming Pool Heater |
| Heat Pump Tune Up | Residential Space Cooling, Residential Space Heating | System tune-up, including coil cleaning, refrigerant charging, and other diagnostics | Standard Heating and Cooling System without Regular Maintenance/tune-up |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Heat Pump Water Heater 50 Gallons-CEE Advanced Tier | Residential Domestic Hot Water | CEE Advanced Tier Heat Pump Water Heater 50 Gallons | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Heat Pump Water Heater 50 Gallons-ENERGY STAR | Residential Domestic Hot Water | Heat Pump Water Heater 50 Gallons | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Heat Pump Water Heater 80 Gallons-ENERGY STAR | Residential Domestic Hot Water | Energy Star Heat Pump Water Heater 80 Gallons | Code-Compliant 80 Gallon Electric Resistance Water Heater |
| Heat Trap | Residential Domestic Hot Water | Heat Trap | Existing Water Heater without heat trap |
| High Efficiency Convection Oven | Residential Cooking | One Full-Size Convection Oven meeting ENERGY STAR 3.0 Standards | One Standard Economy-Grade Full-Size Oven |
| High Efficiency Induction Cooktop | Residential Cooking | One residential induction cooktop | One standard residential electric cooktop |
| Home Energy Management System | Lighting, Plug Load, Residential Space Cooling, Residential Space Heating | Typical HVAC by Building Type Controlled by Energy Management System | Typical HVAC by Building Type, Manually Controlled |
| Hot Water Pipe Insulation | Residential Domestic Hot Water | 1' of Insulated Pipe in Unconditioned Spaces, Insulation of R-5 | 1' of Pipe in Unconditioned Spaces with Code Minimum of 1"of Insulation |
| HVAC ECM Motor | Residential Ventilation and Circulation | A brushless permanent magnet (ECM) blower motor for electric furnace | Permanent Split Capacitor Motor for Electric Furnace |
| HVAC Economizer | Residential Space Cooling | Install residential economizer | No economizer |
| HVAC Zoning System | Residential Space Cooling, Residential Space Heating | Install dampers in the ducts, dividing home into multiple zones, each controlled by its own thermostat | Single zone HVAC system |
| Indoor Daylight Sensor | Lighting | Install Indoor Daylight Sensors, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Induction Range | Residential Cooking | Residential induction range | Electric range |
| Instantaneous Hot Water System | Residential Domestic Hot Water | Instantaneous Hot Water System | Standard Efficiency Storage Tank Water Heater |
| Kitchen Faucet Aerators | Residential Domestic Hot Water | Low-Flow Faucet Aerator with Flow Rate of 1.5 gpm | Faucet Aerator with Federal Standard Flow Rate of 2.2 gpm |
| LED - 9W_CFL Baseline | Lighting | LED (assume 9W) replacing CFL baseline lamp | 14W CFL (60W equivalent) |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| LED - 9W_Halogen Baseline | Lighting | LED (assume 9W) replacing EISA-2020 compliant baseline lamp | EISA-2020 compliant baseline lamp (60W equivalent) |
| LED Specialty Lamps-5W Chandelier | Lighting | 5 W Chandelier LED | Standard incandescent chandelier lamp |
| Linear LED | Lighting | Linear LED Lamps in Linear Fluorescent Fixture | Standard (32w) T8 lamps in Linear Fluorescent Fixture |
| Low Flow Showerhead | Residential Domestic Hot Water | Low-Flow Handheld Showerhead, Flow Rate: 1.60 gpm | Standard Handheld Showerhead, Flow Rate: 2.50 gpm |
| New Construction - Whole Home Improvements - Tier 1 | Whole Home | Performance-based improvements in new homes - 20% savings | Residential New Construction (Baseline Efficiency) |
| New Construction - Whole Home Improvements - Tier 2 | Whole Home | Performance-based improvements in new homes - 35% savings | Residential New Construction (Baseline Efficiency) |
| Occupancy Sensors Switch Mounted | Lighting | Switch Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor Lighting Timer | Lighting | Timer on Outdoor Lighting, Controlling 120 Watts | 120 Watts of Lighting, Manually Controlled |
| Outdoor Motion Sensor | Lighting | Motion Sensor on Outdoor Lighting, Controlling 120 Watts | 120 Watts of Lighting, Manually Controlled |
| Ozone Laundry | Clothes Washers | Add a New, Single-Unit Ozone Laundry System to the Clothes Washer | One Clothes Washer meeting Federal Standard |
| Programmable Thermostat | Residential Space Cooling, Residential Space Heating | Standard Heating and Cooling System with Programmable Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Properly Sized CAC | Residential Space Cooling | Properly Sized Central Air Conditioning | Standard Central Air Conditioning, Oversized |
| Radiant Barrier | Residential Space Cooling | Radiant Barrier | No radiant barrier |
| Reflective Roof | Residential Space Cooling | Reflective Roof Treatment | Standard dark shingle |
| Refrigerator Coil Cleaning | Refrigerators | Refrigerator Coil Cleaning | |
| Refrigerator Recycling | Refrigerators | No Refrigerator | Current Market Average Refrigerator |
| Residential Whole House Fan | Residential Space Cooling | Standard Central Air Conditioning with Whole House Fan | Standard Central Air Conditioning, No Whole House Fan |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Sealed crawlspace | Residential Space Cooling, Residential Space Heating | Encapsulated and semi-conditioned crawlspace | Naturally vented, unconditioned crawlspace |
| Smart Breaker | Whole Home | Smart Breaker | standard electric breakers |
| Smart Panel | Whole Home | Multi-channel device that attaches to customer's circuit breaker to enable monitoring and control of major end-use appliances by customer | standard electric panel |
| Smart Power Strip | Plug Load | Smart plug strips for entertainment centers and home office | Standard entertainment center or home office usage, no smart strip controls |
| Smart Thermostat | Residential Space Cooling, Residential Space Heating | Standard Heating and Cooling System with Smart Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Solar Attic Fan | Residential Space Cooling | Standard Central Air Conditioning with Solar Attic Fan | Standard Central Air Conditioning, No Solar Attic Fan |
| Solar Pool Heater | Residential Miscellaneous | Solar Swimming Pool Heater | Electric Resistance Swimming Pool Heater |
| Solar Powered Pool Pumps | Residential Miscellaneous | Solar Powered Pool Pump | Variable Speed Pool Pump Motor |
| Solar Thermal Water Heating System | Residential Domestic Hot Water | Solar Thermal System with Electric Backup | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Spray Foam Insulation (Base R11) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in existing (1982-1985) homes | Existing ceiling insulation based on building code at time of construction |
| Spray Foam Insulation (Base R19) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in existing (1982-1985) homes | Existing ceiling insulation based on building code at time of construction |
| Spray Foam Insulation (Base R2) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in older (pre-1982) homes | Existing ceiling insulation based on building code at time of construction |
| Spray Foam Insulation (Base R30) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in existing (1986-2020) homes | Existing ceiling insulation based on building code at time of construction |
| Thermostatic Shower Restriction Valve | Residential Domestic Hot Water | 50 Gallon Electric Resistance Heater and Thermostatic Shower Valves | 50 Gallon Electric Resistance Heater and Standard Shower Valves |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Variable Refrigerant Flow (VRF) HVAC Systems | Residential Space Cooling, Residential Space Heating | Variable Refrigerant Flow (VRF) HVAC Systems | Code-Compliant ASHP, 15 SEER, 8.8 HSPF |
| Water Heater Blanket | Residential Domestic Hot Water | 50 Gallon Electric Resistance Water Heater with Insulated Tank Wrap | Code-Compliant 50 Gallon Electric Resistance Water Heater, No Tank Wrap |
| Water Heater Thermostat Setback | Residential Domestic Hot Water | 50 Gallon Electric Resistance Water Heater with Temperature Setpoint of 119°F | Code-Compliant 50 Gallon Electric Resistance Water Heater (Temp. Setpoint = 130Â°F) |
| Water Heater Timeclock | Residential Domestic Hot Water | Water Heater Timeclock | Existing Water Heater without time clock |
| Weather stripping | Residential Space Cooling, Residential Space Heating | Specific quantity of weather stripping to seal | |
| Window Caulking | Residential Space Cooling, Residential Space Heating | Window caulking | |
| Window Sun Protection | Residential Space Cooling | Window Film Applied to Standard Window | Standard Window with below Code Required Minimum SHGC |

**Table 13: Commercial EE Measures**

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| 1.5HP Open Drip-Proof (ODP) Motor | Ventilation and Circulation | High Efficiency 1.5 HP Open-Drip Proof Motor | 1.5HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 10HP Open Drip-Proof (ODP) Motor | Ventilation and Circulation | High Efficiency 10 HP Open-Drip Proof Motor | 10HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 20HP Open Drip-Proof (ODP) Motor | Ventilation and Circulation | High Efficiency 20 HP Open-Drip Proof Motor | 20HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| Advanced Rooftop Controller | Ventilation and Circulation | Advanced Rooftop Controller | Without Advanced Rooftop Controller |
| Air Compressor Optimization | Miscellaneous | Performing Routine Maintenance on 20HP Inlet Modulation Fixed-Speed Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Air Curtains | Space Cooling, Space Heating | Air Curtain across door opening | Door opening with no air curtain |
| Airside Economizer | Space Cooling | Airside Economizer | No economizer |
| Anti-Sweat Controls | Refrigeration | One Medium Temperature Reach-In Case with Anti-Sweat Heater Controls | One Medium Temperature Reach-In Case without Anti-Sweat Heater Controls |
| Auto Off Time Switch | Interior Lighting | Auto-Off Time Switch on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Automatic Door Closer for Walk-in Coolers and Freezers | Refrigeration | One Medium Temperature Walk-In Refrigerator Door with Auto-Closer | One Medium Temperature Walk-In Refrigerator Door without Auto-Closer |
| Beverage Vending Machine Controls | Refrigeration | One non-ENERGY STAR beverage vending machine equipped with infrared occupancy sensing controls | One non-ENERGY STAR beverage vending machine, no controls |
| Bi-Level Lighting Control (Exterior) | Exterior Lighting | Bi-Level Controls on Exterior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Bi-Level Lighting Control (Interior) | Interior Lighting | Bi-Level Controls on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Ceiling Insulation (R19 to R30) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation (R19 to R38) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation (R19 to R49) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic - Beyond Code | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation (R2 to R30) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation (R2 to R38) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation (R2 to R49) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic - Beyond Code | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Chilled Water Reset | Space Cooling | One Chiller with Reset of Chilled Water Temperature Setpoint | One Chiller with Fixed Chilled Water Temperature |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Chiller maintenance | Space Cooling | O&M improvements to restore chiller performance | |
| CO Sensors for Parking Garage Exhaust | Miscellaneous | Enclosed Parking Garage Exhaust with CO Control | Constant Volume Enclosed Parking Garage Exhaust |
| Commercial Duct Sealing | Space Cooling, Space Heating | Standard Electric Heating and Central AC with Improved Duct Sealing | Standard Electric Heating and Central AC, Standard Duct Sealing |
| Commercial Strategic Energy Management | Whole Building | Commercial Strategic Energy Management | No active energy management |
| Custom measure - Non-lighting | Space Cooling, Space Heating | Custom Improvement to Facility's Operations | Baseline Technology/Process |
| Data Center Hot Cold Aisle | Office Equipment | Equipment configuration that saves HVAC | No hot, cold aisle containment |
| Dedicated Outside Air System (DOAS) | Space Cooling, Space Heating | Install Dedicated Outside Air System (DOAS) | Typical HVAC by Building Type |
| Demand Controlled Circulating Systems | Domestic Hot Water | Recirculation Pump with Demand Control Mechanism | Uncontrolled Recirculation Pump |
| Demand Controlled Ventilation | Ventilation and Circulation | Return Air System with CO2 Sensors | Standard Return Air System, No Sensors |
| Demand Defrost | Refrigeration | Walk-In Freezer System with Demand-Controlled Electric Defrost Cycle | Walk-In Freezer System with Timer-Controlled Electric Defrost Cycle |
| Destratification Fans | Space Heating | Destratification Fans improve temperature distribution by circulating warmer air from the ceiling back down to the floor level | No destratification fan |
| Door Gasket (Cooler) | Refrigeration | New Door Gasket on One-Door Medium Temperature Reach-In Case | Worn or Damaged Door Gasket on One-Door Medium Temperature Reach-In Case |
| Door Gasket (Freezer) | Refrigeration | New Door Gasket on One-Door Medium Temperature Reach-In Case | Worn or Damaged Door Gasket on One-Door Medium Temperature Reach-In Case |
| Drain water heat recovery | Domestic Hot Water | Hot Water Loop with 50 Gallon Electric Resistance Heater and Drain Water Heat Exchanger | Standard Hot Water Loop with 50 Gallon Electric Resistance Heater, No Drain Water Heat Recovery |
| Dual Enthalpy Economizer | Ventilation and Circulation | Standard HVAC Unit with an economizer and dual enthalpy differential control | HVAC unit with no economizer or with a non-functional disabled economizer |
| Duct Insulation | Space Cooling, Space Heating | Standard Electric Heating and Central AC with Insulated Ductwork (R-8) | Standard Electric Heating and Central AC with Uninsulated Ductwork (R-4) |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Ductless Mini-Split AC | Space Cooling | Ductless Mini-Split AC, 4 Ton, 16 SEER | Code-Compliant AC Unit, 4 Ton, 15 SEER |
| Ductless Mini-Split HP | Space Cooling, Space Heating | Ductless Mini-Split HP, 17 SEER, 9.5 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF |
| DX Coil Cleaning | Space Cooling | DX Coil Cleaning | DX Coil Not Cleaned |
| ECM Motors on Furnaces | Space Heating | Variable Speed Electronically Commutated Motor for an Electric Furnace | Permanent Split Capacitor Motor for Electric Furnace |
| Efficient Battery Charger | Miscellaneous | Efficient Battery Charger | FR or SCR charging stations with power conversion efficiency < 89% or > 10 W |
| Efficient Exhaust Hood | Cooking | Kitchen ventilation with automatically adjusting fan controls | Kitchen ventilation with constant speed ventilation motor |
| Efficient Motor Belts | Miscellaneous | Synchronous belt, 98% efficiency | Standard V-belt drive |
| Efficient New Construction Lighting | Interior Lighting | Efficient New Construction Lighting, 15% Better than Code | New Construction with Lighting Power Density meeting Code Minimum |
| Energy Recovery Ventilation System (ERV) | Space Cooling | Unitary Cooling Equipment that Incorporates Energy Recovery | Current Market Packaged or Split DX Unit |
| Energy Star Combination Oven | Cooking | Energy Star Combination Oven meeting ENERGY STAR Version 3.0 Standards | One Standard Economy-Grade 10-Pan Combination Oven |
| Energy Star Commercial Clothes Washer | Miscellaneous | One Commercial Clothes Washer meeting current ENERGY STAR Version 8.1 Standards | One Commercial Clothes Washer meeting Federal Standard |
| Energy Star Commercial Dishwasher | Domestic Hot Water | One Commercial Dishwasher meeting ENERGY STAR Version 3.0 Standards | One Dishwasher meeting Federal Standard |
| Energy Star Commercial Glass Door Freezer | Refrigeration | One Glass Door Freezer meeting ENERGY STAR Version 5.0 Standards | One Glass Door Freezer meeting Federal Standards |
| Energy Star Commercial Glass Door Refrigerator | Refrigeration | One Glass Door Refrigerator meeting ENERGY STAR Version 5.0 Standards | One Glass Door Refrigerator meeting Federal Standards |
| Energy Star Commercial Solid Door Freezer | Refrigeration | One Solid Door Freezer meeting ENERGY STAR Version 5.0 Standards | One Solid Door Freezer meeting Federal Standards |
| Energy Star Commercial Solid Door Refrigerator | Refrigeration | One Solid Door Refrigerator meeting ENERGY STAR Version 5.0 Standards | One Solid Door Refrigerator meeting Federal Standards |
| Energy Star convection oven | Cooking | Energy Star convection oven meeting ENERGY STAR Version 3.0 Standards | One Standard Economy-Grade Full-Size Convection Oven |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Energy Star EV Chargers | Miscellaneous | Level 2 Electric Vehicle Supply Equipment (EVSE) | Level 1 Electric Vehicle Supply Equipment (EVSE) |
| Energy Star Fryer | Cooking | One Standard Vat Electric Fryer meeting ENERGY STAR Version 3.0 Standards | One Standard Economy-Grade Standard Vat Electric Fryer |
| Energy Star Griddle | Cooking | One Griddle meeting current ENERGY STAR Version 1.2 Standards | One Conventional Griddle |
| Energy Star Hot Food Holding Cabinet | Cooking | One Hot Food Holding Cabinet meeting current ENERGY STAR Version 2.0 Standards | One Standard Hot Food Holding Cabinet |
| Energy Star Ice Maker | Refrigeration | One Continuous Self-Contained Ice Maker meeting ENERGY STAR Version 3.0 Standards | One Continuous Self-Contained Ice Maker meeting Federal Standard |
| ENERGY STAR Imaging Equipment | Office Equipment | One imaging device meeting current ENERGY STAR Standards | One non-ENERGY STAR imaging device |
| Energy Star LED Directional Lamp | Interior Lighting | Energy Star 7.6W Directional LED lamp | 50W Incandescent lamp |
| Energy Star Monitors | Office Equipment | One Monitor meeting ENERGY STAR 8.0 Standards | One Standard Monitor |
| Energy Star PCs | Office Equipment | One Personal Computer (desktop or laptop) meeting current ENERGY STARÂ® Standards | One non-ENERGY STARÂ® Personal Computer |
| Energy Star room AC | Space Cooling | Room AC meeting current ENERGY STAR standards | Code-Compliant Room AC, 1 Ton, 10.9 CEER |
| Energy Star Servers | Office Equipment | One Server meeting ENERGY STAR 2.0 Standards | One Standard Server |
| Energy Star Steamer | Cooking | One 4-Pan Electric Steamer meeting ENERGY STARÂ® 2.0 Standards | One Standard Economy-Grade 4-Pan Steamer |
| Energy Star Uninterruptable Power Supply | Office Equipment | Standard Desktop Plugged into Energy Star Uninterruptable Power Supply at 25% Load | Standard Desktop Plugged into Average Rotary Uninterruptable Power Supply at 25% Load |
| Energy Star Vending Machine | Refrigeration | One Refrigerated Vending Machine meeting ENERGY STAR Version 4.0 Standards | One Refrigerated Vending Machine meeting ENERGY STARÂ® 1.0 Standards |
| ENERGY STAR Water Cooler | Miscellaneous | One Storage Type Hot/Cold Water Cooler Unit meeting ENERGY STAR Version 3.0 Standards | One Standard Storage Type Hot/Cold Water Cooler Unit |
| Energy Star windows | Space Cooling, Space Heating | 100ft2 of Window meeting Energy Star Version 6.0 Requirements (U-Value: 0.27, SHGC: 0.21) | 100ft2 of Window meeting Energy Star Version 5.0 Requirements (U-Value: 0.3, SHGC: 0.3) |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Engine Block Timer | Miscellaneous | Plug-in timer that activates engine block timer to reduce unnecessary run time | Engine block heater (typically used for backup generators) running continuously |
| Escalator Motor Efficiency Controller | Miscellaneous | Install Escalator Motor Efficiency Controller | Escalator without Motor Efficiency Controller |
| Facility Commissioning | Space Cooling, Space Heating, Ventilation and Circulation | Perform facility commissioning to optimize building operations in new facilities | Standard new construction facility with no commissioning |
| Facility Energy Management System | Space Cooling, Space Heating, Ventilation and Circulation | Typical HVAC by Building Type Controlled by Energy Management System | Standard/manual facility equipment controls |
| Faucet Aerator | Domestic Hot Water | Low-flow lavatory faucet aerator, flow rate: 1.0 gpm | Federal lavatory flow rate standard, 1994, flow rate: 2.2 gpm |
| Floating Head Pressure Controls | Refrigeration | Medium-Temperature Refrigeration System with 5HP Compressor and Adjustable Condenser Head Pressure Control Valve | Medium-Temperature Refrigeration System with 5 HP Compressor without Adjustable Condenser Head Pressure Control Valve |
| Floor Insulation | Space Cooling, Space Heating | Increased Floor Insulation (R-19) | Market Average Existing Floor Insulation |
| Geothermal Heat Pump | Space Cooling, Space Heating | Geothermal Heat Pump | Code-Compliant Air Source Heat Pump |
| Green roof | Space Cooling, Space Heating | Vegetated Roof Surface on top of Standard Roof | Standard Black Roof |
| HE Air Cooled Chiller - All Compressor Types - 100 Tons | Space Cooling | HE Air Cooled Chiller - Air Compressor Types - 100 Tons | Code-Compliant Air Cooled Positive Displacement Chiller, 100 Tons |
| HE DX 11.25-20.0 Tons Elec Heat | Space Cooling, Space Heating | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 11.25-20.0 Tons Other Heat | Space Cooling | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Elect Heat | Space Cooling, Space Heating | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Other Heat | Space Cooling | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX Less than 5.4 Tons Elect Heat | Space Cooling, Space Heating | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| HE DX Less than 5.4 Tons Other Heat | Space Cooling | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE Water Cooled Chiller - Centrifugal Compressor - 200 Tons | Space Cooling | Water Cooled Centrifugal Chiller with Integral VFD, 200 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 200 Tons |
| HE Water Cooled Chiller - Centrifugal Compressor - 500 Tons | Space Cooling | Water Cooled Centrifugal Chiller with Integral VFD, 500 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 500 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 175 Tons | Space Cooling | Water Cooled Positive Displacement Chiller with Integral VFD, 175 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 175 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 50 Tons | Space Cooling | Water Cooled Positive Displacement Chiller with Integral VFD, 50 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 50 Tons |
| Heat Pump Pool Heater Commercial | Miscellaneous | High Efficiency Pool Heater Eff. >=84% | Standard Efficiency Pool Heater 78% Eff. |
| Heat Pump Water Heater | Domestic Hot Water | Efficient 50 Gallon Electric Heat Pump Water Heater | Code-Compliant 50 Gallon Electric Heat Pump Water Heater |
| High Efficiency Air Compressor | Miscellaneous | 20 HP VFD Air Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| High Efficiency Data Center Cooling | Space Cooling | High Efficiency CRAC (computer room air conditioner) | Standard Efficiency CRAC |
| High Efficiency PTAC | Space Cooling | High Efficiency PTAC | Code-Compliant PTAC |
| High Efficiency PTHP | Space Cooling, Space Heating | High Efficiency PTHP | Code-Compliant PTHP |
| High Efficiency Refrigeration Compressor_Discus | Refrigeration | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Efficiency Refrigeration Compressor_Scroll | Refrigeration | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Speed Fans | Ventilation and Circulation | High Speed Fan, 24" - 35" Blade Diameter | Standard Speed Fan, 24" - 35" Blade Diameter |
| Hot water pipe insulation | Domestic Hot Water | 1' of Insulated Pipe in Unconditioned Spaces, Insulation of R-4 | 1' of Pipe in Unconditioned Spaces with Code Minimum of 1"of Insulation |
| Hotel Card Energy Control Systems | Space Cooling, Space Heating | Guest Room HVAC Unit Controlled by Hotel-Key-Card | Guest Room HVAC Unit, Manually Controlled by Guest |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| | | Activated Energy Control System | |
| Indoor daylight sensor | Interior Lighting | Install Indoor Daylight Sensors, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Induction Cooktops | Cooking | Efficient Induction Cooktop | One Standard Electric Cooktop |
| Infiltration Reduction - Air Sealing | Space Cooling, Space Heating | Reduced leakage through caulking, weather-stripping | Standard Heating and Cooling System with Moderate Infiltration |
| Instantaneous Hot Water System Commercial | Domestic Hot Water | Instantaneous Hot Water System | Code-Compliant Electric Storage Water Heater |
| LED - 14W_CFL Baseline | Interior Lighting | LED (assume 14W) replacing CFL | 100W equivalent CFL |
| LED - 9W Flood_CFL Baseline | Exterior Lighting | LED (assume 9W) replacing CFL | 14W CFL |
| LED Canopy Lighting (Exterior) | Exterior Lighting | One 67.2W LED Canopy Light | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED Display Lighting (Exterior) | Exterior Lighting | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED Display Lighting (Interior) | Interior Lighting | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED Exit Sign | Interior Lighting | One 5W Single-Sided LED Exit Sign | One 9W Single-Sided CFL Exit Sign |
| LED Exterior Wall Packs | Exterior Lighting | One 35W LED Wall Pack | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED High Bay_HID Baseline | Interior Lighting | One 140W High Bay LED Fixture | Lumen-Equivalent HID High Bay Fixture |
| LED High Bay_LF Baseline | Interior Lighting | One 140W High Bay LED Fixture | Lumen-Equivalent Linear Fluorescent High Bay Fixture |
| LED Linear - Fixture Replacement | Interior Lighting | 2x4 LED Troffer | Lumen-Equivalent 32-Watt T8 Lamp |
| LED Linear - Lamp Replacement | Interior Lighting | Linear LED (16W) | Lumen-Equivalent 32-Watt T8 Lamp |
| LED Parking Lighting | Exterior Lighting | One 160W LED Area Light | Average Lumen Equivalent Exterior HID Area Lighting |
| LEED New Construction Whole Building | Space Cooling, Space Heating | LEED New Construction Whole Building | Comparable facility, code-compliance construction |
| Light Tube | Interior Lighting | One 14" Light Tube, Delivering light to 250 S.F. of Commercial Space | 250 S.F. of Commercial Space Lit by Typical Lighting Strategies |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Low Flow Shower Head | Domestic Hot Water | Low-Flow Handheld Showerhead, Flow Rate: 1.50 gpm | Standard Handheld Showerhead, Flow Rate: 2.50 gpm |
| Low-Flow Pre-Rinse Sprayers | Domestic Hot Water | Low-Flow Pre-Rinse Sprayer with Flow Rate of 1.6 gpm | Pre-Rinse Sprayer with Federal Standard Flow Rate of 2.25 gpm |
| Network PC Power Management | Office Equipment | One computer and monitor attached to centralized energy management system that controls when desktop computers and monitors plugged into a n | One computer and monitor, manually controlled |
| Networked Lighting Controls | Interior Lighting | Install Networked Lighting Controls System on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Controlled either Manually or by Sensor as Specified by Code |
| Night Covers for Display Cases | Refrigeration | One Open Vertical Case with Night Covers | One Existing Open Vertical Case, No Night Covers |
| Occupancy Sensors, Ceiling Mounted | Interior Lighting | Ceiling Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Occupancy Sensors, Switch Mounted | Interior Lighting | Switch Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor Lighting Controls | Exterior Lighting | Install Exterior Photocell Dimming Controls, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor motion sensor | Exterior Lighting | Install Exterior Motion Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Ozone Laundry Commercial | Miscellaneous | Add a new ozone laundry system onto a commercial clothes washer | One commercial clothes washer without ozone laundry system |
| Programmable thermostat | Space Cooling, Space Heating | Pre-set programmable thermostat that replaces manual thermostat | Standard Heating and Cooling System with Manual Thermostat |
| PSC to ECM Evaporator Fan Motor (Reach-In) | Refrigeration | Medium Temperature Reach-In Case with equivalent size Electronically Commutated Evaporator Fan Motor | Medium Temperature Reach-In Case with Permanent Split Capacitor Evaporator Fan Motor |
| PSC to ECM Evaporator Fan Motor (Walk-In, Refrigerator) | Refrigeration | Medium Temperature Walk-In Case with Electronically Commutated Evaporator Fan Motor | Medium Temperature Walk-In Case with Permanent Split Capacitor Evaporator Fan Motor |
| Q-Sync Evaporator Fan Motor | Refrigeration | Medium Temperature Reach-In Case with equivalent size Q-Sync Evaporator Fan Motor | Medium Temperature Reach-In Case with 20W Permanent Split Capacitor Fan Motor |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Reflective Roof Treatment | Space Cooling | Reflective Roof Treatment | Standard Black Roof |
| Refrigerated Display Case LED Lighting | Refrigeration | 60" Refrigerated Case LED Strip | Lumen-Equivalent 32-Watt T8 Fixture |
| Refrigerated Display Case Lighting Controls | Refrigeration | Occupancy Sensors for Refrigerated Case Lighting to reduce run time | Market-Share Weighted Existing Linear Fluorescent Fixture |
| Refrigeration Commissioning | Refrigeration | Commissioned Refrigeration System | Non-Commissioned Refrigeration System |
| Refrigeration Economizer | Refrigeration | Walk-in refrigerator with economizer | Walk-in refrigerator without economizer |
| Regenerative Drive Elevator Motor | Miscellaneous | Regenerative drive produced energy when motor in overhaul condition | Standard motor |
| Retro-Commissioning (Existing Construction) | Space Cooling, Space Heating, Ventilation and Circulation | Perform facility retro-commissioning, including assessment, process improvements, and optimization of energy-consuming equipment and systems | |
| Roof Insulation | Space Cooling, Space Heating | Roof Insulation (built-up roof applicable to flat/low slope roofs) | Code-Compliant Flat Roof |
| Server Virtualization | Office Equipment | 2 Virtual Host Server | 20 Single Application Servers |
| Smart Strip Plug Outlet | Office Equipment | One Smart Strip Plug Outlet | One Standard plug strip/outlet |
| Smart thermostat | Space Cooling, Space Heating | Thermostats that include "smart" features such as occupancy sensors, geo-fencing, multi-zone sensors | Standard Heating and Cooling System with Manual Thermostat |
| Solar Pool Heater Commercial | Miscellaneous | Solar Swimming Pool Heater | Electric Resistance Swimming Pool Heater |
| Solar Powered Pool Pump | Miscellaneous | Solar Powered Pool Pump Motor | Variable Speed Pool Pump Motor |
| Solar Thermal Water Heating System Commercial | Domestic Hot Water | Solar Thermal System with Electric Backup | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Strip Curtains - Freezers | Refrigeration | Walk-in freezer with strip curtains at least 0.06 inches thick covering the entire area of the doorway | Walk-in freezer without strip curtains |
| Strip Curtains - Refrigerators | Refrigeration | Walk-in cooler with strip curtains at least 0.06 inches | Walk-in cooler without strip curtains |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| | | thick covering the entire area of the doorway | |
| Suction Pipe Insulation - Freezers | Refrigeration | Suction Pipe Insulation - Freezers | Uninsulated freezer suction lines |
| Suction Pipe Insulation - Refrigerators | Refrigeration | Suction Pipe Insulation - Refrigerators | Uninsulated refrigeration suction lines |
| Thermal Energy Storage | Space Cooling | Deploy thermal energy storage technology (ice harvester, etc.) to shift load | Code compliant chiller |
| Thermostatic Shower Restriction Valve Commercial | Domestic Hot Water | Hot Water Loop with 50 Gallon Electric Resistance Heater and Pressure Balance Shower Valves | Standard Hot Water Loop with 50 Gallon Electric Resistance Heater and Standard Shower Valves |
| Time Clock Control | Interior Lighting | Time Clock Controlled Lighting, 500 Watts Controlled | 500 Watts of Lighting, Controlled either Manually or by Sensor as Specified by Code |
| Variable Refrigerant Flow (VRF) HVAC Systems | Space Cooling, Space Heating | Variable Refrigerant Flow (VRF) HVAC Systems | Code-Compliant PTHP |
| VAV System | Ventilation and Circulation | Variable Air Volume Distribution System | Constant Air Volume Distribution System |
| VFD on Cooling Tower Fans | Space Cooling | Cooling Tower Fans with VFD Control | Cooling Tower Fans without VFD Control |
| VFD on HVAC Pump | Space Cooling, Space Heating | VFD on HVAC Pump | 7.5 HP HVAC Pump Motor, no VFD Control |
| VSD Controlled Compressor | Refrigeration | Refrigeration System with VSD Control | Refrigeration System with Standard Slide-Valve Control System |
| Wall Insulation | Space Cooling, Space Heating | Increased Exterior Above-Grade Wall Insulation | Market Average Existing Exterior Above-Grade Wall Insulation |
| Warehouse Loading Dock Seals | Space Cooling, Space Heating | Seals to reduce infiltration losses at loading dock | Loading dock with no seals |
| Water Cooled Refrigeration Heat Recovery | Domestic Hot Water | The heat reclaim system transfers waste heat from refrigeration system to space heating or hot water | No heat recovery |
| Water Heater Setback | Domestic Hot Water | A 50 gallon electric hot water tank with a thermostat setting reduced to no lower than 120 degrees. | A 50 gallon electric hot water tank with a thermostat setting that is higher than 120 degrees, typically hot water tanks with settings of 130 degrees or higher. |
| Water source heat pump | Space Cooling, Space Heating | Water Source Heat Pump, 2.5 Tons, 17.4 EER, 4.4 COP | Code-Compliant ASHP |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Waterside Economizer | Space Cooling | Waterside Economizer | No economizer |
| Window shade film | Space Cooling | Window Film with SHGC of 0.35 Applied to Standard Window | Standard Window with below Code Required Minimum SHGC |
| Zero Energy Doors | Refrigeration | Install zero energy doors for a reach-in refrigerated cooler or freezer | Standard vertical reach-in refrigerated cooler or freezer with anti-sweat heaters on the glass surface of the doors |

**Table 14: Industrial EE Measures**

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| 1.5HP Open Drip-Proof (ODP) Motor | Motors Pumps | High Efficiency 1.5 HP Open-Drip Proof Motor | 1.5HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 10HP Open Drip-Proof (ODP) Motor | Motors Pumps | High Efficiency 10 HP Open-Drip Proof Motor | 10HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 20HP Open Drip-Proof (ODP) Motor | Motors Pumps | High Efficiency 20 HP Open-Drip Proof Motor | 20HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 3-phase High Frequency Battery Charger - 1 shift | Other | 3-phase High Frequency Battery Charger | Standard Charger |
| Advanced Rooftop Controller | HVAC | Advanced Rooftop Controller | Without Advanced Rooftop Controller |
| Air Compressor Optimization | Compressed Air | Performing Routine Maintenance on 20HP Inlet Modulation Fixed-Speed Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| Air curtains | HVAC | Air Curtain across door opening | Door opening with no air curtain |
| Airside economizer | HVAC | Airside Economizer | No economizer |
| Auto Closer on Refrigerator Door | Process Cooling | One Medium Temperature Walk-In Refrigerator Door with Auto-Closer | One Medium Temperature Walk-In Refrigerator Door without Auto-Closer |
| Auto Off Time Switch | Interior Lighting High Bay | Auto-Off Time Switch on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Bi-Level Lighting Control (Exterior) | Exterior Lighting Industrial | Install Exterior Bi-Level Lighting Control, 500 Watts Controlled | 500 Watts of Lighting, No Dim Setting |
| Bi-Level Lighting Control (Interior) | Interior Lighting High Bay | Bi-Level Controls on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, No Dim Setting |
| Chilled Water Reset | HVAC | One Chiller with Reset of Chilled Water Temperature Setpoint | One Chiller with Fixed Chilled Water Temperature |
| Cogged Belt on 15hp ODP Motor | Motors Pumps | 15HP ODP Motor with Cogged Belts Installed on Supply and/or Return Air Fans | 15HP ODP Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Cogged Belt on 40hp ODP Motor | Motors Pumps | 40HP ODP Motor with Cogged Belts Installed on Supply and/or Return Air Fans | 40HP ODP Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Compressed Air Desiccant Dryer | Process Specific | heated regenerative desiccant dryer without dew point demand controls | heatless regenerative desiccant dryer without dew point demand controls |
| Compressed Air No-Loss Condensate Drains | Process Specific | Install no-loss condensate drains | Install standard condensate drains |
| Compressed Air Storage Tank | Compressed Air | 20 HP Inlet Modulation Fixed-Speed Compressor with Receiver Tank | 20 HP Inlet Modulation Fixed-Speed Compressor, No Receiver Tank |
| Custom Measure - Non-Lighting | HVAC | Custom Improvement to Facility's Operations | Baseline Technology/Process |
| Dairy Refrigeration Heat Recovery | Other | refrigeration equipment with refrigeration heat recovery tank installed | existing dairy farm with refrigeration equipment and a water heater unit without an RHR unit |
| Dedicated Outside Air System (DOAS) | HVAC | Install Dedicated Outside Air System (DOAS) | Typical HVAC by Building Type |
| Demand Controlled Ventilation | HVAC | Return Air System with CO2 Sensors | Standard Return Air System, No Sensors |
| Demand Defrost | Process Cooling | Walk-In Freezer System with Demand-Controlled Electric Defrost Cycle | Walk-In Freezer System with Timer-Controlled Electric Defrost Cycle |
| Dew Point Sensor Control for Dessicant CA Dryer | Compressed Air | 1000 CFM Heated Desicant Air Dryer with Dew Point Controls | 1000 CFM Modulating Heated Desicant Air Dryer |
| Drip Irrigation Nozzles | Other | Flow Control Nozzles | Standard Irrigation Nozzles |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Dual Enthalpy Economizer | Process Cooling | Standard HVAC Unit with an economizer and dual enthalpy differential control | HVAC unit with no economizer or with a non-functional disabled economizer |
| DX Coil Cleaning | HVAC | DX Coil Cleaning | DX Coil Not Cleaned |
| Efficient Compressed Air Nozzles | Compressed Air | 1/4" Engineered Air Nozzle | 1/4" Open-End Air Nozzle |
| Efficient New Construction Lighting | Interior Lighting High Bay | Efficient New Construction Lighting, 15% Better than Code | New Construction with Lighting Power Density meeting Code Minimum |
| Electric Actuators | Other | Electric Actuator | Pneumatic Actuator |
| Energy Efficient Laboratory Fume Hood | HVAC | Variable Air Volume High Performance Fume Hood | Constant Volume Conventional Bypass Fume Hood |
| Energy Efficient Transformers | Other | Energy Efficient Dry Type Transformer (CSL-3) | Standard Transformer (TP-1) |
| Energy Recovery Ventilation System | HVAC | Unitary Cooling Equipment that Incorporates Energy Recovery | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11.2 EER |
| Energy Star LED Directional Lamp | Interior Lighting Other | Energy Star 7.6W Directional LED lamp | 50W Incandescent lamp |
| Energy Star room ac | HVAC | Room AC meeting current ENERGY STAR standards | Code-Compliant Room AC |
| Energy Star windows | HVAC | 100ft2 of Window meeting Energy Star Version 6.0 Requirements (U-Value: 0.27, SHGC: 0.21) | 100ft2 of Window meeting Energy Star Version 5.0 Requirements (U-Value: 0.3, SHGC: 0.3) |
| Engine Block Timer | Other | An engine block heater operated by an outdoor plug-in timer | An engine block heater that is manually plugged in |
| Facility Commissioning | HVAC | Perform facility commissioning | Comparable facility, no commissioning |
| Facility Energy Management System | HVAC | Typical HVAC by Building Type Controlled by Energy Management System | Typical HVAC by Building Type, Manually Controlled |
| Fan Thermostat Controller | HVAC | Typical HVAC by Building Type with Fan Thermostat Controller Installed | Typical HVAC by Building Type with Programmable Thermostat |
| Floating Head Pressure Controller | Process Cooling | Medium-Temperature Refrigeration System with 5HP Compressor and Adjustable Condenser Head Pressure Control Valve | Medium-Temperature Refrigeration System with 5 HP Compressor without Adjustable Condenser Head Pressure Control Valve |
| Grain Bin Aeration Control System | Process Specific | Grain Storage Fan System with Automatic Controls | Grain Storage Fan System with Manual Controls |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| HE Air Cooled Chiller - All Compressor Types - 100 Tons | HVAC | HE Air Cooled Chiller - All Compressor Types - 100 Tons | Code-Compliant Air Cooled Positive Displacement Chiller, 100 Tons |
| HE Air Cooled Chiller - All Compressor Types - 300 Tons | HVAC | Air Cooled Positive Displacement Chiller with Integral VFD, 300 Tons, 13.7 EER | Code-Compliant Air Cooled Positive Displacement Chiller, 300 Tons, 12.5 EER |
| HE DX 11.25-20.0 Tons Elec Heat | HVAC | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 11.25-20.0 Tons Other Heat | HVAC | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Elect Heat | HVAC | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Other Heat | HVAC | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX Less than 5.4 Tons Elect Heat | HVAC | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE DX Less than 5.4 Tons Other Heat | HVAC | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE Water Cooled Chiller - Centrifugal Compressor - 200 Tons | HVAC | Water Cooled Centrifugal Chiller with Integral VFD, 200 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 200 Tons |
| HE Water Cooled Chiller - Centrifugal Compressor - 500 Tons | HVAC | Water Cooled Centrifugal Chiller with Integral VFD, 500 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 500 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 175 Tons | HVAC | Water Cooled Positive Displacement Chiller with Integral VFD, 175 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 175 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 50 Tons | HVAC | Water Cooled Positive Displacement Chiller with Integral VFD, 50 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 50 Tons |
| High Bay Occupancy | Interior Lighting High Bay | Ceiling Mounted Occupancy Sensor, 800 Watts Controlled | 800 Watts of Lighting, Manually Controlled |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Sensors, Ceiling Mounted | | | |
| High Efficiency Air Compressor | Compressed Air | 20 HP VFD Air Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| High Efficiency Refrigeration Compressor - Discus | Process Cooling | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Efficiency Refrigeration Compressor - Scroll | Process Cooling | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Efficiency Welder | Process Specific | High Efficiency Welder | Standard Welding Practices |
| High Speed Fans | HVAC | High Speed Fan, 24" - 35" Blade Diameter | Standard Speed Fan, 24" - 35" Blade Diameter |
| High Volume Low Speed Fan (HVLS) | Motors Fans Blowers | 20' High Volume Low Speed Fan | Conventional Circulating Fan |
| Indoor Agriculture - LED Grow Lights | Interior Lighting High Bay | LED grow light | 1000W High Pressure Sodium |
| Indoor daylight sensor | Interior Lighting High Bay | Install Indoor Daylight Sensors, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Industrial Duct Sealing | HVAC | Standard Electric Heating and Central AC with Improved Duct Sealing | Standard Electric Heating and Central AC, Standard Duct Sealing |
| Injection Mold and Extruder Barrel Wraps | Other | 2' Diameter, 20' Long Machine Barrel with 1" Insulation | 2' Diameter, 20' Long Machine Barrel with no Insulation |
| Insulated Pellet Dryer Tanks and Ducts | Process Heating | Insulation for Pellet Tank and Duct | Uninsulated Pellet Tank and Duct |
| LED - 14W_CFL Baseline | Interior Lighting Other | LED (assume 14W) replacing CFL | 100W equivalent CFL |
| LED Canopy Lighting (Exterior) | Exterior Lighting Industrial | One 67.2W LED Canopy Light | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED Display Lighting (Exterior) | Exterior Lighting Industrial | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED Display Lighting (Interior) | Interior Lighting Other | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED exit sign | Interior Lighting Other | One 5W Single-Sided LED Exit Sign | One 9W Single-Sided CFL Exit Sign |
| LED Exterior Wall Packs | Exterior Lighting Industrial | One 35W LED Wall Pack | Average Lumen Equivalent Exterior Incandescent Area Lighting |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| LED High Bay_HID Baseline | Interior Lighting High Bay | One 140W High Bay LED Fixture | Lumen-Equivalent HID High Bay Fixture |
| LED High Bay_LF Baseline | Interior Lighting High Bay | One 140W High Bay LED Fixture | Lumen-Equivalent Linear Fluorescent High Bay Fixture |
| LED Linear - Fixture Replacement | Interior Lighting Linear Fluorescent | 2x4 LED Troffer Fixture | Lumen-Equivalent 32-Watt T8 Fixture |
| LED Linear - Lamp Replacement | Interior Lighting Linear Fluorescent | Linear LED | Lumen-Equivalent 32-Watt T8 Lamp |
| LED Parking Lighting | Exterior Lighting Industrial | One 160W LED Area Light | Average Lumen Equivalent Exterior HID Area Lighting |
| LEED New Construction Whole Building | HVAC | LEED Qualifying New Construction | Comparable facility, code-compliance construction |
| Light Tube | Interior Lighting Other | One 14" Light Tube, Delivering light to 250 S.F. of Industrial Space | 250 S.F. of Industrial Space Lit by Typical Lighting Strategies |
| Low Energy Livestock Waterer | Motors Pumps | Install Thermostatically Controlled Livestock Watering System | Standard Livestock Watering System |
| Low Pressure Sprinkler Nozzles | Motors Pumps | Low Pressure Irrigation Nozzles operate at 35 psi or lower | Standard high pressure irrigation nozzles that operate at 50 psi or greater |
| Low Pressure-drop Filters | Compressed Air | 20 HP Inlet Modulation Fixed-Speed Compressor with Low Pressure Drop Filter | 20 HP Inlet Modulation Fixed-Speed Compressor, No Particulate Removal |
| Milk Pre-Cooler | Other | Installed pre-cooler heat exchanger | no pre-cooler heat exchanger installed |
| Networked Lighting Controls | Interior Lighting Linear Fluorescent | Install Networked Lighting Controls System on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Controlled either Manually or by Sensor as Specified by Code |
| Occupancy Sensors, Ceiling Mounted | Interior Lighting High Bay | Ceiling Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Occupancy sensors, switch mounted | Interior Lighting Linear Fluorescent | Switch Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor Lighting Controls | Exterior Lighting Industrial | Install Exterior Photocell Dimming Controls, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor motion sensor | Exterior Lighting Industrial | Install Exterior Motion Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Packaged Terminal AC | HVAC | High Efficiency Packaged Terminal AC | Code-Compliant PTAC, 10.9 EER |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Process Cooling Ventilation Reduction | Process Cooling | Standard Process Cooling with Reduced Ventilation | Standard Process Cooling |
| Programmable thermostat | HVAC | Standard Heating and Cooling System with Programmable Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Reflective Roof Treatment | HVAC | Reflective Roof Treatment | Standard Black Roof |
| Refrigeration Commissioning | Process Cooling | Commissioned Refrigeration System | Non-Commissioned Refrigeration System |
| Retro-Commissioning (Existing Construction) | HVAC | Perform Facility Retro-commissioning | |
| Roof insulation | HVAC | Roof Insulation (built-up roof applicable to flat/low slope roofs) | Code-Compliant Flat Roof |
| Smart thermostat | HVAC | Standard Heating and Cooling System with Smart Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Strategic Energy Management | HVAC | SEM goal setting and tracking | No active energy management |
| Synchronous Belt on 15hp ODP Motor | Motors Pumps | 15 HP Open-Drip Proof Motor with Synchronous Belts Installed on Supply and/or Return Air Fans | 15 HP Open-Drip Proof Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Synchronous Belt on 5hp ODP Motor | Motors Pumps | 5 HP Open-Drip Proof Motor with Synchronous Belts Installed on Supply and/or Return Air Fans | 5 HP Open-Drip Proof Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Synchronous Belt on 75hp ODP Motor | Motors Pumps | 75 HP Open-Drip Proof Motor with Synchronous Belts Installed on Supply and/or Return Air Fans | 75 HP Open-Drip Proof Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Thermal energy storage | HVAC | Deploy thermal energy storage technology (ice harvester, etc.) to shift load | Code compliant chiller |
| Time Clock Control | Interior Lighting High Bay | Time Clock Controlled Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| VAV System | HVAC | Variable Air Volume Distribution System | Constant Air Volume Distribution System |
| VFD on Air Compressor | Compressed Air | 20 HP VFD Air Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| VFD on Cooling Tower Fans | Process Cooling | Cooling Tower Fans with VFD Control | Cooling Tower Fans without VFD Control |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| VFD on HVAC Fan | Motors Fans Blowers | 5 HP HVAC Fan Motor, with VFD Control | 5 HP HVAC Fan Motor, no VFD Control |
| VFD on HVAC Pump | Motors Pumps | VFD on HVAC Pump | 7.5 HP HVAC Pump Motor, no VFD Control |
| VFD on process pump | Motors Pumps | 20 HP Process Pump Equipped with VFD Control | 20 HP Process Pump, Constant Speed |
| VSD Controlled Compressor | Process Cooling | Refrigeration System with VSD Control | Refrigeration System with Standard Slide-Valve Control System |
| Water source heat pump | HVAC | Water Source Heat Pump, 2.5 Tons, 17.4 EER, 4.4 COP | Code-Compliant ASHP |
| Waterside economizer | HVAC | Waterside Economizer | No economizer |
| Window shade film | HVAC | Window Film with SHGC of 0.35 Applied to Standard Window | Standard Window with below Code Required Minimum SHGC |

The following EE measures from the 2019 Technical Potential Study were eliminated from the current study[8]:

Table 15: 2019 EE Measures Eliminated from Current Study

| Sector | Measure | End-Use | Reason for Removal |
|---|---|---|---|
| Residential | CFL – 15W Flood | Lighting | Better technology (LED) available |
| Residential | CFL – 15W Flood (Exterior) | Lighting | Better technology (LED) available |
| Residential | CFL – 13W | Lighting | Better technology (LED) available |
| Residential | CFL – 23W | Lighting | Better technology (LED) available |
| Residential | Low Wattage T8 Fixture | Lighting | Better technology (LED) available |
| Residential | 15 SEER Central AC | Space Cooling | Updated Federal Standard |
| Residential | 15 SEER Air Source Heat Pump | Space Cooling, Space Heating | Updated Federal Standard |
| Residential | 14 SEER ASHP from base electric resistance heating | Space Cooling, Space Heating | Updated Federal Standard |

[8] Additional measures from the 2019 study were updated to reflect current vintage/technology for the current study.

| Sector | Measure | End-Use | Reason for Removal |
|---|---|---|---|
| Residential | Two Speed Pool Pump | Miscellaneous | Updated Florida Energy Code |
| Residential | Variable Speed Pool Pump | Miscellaneous | Updated Florida Energy Code |
| Residential | Storm Door | Space Cooling, Space Heating | Minimal/uncertain energy savings |
| Commercial | CFL – 15W Flood | Exterior Lighting | Better technology (LED) available |
| Commercial | High Efficiency HID Lighting | Exterior Lighting | Better technology (LED) available |
| Commercial | LED Street Lights | Exterior Lighting | Market standard |
| Commercial | LED Traffic and Crosswalk Lighting | Exterior Lighting | Market standard |
| Commercial | CFL-23W | Interior Lighting | Better technology (LED) available |
| Commercial | High Bay Fluorescent (T5) | Interior Lighting | Better technology (LED) available |
| Commercial | Premium T8 - Fixture Replacement | Interior Lighting | Better technology (LED) available |
| Commercial | Premium T8 - Lamp Replacement | Interior Lighting | Better technology (LED) available |
| Commercial | Two Speed Pool Pump | Miscellaneous | Updated Florida Energy Code |
| Commercial | Variable Speed Pool Pump | Miscellaneous | Updated Florida Energy Code |
| Commercial | Tank Wrap on Water Heater | Domestic Hot Water | Limited applicability |
| Commercial | Ceiling Insulation (R12 to R38) | Space Cooling, Space Heating | Consolidated measure baseline assumptions |
| Commercial | Ceiling Insulation (R30 to R38) | Miscellaneous | Consolidated measure baseline assumptions |

# Appendix B DR Measure List

Table 16: Residential DR Measures

| Measure | Type | Season | Description |
|---|---|---|---|
| Central air conditioner - Load Shed | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central Heating - Load Shed | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central air conditioner - 50% cycling | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Central Heating - 50% cycling | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Smart thermostats - Utility Installation | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| Smart thermostats – BYOT | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| CPP + Tech | Pricing | Summer and Winter | Electricity rate that varies based on time of day. Can be same rate schedule for every day during a given season (time of use, or TOU) and with critical peak pricing (CPP) days when peak period rates are substantially higher for a limited number of days per year (customers receive advance notification of CPP event). Customers also receive technology that they can pre-program to curtail load when an event is called. |
| Water heater control | Direct load control | Summer and Winter | Load control installed on a water heater (integrated or external switch) |
| Pool pump switches | Direct load control | Summer and Winter | Load control program with switch installed on pool pump |
| Room AC | Direct load control | Summer | Load control program that is focused on room AC units rather than central AC |
| Managed EV Charging – switch | Direct load control | Summer and Winter | Load control switch that is installed on an EV charger |
| Managed EV Charging – telematics | Direct load control | Summer and Winter | Direct load control program leveraging EV smart charging software |
| Battery Storage with PV | Pricing/Direct load control | Summer and Winter | PV charges battery and battery discharges to grid |

**Table 17: Small C&I DR Measures**

| Measure | Type | Season | Description |
|---|---|---|---|
| Central air conditioner - Load Shed | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central Heating - Load Shed* | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central air conditioner - 50% cycling | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Central Heating - 50% cycling* | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Smart thermostats - Utility Installation* | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| Smart thermostats – BYOT* | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| CPP + Tech | Pricing | Summer and Winter | Electricity rate that varies based on time of day. Can be same rate schedule for every day during a given season (time of use, or TOU) and with critical peak pricing (CPP) days when peak period rates are substantially higher for a limited number of days per year (customers receive advance notification of CPP event). Customers also receive technology that they can pre-program to curtail load when an event is called. |
| Managed EV Charging – switch | Direct load control | Summer and Winter | Load control switch that is installed on an EV charger |
| Managed EV Charging – telematics | Direct load control | Summer and Winter | Direct load control program leveraging EV smart charging software |
| Battery Storage with PV | Pricing/Direct load control | Summer and Winter | PV charges battery and battery discharges to grid |

**Table 18: Large C&I DR Measures**

| Measure | Type | Season | Description |
|---|---|---|---|
| CPP + Tech | Pricing | Summer and Winter | Electricity rate that varies based on time of day. Can be same rate schedule for every day during a given season (time of use, or TOU) and with critical peak pricing (CPP) days when peak period rates are substantially higher for a limited number of days per year (customers receive advance notification of |

| Measure | Type | Season | Description |
|---|---|---|---|
| | | | CPP event). Customers also receive technology that they can pre-program to curtail load when an event is called. |
| Auto DR | Utility-controlled loads | Summer and Winter | Custom load control of specific end-uses/processes that is triggered by utility signal to building management system; customer can sometimes opt-out of specific events |
| Firm Service Level | Contractual | Summer and Winter | Customer commits to a maximum usage level during peak periods and, when notified by the utility, agrees to cut usage to that level. |
| Guaranteed Load Drop | Contractual | Summer and Winter | Customer agrees to reduce usage by an agreed upon amount when notified |

No DR measures from the 2019 Technical Potential Study were eliminated from the current study.

# Appendix C DSRE Measure List

**Table 19: Residential DSRE Measures**

| Measure | Description |
|---|---|
| PV System | Roof-mounted system, including multiple panels, AC/DC inverter, racking system, and electrical system interconnections |
| Battery Storage from PV System | Lithium-ion battery system designed to integrate with an on-site PV system to store and discharge excess energy from PV generation |

**Table 20: Non-Residential DSRE Measures**

| Measure | Description |
|---|---|
| PV System | Roof-mounted system, including multiple panels, AC/DC inverter, racking system, and electrical system interconnections |
| Battery Storage from PV System | Lithium-ion battery system designed to integrate with an on-site PV system to store and discharge excess energy from PV generation |
| CHP – Fuel Cell | An electrochemical cell-based generator that reacts hydrogen fuel with oxygen |
| CHP – Micro Turbine | Small combustion turbine that burns gaseous or liquid fuel to drive a generator |
| CHP – Gas Turbine | A combustion turbine that burns gaseous or liquid fuel to drive a generator |
| CHP – Reciprocating Engine | An engine that uses one or more pistons to convert pressure into rotational motion |
| CHP - Steam Turbine | A turbine that extracts thermal energy from pressured steam to drive a generator |

No DSRE measures from the 2019 Technical Potential Study were eliminated from the current study.

# Appendix D External Measure Suggestions

Table 21: External Measure Suggestions and Actions

| Measure Suggestion | Stakeholder Comments | Action taken for FEECA Study |
|---|---|---|
| Efficient Electrification Measures | All measures that can produce substantial site energy savings by converting from natural gas or other fossil fuels should be included in the Florida electric utilities' next efficiency potential study. Key examples include efficient heat pumps to displace gas furnaces and efficient heat pump water heaters to displace gas water heaters. It is important to note that these electrification measures provide not only heating energy savings and water heating energy savings, but can also potentially provide cooling efficiency benefits as well. In the case of heat pumps, that can occur because efficient heat pumps can operate in cooling mode more efficiently than standard central air conditioners. In the case of heat pump water heaters, cooling and dehumidification benefits can occur when/if the water heater is in conditioned space because they transfer heat (particularly latent heat) from the air around them to the water they are heating. A growing number of jurisdictions – including Illinois, Minnesota and some northeastern states – have begun to include efficient electrification measures in their efficiency programs portfolios. | Fuel-switching and electrification are outside the scope of this study |
| Networked Lighting Controls | LED lighting technology has become increasingly accepted and installed in commercial buildings. The next big efficiency opportunity in commercial lighting efficiency is in sophisticated controls integrated into the light fixtures themselves – both luminaire level lighting controls and networked lighting controls. For example, a 2017 report for both the Northwest Energy Efficiency Alliance and the Design Lights Consortium, a non-profit that works with utilities and manufacturers of lighting products (and which many utilities across the country reference for determination of eligibility of lighting products for efficiency program rebates), found that networked lighting controls can provide on the order of 50% additional savings after LED conversion. Other studies have also found the national savings potential from such products to be enormous. Moreover, these products can be designed to provide not only lighting energy savings but also a number of other non-energy benefits (e.g., asset tracking, such as the ability of hospitals to know the location of all wheel chairs). Numerous utilities across the country now actively promote this technology through their efficiency programs. For example, Commonwealth Edison, the utility serving Chicago and other parts of northern Illinois, is currently getting a significant portion of its commercial lighting savings from promotion of networked lighting controls | Added to measure list for 2024 study |

| Measure Suggestion | Stakeholder Comments | Action taken for FEECA Study |
|---|---|---|
| Ductless mini-split heat pumps to displace inefficient electric baseboard heating | While most Florida residential buildings with electric heat provide that heat with heat pumps, at least some (perhaps most likely being older multi-family rental buildings) still use inefficient electric resistance heat. Ductless mini- split heat pump retrofits can very efficiently displace such inefficient electric heat and should be added to the residential measure list. | Added to measure list for 2024 study |
| Air Source Heat Pump baseline assumptions | There are seven air source heat pump (ASHP) measures included in the residential measure list. Two of them – one at SEER 14 and a second at SEER 21 – are listed as relative to an electric resistance baseline. Five of them – SEER 15, SEER 16, SEER 17, SEER 18 and SEER 21 – appear to be relative to a baseline of a standard new ASHP. Are we interpreting this correctly? If so, we have a couple of comments/questions/suggestions:<br>• The efficiency standards assessed need to be modified to be consistent with new federal<br>standards, including new testing procedures.<br>• For cases where the baseline is "electric resistance", why only assessing two efficiency tiers (i.e.,<br>fewer than for standard ASHP baselines)? The same number of efficiency tiers should be<br>assessed for both baselines. | Incorporated suggestions into 2024 study, including updated baseline standard and assessing same efficiency tiers for both baselines |
| Heat Pump Water Heater Efficiency | The Res EE tab of the utilities draft measure list suggests that the efficiency of a heat pump water heater is an EF of 2.50. That is unrealistically low. In fact, of the 222 products listed on the Energy Star website, none had UEFs less than 2.80 and only 29 (13%) had UEFs that were less than 3.4; the average was 3.57. Indeed, the first product listed on a search of heat pump water heaters on Home Depot's website is a 50 gallon, Rheem (Pro Terra) product with a UEF of 3.75 and a cost of $1699. | Incorporated suggestion into 2024 study |
| New Construction Measure Packages | The measures lists did not appear to include packages of measures for building new residential and/or new commercial buildings to levels of efficiency beyond those required by code. Utilities in many jurisdictions run new construction efficiency programs supporting such measure packages. In the residential sector, many base their programs on the long-standing Federal Energy Star standard. However, increasingly utility programs are promoting additional efficiency tiers – often as part of all-electric new construction program offerings – that go well beyond the Energy Star standard. For example, Consumers Energy (Michigan) offers $1000 rebates to builders who construct Energy Star single family homes | Incorporated suggestion into 2024 study with 2 tiers of residential new construction whole-home improvement measures. |

| Measure Suggestion | Stakeholder Comments | Action taken for FEECA Study |
|---|---|---|
| | with a Home Energy Rating (HERS) score of 57 or less, but offer higher rebates for more efficient buildings – up to $4000 for all electric homes with a HERS score of 40 or less. The Florida utilities potential study should assess savings potential for both the Energy Star level and a tier or two of additional efficiency beyond that level. Similar assessments of new commercial building savings potential should also be assessed. | |
| Custom Industrial Measures | The utilities' list of industrial efficiency measures addresses common industrial efficiency opportunities. However, it does not address efficiency opportunities that may be unique to individual industries or even to individual industrial facilities. That can include such things as changes in types of materials used in manufacturing, reductions in waste streams, improved use of water delivered by agricultural irrigation systems, and/or other things that are not directly related to energy using equipment or controls of such equipment. It is obviously not possible to list all such measures. However, a potential study will understate savings potential if it does not include a way of capturing such potential in its estimates. One potential way to get a sense of such potential is to review results of comprehensive industrial efficiency programs run by other utilities to identify the portion of actual program savings from such unique custom measures – and then assume that portion of custom savings could be added to the savings estimated in the study for named measures. | Added to measure list for 2024 study |
| Electric Vehicle measures | Some EV chargers are more efficient than others. The Federal Energy Star program has a standard for them. Savings potential may not be huge, but should be considered in the study. With a growing number of EV sales, the study should also consider the potential savings from promoting the most efficient EVs within different size/style categories | Added to measure list for 2024 study |
| Removing screw-based LEDs | The screw-based LEDs on both the Residential and Commercial measure lists should now be considered baseline due to federal efficiency standards adopted earlier this year. Utility load forecasts for IRPs should reflect resulting improvements in end use efficiency. | Screw-based LEDs were included in the study but with limited applicability to reflect current market |
| Removing Commercial fluorescent lighting | LED technology – for both fixtures and lamps – has advanced significantly in recent years, to the point where it should be the only technology considered for commercial lighting. Measures such as high performance T-8 fluorescent fixtures and high bay T-5 fluorescent fixtures should be replaced with LED alternatives in the study. | Updated measure list for 2024 study to only include LED-based lamps for linear fluorescent replacements |

| Measure Suggestion | Stakeholder Comments | Action taken for FEECA Study |
|---|---|---|
| Removing fossil-gas fueled CHP | Fossil-fuel fired CHP systems should not be considered "renewable" and have questionable benefits if electric generation is expected to get increasingly more renewable and clean. Biogas-fueled CHP – such as systems installed in wastewater treatment facilities that use methane byproducts of processing waste – should be included in the study. | 2024 study will continue to assess all CHP options |
| Adding livestock methane power generation to renewables list | For example, see the "cow power" program currently being run by Green Mountain Power, Vermont's largest electric utility | 2024 study will continue to assess DSRE options consistent with prior study, including customer-sited solar, solar plus storage, and CHP |
| Adding EV managed charging to DR list | With national market shares for EVs growing, it is important that utilities consider programs for managing when charging occurs. Numerous utilities are currently running managed charging programs. This does not currently appear to be on the measure list and should be added to the Florida utilities' potential study. | Added to measure list for 2024 study |
| Residential "smart thermostat" measure can provide both efficiency savings and demand response potential | This is recognized in the inclusion of smart thermostats in both the Res EE and DR tabs of the measure list spreadsheet. We simply want to flag that it is important when assessing cost-effectiveness of this measure that these two potential benefits are considered together. In other words, the cost should be considered compared to the combined efficiency and DR potential rather than separately considered relative to just EE savings and then separately again compared to just DR potential | 2024 study will include interactive impacts of EE and DR opportunities |
| Emerging Technologies | The efficiency potential study measure list appears to be somewhat outdated. It does not include a number of new and emerging technologies. The potential list of such technologies is long. We suggest reviewing the attached list of emerging technologies developed almost two years ago by Consumers Energy (Michigan) and including them in the study. | Consumers Energy study was reviewed and commercially available measures were added to measure list for 2024 study, including heat pump water heaters - CEE advanced tier, heat pump clothes dryers, ozone laundry systems, and 21+ SEER HVAC units |

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# Technical Potential Study of Demand Side Management

## Duke Energy Florida

Date: 03.07.2024

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# Executive Summary

In October 2022, the six electric utilities subject to the Florida Energy Efficiency and Conservation Act (FEECA Utilities) retained Resource Innovations, Inc. for the purpose of identifying and characterizing the market for demand-side management (DSM) opportunities, including energy efficiency (EE) improvement and building retrofits, peak load reductions from demand response (DR), and demand-side renewable energy (DSRE) systems.

The main objective of the study was to assess the technical potential of demand-side resources for reducing customer electric energy consumption and seasonal peak capacity demands.

This report provides the detailed methodology and results for the technical potential analysis of Duke Energy Florida's (DEF) service territory.

## 1.1 Methodology

Resource Innovations estimates DSM savings potential by applying an analytical framework that aligns baseline market conditions for energy consumption and demand with DSM opportunities. After describing the baseline condition, Resource Innovations applies estimated measure savings to disaggregated consumption and demand data. The approach varies slightly according to the type of DSM resources and available data; the specific approaches used for each type of DSM are described below.

### 1.1.1 EE Potential

This study utilized Resource Innovations' proprietary EE modeling tool, TEA-POT (Technical / Economic / Achievable POTential). This modeling tool was built on a platform that provides the ability to create and analyze multiple scenarios and recalculate potential savings based on variable inputs such as sales/load forecasts, electricity prices, discount rates, and actual program savings. The methodology for the EE potential assessment was based on a hybrid "top-down/bottom-up" approach, which started with the current utility load forecast, then disaggregated it into its constituent customer-class and end-use components. Our assessment examined the effect of the range of EE measures and practices on each end-use, taking into account current market saturations, and technical feasibility. These unique impacts were aggregated to produce estimates of potential at the end-use, customer class, and system levels for DEF.

### 1.1.2 DR Potential

The assessment of DR potential in DEF's service territory was an analysis of mass market direct load control programs for residential and small commercial and industrial (C&I) customers, and an analysis of DR programs for large C&I customers. The direct load control program assessment focused on the potential for demand reduction through heating, ventilation, and air conditioning (HVAC), water heater, managed electric vehicle charging, and pool pump load control. These end-uses were of particular interest because of their large contribution to peak period system load. For this analysis, a range of direct load control measures were examined for each customer segment to highlight the range of potential. The assessment further accounted for existing DR programs for DEF when calculating the total DR potential.

### 1.1.3 DSRE Potential

The DSRE technologies included in this study are rooftop solar photovoltaic (PV) systems, battery storage systems charged from customers' PV systems, and combined heat and power (CHP) systems. The study leveraged the customer segmentation and load disaggregation data assembled for the EE and DR analyses, and applied our DSRE model, SPIDER™ (Spatial Penetration and Integration of Distributed Energy Resources), for economic and adoption analysis of solar and battery storage. This model dynamically responds to rapidly changing technologies and accounts for all key time-varying elements such as technology costs, incentives, tax credits, and electric rates. To estimate technical potential for CHP, the study utilized a series of unique distributed generation potential models for each primary market sector (commercial and industrial), calculating the average building consumption, assigning minimum facility size thresholds, and estimating building energy savings share percentage for each CHP technology based on its generation capacity.

## 1.2 Savings Potential

Technical potential for EE, DR, and DSRE are as follows:

### 1.2.1 EE Potential

EE technical potential describes the savings potential when all technically feasible EE measures are fully implemented, ignoring all non-technical constraints on electricity savings, such as cost-effectiveness and customer willingness to adopt EE.

The estimated EE technical potential results are summarized in Table 1.

Table 1. EE Technical Potential

| | Savings Potential | | |
|---|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) | Energy (GWh) |
| **Residential** | 2,217 | 2,423 | 7,599 |
| **Non-Residential**[1] | 669 | 450 | 3,591 |
| **Total** | 2,886 | 2,873 | 11,190 |

### 1.2.2 DR Potential

DR technical potential describes the magnitude of loads that can be managed during conditions when grid operators need peak capacity. For residential and small C&I customers where DR generally takes the form of direct utility control, technical potential for DR is limited by the loads that can be controlled remotely at scale such as heating, cooling, water heaters, managed electric vehicle charging, and pool pumps. For large C&I customers, this included their entire electric demand during a utility's system peak, as many of these types of customers will forego virtually all electric demand temporarily if the financial incentive is large enough.

The estimated DR technical potential results are summarized in Table 2.

Table 2. DR Technical Potential

| | Savings Potential | |
|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) |
| **Residential** | 3,147 | 3,218 |
| **Non-Residential** | 2,631 | 2,391 |
| **Total** | 5,778 | 5,609 |

[1] Non-Residential results include all commercial and industrial customer segments.

### 1.2.3 DSRE Potential

DSRE technical potential estimates quantify all technically feasible distributed generation opportunities from PV systems, battery storage systems charged from PV, and CHP technologies based on the customer characteristics of DEF's customer base.

The estimated DSRE technical potential results are summarized in Table 3.

Table 3. DSRE Technical Potential[2]

| | Savings Potential | | |
|---|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) | Energy (GWh) |
| **PV Systems** | | | |
| **Residential** | 1,761 | 152 | 17,637 |
| **Non-Residential** | 444 | 15 | 4,164 |
| **Total** | 2,205 | 167 | 21,801 |
| **Battery Storage charged from PV Systems** | | | |
| **Residential** | 2,016 | 2,176 | 0 |
| **Non-Residential** | 240 | 315 | 0 |
| **Total** | 2,256 | 2,491 | 0 |
| **CHP Systems** | | | |
| **Total** | 773 | 811 | 3,553 |

[2] PV systems and CHP systems were independently analyzed for technical potential without consideration of the competition between technologies or customer preference for DSRE system.

# 2 Introduction

In October, 2022, the six electric utilities subject to the Florida Energy Efficiency and Conservation Act (FEECA Utilities) retained Resource Innovations, Inc. for the purpose of identifying and characterizing the market for demand-side management (DSM) opportunities, including energy efficiency (EE) improvement and building retrofits, peak load reductions from demand response (DR), and demand-side renewable energy (DSRE) systems. The main objective of the study was:

- Assessing the technical potential of demand-side resources for reducing customer electric energy consumption and seasonal peak capacity demands.

This report provides the detailed methodology and results for the technical potential analysis of DEF's service territory.

The following deliverables were developed by Resource Innovations as part of the project and are addressed in this report:

- DSM measure list and detailed assumption workbooks
- Disaggregated baseline demand and energy use by year, sector, and end-use
- Baseline technology saturations, energy consumption, and demand
- Technical potential demand and energy savings
- Supporting calculation spreadsheets

## 2.1 Technical Potential Study Approach

Resource Innovations estimates technical potential according to the industry standard categorization, as follows:

> *Technical Potential is the theoretical maximum amount of energy and capacity that could be displaced by DSM, regardless of cost and other barriers that may prevent the installation or adoption of a DSM measure.*

For this study, technical potential included full application of commercially available DSM technologies to all residential, commercial, and industrial customers in the utility's service territory.

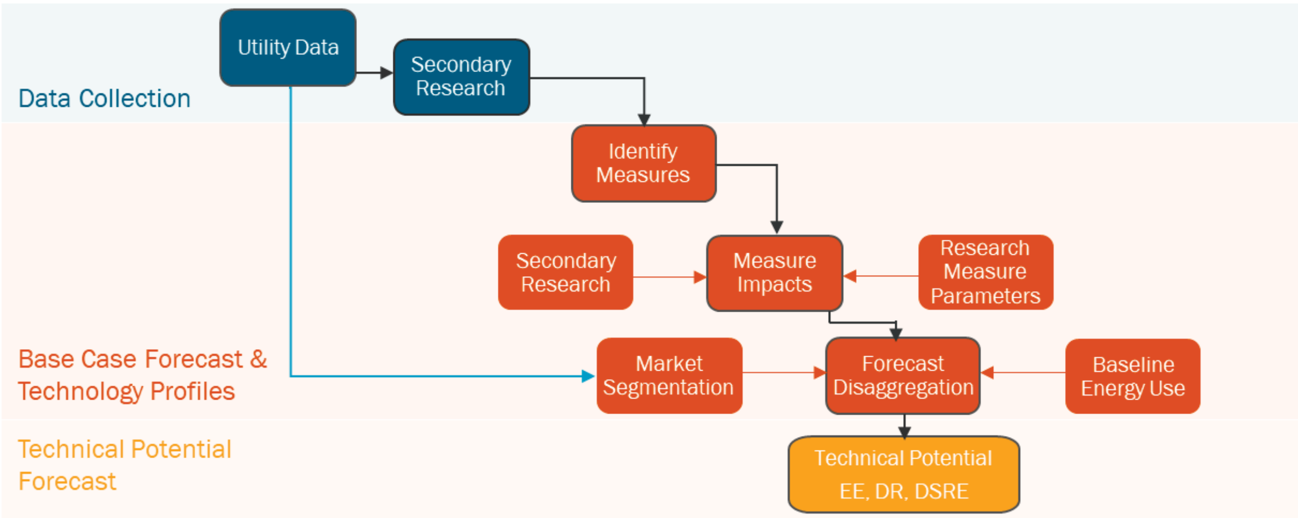
Quantifying DSM technical potential is the result of an analytical process that refines DSM opportunities that align with DEF's customers' electric consumption patterns. Resource Innovations' general methodology for estimating technical potential is a hybrid "top-

down/bottom-up" approach, which is described in detail in Sections 3 through 5 of this report and includes the following steps:

- Develop a baseline forecast: the study began with a disaggregation of the utility's official electric energy forecast to create a baseline electric energy forecast. This forecast does not include any utility-specific assumptions around DSM performance. Resource Innovations applied customer segmentation and consumption data from each utility and data from secondary sources to describe baseline customer-class and end-use components. Additional details on the forecast disaggregation are included in Section 3.
- Identify DSM opportunities: A comprehensive set of DSM opportunities applicable to DEF's climate and customers were analyzed to best depict DSM technical potential. Effects for a range of DSM technologies for each end-use could then be examined while accounting for current market saturations, technical feasibility, and impacts.
- Collect cost and impact data for measures: For those measures applicable to DEF's customers, Resource Innovations conducted primary and secondary research and estimated costs, energy savings, measure life, and demand savings. We differentiated between the type of cost (capital, installation labor, maintenance, etc.) to separately evaluate different implementation modes: retrofit (capital plus installation labor plus incremental maintenance); new construction (incremental capital and incremental maintenance); and burnout costs (incremental capital and incremental maintenance costs for replacement of appliances and equipment that has reached the end of its useful life). Additional details on measure development are included in Section 4.

Figure 1 provides an illustration of the technical potential modeling process conducted for DEF, with the assessment starting with the current utility load forecast, disaggregated into its constituent customer-class and end-use components, and calibrated to ensure consistency with the overall forecast. Resource Innovations considered the range of DSM measures and practices application to each end-use, accounting for current market saturations, and technical feasibility. These unique impacts were aggregated to produce estimates of potential at the technology, end-use, customer class, and system levels.

Figure 1. Approach to Technical Potential Modeling




Resource Innovations estimated DSM technical potential based on a combination of market research, utility load forecasts and customer data, and measure impact analysis, all in coordination with DEF. Resource Innovations examined the technical potential for EE, DR, and DSRE opportunities; this report is organized to offer detail on each DSM category, with additional details on technical potential methodology presented in Section 5.

## 2.2 EE Potential Overview

To estimate EE potential, this study utilized Resource Innovations' modeling tool, TEA-POT (Technical / Economic / Achievable POTential). This modeling tool was built on a platform that provides the ability to create and analyze multiple scenarios and recalculate potential savings based on variable inputs such as sales/load forecasts, electricity prices, discount rates, and actual utility program savings, as described in Section 5.1.1 below. While the analysis estimates the impacts of individual EE measures, the model accounts for interactions and overlap of individual measure impacts within an end-use or equipment type. The model provides transparency into the assumptions and calculations for estimating EE potential.

## 2.3 DR Potential Overview

To estimate DR market potential, Resource Innovations considered customer demand during utility peaking conditions and projected customer response to DR measures. Customer demand was determined by looking at account-level interval data for a sample of customers within each segment. For each segment, Resource Innovations determined the portion of a customer's load that could be curtailed during the system peak.

## 2.4 DSRE Potential Overview

The DSRE technologies included in this study are rooftop solar photovoltaic (PV) systems, battery storage systems charged from PV, and combined heat and power (CHP) systems. The study leveraged the customer segmentation and load disaggregation data assembled for the EE and DR analyses, and applied our DSRE model, SPIDER™ (Spatial Penetration and Integration of Distributed Energy Resources), for economic and adoption analysis of solar and battery storage. This model dynamically responds to rapidly changing technologies and accounts for all key time-varying elements such as technology costs, incentives, tax credits, and electric rates. To estimate technical potential for CHP, the study utilized a series of unique distributed generation potential models for each primary market sector (commercial and industrial), calculating the average building consumption, assigning minimum facility size thresholds, and estimating building energy savings share percentage for each CHP technology based on its generation capacity.

# 3 Baseline Forecast Development

## 3.1 Market Characterization

The DEF base year energy use and sales forecast provided the reference point to determine potential savings. The end-use market characterization of the base year energy use and reference case forecast included customer segmentation and load forecast disaggregation. The characterization is described in this section, while the subsequent section addresses the measures and market potential energy and demand savings scenarios.

### 3.1.1 Customer Segmentation

In order to estimate EE, DR, and DSRE potential, the sales forecast and peak load forecasts were segmented by customer characteristics. As electricity consumption patterns vary by customer type, Resource Innovations segmented customers into homogenous groups to identify which customer groups are eligible to adopt specific DSM technologies, have similar building characteristics and load profiles, or are able to provide DSM grid services.

Resource Innovations segmented customers according to the following:

1) By Sector – how much of DEF's energy sales, summer and winter peak demand forecast is attributable to the residential, commercial, and industrial sectors?
2) By Customer – how much electricity does each customer typically consume annually and during system peaking conditions?
3) By End-Use – within a home or business, what equipment is using electricity during the system peak? How much energy does this end-use consume over the course of a year?

Table 4 summarizes the segmentation within each sector. In addition to the segmentation described here for the EE and DSRE analyses, the residential customer segments were further segmented by heating type (electric heat, gas heat, or unknown) and by annual consumption bins within each sub-segment for the DR analysis.

Table 4. Customer Segmentation

| Residential | Commercial | | Industrial | |
|---|---|---|---|---|
| Single Family | Assembly | Miscellaneous | Agriculture and Assembly | Primary Resources Industries |
| Multi-Family | College and University | Offices | Chemicals and Plastics | Stone/Glass/ Clay/Concrete |
| Manufactured Homes | Grocery | Restaurant | Construction | Textiles and Leather |
| | Healthcare | Retail | Electrical and Electronic Equipment | Transportation Equipment |
| | Hospitals | Schools K-12 | Lumber/Furniture/ Pulp/Paper | Water and Wastewater |
| | Institutional | Warehouse | Metal Products and Machinery | Other |
| | Lodging/ Hospitality | | Miscellaneous Manufacturing | |

From an equipment and energy use perspective, each segment has variation within each building type or sub-sector. For example, the energy consuming equipment in a convenience store will vary significantly from the equipment found in a supermarket. To account for this variation, the selected end-uses describe energy consumption patterns that are consistent with those typically studied in national or regional surveys, such as the U.S. Energy Information Administration's (EIA) Residential Energy Consumption Survey (RECS), Commercial Building Energy Consumption Survey (CBECS) and Manufacturing Energy Consumption Survey (MECS), among others. The end-uses selected for this study are listed in Table 5.

Table 5. End-Uses

| Residential End-Uses | Commercial End-Uses | Industrial End-Uses |
|---|---|---|
| Space heating[3] | Space heating[3] | Process heating |
| Space cooling[3] | Space cooling[3] | Process cooling |
| Domestic hot water | Domestic hot water | Compressed air |
| Ventilation and circulation | Ventilation and circulation | Motors/pumps |

[3] Includes the contribution of building envelope measures and efficiencies.

| Residential End-Uses | Commercial End-Uses | Industrial End-Uses |
|---|---|---|
| Lighting | Interior lighting | Fan, blower motors |
| Cooking | Exterior lighting | Process-specific |
| Appliances | Cooking | Industrial lighting |
| Electronics | Refrigeration | Exterior lighting |
| Miscellaneous | Office equipment | HVAC[3] |
| | Miscellaneous | Other |

For DR, the end-uses targeted were those with controllable load for residential customers (*i.e.*, HVAC, water heaters, pool pumps, and electric vehicles) and small C&I customers (HVAC and electric vehicles). For large C&I customers, all load during peak hours was included assuming these customers would potentially be willing to reduce electricity consumption for a limited time if offered a large enough incentive during temporary system peak demand conditions.

### 3.1.2 Forecast Disaggregation

A common understanding of the assumptions and granularity in the baseline load forecast was developed with input from DEF. Key discussion topics reviewed included:

- How current DSM offerings are reflected in the energy and demand forecast.
- Assumed weather conditions and hour(s) of the day when the system is projected to peak.
- Are there portions of the load forecast attributable to customers or equipment not eligible for DSM programs?
- How are projections of population increase, changes in appliance efficiency, and evolving distribution of end-use load shares accounted for in the peak demand forecast?

#### 3.1.2.1 Electricity Consumption (kWh) Forecast

Resource Innovations segmented DEF's electricity consumption forecast into electricity consumption load shares by customer class and end-use. The baseline customer segmentation represents the electricity market by describing how electricity was consumed within the service territory. Resource Innovations developed the forecast for the year 2025, and based it on data provided by DEF, primarily their 2023 Ten-Year Site Plan, which was the most recent plan available at the time the studies were initiated. The data addressed current baseline consumption, system load, and sales forecasts.

### 3.1.2.2 Peak Demand (kW) Forecast

A fundamental component of DR potential was establishing a baseline forecast of what loads or operational requirements would be absent due to existing dispatchable DR or time varying rates. This baseline was necessary to assess how DR can assist in meeting specific planning and operational requirements. We utilized DEF's summer and winter peak demand forecast, which was developed for system planning purposes.

### 3.1.2.3 Estimating Consumption by End-Use Technology

As part of the forecast disaggregation, Resource Innovations developed a list of electricity end-uses by sector (Table 5). To develop this list, Resource Innovations began with DEF's estimates of average end-use consumption by customer and sector. Resource Innovations combined these data with other information, such as utility residential appliance saturation surveys, as available, to develop estimates of customers' baseline consumption. Resource Innovations calibrated the utility-provided data with data available from public sources, such as the EIA's recurring data-collection efforts that describe energy end-use consumption for the residential, commercial, and manufacturing sectors.

To develop estimates of end-use electricity consumption by customer segment and end-use, Resource Innovations applied estimates of end-use and equipment-type saturation to the average energy consumption for each sector. The following data sources and adjustments were used in developing the base year 2025 sales by end-use:

**Residential Sector:**

- The disaggregation was based on DEF's rate class load shares and intensities.
- Baseline intensity was calibrated to account for differences in end-use saturation, fuel source, and equipment saturation as follows:
    - DEF rate class load share is based on average per customer.
    - Resource Innovations made conversions to usage estimates generated by applying Duke Energy's 2022 Residential End-Use Appliance Study, EIA RECS data, and EIA's Annual Energy Outlook (AEO) 2023.

**Commercial Sector:**

- The disaggregation was based on DEF's rate class load shares, intensities, and EIA CBECS data.
- Segment data from EIA and DEF.
- Baseline intensity was calibrated to account for differences in end-use saturation, fuel source, and equipment saturation as follows:

  - Rate class load share based on EIA CBECS and end-use forecasts from DEF.

**Industrial Sector:**

- The disaggregation was based on rate class load shares, intensities, and EIA MECS data.
- Segment data from EIA and DEF.
- Baseline intensity was calibrated to account for differences in end-use saturation, fuel source, and equipment saturation as follows:
  - Rate class load share based on EIA MECS and end-use forecasts from DEF.

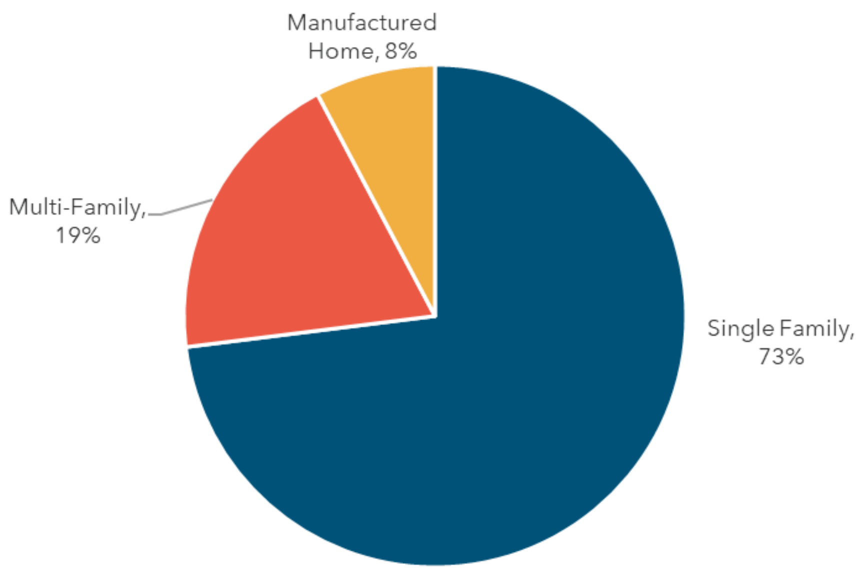
## 3.2 Analysis of Customer Segmentation

Customer segmentation is important to ensuring that a MPS examines DSM measure savings potential in a manner that reflects the diversity of energy savings opportunities existing across the utility's customer base. DEF provided Resource Innovations with data concerning the premise type and loads characteristics for all customers for the MPS analysis. Resource Innovations examined the provided data from multiple perspectives to identify customer segments. Resource Innovations' approach to segmentation varied slightly for non-residential and residential accounts, but the overall logic was consistent with the concept of expressing the accounts in terms that were relevant to DSM opportunities.

### 3.2.1 Residential Customers (EE, DR, and DSRE Analysis)

Segmentation of residential customer accounts enabled Resource Innovations to align DSM opportunities with appropriate DSM measures. Resource Innovations used utility customer data, supplemented with EIA data, to segment the residential sector by customer dwelling type (single family, multi-family, or manufactured home). The resulting distribution of customers according to dwelling unit type is presented in Figure 2.

Figure 2. Residential Customer Segmentation




### 3.2.2 Non-Residential (Commercial and Industrial) Customers (EE and DSRE Analysis)

For the EE and DSRE analysis, Resource Innovations segmented C&I accounts using the utility's North American Industry Classification System (NAICS) or Standard Industrial Classification (SIC) codes, supplemented by data produced by the EIA's CBECS and MECS. Resource Innovations classified the customers in this group as either commercial or industrial, on the basis of DSM measure information available and applicable to each. For example, agriculture and forestry DSM measures are commonly considered industrial savings opportunities. Resource Innovations based this classification on the types of DSM measures applicable by segment, rather than on the annual energy consumption or maximum instantaneous demand from the segment as a whole. The estimated energy sales distributions Resource Innovations applied are shown below in Figure 3 and Figure 4.

**Figure 3. Commercial Customer Segmentation**

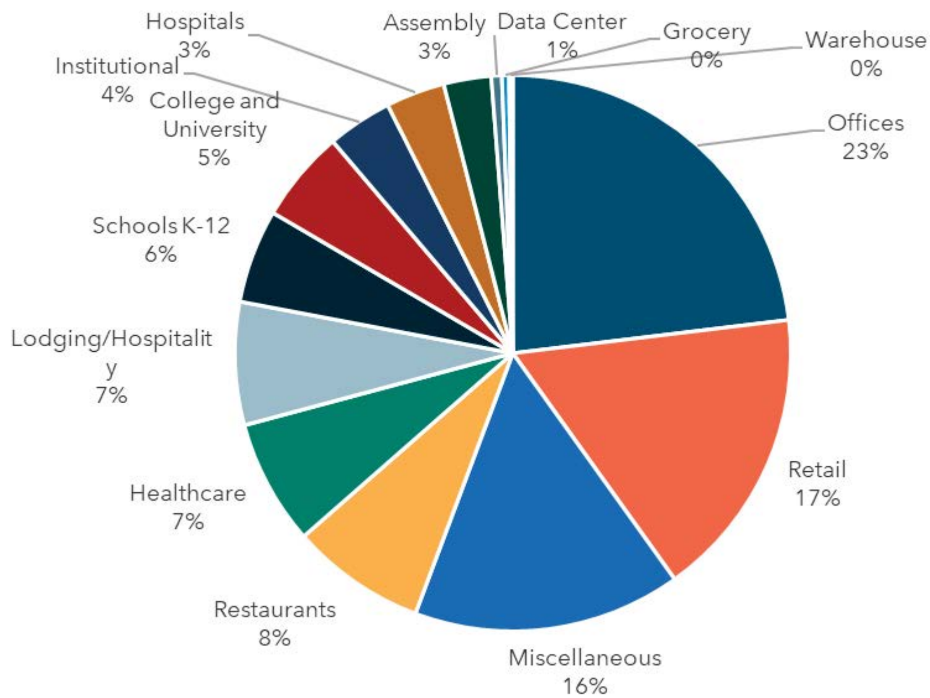
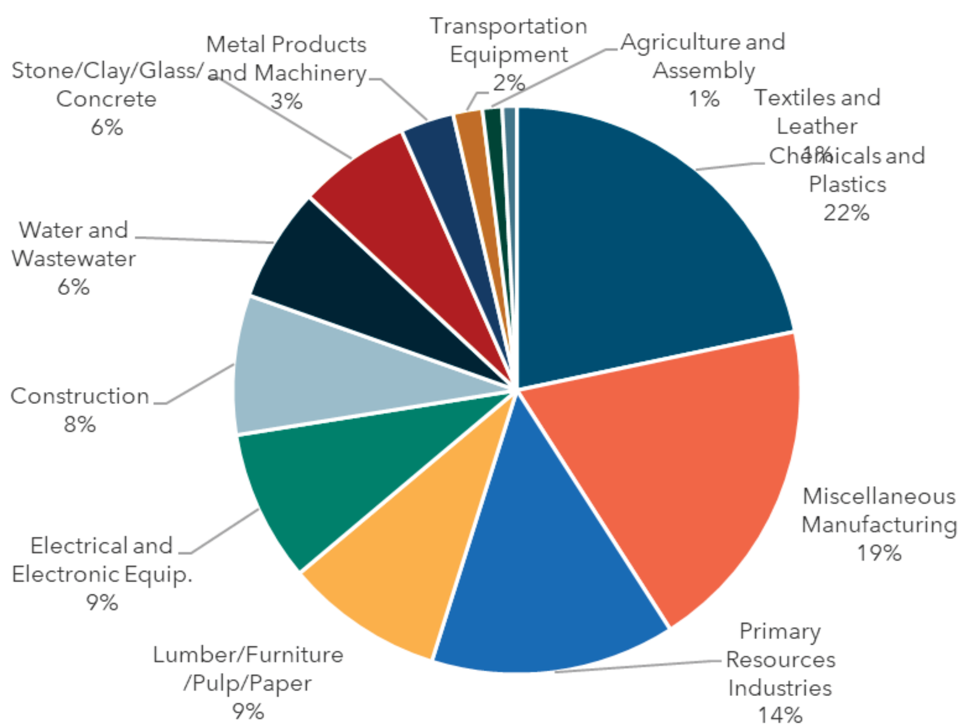



**Figure 4. Industrial Customer Segmentation**



### 3.2.3 Commercial and Industrial Accounts (DR Analysis)

For the DR analysis, Resource Innovations divided the non-residential customers into the two customer classes of small C&I and large C&I using rate class and annual consumption. For the purposes of this analysis, small C&I customers are those on the General Service (GS) tariff. Large C&I customers are all customers on the General Service Demand (GSD) tariff or on the General Service Large Demand (GSLD) tariff. Resource Innovations further segmented these two groups based on customer size. For small C&I, segmentation was determined using annual customer consumption and for large C&I the customer's maximum demand was used. Both customer maximum demand and customer annual consumption were calculated using billing data provided by DEF.

Table 6 shows the account breakout between small C&I and large C&I.

**Table 6. Summary of Customer Classes for DR Analysis**

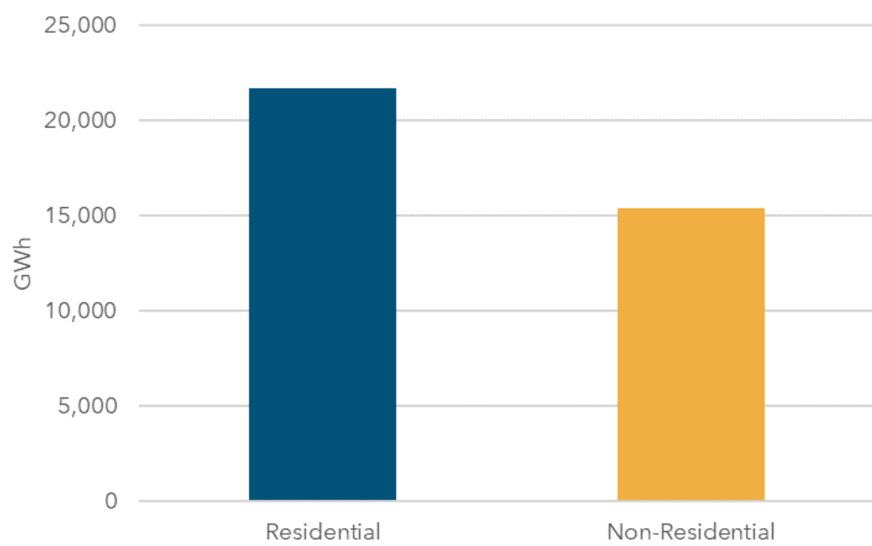
| Customer Class | Annual kWh | Estimated Number of Accounts |
|---|---|---|
| **Small C&I** | 0-15,000 kWh | 113,449 |
| | 15,001-25,000 kWh | 15,600 |
| | 25,001-50,000 kWh | 10,446 |
| | 50,001 kWh + | 7,403 |
| | Total | 146,898 |
| **Large C&I** | 0-50 kW | 35,795 |
| | 51-300 kW | 8,700 |
| | 301-500 kW | 850 |
| | 501 kW + | 924 |
| | Total | 46,269 |

## 3.3 Analysis of System Load

### 3.3.1 System Energy Sales

Technical potential is based on DEF's load forecast for the year 2025 from their 2023 Ten Year Site Plan, which is illustrated in Figure 5.

Figure 5. 2025 Electricity Sales Forecast by Sector




### 3.3.2 System Demand

To determine the technical potential for DR, Resource Innovations first established peaking conditions for each utility by looking at when each utility historically experienced its maximum demand. The primary data source used to determine when maximum DR impact was the historical system load for DEF. The data provided contained the system loads for all 8,760 hours of the most recent five years leading up to the study (2016-2021). The utility summer and winter peaks were then identified within the utility-defined peaking conditions. For DEF the summer peaking conditions were defined as August from 4:00-5:00 PM and the winter peaking conditions were defined as January from 7:00-8:00 AM. The seasonal peaks were then selected as the maximum demand during utility peaking conditions.

### 3.3.3 Load Disaggregation

The disaggregated annual electric loads[4] for the base year 2025 by sector and end-use are summarized in Figure 6, Figure 7, and Figure 8.

[4] Full disaggregation of system demand by end-use was not conducted, as DR potential for residential and small C&I customers focused on specific end-uses of particular interest because of their large contribution to peak period system load, and was not end-use specific for large C&I customers. A description of the end-use analysis for residential and small C&I customers is included in Section 5.1.2

**Figure 6. Residential Baseline (2025) Energy Sales by End-Use**

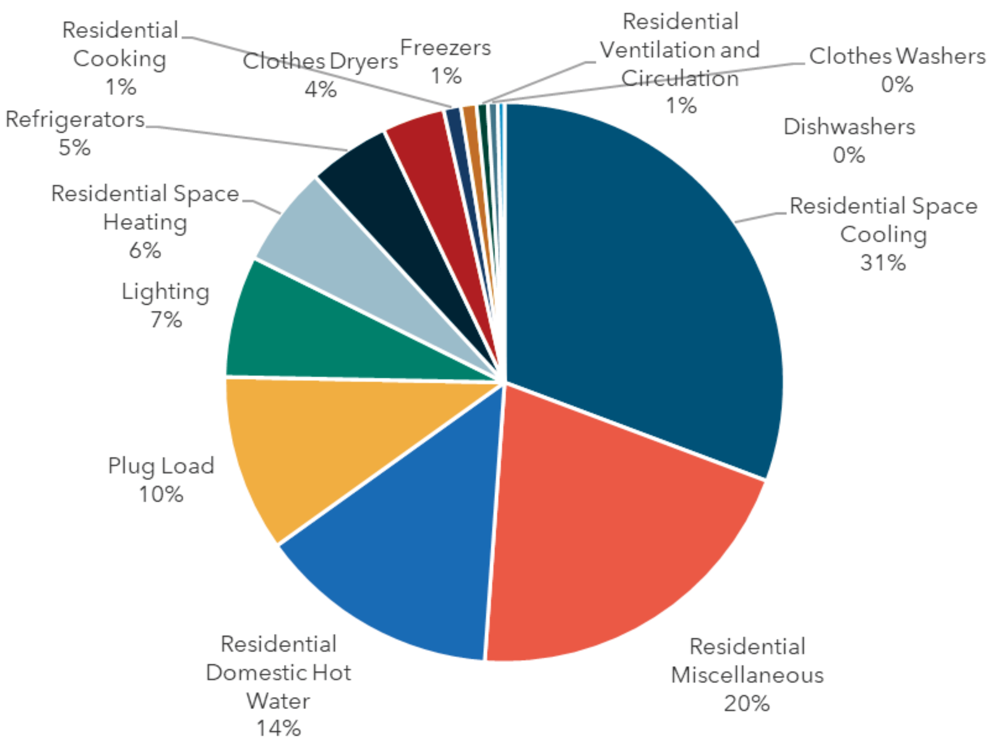


**Figure 7. Commercial Baseline (2025) Energy Sales by End-Use**

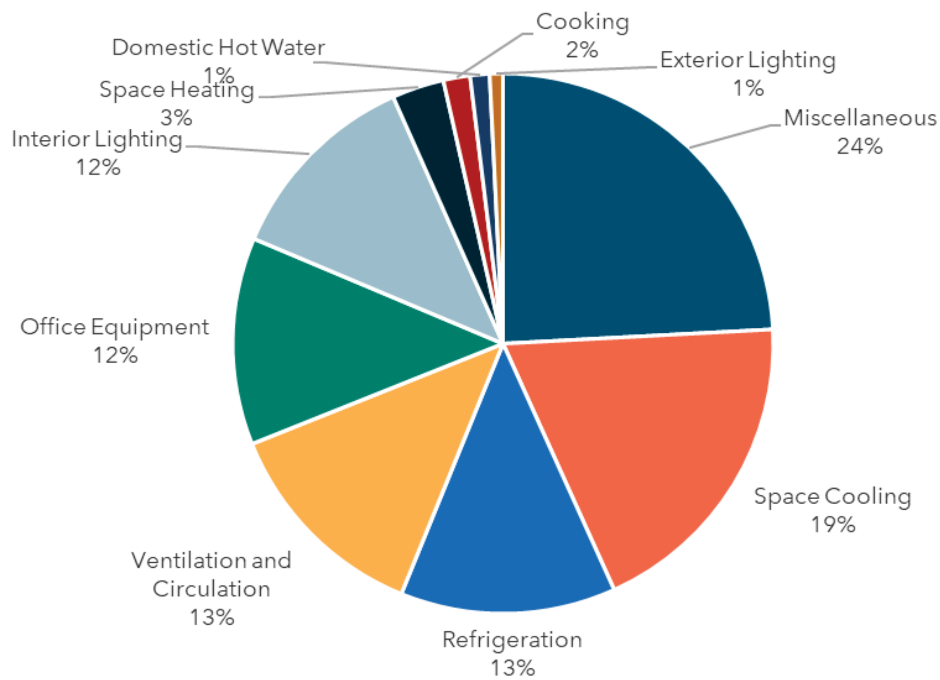
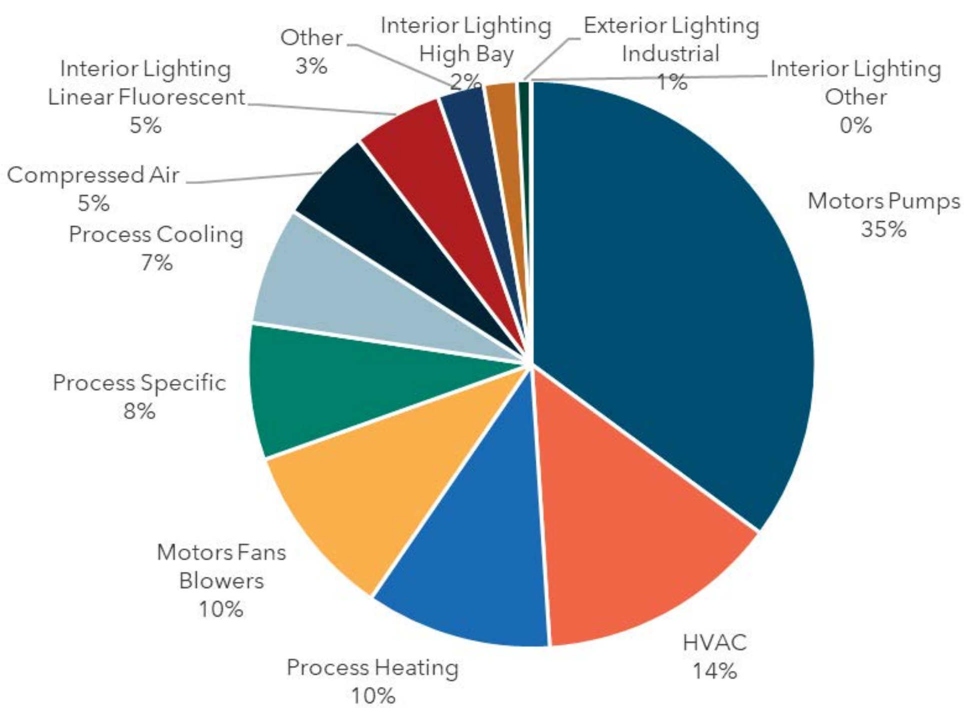



**Figure 8. Industrial Baseline (2025) Energy Sales by End-Use**



# 4 DSM Measure Development

DSM potential is described by comparing baseline market consumption with opportunities for savings. Describing these individual savings opportunities results in a list of DSM measures to analyze. This section presents the methodology to develop the EE, DR, and DSRE measure lists.

## 4.1 Methodology

Resource Innovations identified a comprehensive catalog of DSM measures for the study. The measure list is the same for all FEECA Utilities. The iterative vetting process with the utilities to develop the measure list began by initially examining the list of measures included in the 2019 Goals docket. This list was then adjusted based on proposed measure additions and revisions provided by the FEECA Utilities. Resource Innovations further refined the measure list based on reviews of Resource Innovations' DSM measure library, compiled from similar market potential studies conducted in recent years throughout the United States, as well as measures included in other utility programs where Resource Innovations is involved with program design, implementation, or evaluation. The FEECA Utilities also reached out to interested parties and received input with recommendations on measure additions to the 2019 measure list. Their measure suggestions were reviewed and incorporated into the study as appropriate. External measure suggestions and actions are summarized in Appendix D. The extensive, iterative review process involving multiple parties has ensured that the study included a robust and comprehensive set of DSM measures.

See Appendix A for the list of EE measures, Appendix B for the list of DR measures, and Appendix C for the list of DSRE measures analyzed in the study.

## 4.2 EE Measures

EE measures represent technologies applicable to the residential, commercial, and industrial customers in the FEECA Utilities' service territories. The development of EE measures included consideration of:

- EE technologies that are applicable to Florida and commercially available: Measures that are not applicable due to climate or customer characteristics were excluded, as were "emerging" technologies that are not currently commercially available to FEECA utility customers.
- Current and planned Florida Building Codes and Federal equipment standards (Codes & Standards) for baseline equipment: Measures included from prior studies

were adjusted to reflect current Codes & Standards as well as updated efficiency tiers, as appropriate.

- Eligibility for utility DSM offerings in Florida: For example, behavioral measures were excluded from consideration, as they historically have not been allowed to count towards utility DSM goals. Behavioral measures are intended to motivate customers to operate in a more energy-efficient manner (*e.g.*, setting an air-conditioner thermostat to a higher temperature) without accompanying: a) physical changes to more efficient end-use equipment or to their building envelope, b) utility-provided products and tools to facilitate the efficiency improvements, or c) permanent operational changes that improve efficiency which are not easily revertible to prior conditions. These types of behavioral measures were excluded because of the variability in forecasting the magnitude and persistence of energy and demand savings from the utility's perspective. Additionally, decoupling behavioral measure savings from the installation of certain EE technologies like smart thermostats can be challenging and could result in overlapping potential with other EE measures included in the study.

Upon development of the final EE measure list, utility-specific measure details were developed. RI maintains a proprietary online database of energy efficiency measures for MPS studies, which was used as a starting point for measure development for this study. Measures are added or updated at the request of project stakeholders or because of changes to the EE marketplace (for example, new codes and standards, or current practice in the market). Measure data are refined as new data or algorithms are developed for estimating measure impacts and updated for each study to incorporate inputs parameters specific to the service territory being analyzed. The database contains the following information for each of the measures:

- Measure description: measure classification by type, end-use, and subsector, and description of the base-case and the efficient-case scenarios.
- kWh savings: Energy savings associated with each measure were developed through engineering algorithms or building simulation modeling, taking climate data and customer segments into consideration as appropriate. Reference sources used for developing residential, commercial, and industrial measure savings included a variety of Florida-specific, as well as regional and national sources, such as utility-specific measurement & verification (M&V) data, technical reference manuals (TRM) from other jurisdictions, ENERGY STAR calculators, and manufacturer or retailer specifications for particular products.
- Energy savings were applied in RI's TEA-POT model as a percentage of total baseline consumption. Peak demand savings were determined using utility-specific load shapes or coincidence factors.

- Measure Expected Useful Lifetime: Sources included the Database for Energy Efficient Resources (DEER), the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Handbook, TRMs, and other regional and national measure databases and EE program evaluations.
- Measure Costs: Per-unit costs (full or incremental, depending on the application) associated with measure installations. Sources included: TRMs, ENERGY STAR calculator, online market research, FEECA utility program data, and other secondary sources.

The measure details from the online measure library are exported for use in RI's TEA-POT model, accompanied by utility-specific estimates of measure applicability. Measure applicability is a general term encompassing an array of factors, including technical feasibility of installation, and the measure's current saturation as well as factors to allocate savings associated with competing measures. Information used was primarily derived from data in current regional and national databases, as well as DEF's program tracking data. These factors are described in Table 7.

**Table 7. Measure Applicability Factors**

| Measure Impact | Explanation | Sources |
|---|---|---|
| Technical Feasibility | The percentage of buildings that can have the measure physically installed. Various factors may affect this, including, but not limited to, whether the building already has the baseline measure (*e.g.*, dishwasher), and limitations on installation (*e.g.*, size of unit and space available to install the unit). | Various secondary sources and engineering experience. |
| Measure Incomplete Factor | The percentage of buildings without the specific measure currently installed. | Utility RASS; EIA RECS, CBECS; MECS; ENERGY STAR sales figures; and engineering experience. |
| Measure Share | Used to distribute the percentage of market shares for competing measures (*e.g.*, only blown-in ceiling insulation or spray foam insulation, not both would be installed in an attic). | Utility customer data, Various secondary sources and engineering experience. |

As shown in Table 8, the measure list includes 395 unique energy-efficiency measures. Expanding the measures to account for all appropriate installation scenarios resulted in

9,535 measure permutations, which are the application of individual measures to various customer segments, construction types, and end-uses (*i.e.*, a single air-source heat pump "measure" can be installed in single family, multi-family, and manufactured homes, as well as new and existing vintages of each home type, and impacts both space cooling and space heating end-uses, resulting in twelve separate measure "permutations" analyzed).

**Table 8. EE Measure Counts by Sector**

| Sector | Unique Measures | Permutations |
|---|---|---|
| **Residential** | 119 | 1,173 |
| **Commercial** | 164 | 5,798 |
| **Industrial** | 112 | 2,564 |

## 4.3 DR Measures

The DR measures included in the measure list utilize the following DR strategies:

- **Direct Load Control.** Utility control of selected equipment at the customer's home or business, such as HVAC or water heaters.
- **Critical Peak Pricing (CPP) with Technology.** Electricity rate structures that vary based on time of day. Includes CPP when the rate is substantially higher for a limited number of hours or days per year (customers receive advance notification of CPP event) coupled with technology that enables customer to lower their usage in a specific end-use in response to the event (e.g., HVAC via smart thermostat).
- **Contractual DR.** Customers receive incentive payments or a rate discount for committing to reduce load by a pre-determined amount or to a pre-determined firm service level upon utility request.
- **Automated DR.** Utility dispatched control of specific end-uses at a customer facility.

DR initiatives that do not rely on the installation of a specific device or technology to implement (such as a voluntary curtailment program or time of use rates) were not included.

A workbook was developed for each measure which included the same measure inputs as previously described for the EE measures. In addition, the DR workbook included expected load reduction from the measure, based on utility technical potential, existing utility DR programs, and other nationwide DR programs if needed.

For technical potential, Resource Innovations did not break out results by specific measure or control technology because all of the developed measures target the end-uses estimated

for technical potential (*i.e.*, potential is reported for space cooling end-use and not allocated to switches, smart thermostats, etc.).

## 4.4 DSRE Measures

The DSRE measure list includes rooftop PV systems, battery storage systems charged from PV systems, and CHP systems.

**PV Systems**

PV systems utilize solar panels (a packaged collection of PV cells) to convert sunlight into electricity. A system is constructed with multiple solar panels, a DC/AC inverter, a racking system to hold the panels, and electrical system interconnections. These systems are often roof-mounted systems that face south-west, south, and/or, south-east. The potential associated with roof-mounted systems installed on residential and commercial buildings was analyzed.

**Battery Storage Systems Charged from PV Systems**

Distributed battery storage systems included in this study consist of behind-the-meter battery systems installed in conjunction with an appropriately-sized PV system at residential and commercial customer facilities. These battery systems typically consist of a DC-charged battery, a DC/AC inverter, and electrical system interconnections to a PV system. On their own battery storage systems do not generate or conserve energy, but can collect and store excess PV generation to provide power during particular time periods, which for DSM purposes would be to offset customer demand during the utility's system peak.

**CHP Systems**

In most CHP applications, a heat engine creates shaft power that drives an electrical generator (fuel cells can produce electrical power directly from electrochemical reactions). The waste heat from the engine is then recovered to provide other on-site needs. Common prime mover technologies used in CHP applications and explored in this study include:

- Steam turbines
- Gas turbines
- Micro turbines
- Fuel Cells
- Internal combustion engines

A workbook was developed for each measure which included the inputs previously described for EE measures and prime mover operating parameters.

# 5 Technical Potential

In the previous sections, the approach for DSM measure development was summarized, and the 2025 base year load shares and reference-case load forecast were described. The outputs from these tasks provided the input for estimating the technical potential scenario, which is discussed in this section.

The technical potential scenario estimates the potential energy and demand savings when all technically feasible and commercially available DSM measures are implemented without regard for cost-effectiveness and customer willingness to adopt the most impactful EE, DR, or DSRE technologies. Since the technical potential does not consider the costs or time required to achieve these savings, the estimates provide a theoretical upper limit on electricity savings potential. Technical potential is only constrained by factors such as technical feasibility and applicability of measures. For this study, technical potential included full application of the commercially available DSM measures to all residential, commercial, and industrial customers in the utility's service territory.

## 5.1 Methodology

### 5.1.1 EE Technical Potential

EE technical potential refers to delivering less electricity to the same end-uses. In other words, technical potential might be summarized as "doing the same thing with less energy, regardless of the cost."

DSM measures were applied to the disaggregated utility electricity sales forecasts to estimate technical potential. This involved applying estimated energy savings from equipment and non-equipment measures to all electricity end-uses and customers. Technical potential consists of the total energy and demand that can be saved in the market which Resource Innovations reported as single numerical values for each utility's service territory.

The core equation used in the residential sector EE technical potential analysis for each individual efficiency measure is shown in Equation 1 below, while the core equation used in the nonresidential sector technical potential analysis for each individual efficiency measure is shown in Equation 2.

**Equation 1: Core Equation for Residential Sector EE Technical Potential**


Where:

- **Baseline Equipment Energy Use Intensity** = the electricity used per customer per year by each baseline technology in each market segment. In other words, the baseline equipment energy-use intensity is the consumption of the electrical energy using equipment that the efficient technology replaces or affects.
- **Saturation Share** = the fraction of the end-use electrical energy that is applicable for the efficient technology in a given market segment. For example, for residential cooling, the saturation share would be the fraction of all residential electric customers that have central air conditioners in their household.
- **Percent Incomplete** = the fraction of equipment that is not considered to already be energy efficient. To extend the example above, the fraction of central air conditioners that is not already energy efficient.
- **Feasibility Factor** = the fraction of units that is technically feasible for conversion to the most efficient available technology from an engineering perspective (*i.e.*, it may not be possible to install LEDs in all light sockets in a home because the available styles may not fit in every socket).
- **Savings Factor** = the percentage reduction in electricity consumption resulting from the application of the efficient technology.

**Equation 2: Core Equation for Non-Residential Sector EE Technical Potential**


Where:

- **Total Stock Square Footage by Segment** = the forecasted square footage level for a given building type (*e.g.*, square feet of office buildings).
- **Baseline Equipment Energy Use Intensity** = the electricity used per square foot per year by each baseline equipment type in each market segment.

- **Saturation Shares** = the fraction of total end-use energy consumption associated with the efficient technology in a given market segment. For example, for packaged terminal air-conditioner (PTAC), the saturation share would be the fraction of all space cooling kWh in a given market segment that is associated with PTAC equipment.
- **Percent Incomplete** = the fraction of equipment that is not considered to already be energy efficient.
- **Feasibility Factor** = the fraction of the equipment or practice that is technically feasible for conversion to the efficient technology from an engineering perspective (*i.e.*, it may not be possible to install Variable Frequency Drives (VFD) on all motors in a given market segment).
- **Savings Factor** = the percentage reduction in electricity consumption resulting from the application of the efficient technology.

It is important to note that the technical potential estimate represents electricity savings potential at a specific point in time. In other words, the technical potential estimate is based on data describing status quo customer electricity use and technologies known to exist today. As technology and electricity consumption patterns evolve over time, the baseline electricity consumption will also change accordingly. For this reason, technical potential is a discrete estimate of a dynamic market. Resource Innovations reported the technical potential for 2025, based on currently known DSM measures and observed electricity consumption patterns.

### Measure Interaction and Competition (Overlap)

While the technical potential equations listed above focus on the technical potential of a single measure or technology, Resource Innovations' modeling approach does recognize the overlap of individual measure impacts within an end-use or equipment type, and accounts for the following interactive effects:

- Measure interaction: Installing high-efficiency equipment could reduce energy savings in absolute terms (kWh) associated with non-equipment measures that impact the same end-use. For example, installing a high-efficiency heat pump will reduce heating and cooling consumption which will reduce the baseline against which attic insulation would be applied, thus reducing savings associated with installing insulation. To account for this interaction, Resource Innovations' TEA-POT model ranks measures that interact with one another and reduces the baseline consumption for the subsequent measure based on the savings achieved by the preceding measure. For technical potential, interactive measures are ranked based on total end-use energy savings percentage.
- Measure competition (overlap): The "measure share"—as defined above—accounted for competing measures, ensuring savings were not double-counted. This interaction

occurred when two or more measures "competed" for the same end-use. For example, a T-12 lamp could be replaced with a T-8 or linear LED lamp.

**Addressing Naturally-Occurring EE**

Naturally occurring energy efficiency includes actions taken by customers to improve the efficiency of their homes and businesses in the absence of utility program intervention. For the analysis of technical potential, Resource Innovations verified with DEF's forecasting group that the baseline sales forecasts incorporated two known sources of naturally-occurring efficiency:

- Codes and Standards: The sales forecasts already incorporated the impacts of known Code & standards changes.
- Baseline Measure Adoption: The sales forecast excluded the projected impacts of future DSM efforts but included already implemented DSM penetration.

By properly accounting for these factors, the technical potential analysis estimated the additional EE opportunities beyond what is already included in the utility sales forecast.

### 5.1.2 DR Technical Potential

The concept of technical potential applies differently to DR than for EE. Technical potential for DR is effectively the magnitude of loads that can be curtailed during conditions when utilities need peak capacity reductions. In evaluating this potential at peak capacity, the following were considered: which customers are consuming electricity at those times? What end-uses are in play? Can those end-use loads be managed? Large C&I accounts generally do not provide the utility with direct control over particular end-uses. Instead, many of these customers will forego electric demand temporarily if the financial incentive is large enough. For residential and small C&I customers where DR generally takes the form of direct utility control, technical potential for DR is limited by the loads that can be controlled remotely at scale.

This framework makes end-use disaggregation an important element for understanding DR potential, particularly in the residential and small C&I sectors. When done properly, end-use disaggregation not only provides insights into which loads are on and off when specific grid services are needed, it also provides insight concerning how key loads and end-uses, such as air conditioning use, vary across customers. Resource Innovations' approach used for load disaggregation is more advanced than what is used for most potential studies. Instead of disaggregating annual consumption or peak demand, Resource Innovations produced end-use load disaggregation for all 8,760 hours. This was needed because the loads available at times when different grid applications are needed can vary substantially. Instead

of producing disaggregated loads for the average customer, the study was produced for several customer segments. For DEF, Resource Innovations examined three residential segments based on customer housing type, four different small C&I segments based on customer size, and four different large C&I segments based on customer size, for a total of 11 different customer segments.

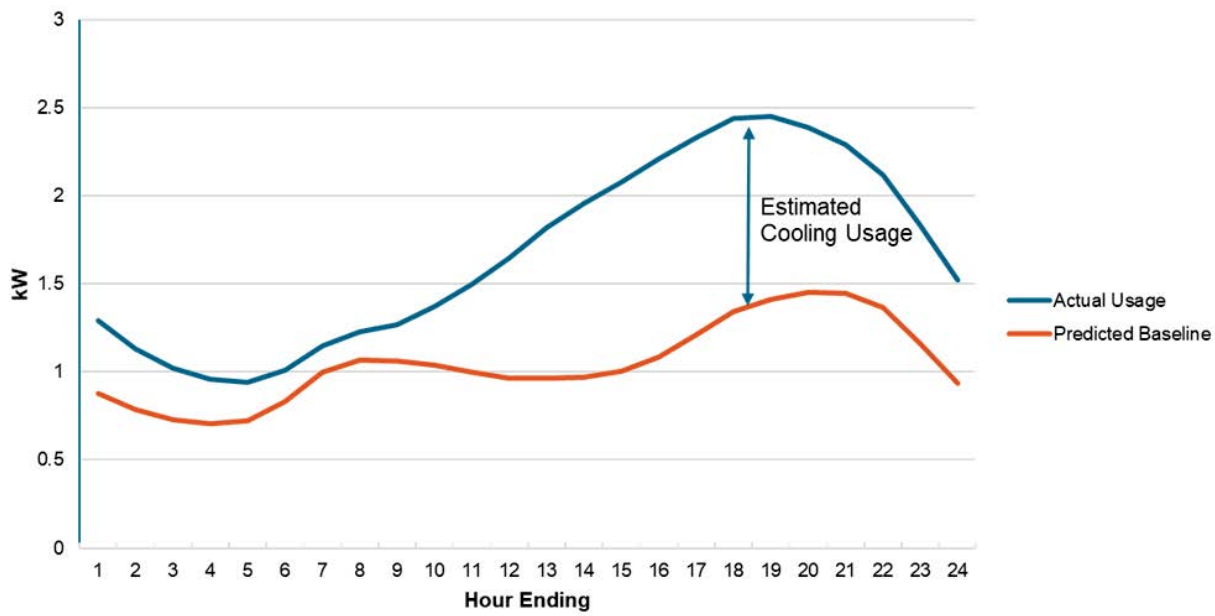
Technical potential, in the context of DR, is defined as the total amount of load available for reduction that is coincident with the period of interest; in this case, the system peak hour for the summer and winter seasons. Thus, two sets of capacity values are estimated: a summer capacity and a winter capacity.

As previously mentioned, for technical potential purposes, all coincident large C&I load is considered dispatchable, while residential and small C&I DR capacity is based on specific end-uses. Summer DR capacity for residential customers was comprised of air-conditioning (AC), pool pumps, water heaters, and managed electric vehicle charging. For small C&I customers, summer capacity was based on AC load. For winter DR capacity, residential was based on electric heating, pool pumps, and water heaters. For small C&I customers, winter capacity was based on electric heating.

AC and heating load profiles were generated for residential and small C&I customers using a sample of customer interval data provided by DEF. This sample included a customer breakout based on housing type for residential customers and size for small C&I customers. Resource Innovations then used the interval data from these customers to create an average load profile for each customer segment.

The average load profile for each customer segment was combined with historical weather data, and used to estimate hourly load as a function of weather conditions. AC and heating loads were estimated by first calculating the baseline load on days when cooling degree days (CDD) and heating degree days (HDD) were equal to zero, and then subtracting this baseline load. This methodology is illustrated by Figure 9 (a similar methodology was used to predict heating loads).

Figure 9: Methodology for Estimating Cooling Loads




This method was able to produce estimates for average AC/heating load profiles for the seven different customer segments within the residential and small C&I sectors.

Profiles for residential pool pump loads were estimated by utilizing utility-specific end-use load data provided by DEF. Profiles for residential water heater loads were estimated by using NREL's end-use load profile database.

For all eligible loads, the technical potential was defined as the amount that was coincident with system peak hours for each season, which are August from 4:00-5:00 PM for summer, and January from 7:00-8:00 AM for winter. As mentioned in Section 4, for technical potential there was also no measure breakout needed, because all measures will target the end-uses' estimated total loads.

### 5.1.3 DSRE Technical Potential

#### 5.1.3.1 PV Systems

To determine technical potential for PV systems, RI estimated the percentage of rooftop square footage in Florida that is suitable for hosting PV technology. Our estimate of technical potential for PV systems in this report is based in part on the available roof area and consisted of the following steps:

- Step 1: Outcomes from the forecast disaggregation analysis were used to characterize the existing and new residential, commercial, and industrial building stocks.
    - To calculate the total roof area for residential buildings, the average roof area per household is multiplied by the number of households.
    - For commercial and industrial buildings, RI calculated the total roof area by first dividing the load forecast by the energy usage intensity, which provides an estimate of the total building square footage. This result is then divided by the average number of floors to derive the total roof area.
- Step 2: The total available roof area feasible for installing PV systems was calculated. Relevant parameters included unusable area due to other rooftop equipment and setback requirements, in addition to possible shading from trees and limitations of roof orientation (factored into a "technical suitability" multiplier).
- Step 3: Estimated the expected power density (kW per square foot of roof area).
- Step 4: Estimated the hourly PV generation profile using NREL's PV Watts Calculator
- Step 5: Calculated total energy and coincident peak demand potential by applying RI's Spatial Penetration and Integration of Distributed Energy Resources (SPIDER) Model.

The methodology presented in this report uses the following formula to estimate overall technical potential of PVs:

**Equation 3: Core Equation for Solar DSRE Technical Energy Potential**

$$\text{PV Technical Energy Potential} = \text{Suitable Rooftop PV Area (Sq Ft)} \times \text{PV Power Density (kW-DC/Sq Ft)} \times \text{Generation Factor (kWh/kW-DC)}$$

Where:

- **Suitable Rooftop PV Area for Residential [Square Feet]:** Number of Residential Buildings x Average Roof Area Per Building x Technical Suitability Factor
- **Suitable Rooftop PV Area for Commercial [Square Feet] :** Energy Consumption [kWh] / Energy Intensity [kWh / Square Feet] / Average No. of Stories Per Building x Technical Suitability Factor
- **PV Power Density [kW-DC/Square Feet]:** Maximum power generated in Watts per square foot of solar panel.
- **Generation Factor:** Annual Energy Generation Factor for PV, from PV Watts (dependent on local solar irradiance)

#### 5.1.3.2 Battery Storage Systems Charged from PV Systems

Battery storage systems on their own do not generate power or create efficiency improvements, but store power for use at different times. Therefore, in analyzing the technical potential for battery storage systems, the source of the stored power and overlap with technical potential identified in other categories was considered.

Battery storage systems that are powered directly from the grid do not produce annual energy savings but may be used to shift or curtail load during particular time periods. As the DR technical potential analyzes curtailment opportunities for the summer and winter peak period, and battery storage systems can be used as a DR technology, the study concluded that no additional technical potential should be claimed for grid-powered battery systems beyond that already attributed to DR.

Battery storage systems that are connected to on-site PV systems also do not produce additional energy savings beyond the energy produced from the PV system[5]. However, PV-connected battery systems do create the opportunity to store energy during period when the PV system is generating more than the home or business is consuming and use that stored power during utility system peak periods.

To determine the additional technical potential peak demand savings for "solar plus storage" systems, our methodology consisted of the following steps:

- Assume that every PV system included in PV Technical Potential is installed with a paired storage system.
- Size the storage system assuming peak storage power is equal to peak PV generation and energy storage duration is three hours.
- Apply RI's hourly dispatch optimization module in SPIDER to create an hourly storage dispatch profile that flattens the individual customer's load profile to the greatest extent possible accounting for a) customer hourly load profile, b) hourly PV generation profile, and c) battery peak demand, energy capacity, and roundtrip charge/discharge efficiency.
- Calculate the effective hourly impact for the utility using the above storage dispatch profile, aligned with the utility's peak hour (calculated separately for summer and winter)
- Report the output storage kW impact on utility coincident peak demand in summer and winter.

[5] PV-connected battery systems experience some efficiency loss due to storage, charging, and discharging. However, for this study, these losses were not quantified.

### 5.1.3.3 CHP Systems

The CHP analysis created a series of unique distributed generation potential models for each primary market sector (commercial and industrial).

Only non-residential customer segments whose electric and thermal load profiles allow for the application of CHP were considered. The technical potential analysis followed a three-step process. First, minimum facilities size thresholds were determined for each non-residential customer segment. Next, the full population of non-residential customers were segmented and screened based on the size threshold established for that segment. Finally, the facilities that were of sufficient size were matched with the appropriately sized CHP technology.

To determine the minimum threshold for CHP suitability, a thermal factor was applied to potential candidate customer loads to reflect thermal load considerations in CHP sizing. In most cases, on-site thermal energy demand is smaller than electrical demand. Thus, CHP size is usually dictated by the thermal load in order to achieve improved efficiencies.

The study collected electric and thermal intensity data from other recent CHP studies. For industrial customers, Resource Innovations assumed that the thermal load would primarily be used for process operations and was not modified from the secondary data sources for Florida climate conditions. For commercial customers, the thermal load is more commonly made up of water heating, space heating, and space cooling (through the use of an absorption chiller). Therefore, to account for the hot and humid climate in Florida, which traditionally limits weather-dependent internal heating loads, commercial customers' thermal loads were adjusted to incorporate a higher proportion of space cooling to space heating as available opportunities for waste heat recovery.

After determination of minimum kWh thresholds by segment, Resource Innovations used the utility-provided customer data with NAICS or SIC codes as well as annual consumption data. Non-residential customers were then categorized by segment and size. Customers with annual loads below the kWh thresholds are not expected to have the consistent electric and thermal loads necessary to support CHP and were eliminated from consideration.

In general, internal combustion engines are the prime mover for systems under 500kW with gas turbines becoming progressively more popular as system size increases above that. Based on the available load by customer, adjusted by the estimated thermal factor for each segment, CHP technologies were assigned to utility customers in a top-down fashion (*i.e.*, starting with the largest CHP generators).

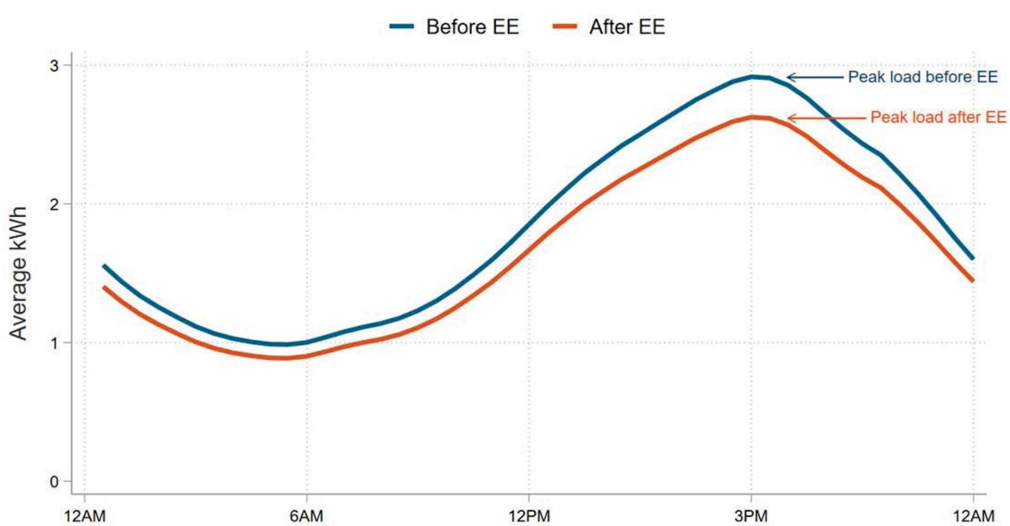
**Measure Interaction**

PV systems and battery storage charged from PV systems were analyzed collectively due to their common power generation source; and therefore, the identified technical potential for these systems is additive. However, CHP systems were independently analyzed for technical potential without consideration of the competition between DSRE technologies or customer preference for a particular DSRE system. Therefore, results for CHP technical potential should not be combined with PV systems or battery storage systems for overall DSRE potential but used as independent estimates.

### 5.1.4 Interaction of Technical Potential Impacts

As described above, the technical potential was estimated using separate models for EE, DR, and DSRE systems. However, there is interaction between these technologies; for example, a more efficient HVAC system would result in a reduced peak demand available for DR curtailment, as illustrated in Figure 10.

**Figure 10: Illustration of EE Impacts on HVAC System Load Shape**




Therefore, after development of the independent models, the interaction between EE, DR, and DSRE was incorporated as follows:

- The EE technical potential was assumed to be implemented first, followed by DR technical potential and DSRE technical potential.

- To account for the impact of EE technical potential on DR, the baseline load forecast for the applicable end-uses was adjusted by the EE technical potential, resulting in a reduction in baseline load available for curtailment.
- For DSRE systems, the EE and DR technical potential was incorporated in a similar fashion, adjusting the baseline load used to estimate DSRE potential.
  - For the PV analysis, this did not impact the results as the EE and DR technical potential did not affect the amount of PV that could be installed on available rooftops.
  - For the battery storage charged from PV systems, the reduced baseline load from EE resulted in additional PV-generated energy being available for the battery systems and for use during peak periods. The impact of DR events during the assumed curtailment hours was incorporated into the modeling of available battery storage and discharge loads.
- For CHP systems, the reduced baseline load from EE resulted in a reduction in the number of facilities that met the annual energy threshold needed for CHP installations. Installed DR capacity was assumed to not impact CHP potential as the CHP system feasibility was determined based on energy and thermal consumption at the facility. It should be noted that CHP systems not connected to the grid could impact the amount of load available for curtailment with utility-sponsored DR. Therefore, CHP technical potential should not be combined with DR potential but used as independent estimates.

## 5.2 EE Technical Potential

### 5.2.1 Summary

Table 9 summarizes the EE technical potential by sector:

Table 9. EE Technical Potential

| | Savings Potential | | |
|---|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) | Energy (GWh) |
| **Residential** | 2,217 | 2,423 | 7,599 |
| **Non-Residential**[6] | 669 | 450 | 3,591 |
| **Total** | 2,886 | 2,873 | 11,190 |

[6] Non-Residential results include all commercial and industrial customer segments.

### 5.2.2 Residential

Figure 11, Figure 12, and Figure 13 summarize the residential sector EE technical potential by end-use.

Figure 11: Residential EE Technical Potential by End-Use (Summer Peak Savings)

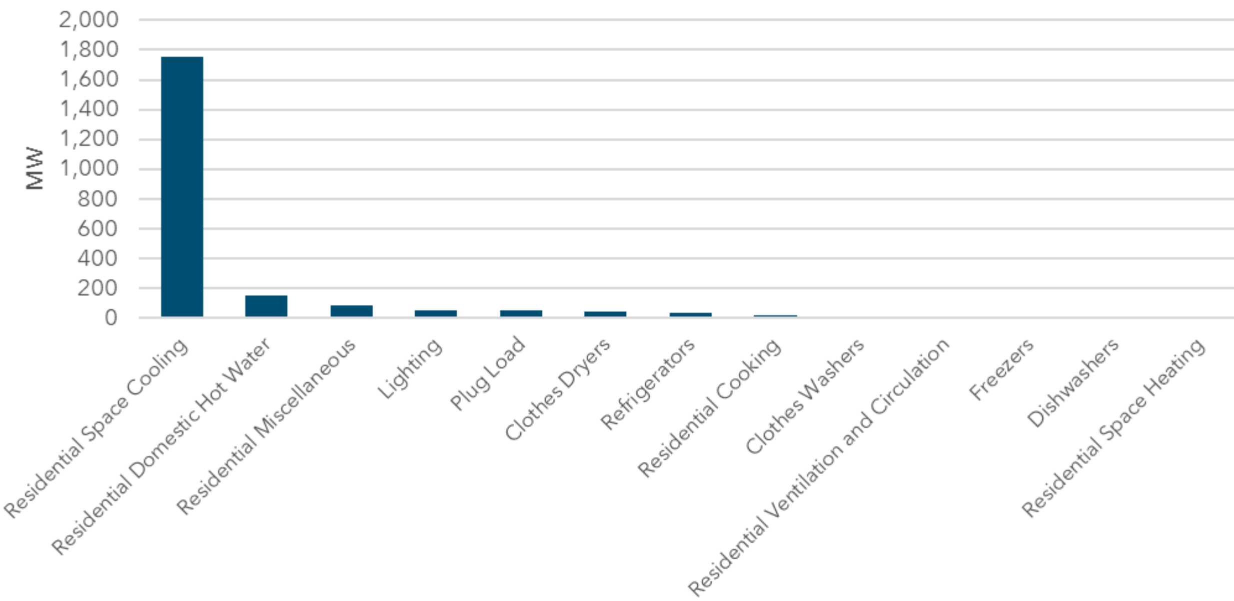


**Figure 12: Residential EE Technical Potential by End-Use (Winter Peak Savings)**

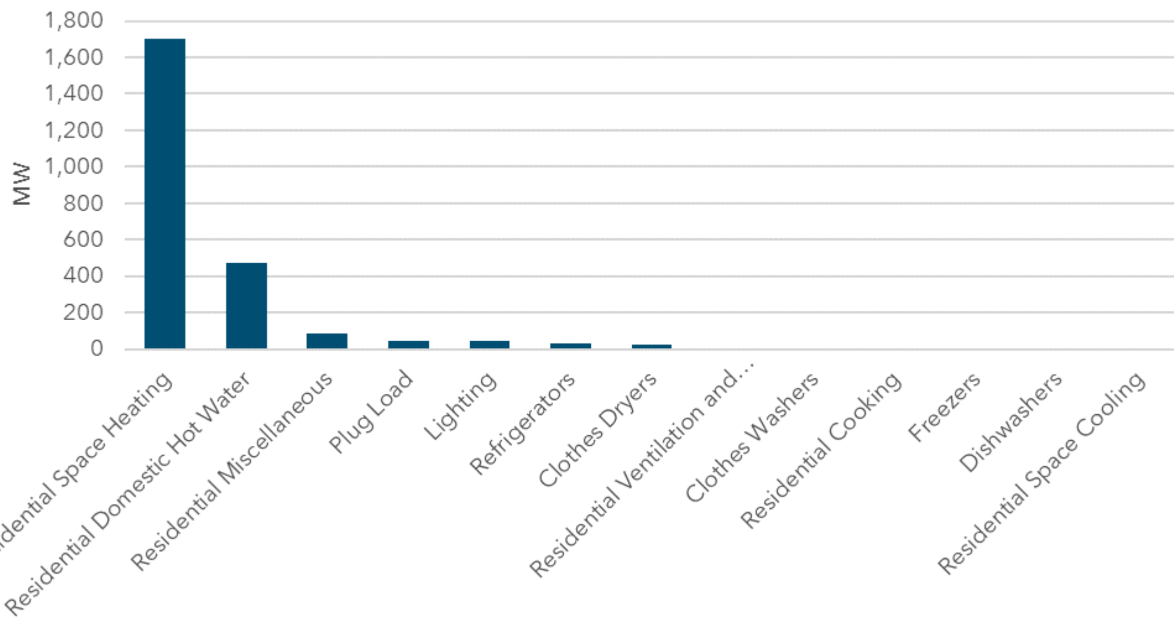
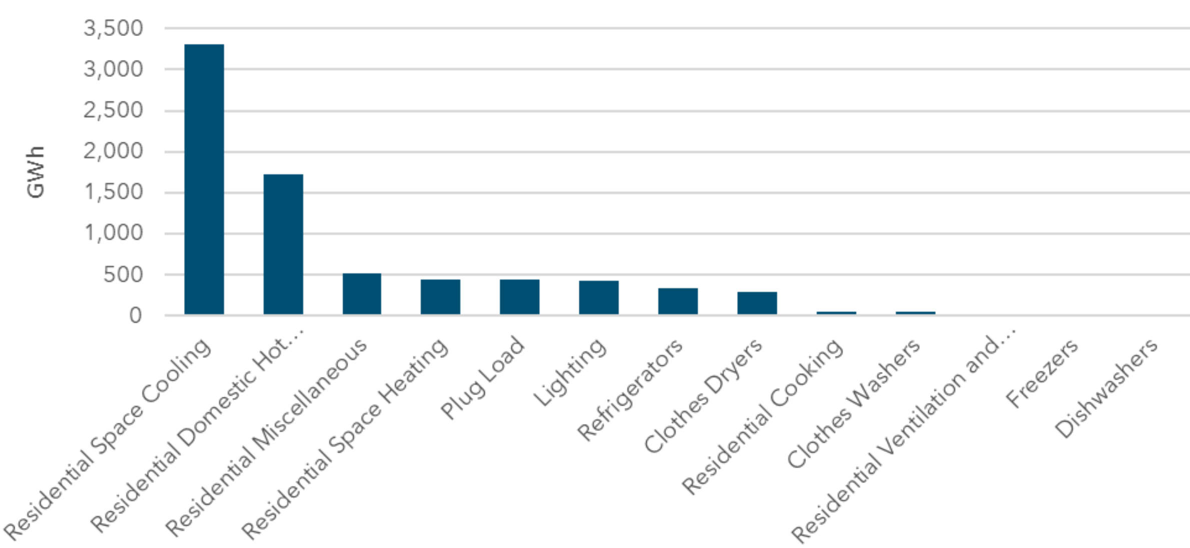



**Figure 13: Residential EE Technical Potential by End-Use (Energy Savings)**



## 5.2.3 Non-Residential

### 5.2.3.1 Commercial Segments

Figure 14, Figure 15, and Figure 16 summarize the commercial sector EE technical potential by end-use.

Figure 14: Commercial EE Technical Potential by End-Use (Summer Peak Savings)

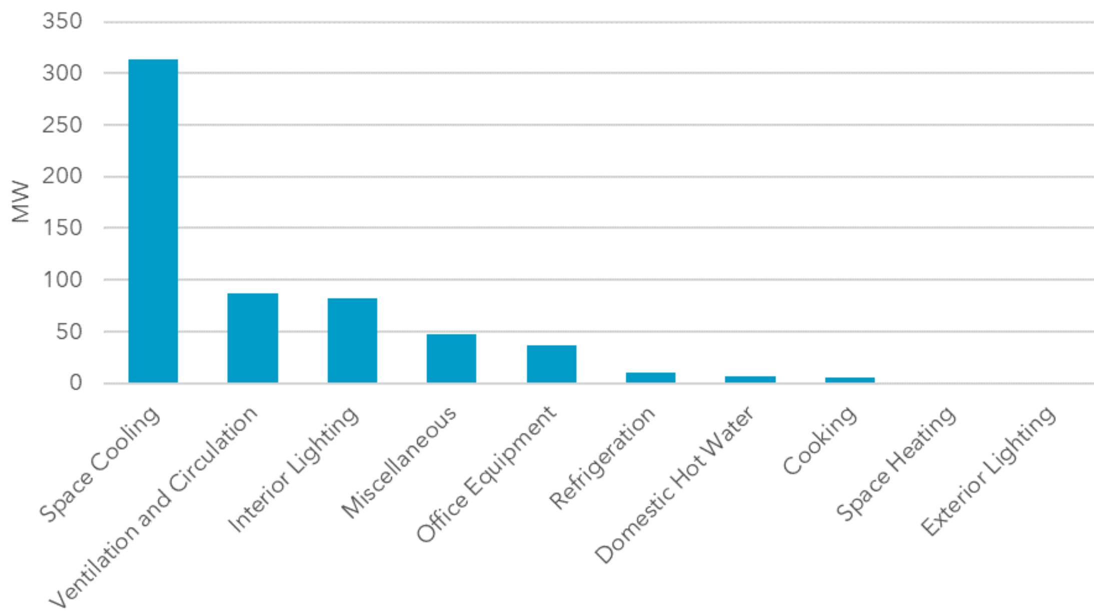


Figure 15: Commercial EE Technical Potential by End-Use (Winter Peak Savings)

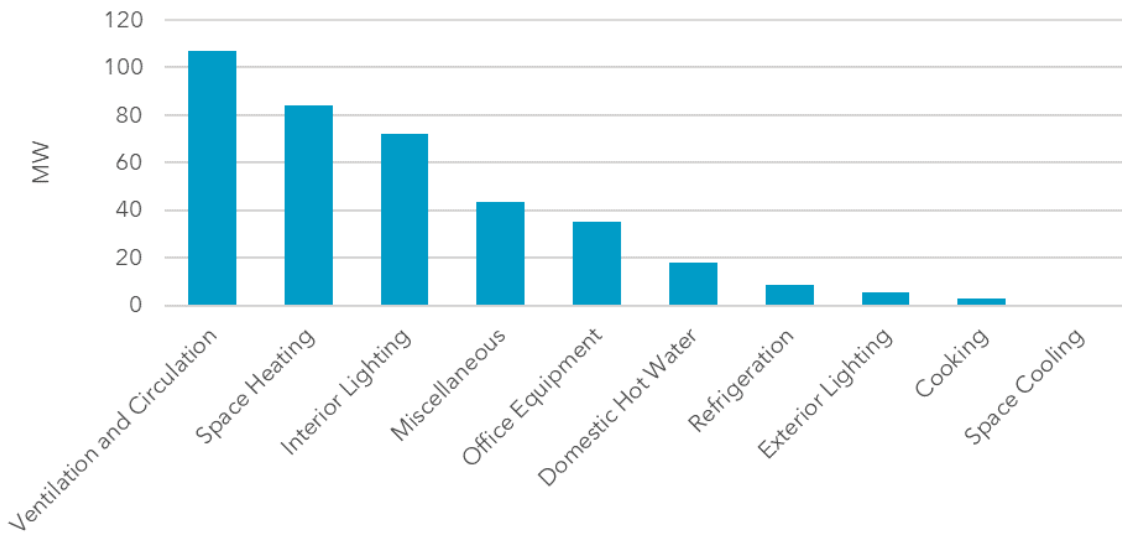
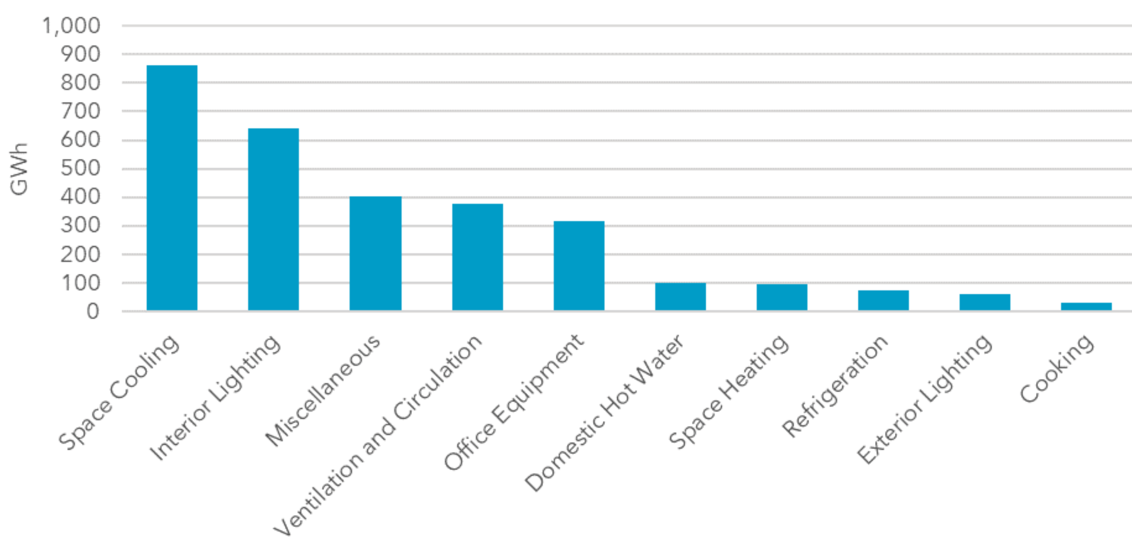



Figure 16: Commercial EE Technical Potential by End-Use (Energy Savings)




## 5.2.3.2 Industrial Segments

Figure 17, Figure 18, and Figure 19 summarize the industrial sector EE technical potential by end-use.

Figure 17: Industrial EE Technical Potential by End-Use (Summer Peak Savings)

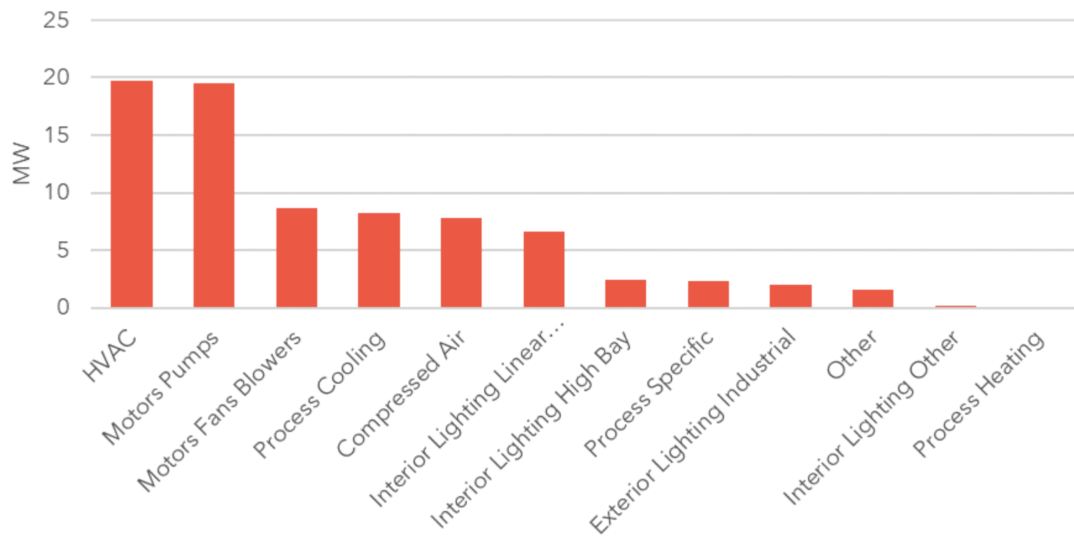



Figure 18: Industrial EE Technical Potential by End-Use (Winter Peak Savings)

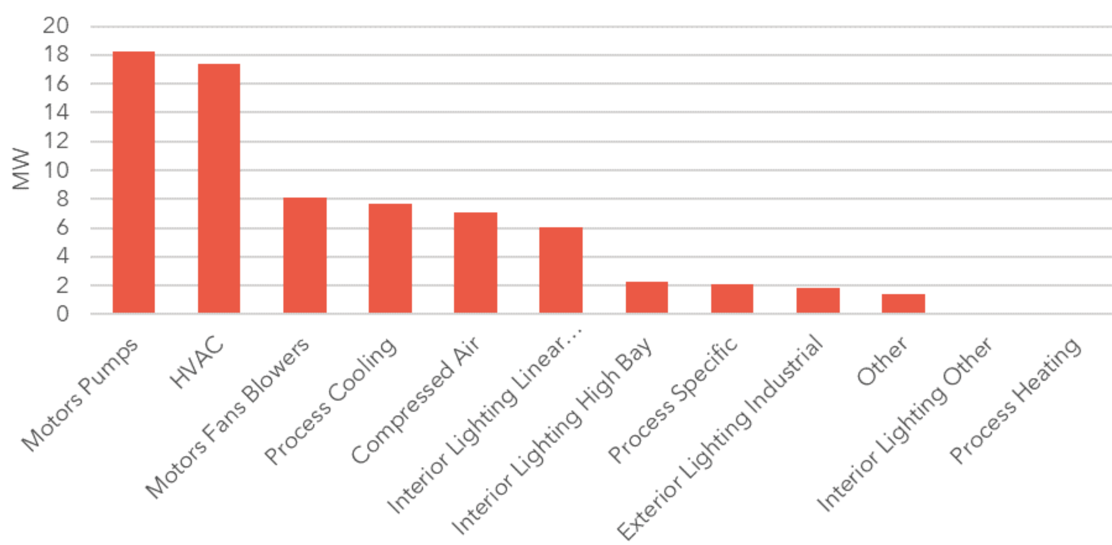
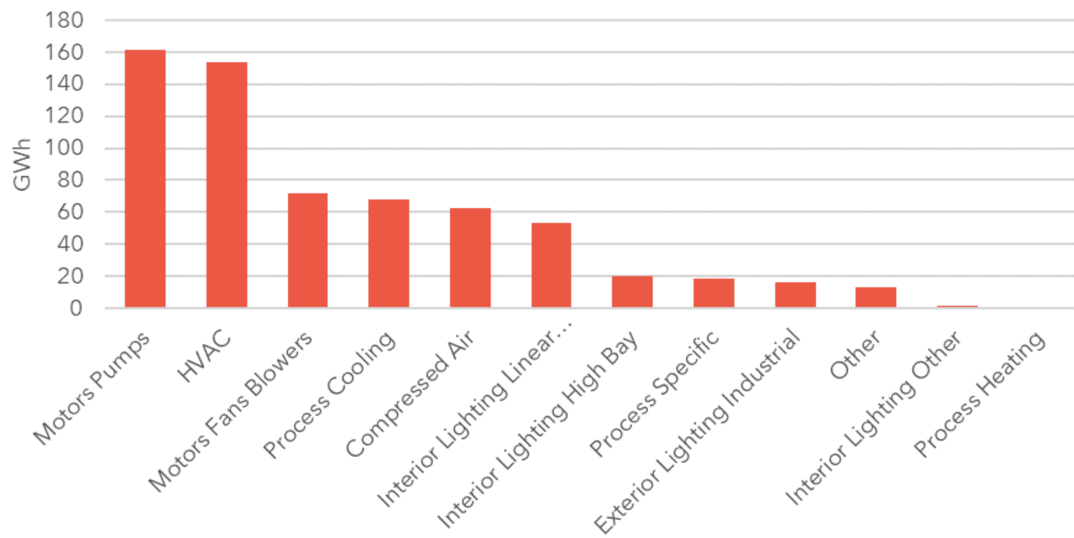


Figure 19: Industrial EE Technical Potential by End-Use (Energy Savings)




## 5.3 DR Technical Potential

Technical potential for DR is defined for each class of customers as follows:

- Residential & Small C&I customers – Technical potential is equal to the aggregate load for all end-uses that can participate in DEF's current programs plus DR measures not currently offered in which the utility uses specialized devices to control loads (*i.e.*, direct load control programs). This includes cooling and heating loads for residential and small C&I customers and water heater and pool pump loads for residential customers. Not all demand reductions are delivered via direct load control of end-uses. The magnitude of demand reductions from non-direct load control such as time varying pricing, peak time rebates and targeted notifications is linked to cooling and heating loads.
- Large C&I customers – Technical potential is equal to the total amount of load for each customer segment (*i.e.*, that customers reduce their total load to zero when called upon).

Table 10 summarizes the seasonal DR technical potential by sector:

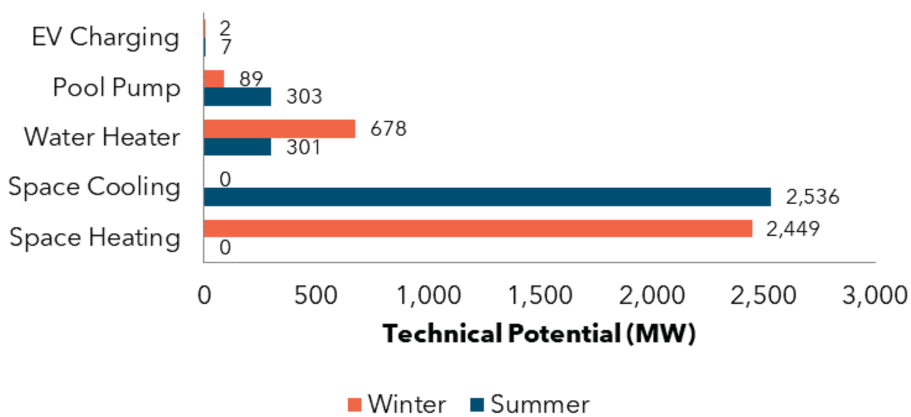
Table 10. DR Technical Potential

| | Savings Potential | |
|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) |
| **Residential** | 3,147 | 3,218 |
| **Non-Residential** | 2,631 | 2,391 |
| **Total** | 5,778 | 5,609 |

## 5.3.1 Residential

Residential technical potential is summarized in Figure 20.

Figure 20: Residential DR Technical Potential by End-Use

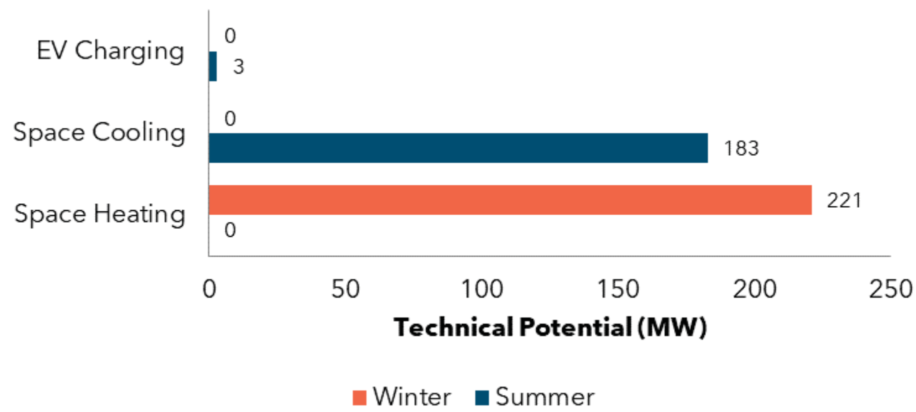



## 5.3.2 Non-Residential

### 5.3.2.1 Small C&I Customers

For small C&I technical potential, Resource Innovations looked at cooling and heating loads only. Small C&I technical potential is provided in Figure 21.

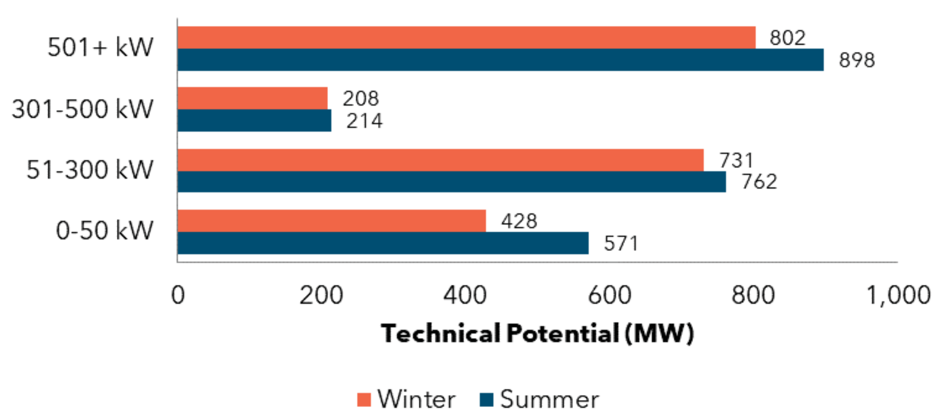
Figure 21: Small C&I DR Technical Potential by End-Use




### 5.3.2.2 Large C&I Customers

Figure 22 provides the technical potential for large C&I customers, broken down by customer size.

Figure 22: Large C&I DR Technical Potential by Segment



## 5.4 DSRE Technical Potential

Table 11 provides the results of the DSRE technical potential for each customer segment:

**Table 11. DSRE Technical Potential[7]**

| | Savings Potential | | |
|---|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) | Energy (GWh) |
| **PV Systems** | | | |
| **Residential** | 1,761 | 152 | 17,637 |
| **Non-Residential** | 444 | 15 | 4,164 |
| **Total** | 2,205 | 167 | 21,801 |
| **Battery Storage charged from PV Systems** | | | |
| **Residential** | 2,016 | 2,176 | 0 |
| **Non-Residential** | 240 | 315 | 0 |
| **Total** | 2,256 | 2,491 | 0 |
| **CHP Systems** | | | |
| **Total** | 773 | 811 | 3,553 |

[7] PV systems and CHP systems were independently analyzed for technical potential without consideration of the competition between technologies or customer preference for DSRE system.

# Appendix A EE Measure List

For information on how Resource Innovations developed this list, please see Section 4.

Table 12: Residential EE Measures

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| 120v Heat Pump Water Heater 50 Gallons | Residential Domestic Hot Water | 120v Heat Pump Water Heater 50 Gallons | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Air Sealing-Infiltration Control | Residential Space Cooling, Residential Space Heating | Standard Heating and Cooling System with Improved Infiltration Control | Standard Heating and Cooling System with Standard Infiltration Control |
| Air-to-Water Heat Pump | Residential Space Cooling, Residential Space Heating | Energy Star Air-to-Water Heat Pump, 25 SEER, 13 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - 15 SEER/14.3 SEER2 from base electric resistance | Residential Space Cooling, Residential Space Heating | ASHP 15 SEER from base electric resistance | Base AC, 15 SEER, Electric resistance heating |
| ASHP - 24 SEER/22.9 SEER2 (from elec resistance) | Residential Space Cooling, Residential Space Heating | ASHP: 24/22.9 SEER/SEER2, 10.5 HSPF | Base AC, 15 SEER, Electric resistance heating |
| ASHP - 24 SEER/22.9 SEER2, 10.5 HSPF | Residential Space Cooling, Residential Space Heating | ASHP: 24/22.9 SEER/SEER2, 10.5 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - CEE Advanced Tier: 17.8 SEER/17 SEER2; 10.0 HSPF | Residential Space Cooling, Residential Space Heating | CEE Advanced Tier ASHP:17.8/17 SEER/SEER2; 10.0 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - CEE Advanced Tier: 17.8 SEER/17 SEER2; 10.0 HSPF (from elec resistance) | Residential Space Cooling, Residential Space Heating | CEE Advanced Tier ASHP:17.8/17 SEER/SEER2; 10.0 HSPF | Base AC, 15 SEER, Electric resistance heating |
| ASHP - CEE Tier 2: 16.8 SEER/16 SEER2; 9.0 HSPF | Residential Space Cooling, Residential Space Heating | CEE Tier 2 ASHP: 16.8/16 SEER/SEER2; 9.0 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - CEE Tier 2: 16.8 SEER/16 SEER2; 9.0 HSPF (from elec resistance) | Residential Space Cooling, Residential Space Heating | CEE Tier 2 ASHP: 16.8/16 SEER/SEER2; 9.0 HSPF | Base AC, 15 SEER, Electric resistance heating |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| ASHP - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 (from elect resistance) | Residential Space Cooling, Residential Space Heating | ENERGY STAR/CEE Tier 1 ASHP: 16/15.2 SEER/SEER2, 9.0 HSPF | Base AC, 15 SEER, Electric resistance heating |
| ASHP - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2, 9.0 HSPF | Residential Space Cooling, Residential Space Heating | ENERGY STAR/CEE Tier 1 ASHP: 16/15.2 SEER/SEER2, 9.0 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| Basement or Crawlspace Wall Insulation R-15 | Residential Space Cooling, Residential Space Heating | Increased Basement or Crawlspace Wall Insulation (R-15) | Code-Compliant Exterior Below-Grade Wall Insulation (R-10) |
| Bathroom Faucet Aerators | Residential Domestic Hot Water | Low-Flow Faucet Aerator with Flow Rate of 1.5 gpm | Faucet Aerator with Federal Standard Flow Rate of 2.2 gpm |
| CEE Advanced Tier Clothes Dryer | Clothes Dryers | CEE Advanced Tier Clothes Dryer | One Clothes Dryer meeting Federal Standard |
| CEE Advanced Tier Clothes Washer | Clothes Washers | Tier 3 CEE Clothes washer | One Clothes Washer meeting Federal Standard |
| CEE Tier 3 Refrigerator | Refrigerators | Residential Tier 3 Refrigerator | One Refrigerator meeting Federal Standard |
| Ceiling Insulation (R11 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-1985) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R11 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-1985) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R19 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-2020) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R19 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-2020) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R2 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, older (pre-1982) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R2 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, older (pre-1982) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R30 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1986-2020) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R30 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1986-2020) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Ceiling Insulation (R38 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1986-2020) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Central AC - CEE Tier 2: 16.8 SEER/16 SEER2 | Residential Space Cooling | Central AC - CEE Tier 2: 16.8 SEER/16 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC - 24 SEER/22.9 SEER2 | Residential Space Cooling | Central AC - 24 SEER/22.9 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC - CEE Advanced Tier: 17.8 SEER/17 SEER2 | Residential Space Cooling | Central AC - CEE Advanced Tier: 17.8 SEER/17 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC - ENERGY STAR/ CEE Tier 1: 16 SEER/15.2 SEER2 | Residential Space Cooling | Central AC - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC Tune Up | Residential Space Cooling | System tune-up, including coil cleaning, refrigerant charging, and other diagnostics | Existing Typical Central AC without Regular Maintenance/tune-up |
| Dehumidifier Recycling | Plug Load | No dehumidifier | One Dehumidifier meeting Federal Standard |
| Drain Water Heat Recovery | Residential Domestic Hot Water | 50 Gallon Electric Resistance Heater and Drain Water Heat Exchanger | 50 Gallon Electric Resistance Heater, No Drain Water Heat Recovery |
| Duct Insulation | Residential Space Cooling, Residential Space Heating | Standard Electric Heating and Central AC with Insulated Ductwork | Standard Electric Heating and Central AC with Uninsulated Ductwork |
| Duct Repair | Residential Space Cooling, Residential Space Heating | Duct Repair to eliminate/minimize leaks, includes testing and sealing | Standard Electric Heating and Central AC with typical duct leakage |
| ECM Circulator Pump | Residential Miscellaneous | Install ECM Circulator Pump | Install Standard Circulator Pump |
| Energy Star Air Purifier | Plug Load | One Air Purifier meeting ENERGY STAR 2.0 Standards | One Standard Conventional Air Purifier |
| Energy Star Audio-Video Equipment | Plug Load | One DVD/Blu-Ray Player meeting current ENERGY STAR Standards | One Market Average DVD/Blu-Ray Player |
| Energy Star Bathroom Ventilating Fan | Residential Ventilation and Circulation | Bathroom Exhaust Fan meeting current ENERGY STAR Standards | Bathroom Exhaust Fan meeting Federal Standard |
| Energy Star Ceiling Fan | Residential Miscellaneous | 60" Ceiling Fan Meeting ENERGY STAR 3.1 Standards | Standard 60" Ceiling Fan |
| Energy Star Clothes Dryer | Clothes Dryers | One Electric Resistance Clothes Dryer meeting ENERGY STAR 1.1 Standards | One Clothes Dryer meeting Federal Standard |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Energy Star Clothes Washer | Clothes Washers | One Clothes Washer meeting ENERGY STAR 8.1 Standards | One Clothes Washer meeting Federal Standard |
| Energy Star Dehumidifier | Plug Load | One Dehumidifier meeting ENERGY STAR 5.0 Standards | One Dehumidifier meeting Federal Standard |
| Energy Star Dishwasher | Dishwashers | One Dishwasher meeting ENERGY STAR 7.0 Requirements (effective on July 19, 2023), electric water heating | One Dishwasher meeting Federal Standard |
| Energy Star Dishwasher (Gas Water Heating) | Dishwashers | One Dishwasher meeting ENERGY STAR 7.0 Requirements, gas water heating | One Dishwasher meeting Federal Standard; gas water heating |
| Energy Star Door | Residential Space Cooling, Residential Space Heating | 100ft2 of Opaque Door meeting Energy Star Version 6.0 Requirements (U-Value: 0.17) | 100ft2 of Opaque Door meeting current FL Code Requirements |
| ENERGY STAR EV supply equipment (level 2 charger) | Residential Miscellaneous | Level 2 Electric Vehicle Supply Equipment (EVSE) | Level 1 Electric Vehicle Supply Equipment (EVSE) |
| Energy Star Freezer | Freezers | One Freezer meeting current ENERGY STAR 5.1 Standards | One Freezer meeting Federal Standard |
| Energy Star Ground Source Heat Pump | Residential Space Cooling, Residential Space Heating | Energy Star GSHP, 17.1 SEER, 12 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF |
| Energy Star Imaging Equipment | Plug Load | One imaging device meeting current ENERGY STAR Standards | One non-ENERGY STAR imaging device |
| Energy Star Monitor | Plug Load | One Monitor meeting ENERGY STAR 8.0 Standards | One Standard Monitor |
| Energy Star Personal Computer | Plug Load | One Personal Computer meeting ENERGY STAR 8.0 Standards | One Personal Computer meeting ENERGY STARÂ® 3.0 Standards |
| Energy Star Refrigerator | Refrigerators | One Refrigerator/Freezer meeting ENERGY STAR 5.1 Standards | One Refrigerator/Freezer meeting Federal Standard |
| Energy Star Room AC | Residential Space Cooling | Room AC meeting current ENERGY STAR standards | Code-Compliant Room AC |
| Energy Star Set-Top Receiver | Plug Load | One Set-top Box meeting ENERGY STAR 4.1 Standards | One Market Average Set-top Box |
| Energy Star TV | Plug Load | One Television meeting ENERGY STAR 9.0 Standards | One non-ENERGY STAR Television |
| Energy Star Windows | Residential Space Cooling, Residential Space Heating | 100ft2 of Window meeting Energy Star Version 6.0 Requirements (U-Value: 0.27, SHGC: 0.21) | 100ft2 of Window current FL energy code requirements |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Exterior Wall Insulation | Residential Space Cooling, Residential Space Heating | Increased Exterior Above-Grade Wall Insulation (R-13) | Market Average Existing Exterior Above-Grade Wall Insulation |
| Filter Whistle | Residential Ventilation and Circulation | Install the Furnace Filter Alarm | No Furnace Filter Alarm on a Central Forced-Air Furnace |
| Floor Insulation | Residential Space Heating | Increased Floor Insulation (R-30) | Code-Compliant Floor Insulation |
| Freezer Recycling | Freezers | No Freezer | Current Market Freezer |
| Green Roof | Residential Space Cooling | Vegetated Roof Surface on top of Standard Roof | Standard Black Roof |
| Heat Pump Clothes Dryer | Clothes Dryers | One Heat Pump Clothes Dryer | One Clothes Dryer meeting Federal Standard |
| Heat Pump Pool Heater | Residential Miscellaneous | Heat Pump Swimming Pool Heater | Electric Resistance Swimming Pool Heater |
| Heat Pump Tune Up | Residential Space Cooling, Residential Space Heating | System tune-up, including coil cleaning, refrigerant charging, and other diagnostics | Standard Heating and Cooling System without Regular Maintenance/tune-up |
| Heat Pump Water Heater 50 Gallons-CEE Advanced Tier | Residential Domestic Hot Water | CEE Advanced Tier Heat Pump Water Heater 50 Gallons | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Heat Pump Water Heater 50 Gallons-ENERGY STAR | Residential Domestic Hot Water | Heat Pump Water Heater 50 Gallons | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Heat Pump Water Heater 80 Gallons-ENERGY STAR | Residential Domestic Hot Water | Energy Star Heat Pump Water Heater 80 Gallons | Code-Compliant 80 Gallon Electric Resistance Water Heater |
| Heat Trap | Residential Domestic Hot Water | Heat Trap | Existing Water Heater without heat trap |
| High Efficiency Convection Oven | Residential Cooking | One Full-Size Convection Oven meeting ENERGY STAR 3.0 Standards | One Standard Economy-Grade Full-Size Oven |
| High Efficiency Induction Cooktop | Residential Cooking | One residential induction cooktop | One standard residential electric cooktop |
| Home Energy Management System | Lighting, Plug Load, Residential Space Cooling, Residential Space Heating | Typical HVAC by Building Type Controlled by Energy Management System | Typical HVAC by Building Type, Manually Controlled |
| Hot Water Pipe Insulation | Residential Domestic Hot Water | 1' of Insulated Pipe in Unconditioned Spaces, Insulation of R-5 | 1' of Pipe in Unconditioned Spaces with Code Minimum of 1"of Insulation |
| HVAC ECM Motor | Residential Ventilation and Circulation | A brushless permanent magnet (ECM) blower motor for electric furnace | Permanent Split Capacitor Motor for Electric Furnace |
| HVAC Economizer | Residential Space Cooling | Install residential economizer | No economizer |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| HVAC Zoning System | Residential Space Cooling, Residential Space Heating | Install dampers in the ducts, dividing home into multiple zones, each controlled by its own thermostat | Single zone HVAC system |
| Indoor Daylight Sensor | Lighting | Install Indoor Daylight Sensors, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Induction Range | Residential Cooking | Residential induction range | Electric range |
| Instantaneous Hot Water System | Residential Domestic Hot Water | Instantaneous Hot Water System | Standard Efficiency Storage Tank Water Heater |
| Kitchen Faucet Aerators | Residential Domestic Hot Water | Low-Flow Faucet Aerator with Flow Rate of 1.5 gpm | Faucet Aerator with Federal Standard Flow Rate of 2.2 gpm |
| LED - 9W_CFL Baseline | Lighting | LED (assume 9W) replacing CFL baseline lamp | 14W CFL (60W equivalent) |
| LED - 9W_Halogen Baseline | Lighting | LED (assume 9W) replacing EISA-2020 compliant baseline lamp | EISA-2020 compliant baseline lamp (60W equivalent) |
| LED Specialty Lamps-5W Chandelier | Lighting | 5 W Chandelier LED | Standard incandescent chandelier lamp |
| Linear LED | Lighting | Linear LED Lamps in Linear Fluorescent Fixture | Standard (32w) T8 lamps in Linear Fluorescent Fixture |
| Low Flow Showerhead | Residential Domestic Hot Water | Low-Flow Handheld Showerhead, Flow Rate: 1.60 gpm | Standard Handheld Showerhead, Flow Rate: 2.50 gpm |
| New Construction - Whole Home Improvements - Tier 1 | Whole Home | Performance-based improvements in new homes - 20% savings | Residential New Construction (Baseline Efficiency) |
| New Construction - Whole Home Improvements - Tier 2 | Whole Home | Performance-based improvements in new homes - 35% savings | Residential New Construction (Baseline Efficiency) |
| Occupancy Sensors Switch Mounted | Lighting | Switch Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor Lighting Timer | Lighting | Timer on Outdoor Lighting, Controlling 120 Watts | 120 Watts of Lighting, Manually Controlled |
| Outdoor Motion Sensor | Lighting | Motion Sensor on Outdoor Lighting, Controlling 120 Watts | 120 Watts of Lighting, Manually Controlled |
| Ozone Laundry | Clothes Washers | Add a New, Single-Unit Ozone Laundry System to the Clothes Washer | One Clothes Washer meeting Federal Standard |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Programmable Thermostat | Residential Space Cooling, Residential Space Heating | Standard Heating and Cooling System with Programmable Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Properly Sized CAC | Residential Space Cooling | Properly Sized Central Air Conditioning | Standard Central Air Conditioning, Oversized |
| Radiant Barrier | Residential Space Cooling | Radiant Barrier | No radiant barrier |
| Reflective Roof | Residential Space Cooling | Reflective Roof Treatment | Standard dark shingle |
| Refrigerator Coil Cleaning | Refrigerators | Refrigerator Coil Cleaning | |
| Refrigerator Recycling | Refrigerators | No Refrigerator | Current Market Average Refrigerator |
| Residential Whole House Fan | Residential Space Cooling | Standard Central Air Conditioning with Whole House Fan | Standard Central Air Conditioning, No Whole House Fan |
| Sealed crawlspace | Residential Space Cooling, Residential Space Heating | Encapsulated and semi-conditioned crawlspace | Naturally vented, unconditioned crawlspace |
| Smart Breaker | Whole Home | Smart Breaker | standard electric breakers |
| Smart Panel | Whole Home | Multi-channel device that attaches to customer's circuit breaker to enable monitoring and control of major end-use appliances by customer | standard electric panel |
| Smart Power Strip | Plug Load | Smart plug strips for entertainment centers and home office | Standard entertainment center or home office usage, no smart strip controls |
| Smart Thermostat | Residential Space Cooling, Residential Space Heating | Standard Heating and Cooling System with Smart Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Solar Attic Fan | Residential Space Cooling | Standard Central Air Conditioning with Solar Attic Fan | Standard Central Air Conditioning, No Solar Attic Fan |
| Solar Pool Heater | Residential Miscellaneous | Solar Swimming Pool Heater | Electric Resistance Swimming Pool Heater |
| Solar Powered Pool Pumps | Residential Miscellaneous | Solar Powered Pool Pump | Variable Speed Pool Pump Motor |
| Solar Thermal Water Heating System | Residential Domestic Hot Water | Solar Thermal System with Electric Backup | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Spray Foam Insulation (Base R11) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in existing (1982-1985) homes | Existing ceiling insulation based on building code at time of construction |
| Spray Foam Insulation (Base R19) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in existing (1982-1985) homes | Existing ceiling insulation based on building code at time of construction |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Spray Foam Insulation (Base R2) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in older (pre-1982) homes | Existing ceiling insulation based on building code at time of construction |
| Spray Foam Insulation(Base R30) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in existing (1986-2020) homes | Existing ceiling insulation based on building code at time of construction |
| Thermostatic Shower Restriction Valve | Residential Domestic Hot Water | 50 Gallon Electric Resistance Heater and Thermostatic Shower Valves | 50 Gallon Electric Resistance Heater and Standard Shower Valves |
| Variable Refrigerant Flow (VRF) HVAC Systems | Residential Space Cooling, Residential Space Heating | Variable Refrigerant Flow (VRF) HVAC Systems | Code-Compliant ASHP, 15 SEER, 8.8 HSPF |
| Water Heater Blanket | Residential Domestic Hot Water | 50 Gallon Electric Resistance Water Heater with Insulated Tank Wrap | Code-Compliant 50 Gallon Electric Resistance Water Heater, No Tank Wrap |
| Water Heater Thermostat Setback | Residential Domestic Hot Water | 50 Gallon Electric Resistance Water Heater with Temperature Setpoint of 119°F | Code-Compliant 50 Gallon Electric Resistance Water Heater (Temp. Setpoint = 130Â°F) |
| Water Heater Timeclock | Residential Domestic Hot Water | Water Heater Timeclock | Existing Water Heater without time clock |
| Weather stripping | Residential Space Cooling, Residential Space Heating | Specific quantity of weather stripping to seal | |
| Window Caulking | Residential Space Cooling, Residential Space Heating | Window caulking | |
| Window Sun Protection | Residential Space Cooling | Window Film Applied to Standard Window | Standard Window with below Code Required Minimum SHGC |

**Table 13: Commercial EE Measures**

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| 1.5HP Open Drip-Proof (ODP) Motor | Ventilation and Circulation | High Efficiency 1.5 HP Open-Drip Proof Motor | 1.5HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 10HP Open Drip-Proof (ODP) Motor | Ventilation and Circulation | High Efficiency 10 HP Open-Drip Proof Motor | 10HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 20HP Open Drip-Proof (ODP) Motor | Ventilation and Circulation | High Efficiency 20 HP Open-Drip Proof Motor | 20HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Advanced Rooftop Controller | Ventilation and Circulation | Advanced Rooftop Controller | Without Advanced Rooftop Controller |
| Air Compressor Optimization | Miscellaneous | Performing Routine Maintenance on 20HP Inlet Modulation Fixed-Speed Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| Air Curtains | Space Cooling, Space Heating | Air Curtain across door opening | Door opening with no air curtain |
| Airside Economizer | Space Cooling | Airside Economizer | No economizer |
| Anti-Sweat Controls | Refrigeration | One Medium Temperature Reach-In Case with Anti-Sweat Heater Controls | One Medium Temperature Reach-In Case without Anti-Sweat Heater Controls |
| Auto Off Time Switch | Interior Lighting | Auto-Off Time Switch on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Automatic Door Closer for Walk-in Coolers and Freezers | Refrigeration | One Medium Temperature Walk-In Refrigerator Door with Auto-Closer | One Medium Temperature Walk-In Refrigerator Door without Auto-Closer |
| Beverage Vending Machine Controls | Refrigeration | One non-ENERGY STAR beverage vending machine equipped with infrared occupancy sensing controls | One non-ENERGY STAR beverage vending machine, no controls |
| Bi-Level Lighting Control (Exterior) | Exterior Lighting | Bi-Level Controls on Exterior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Bi-Level Lighting Control (Interior) | Interior Lighting | Bi-Level Controls on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Ceiling Insulation (R19 to R38) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation (R19 to R49) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic - Beyond Code | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation (R2 to R38) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation (R2 to R49) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic - Beyond Code | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Chilled Water Reset | Space Cooling | One Chiller with Reset of Chilled Water Temperature Setpoint | One Chiller with Fixed Chilled Water Temperature |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Chiller maintenance | Space Cooling | O&M improvements to restore chiller performance | |
| CO Sensors for Parking Garage Exhaust | Miscellaneous | Enclosed Parking Garage Exhaust with CO Control | Constant Volume Enclosed Parking Garage Exhaust |
| Commercial Duct Sealing | Space Cooling, Space Heating | Standard Electric Heating and Central AC with Improved Duct Sealing | Standard Electric Heating and Central AC, Standard Duct Sealing |
| Commercial Strategic Energy Management | Whole Building | Commercial Strategic Energy Management | No active energy management |
| Custom measure - Non-lighting | Space Cooling, Space Heating | Custom Improvement to Facility's Operations | Baseline Technology/Process |
| Data Center Hot Cold Aisle | Office Equipment | Equipment configuration that saves HVAC | No hot, cold aisle containment |
| Dedicated Outside Air System (DOAS) | Space Cooling, Space Heating | Install Dedicated Outside Air System (DOAS) | Typical HVAC by Building Type |
| Demand Controlled Circulating Systems | Domestic Hot Water | Recirculation Pump with Demand Control Mechanism | Uncontrolled Recirculation Pump |
| Demand Controlled Ventilation | Ventilation and Circulation | Return Air System with CO2 Sensors | Standard Return Air System, No Sensors |
| Demand Defrost | Refrigeration | Walk-In Freezer System with Demand-Controlled Electric Defrost Cycle | Walk-In Freezer System with Timer-Controlled Electric Defrost Cycle |
| Destratification Fans | Space Heating | Destratification Fans improve temperature distribution by circulating warmer air from the ceiling back down to the floor level | No destratification fan |
| Door Gasket (Cooler) | Refrigeration | New Door Gasket on One-Door Medium Temperature Reach-In Case | Worn or Damaged Door Gasket on One-Door Medium Temperature Reach-In Case |
| Door Gasket (Freezer) | Refrigeration | New Door Gasket on One-Door Medium Temperature Reach-In Case | Worn or Damaged Door Gasket on One-Door Medium Temperature Reach-In Case |
| Drain water heat recovery | Domestic Hot Water | Hot Water Loop with 50 Gallon Electric Resistance Heater and Drain Water Heat Exchanger | Standard Hot Water Loop with 50 Gallon Electric Resistance Heater, No Drain Water Heat Recovery |
| Dual Enthalpy Economizer | Ventilation and Circulation | Standard HVAC Unit with an economizer and dual enthalpy differential control | HVAC unit with no economizer or with a non-functional disabled economizer |
| Duct Insulation | Space Cooling, Space Heating | Standard Electric Heating and Central AC with Insulated Ductwork (R-8) | Standard Electric Heating and Central AC with Uninsulated Ductwork (R-4) |
| Ductless Mini-Split AC | Space Cooling | Ductless Mini-Split AC, 4 Ton, 16 SEER | Code-Compliant AC Unit, 4 Ton, 15 SEER |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Ductless Mini-Split HP | Space Cooling, Space Heating | Ductless Mini-Split HP, 17 SEER, 9.5 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF |
| DX Coil Cleaning | Space Cooling | DX Coil Cleaning | DX Coil Not Cleaned |
| ECM Motors on Furnaces | Space Heating | Variable Speed Electronically Commutated Motor for an Electric Furnace | Permanent Split Capacitor Motor for Electric Furnace |
| Efficient Battery Charger | Miscellaneous | Efficient Battery Charger | FR or SCR charging stations with power conversion efficiency < 89% or > 10 W |
| Efficient Exhaust Hood | Cooking | Kitchen ventilation with automatically adjusting fan controls | Kitchen ventilation with constant speed ventilation motor |
| Efficient Motor Belts | Miscellaneous | Synchronous belt, 98% efficiency | Standard V-belt drive |
| Efficient New Construction Lighting | Interior Lighting | Efficient New Construction Lighting, 15% Better than Code | New Construction with Lighting Power Density meeting Code Minimum |
| Energy Recovery Ventilation System (ERV) | Space Cooling | Unitary Cooling Equipment that Incorporates Energy Recovery | Current Market Packaged or Split DX Unit |
| Energy Star Combination Oven | Cooking | Energy Star Combination Oven meeting ENERGY STAR Version 3.0 Standards | One Standard Economy-Grade 10-Pan Combination Oven |
| Energy Star Commercial Clothes Washer | Miscellaneous | One Commercial Clothes Washer meeting current ENERGY STAR Version 8.1 Standards | One Commercial Clothes Washer meeting Federal Standard |
| Energy Star Commercial Dishwasher | Domestic Hot Water | One Commercial Dishwasher meeting ENERGY STAR Version 3.0 Standards | One Dishwasher meeting Federal Standard |
| Energy Star Commercial Glass Door Freezer | Refrigeration | One Glass Door Freezer meeting ENERGY STAR Version 5.0 Standards | One Glass Door Freezer meeting Federal Standards |
| Energy Star Commercial Glass Door Refrigerator | Refrigeration | One Glass Door Refrigerator meeting ENERGY STAR Version 5.0 Standards | One Glass Door Refrigerator meeting Federal Standards |
| Energy Star Commercial Solid Door Freezer | Refrigeration | One Solid Door Freezer meeting ENERGY STAR Version 5.0 Standards | One Solid Door Freezer meeting Federal Standards |
| Energy Star Commercial Solid Door Refrigerator | Refrigeration | One Solid Door Refrigerator meeting ENERGY STAR Version 5.0 Standards | One Solid Door Refrigerator meeting Federal Standards |
| Energy Star convection oven | Cooking | Energy Star convection oven meeting ENERGY STAR Version 3.0 Standards | One Standard Economy-Grade Full-Size Convection Oven |
| Energy Star EV Chargers | Miscellaneous | Level 2 Electric Vehicle Supply Equipment (EVSE) | Level 1 Electric Vehicle Supply Equipment (EVSE) |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Energy Star Fryer | Cooking | One Standard Vat Electric Fryer meeting ENERGY STAR Version 3.0 Standards | One Standard Economy-Grade Standard Vat Electric Fryer |
| Energy Star Griddle | Cooking | One Griddle meeting current ENERGY STAR Version 1.2 Standards | One Conventional Griddle |
| Energy Star Hot Food Holding Cabinet | Cooking | One Hot Food Holding Cabinet meeting current ENERGY STAR Version 2.0 Standards | One Standard Hot Food Holding Cabinet |
| Energy Star Ice Maker | Refrigeration | One Continuous Self-Contained Ice Maker meeting ENERGY STAR Version 3.0 Standards | One Continuous Self-Contained Ice Maker meeting Federal Standard |
| ENERGY STAR Imaging Equipment | Office Equipment | One imaging device meeting current ENERGY STAR Standards | One non-ENERGY STAR imaging device |
| Energy Star LED Directional Lamp | Interior Lighting | Energy Star 7.6W Directional LED lamp | 50W Incandescent lamp |
| Energy Star Monitors | Office Equipment | One Monitor meeting ENERGY STAR 8.0 Standards | One Standard Monitor |
| Energy Star PCs | Office Equipment | One Personal Computer (desktop or laptop) meeting current ENERGY STARÂ® Standards | One non-ENERGY STARÂ® Personal Computer |
| Energy Star room AC | Space Cooling | Room AC meeting current ENERGY STAR standards | Code-Compliant Room AC, 1 Ton, 10.9 CEER |
| Energy Star Servers | Office Equipment | One Server meeting ENERGY STAR 2.0 Standards | One Standard Server |
| Energy Star Steamer | Cooking | One 4-Pan Electric Steamer meeting ENERGY STARÂ® 2.0 Standards | One Standard Economy-Grade 4-Pan Steamer |
| Energy Star Uninterruptable Power Supply | Office Equipment | Standard Desktop Plugged into Energy Star Uninterruptable Power Supply at 25% Load | Standard Desktop Plugged into Average Rotary Uninterruptable Power Supply at 25% Load |
| Energy Star Vending Machine | Refrigeration | One Refrigerated Vending Machine meeting ENERGY STAR Version 4.0 Standards | One Refrigerated Vending Machine meeting ENERGY STARÂ® 1.0 Standards |
| ENERGY STAR Water Cooler | Miscellaneous | One Storage Type Hot/Cold Water Cooler Unit meeting ENERGY STAR Version 3.0 Standards | One Standard Storage Type Hot/Cold Water Cooler Unit |
| Energy Star windows | Space Cooling, Space Heating | 100ft2 of Window meeting Energy Star Version 6.0 Requirements (U-Value: 0.27, SHGC: 0.21) | 100ft2 of Window meeting Energy Star Version 5.0 Requirements (U-Value: 0.3, SHGC: 0.3) |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Engine Block Timer | Miscellaneous | Plug-in timer that activates engine block timer to reduce unnecessary run time | Engine block heater (typically used for backup generators) running continuously |
| Escalator Motor Efficiency Controller | Miscellaneous | Install Escalator Motor Efficiency Controller | Escalator without Motor Efficiency Controller |
| Facility Commissioning | Space Cooling, Space Heating, Ventilation and Circulation | Perform facility commissioning to optimize building operations in new facilities | Standard new construction facility with no commissioning |
| Facility Energy Management System | Space Cooling, Space Heating, Ventilation and Circulation | Typical HVAC by Building Type Controlled by Energy Management System | Standard/manual facility equipment controls |
| Faucet Aerator | Domestic Hot Water | Low-flow lavatory faucet aerator, flow rate: 1.0 gpm | Federal lavatory flow rate standard, 1994, flow rate: 2.2 gpm |
| Floating Head Pressure Controls | Refrigeration | Medium-Temperature Refrigeration System with 5HP Compressor and Adjustable Condenser Head Pressure Control Valve | Medium-Temperature Refrigeration System with 5 HP Compressor without Adjustable Condenser Head Pressure Control Valve |
| Floor Insulation | Space Cooling, Space Heating | Increased Floor Insulation (R-19) | Market Average Existing Floor Insulation |
| Geothermal Heat Pump | Space Cooling, Space Heating | Geothermal Heat Pump | Code-Compliant Air Source Heat Pump |
| Green roof | Space Cooling, Space Heating | Vegetated Roof Surface on top of Standard Roof | Standard Black Roof |
| HE Air Cooled Chiller - All Compressor Types - 100 Tons | Space Cooling | HE Air Cooled Chiller - Air Compressor Types - 100 Tons | Code-Compliant Air Cooled Positive Displacement Chiller, 100 Tons |
| HE DX 11.25-20.0 Tons Elec Heat | Space Cooling, Space Heating | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 11.25-20.0 Tons Other Heat | Space Cooling | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Elect Heat | Space Cooling, Space Heating | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Other Heat | Space Cooling | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX Less than 5.4 Tons Elect Heat | Space Cooling, Space Heating | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| HE DX Less than 5.4 Tons Other Heat | Space Cooling | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE Water Cooled Chiller - Centrifugal Compressor - 200 Tons | Space Cooling | Water Cooled Centrifugal Chiller with Integral VFD, 200 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 200 Tons |
| HE Water Cooled Chiller - Centrifugal Compressor - 500 Tons | Space Cooling | Water Cooled Centrifugal Chiller with Integral VFD, 500 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 500 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 175 Tons | Space Cooling | Water Cooled Positive Displacement Chiller with Integral VFD, 175 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 175 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 50 Tons | Space Cooling | Water Cooled Positive Displacement Chiller with Integral VFD, 50 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 50 Tons |
| Heat Pump Pool Heater Commercial | Miscellaneous | High Efficiency Pool Heater Eff. >=84% | Standard Efficiency Pool Heater 78% Eff. |
| Heat Pump Water Heater | Domestic Hot Water | Efficient 50 Gallon Electric Heat Pump Water Heater | Code-Compliant 50 Gallon Electric Heat Pump Water Heater |
| High Efficiency Air Compressor | Miscellaneous | 20 HP VFD Air Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| High Efficiency Data Center Cooling | Space Cooling | High Efficiency CRAC (computer room air conditioner) | Standard Efficiency CRAC |
| High Efficiency PTAC | Space Cooling | High Efficiency PTAC | Code-Compliant PTAC |
| High Efficiency PTHP | Space Cooling, Space Heating | High Efficiency PTHP | Code-Compliant PTHP |
| High Efficiency Refrigeration Compressor_Discus | Refrigeration | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Efficiency Refrigeration Compressor_Scroll | Refrigeration | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Speed Fans | Ventilation and Circulation | High Speed Fan, 24" - 35" Blade Diameter | Standard Speed Fan, 24" - 35" Blade Diameter |
| Hot water pipe insulation | Domestic Hot Water | 1' of Insulated Pipe in Unconditioned Spaces, Insulation of R-4 | 1' of Pipe in Unconditioned Spaces with Code Minimum of 1"of Insulation |
| Hotel Card Energy Control Systems | Space Cooling, Space Heating | Guest Room HVAC Unit Controlled by Hotel-Key-Card Activated Energy Control System | Guest Room HVAC Unit, Manually Controlled by Guest |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Indoor daylight sensor | Interior Lighting | Install Indoor Daylight Sensors, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Induction Cooktops | Cooking | Efficient Induction Cooktop | One Standard Electric Cooktop |
| Infiltration Reduction - Air Sealing | Space Cooling, Space Heating | Reduced leakage through caulking, weather-stripping | Standard Heating and Cooling System with Moderate Infiltration |
| Instantaneous Hot Water System Commercial | Domestic Hot Water | Instantaneous Hot Water System | Code-Compliant Electric Storage Water Heater |
| LED - 14W_CFL Baseline | Interior Lighting | LED (assume 14W) replacing CFL | 100W equivalent CFL |
| LED - 9W Flood_CFL Baseline | Exterior Lighting | LED (assume 9W) replacing CFL | 14W CFL |
| LED Canopy Lighting (Exterior) | Exterior Lighting | One 67.2W LED Canopy Light | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED Display Lighting (Exterior) | Exterior Lighting | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED Display Lighting (Interior) | Interior Lighting | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED Exit Sign | Interior Lighting | One 5W Single-Sided LED Exit Sign | One 9W Single-Sided CFL Exit Sign |
| LED Exterior Wall Packs | Exterior Lighting | One 35W LED Wall Pack | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED High Bay_HID Baseline | Interior Lighting | One 140W High Bay LED Fixture | Lumen-Equivalent HID High Bay Fixture |
| LED High Bay_LF Baseline | Interior Lighting | One 140W High Bay LED Fixture | Lumen-Equivalent Linear Fluorescent High Bay Fixture |
| LED Linear - Fixture Replacement | Interior Lighting | 2x4 LED Troffer | Lumen-Equivalent 32-Watt T8 Lamp |
| LED Linear - Lamp Replacement | Interior Lighting | Linear LED (16W) | Lumen-Equivalent 32-Watt T8 Lamp |
| LED Parking Lighting | Exterior Lighting | One 160W LED Area Light | Average Lumen Equivalent Exterior HID Area Lighting |
| LEED New Construction Whole Building | Space Cooling, Space Heating | LEED New Construction Whole Building | Comparable facility, code-compliance construction |
| Light Tube | Interior Lighting | One 14" Light Tube, Delivering light to 250 S.F. of Commercial Space | 250 S.F. of Commercial Space Lit by Typical Lighting Strategies |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Low Flow Shower Head | Domestic Hot Water | Low-Flow Handheld Showerhead, Flow Rate: 1.50 gpm | Standard Handheld Showerhead, Flow Rate: 2.50 gpm |
| Low-Flow Pre-Rinse Sprayers | Domestic Hot Water | Low-Flow Pre-Rinse Sprayer with Flow Rate of 1.6 gpm | Pre-Rinse Sprayer with Federal Standard Flow Rate of 2.25 gpm |
| Network PC Power Management | Office Equipment | One computer and monitor attached to centralized energy management system that controls when desktop computers and monitors plugged into a n | One computer and monitor, manually controlled |
| Networked Lighting Controls | Interior Lighting | Install Networked Lighting Controls System on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Controlled either Manually or by Sensor as Specified by Code |
| Night Covers for Display Cases | Refrigeration | One Open Vertical Case with Night Covers | One Existing Open Vertical Case, No Night Covers |
| Occupancy Sensors, Ceiling Mounted | Interior Lighting | Ceiling Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Occupancy Sensors, Switch Mounted | Interior Lighting | Switch Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor Lighting Controls | Exterior Lighting | Install Exterior Photocell Dimming Controls, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor motion sensor | Exterior Lighting | Install Exterior Motion Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Ozone Laundry Commercial | Miscellaneous | Add a new ozone laundry system onto a commercial clothes washer | One commercial clothes washer without ozone laundry system |
| Programmable thermostat | Space Cooling, Space Heating | Pre-set programmable thermostat that replaces manual thermostat | Standard Heating and Cooling System with Manual Thermostat |
| PSC to ECM Evaporator Fan Motor (Reach-In) | Refrigeration | Medium Temperature Reach-In Case with equivalent size Electronically Commutated Evaporator Fan Motor | Medium Temperature Reach-In Case with Permanent Split Capacitor Evaporator Fan Motor |
| PSC to ECM Evaporator Fan Motor (Walk-In, Refrigerator) | Refrigeration | Medium Temperature Walk-In Case with Electronically Commutated Evaporator Fan Motor | Medium Temperature Walk-In Case with Permanent Split Capacitor Evaporator Fan Motor |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Q-Sync Evaporator Fan Motor | Refrigeration | Medium Temperature Reach-In Case with equivalent size Q-Sync Evaporator Fan Motor | Medium Temperature Reach-In Case with 20W Permanent Split Capacitor Fan Motor |
| Reflective Roof Treatment | Space Cooling | Reflective Roof Treatment | Standard Black Roof |
| Refrigerated Display Case LED Lighting | Refrigeration | 60" Refrigerated Case LED Strip | Lumen-Equivalent 32-Watt T8 Fixture |
| Refrigerated Display Case Lighting Controls | Refrigeration | Occupancy Sensors for Refrigerated Case Lighting to reduce run time | Market-Share Weighted Existing Linear Fluorescent Fixture |
| Refrigeration Commissioning | Refrigeration | Commissioned Refrigeration System | Non-Commissioned Refrigeration System |
| Refrigeration Economizer | Refrigeration | Walk-in refrigerator with economizer | Walk-in refrigerator without economizer |
| Regenerative Drive Elevator Motor | Miscellaneous | Regenerative drive produced energy when motor in overhaul condition | Standard motor |
| Retro-Commissioning (Existing Construction) | Space Cooling, Space Heating, Ventilation and Circulation | Perform facility retro-commissioning, including assessment, process improvements, and optimization of energy-consuming equipment and systems | |
| Retro-Commissioning (Existing Construction)_VT | Ventilation and Circulation | Perform facility retro-commissioning, including assessment, process improvements, and optimization of energy-consuming equipment and systems | |
| Roof Insulation | Space Cooling, Space Heating | Roof Insulation (built-up roof applicable to flat/low slope roofs) | Code-Compliant Flat Roof |
| Server Virtualization | Office Equipment | 2 Virtual Host Server | 20 Single Application Servers |
| Smart Strip Plug Outlet | Office Equipment | One Smart Strip Plug Outlet | One Standard plug strip/outlet |
| Smart thermostat | Space Cooling, Space Heating | Thermostats that include "smart" features such as occupancy sensors, geo-fencing, multi-zone sensors | Standard Heating and Cooling System with Manual Thermostat |
| Solar Pool Heater Commercial | Miscellaneous | Solar Swimming Pool Heater | Electric Resistance Swimming Pool Heater |
| Solar Powered Pool Pump | Miscellaneous | Solar Powered Pool Pump Motor | Variable Speed Pool Pump Motor |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Solar Thermal Water Heating System Commercial | Domestic Hot Water | Solar Thermal System with Electric Backup | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Strip Curtains - Freezers | Refrigeration | Walk-in freezer with strip curtains at least 0.06 inches thick covering the entire area of the doorway | Walk-in freezer without strip curtains |
| Strip Curtains - Refrigerators | Refrigeration | Walk-in cooler with strip curtains at least 0.06 inches thick covering the entire area of the doorway | Walk-in cooler without strip curtains |
| Suction Pipe Insulation - Freezers | Refrigeration | Suction Pipe Insulation - Freezers | Uninsulated freezer suction lines |
| Suction Pipe Insulation - Refrigerators | Refrigeration | Suction Pipe Insulation - Refrigerators | Uninsulated refrigeration suction lines |
| Thermal Energy Storage | Space Cooling | Deploy thermal energy storage technology (ice harvester, etc.) to shift load | Code compliant chiller |
| Thermostatic Shower Restriction Valve Commercial | Domestic Hot Water | Hot Water Loop with 50 Gallon Electric Resistance Heater and Pressure Balance Shower Valves | Standard Hot Water Loop with 50 Gallon Electric Resistance Heater and Standard Shower Valves |
| Time Clock Control | Interior Lighting | Time Clock Controlled Lighting, 500 Watts Controlled | 500 Watts of Lighting, Controlled either Manually or by Sensor as Specified by Code |
| Variable Refrigerant Flow (VRF) HVAC Systems | Space Cooling, Space Heating | Variable Refrigerant Flow (VRF) HVAC Systems | Code-Compliant PTHP |
| VAV System | Ventilation and Circulation | Variable Air Volume Distribution System | Constant Air Volume Distribution System |
| VFD on Cooling Tower Fans | Space Cooling | Cooling Tower Fans with VFD Control | Cooling Tower Fans without VFD Control |
| VFD on HVAC Pump | Space Cooling, Space Heating | VFD on HVAC Pump | 7.5 HP HVAC Pump Motor, no VFD Control |
| VSD Controlled Compressor | Refrigeration | Refrigeration System with VSD Control | Refrigeration System with Standard Slide-Valve Control System |
| Wall Insulation | Space Cooling, Space Heating | Increased Exterior Above-Grade Wall Insulation | Market Average Existing Exterior Above-Grade Wall Insulation |
| Warehouse Loading Dock Seals | Space Cooling, Space Heating | Seals to reduce infiltration losses at loading dock | Loading dock with no seals |
| Water Cooled Refrigeration Heat Recovery | Domestic Hot Water | The heat reclaim system transfers waste heat from | No heat recovery |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| | | refrigeration system to space heating or hot water | |
| Water Heater Setback | Domestic Hot Water | A 50 gallon electric hot water tank with a thermostat setting reduced to no lower than 120 degrees. | A 50 gallon electric hot water tank with a thermostat setting that is higher than 120 degrees, typically hot water tanks with settings of 130 degrees or higher. |
| Water source heat pump | Space Cooling, Space Heating | Water Source Heat Pump, 2.5 Tons, 17.4 EER, 4.4 COP | Code-Compliant ASHP |
| Waterside Economizer | Space Cooling | Waterside Economizer | No economizer |
| Window shade film | Space Cooling | Window Film with SHGC of 0.35 Applied to Standard Window | Standard Window with below Code Required Minimum SHGC |
| Zero Energy Doors | Refrigeration | Install zero energy doors for a reach-in refrigerated cooler or freezer | Standard vertical reach-in refrigerated cooler or freezer with anti-sweat heaters on the glass surface of the doors |

**Table 14: Industrial EE Measures**

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| 1.5HP Open Drip-Proof (ODP) Motor | Motors Pumps | High Efficiency 1.5 HP Open-Drip Proof Motor | 1.5HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 10HP Open Drip-Proof (ODP) Motor | Motors Pumps | High Efficiency 10 HP Open-Drip Proof Motor | 10HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 20HP Open Drip-Proof (ODP) Motor | Motors Pumps | High Efficiency 20 HP Open-Drip Proof Motor | 20HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 3-phase High Frequency Battery Charger - 1 shift | Other | 3-phase High Frequency Battery Charger | Standard Charger |
| Advanced Rooftop Controller | HVAC | Advanced Rooftop Controller | Without Advanced Rooftop Controller |
| Air Compressor Optimization | Compressed Air | Performing Routine Maintenance on 20HP Inlet Modulation Fixed-Speed Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| Air curtains | HVAC | Air Curtain across door opening | Door opening with no air curtain |
| Airside economizer | HVAC | Airside Economizer | No economizer |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Auto Closer on Refrigerator Door | Process Cooling | One Medium Temperature Walk-In Refrigerator Door with Auto-Closer | One Medium Temperature Walk-In Refrigerator Door without Auto-Closer |
| Auto Off Time Switch | Interior Lighting High Bay | Auto-Off Time Switch on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Bi-Level Lighting Control (Exterior) | Exterior Lighting Industrial | Install Exterior Bi-Level Lighting Control, 500 Watts Controlled | 500 Watts of Lighting, No Dim Setting |
| Bi-Level Lighting Control (Interior) | Interior Lighting High Bay | Bi-Level Controls on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, No Dim Setting |
| Chilled Water Reset | HVAC | One Chiller with Reset of Chilled Water Temperature Setpoint | One Chiller with Fixed Chilled Water Temperature |
| Cogged Belt on 15hp ODP Motor | Motors Pumps | 15HP ODP Motor with Cogged Belts Installed on Supply and/or Return Air Fans | 15HP ODP Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Cogged Belt on 40hp ODP Motor | Motors Pumps | 40HP ODP Motor with Cogged Belts Installed on Supply and/or Return Air Fans | 40HP ODP Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Compressed Air Desiccant Dryer | Process Specific | heated regenerative desiccant dryer without dew point demand controls | heatless regenerative desiccant dryer without dew point demand controls |
| Compressed Air No-Loss Condensate Drains | Process Specific | Install no-loss condensate drains | Install standard condensate drains |
| Compressed Air Storage Tank | Compressed Air | 20 HP Inlet Modulation Fixed-Speed Compressor with Receiver Tank | 20 HP Inlet Modulation Fixed-Speed Compressor, No Receiver Tank |
| Custom Measure - Non-Lighting | HVAC | Custom Improvement to Facility's Operations | Baseline Technology/Process |
| Dairy Refrigeration Heat Recovery | Other | refrigeration equipment with refrigeration heat recovery tank installed | existing dairy farm with refrigeration equipment and a water heater unit without an RHR unit |
| Dedicated Outside Air System (DOAS) | HVAC | Install Dedicated Outside Air System (DOAS) | Typical HVAC by Building Type |
| Demand Controlled Ventilation | HVAC | Return Air System with CO2 Sensors | Standard Return Air System, No Sensors |
| Demand Defrost | Process Cooling | Walk-In Freezer System with Demand-Controlled Electric Defrost Cycle | Walk-In Freezer System with Timer-Controlled Electric Defrost Cycle |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Dew Point Sensor Control for Dessicant CA Dryer | Compressed Air | 1000 CFM Heated Desicant Air Dryer with Dew Point Controls | 1000 CFM Modulating Heated Desicant Air Dryer |
| Drip Irrigation Nozzles | Other | Flow Control Nozzles | Standard Irrigation Nozzles |
| Dual Enthalpy Economizer | Process Cooling | Standard HVAC Unit with an economizer and dual enthalpy differential control | HVAC unit with no economizer or with a non-functional disabled economizer |
| DX Coil Cleaning | HVAC | DX Coil Cleaning | DX Coil Not Cleaned |
| Efficient Compressed Air Nozzles | Compressed Air | 1/4" Engineered Air Nozzle | 1/4" Open-End Air Nozzle |
| Efficient New Construction Lighting | Interior Lighting High Bay | Efficient New Construction Lighting, 15% Better than Code | New Construction with Lighting Power Density meeting Code Minimum |
| Electric Actuators | Other | Electric Actuator | Pneumatic Actuator |
| Energy Efficient Laboratory Fume Hood | HVAC | Variable Air Volume High Performance Fume Hood | Constant Volume Conventional Bypass Fume Hood |
| Energy Efficient Transformers | Other | Energy Efficient Dry Type Transformer (CSL-3) | Standard Transformer (TP-1) |
| Energy Recovery Ventilation System | HVAC | Unitary Cooling Equipment that Incorporates Energy Recovery | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11.2 EER |
| Energy Star LED Directional Lamp | Interior Lighting Other | Energy Star 7.6W Directional LED lamp | 50W Incandescent lamp |
| Energy Star room ac | HVAC | Room AC meeting current ENERGY STAR standards | Code-Compliant Room AC |
| Energy Star windows | HVAC | 100ft2 of Window meeting Energy Star Version 6.0 Requirements (U-Value: 0.27, SHGC: 0.21) | 100ft2 of Window meeting Energy Star Version 5.0 Requirements (U-Value: 0.3, SHGC: 0.3) |
| Engine Block Timer | Other | An engine block heater operated by an outdoor plug-in timer | An engine block heater that is manually plugged in |
| Facility Commissioning | HVAC | Perform facility commissioning | Comparable facility, no commissioning |
| Facility Energy Management System | HVAC | Typical HVAC by Building Type Controlled by Energy Management System | Typical HVAC by Building Type, Manually Controlled |
| Fan Thermostat Controller | HVAC | Typical HVAC by Building Type with Fan Thermostat Controller Installed | Typical HVAC by Building Type with Programmable Thermostat |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Floating Head Pressure Controller | Process Cooling | Medium-Temperature Refrigeration System with 5HP Compressor and Adjustable Condenser Head Pressure Control Valve | Medium-Temperature Refrigeration System with 5 HP Compressor without Adjustable Condenser Head Pressure Control Valve |
| Grain Bin Aeration Control System | Process Specific | Grain Storage Fan System with Automatic Controls | Grain Storage Fan System with Manual Controls |
| HE Air Cooled Chiller - All Compressor Types - 100 Tons | HVAC | HE Air Cooled Chiller - All Compressor Types - 100 Tons | Code-Compliant Air Cooled Positive Displacement Chiller, 100 Tons |
| HE Air Cooled Chiller - All Compressor Types - 300 Tons | HVAC | Air Cooled Positive Displacement Chiller with Integral VFD, 300 Tons, 13.7 EER | Code-Compliant Air Cooled Positive Displacement Chiller, 300 Tons, 12.5 EER |
| HE DX 11.25-20.0 Tons Elec Heat | HVAC | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 11.25-20.0 Tons Other Heat | HVAC | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Elect Heat | HVAC | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Other Heat | HVAC | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX Less than 5.4 Tons Elect Heat | HVAC | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE DX Less than 5.4 Tons Other Heat | HVAC | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE Water Cooled Chiller - Centrifugal Compressor - 200 Tons | HVAC | Water Cooled Centrifugal Chiller with Integral VFD, 200 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 200 Tons |
| HE Water Cooled Chiller - Centrifugal Compressor - 500 Tons | HVAC | Water Cooled Centrifugal Chiller with Integral VFD, 500 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 500 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 175 Tons | HVAC | Water Cooled Positive Displacement Chiller with Integral VFD, 175 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 175 Tons |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| HE Water Cooled Chiller - Rotary or Screw Compressor - 50 Tons | HVAC | Water Cooled Positive Displacement Chiller with Integral VFD, 50 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 50 Tons |
| High Bay Occupancy Sensors, Ceiling Mounted | Interior Lighting High Bay | Ceiling Mounted Occupancy Sensor, 800 Watts Controlled | 800 Watts of Lighting, Manually Controlled |
| High Efficiency Air Compressor | Compressed Air | 20 HP VFD Air Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| High Efficiency Refrigeration Compressor - Discus | Process Cooling | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Efficiency Refrigeration Compressor - Scroll | Process Cooling | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Efficiency Welder | Process Specific | High Efficiency Welder | Standard Welding Practices |
| High Speed Fans | HVAC | High Speed Fan, 24" - 35" Blade Diameter | Standard Speed Fan, 24" - 35" Blade Diameter |
| High Volume Low Speed Fan (HVLS) | Motors Fans Blowers | 20' High Volume Low Speed Fan | Conventional Circulating Fan |
| Indoor Agriculture - LED Grow Lights | Interior Lighting High Bay | LED grow light | 1000W High Pressure Sodium |
| Indoor daylight sensor | Interior Lighting High Bay | Install Indoor Daylight Sensors, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Industrial Duct Sealing | HVAC | Standard Electric Heating and Central AC with Improved Duct Sealing | Standard Electric Heating and Central AC, Standard Duct Sealing |
| Injection Mold and Extruder Barrel Wraps | Other | 2' Diameter, 20' Long Machine Barrel with 1" Insulation | 2' Diameter, 20' Long Machine Barrel with no Insulation |
| Insulated Pellet Dryer Tanks and Ducts | Process Heating | Insulation for Pellet Tank and Duct | Uninsulated Pellet Tank and Duct |
| LED - 14W_CFL Baseline | Interior Lighting Other | LED (assume 14W) replacing CFL | 100W equivalent CFL |
| LED Canopy Lighting (Exterior) | Exterior Lighting Industrial | One 67.2W LED Canopy Light | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED Display Lighting (Exterior) | Exterior Lighting Industrial | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| LED Display Lighting (Interior) | Interior Lighting Other | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED exit sign | Interior Lighting Other | One 5W Single-Sided LED Exit Sign | One 9W Single-Sided CFL Exit Sign |
| LED Exterior Wall Packs | Exterior Lighting Industrial | One 35W LED Wall Pack | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED High Bay_HID Baseline | Interior Lighting High Bay | One 140W High Bay LED Fixture | Lumen-Equivalent HID High Bay Fixture |
| LED High Bay_LF Baseline | Interior Lighting High Bay | One 140W High Bay LED Fixture | Lumen-Equivalent Linear Fluorescent High Bay Fixture |
| LED Linear - Fixture Replacement | Interior Lighting Linear Fluorescent | 2x4 LED Troffer Fixture | Lumen-Equivalent 32-Watt T8 Fixture |
| LED Linear - Lamp Replacement | Interior Lighting Linear Fluorescent | Linear LED | Lumen-Equivalent 32-Watt T8 Lamp |
| LED Parking Lighting | Exterior Lighting Industrial | One 160W LED Area Light | Average Lumen Equivalent Exterior HID Area Lighting |
| LEED New Construction Whole Building | HVAC | LEED Qualifying New Construction | Comparable facility, code-compliance construction |
| Light Tube | Interior Lighting Other | One 14" Light Tube, Delivering light to 250 S.F. of Industrial Space | 250 S.F. of Industrial Space Lit by Typical Lighting Strategies |
| Low Energy Livestock Waterer | Motors Pumps | Install Thermostatically Controlled Livestock Watering System | Standard Livestock Watering System |
| Low Pressure Sprinkler Nozzles | Motors Pumps | Low Pressure Irrigation Nozzles operate at 35 psi or lower | Standard high pressure irrigation nozzles that operate at 50 psi or greater |
| Low Pressure-drop Filters | Compressed Air | 20 HP Inlet Modulation Fixed-Speed Compressor with Low Pressure Drop Filter | 20 HP Inlet Modulation Fixed-Speed Compressor, No Particulate Removal |
| Milk Pre-Cooler | Other | Installed pre-cooler heat exchanger | no pre-cooler heat exchanger installed |
| Networked Lighting Controls | Interior Lighting Linear Fluorescent | Install Networked Lighting Controls System on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Controlled either Manually or by Sensor as Specified by Code |
| Occupancy Sensors, Ceiling Mounted | Interior Lighting High Bay | Ceiling Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Occupancy sensors, switch mounted | Interior Lighting Linear Fluorescent | Switch Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Outdoor Lighting Controls | Exterior Lighting Industrial | Install Exterior Photocell Dimming Controls, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor motion sensor | Exterior Lighting Industrial | Install Exterior Motion Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Packaged Terminal AC | HVAC | High Efficiency Packaged Terminal AC | Code-Compliant PTAC, 10.9 EER |
| Process Cooling Ventilation Reduction | Process Cooling | Standard Process Cooling with Reduced Ventilation | Standard Process Cooling |
| Programmable thermostat | HVAC | Standard Heating and Cooling System with Programmable Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Reflective Roof Treatment | HVAC | Reflective Roof Treatment | Standard Black Roof |
| Refrigeration Commissioning | Process Cooling | Commissioned Refrigeration System | Non-Commissioned Refrigeration System |
| Retro-Commissioning (Existing Construction) | HVAC | Perform Facility Retro-commissioning | |
| Roof insulation | HVAC | Roof Insulation (built-up roof applicable to flat/low slope roofs) | Code-Compliant Flat Roof |
| Smart thermostat | HVAC | Standard Heating and Cooling System with Smart Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Strategic Energy Management | HVAC | SEM goal setting and tracking | No active energy management |
| Synchronous Belt on 15hp ODP Motor | Motors Pumps | 15 HP Open-Drip Proof Motor with Synchronous Belts Installed on Supply and/or Return Air Fans | 15 HP Open-Drip Proof Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Synchronous Belt on 5hp ODP Motor | Motors Pumps | 5 HP Open-Drip Proof Motor with Synchronous Belts Installed on Supply and/or Return Air Fans | 5 HP Open-Drip Proof Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Synchronous Belt on 75hp ODP Motor | Motors Pumps | 75 HP Open-Drip Proof Motor with Synchronous Belts Installed on Supply and/or Return Air Fans | 75 HP Open-Drip Proof Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Thermal energy storage | HVAC | Deploy thermal energy storage technology (ice harvester, etc.) to shift load | Code compliant chiller |
| Time Clock Control | Interior Lighting High Bay | Time Clock Controlled Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| VAV System | HVAC | Variable Air Volume Distribution System | Constant Air Volume Distribution System |
| VFD on Air Compressor | Compressed Air | 20 HP VFD Air Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| VFD on Cooling Tower Fans | Process Cooling | Cooling Tower Fans with VFD Control | Cooling Tower Fans without VFD Control |
| VFD on HVAC Fan | Motors Fans Blowers | 5 HP HVAC Fan Motor, with VFD Control | 5 HP HVAC Fan Motor, no VFD Control |
| VFD on HVAC Pump | Motors Pumps | VFD on HVAC Pump | 7.5 HP HVAC Pump Motor, no VFD Control |
| VFD on process pump | Motors Pumps | 20 HP Process Pump Equipped with VFD Control | 20 HP Process Pump, Constant Speed |
| VSD Controlled Compressor | Process Cooling | Refrigeration System with VSD Control | Refrigeration System with Standard Slide-Valve Control System |
| Water source heat pump | HVAC | Water Source Heat Pump, 2.5 Tons, 17.4 EER, 4.4 COP | Code-Compliant ASHP |
| Waterside economizer | HVAC | Waterside Economizer | No economizer |
| Window shade film | HVAC | Window Film with SHGC of 0.35 Applied to Standard Window | Standard Window with below Code Required Minimum SHGC |

The following EE measures from the 2019 Technical Potential Study were eliminated from the current study[8]:

**Table 15: 2019 EE Measures Eliminated from Current Study**

| Sector | Measure | End-Use | Reason for Removal |
|---|---|---|---|
| Residential | CFL – 15W Flood | Lighting | Better technology (LED) available |
| Residential | CFL – 15W Flood (Exterior) | Lighting | Better technology (LED) available |
| Residential | CFL – 13W | Lighting | Better technology (LED) available |
| Residential | CFL – 23W | Lighting | Better technology (LED) available |
| Residential | Low Wattage T8 Fixture | Lighting | Better technology (LED) available |

[8] Additional measures from the 2019 study were updated to reflect current vintage/technology for the current study.

| Sector | Measure | End-Use | Reason for Removal |
|---|---|---|---|
| Residential | 15 SEER Central AC | Space Cooling | Updated Federal Standard |
| Residential | 15 SEER Air Source Heat Pump | Space Cooling, Space Heating | Updated Federal Standard |
| Residential | 14 SEER ASHP from base electric resistance heating | Space Cooling, Space Heating | Updated Federal Standard |
| Residential | Two Speed Pool Pump | Miscellaneous | Updated Florida Energy Code |
| Residential | Variable Speed Pool Pump | Miscellaneous | Updated Florida Energy Code |
| Residential | Storm Door | Space Cooling, Space Heating | Minimal/uncertain energy savings |
| Commercial | CFL – 15W Flood | Exterior Lighting | Better technology (LED) available |
| Commercial | High Efficiency HID Lighting | Exterior Lighting | Better technology (LED) available |
| Commercial | LED Street Lights | Exterior Lighting | Market standard |
| Commercial | LED Traffic and Crosswalk Lighting | Exterior Lighting | Market standard |
| Commercial | High Efficiency HID Lighting | Exterior Lighting | Market standard |
| Commercial | CFL-23W | Interior Lighting | Better technology (LED) available |
| Commercial | High Bay Fluorescent (T5) | Interior Lighting | Better technology (LED) available |
| Commercial | Premium T8 - Fixture Replacement | Interior Lighting | Better technology (LED) available |
| Commercial | Premium T8 - Lamp Replacement | Interior Lighting | Better technology (LED) available |
| Commercial | Two Speed Pool Pump | Miscellaneous | Updated Florida Energy Code |
| Commercial | Variable Speed Pool Pump | Miscellaneous | Updated Florida Energy Code |
| Commercial | Tank Wrap on Water Heater | Domestic Hot Water | Limited applicability |
| Commercial | Ceiling Insulation (R12 to R38) | Space Cooling, Space Heating | Consolidated measure baseline assumptions |
| Commercial | Ceiling Insulation (R30 to R38) | Miscellaneous | Consolidated measure baseline assumptions |

# Appendix B DR Measure List

Table 16: Residential DR Measures

| Measure | Type | Season | Description |
|---|---|---|---|
| Central air conditioner - Load Shed | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central Heating - Load Shed | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central air conditioner - 50% cycling | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Central Heating - 50% cycling | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Smart thermostats - Utility Installation | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| Smart thermostats – BYOT | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| CPP + Tech | Pricing | Summer and Winter | Electricity rate that varies based on time of day. Can be same rate schedule for every day during a given season (time of use, or TOU) and with critical peak pricing (CPP) days when peak period rates are substantially higher for a limited number of days per year (customers receive advance notification of CPP event). Customers also receive technology that they can pre-program to curtail load when an event is called. |
| Water heater control | Direct load control | Summer and Winter | Load control installed on a water heater (integrated or external switch) |
| Pool pump switches | Direct load control | Summer and Winter | Load control program with switch installed on pool pump |
| Room AC | Direct load control | Summer | Load control program that is focused on room AC units rather than central AC |
| Managed EV Charging – switch | Direct load control | Summer and Winter | Load control switch that is installed on an EV charger |
| Managed EV Charging – telematics | Direct load control | Summer and Winter | Direct load control program leveraging EV smart charging software |
| Battery Storage with PV | Pricing/Direct load control | Summer and Winter | PV charges battery and battery discharges to grid |

**Table 17: Small C&I DR Measures**

| Measure | Type | Season | Description |
|---|---|---|---|
| Central air conditioner - Load Shed | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central Heating - Load Shed* | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central air conditioner - 50% cycling | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Central Heating - 50% cycling* | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Smart thermostats - Utility Installation* | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| Smart thermostats – BYOT* | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| CPP + Tech | Pricing | Summer and Winter | Electricity rate that varies based on time of day. Can be same rate schedule for every day during a given season (time of use, or TOU) and with critical peak pricing (CPP) days when peak period rates are substantially higher for a limited number of days per year (customers receive advance notification of CPP event). Customers also receive technology that they can pre-program to curtail load when an event is called. |
| Managed EV Charging – switch | Direct load control | Summer and Winter | Load control switch that is installed on an EV charger |
| Managed EV Charging – telematics | Direct load control | Summer and Winter | Direct load control program leveraging EV smart charging software |
| Battery Storage with PV | Pricing/Direct load control | Summer and Winter | PV charges battery and battery discharges to grid |

**Table 18: Large C&I DR Measures**

| Measure | Type | Season | Description |
|---|---|---|---|
| CPP + Tech | Pricing | Summer and Winter | Electricity rate that varies based on time of day. Can be same rate schedule for every day during a given season (time of use, or TOU) and with critical peak pricing (CPP) days when peak period rates are substantially higher for a limited number of days per year (customers receive advance notification of |

| Measure | Type | Season | Description |
|---|---|---|---|
| | | | CPP event). Customers also receive technology that they can pre-program to curtail load when an event is called. |
| Auto DR | Utility-controlled loads | Summer and Winter | Custom load control of specific end-uses/processes that is triggered by utility signal to building management system; customer can sometimes opt-out of specific events |
| Firm Service Level | Contractual | Summer and Winter | Customer commits to a maximum usage level during peak periods and, when notified by the utility, agrees to cut usage to that level. |
| Guaranteed Load Drop | Contractual | Summer and Winter | Customer agrees to reduce usage by an agreed upon amount when notified |

No DR measures from the 2019 Technical Potential Study were eliminated from the current study.

# Appendix C DSRE Measure List

Table 19: Residential DSRE Measures

| Measure | Description |
|---|---|
| PV System | Roof-mounted system, including multiple panels, AC/DC inverter, racking system, and electrical system interconnections |
| Battery Storage from PV System | Lithium-ion battery system designed to integrate with an on-site PV system to store and discharge excess energy from PV generation |

Table 20: Non-Residential DSRE Measures

| Measure | Description |
|---|---|
| PV System | Roof-mounted system, including multiple panels, AC/DC inverter, racking system, and electrical system interconnections |
| Battery Storage from PV System | Lithium-ion battery system designed to integrate with an on-site PV system to store and discharge excess energy from PV generation |
| CHP – Fuel Cell | An electrochemical cell-based generator that reacts hydrogen fuel with oxygen |
| CHP – Micro Turbine | Small combustion turbine that burns gaseous or liquid fuel to drive a generator |
| CHP – Gas Turbine | A combustion turbine that burns gaseous or liquid fuel to drive a generator |
| CHP – Reciprocating Engine | An engine that uses one or more pistons to convert pressure into rotational motion |
| CHP - Steam Turbine | A turbine that extracts thermal energy from pressured steam to drive a generator |

No DSRE measures from the 2019 Technical Potential Study were eliminated from the current study.

# Appendix D External Measure Suggestions

Table 21: External Measure Suggestions and Actions

| Measure Suggestion | Stakeholder Comments | Action taken for FEECA Study |
|---|---|---|
| Efficient Electrification Measures | All measures that can produce substantial site energy savings by converting from natural gas or other fossil fuels should be included in the Florida electric utilities' next efficiency potential study. Key examples include efficient heat pumps to displace gas furnaces and efficient heat pump water heaters to displace gas water heaters. It is important to note that these electrification measures provide not only heating energy savings and water heating energy savings, but can also potentially provide cooling efficiency benefits as well. In the case of heat pumps, that can occur because efficient heat pumps can operate in cooling mode more efficiently than standard central air conditioners. In the case of heat pump water heaters, cooling and dehumidification benefits can occur when/if the water heater is in conditioned space because they transfer heat (particularly latent heat) from the air around them to the water they are heating. A growing number of jurisdictions – including Illinois, Minnesota and some northeastern states – have begun to include efficient electrification measures in their efficiency programs portfolios. | Fuel-switching and electrification are outside the scope of this study |
| Networked Lighting Controls | LED lighting technology has become increasingly accepted and installed in commercial buildings. The next big efficiency opportunity in commercial lighting efficiency is in sophisticated controls integrated into the light fixtures themselves – both luminaire level lighting controls and networked lighting controls. For example, a 2017 report for both the Northwest Energy Efficiency Alliance and the Design Lights Consortium, a non-profit that works with utilities and manufacturers of lighting products (and which many utilities across the country reference for determination of eligibility of lighting products for efficiency program rebates), found that networked lighting controls can provide on the order of 50% additional savings after LED conversion. Other studies have also found the national savings potential from such products to be enormous. Moreover, these products can be designed to provide not only lighting energy savings but also a number of other non-energy benefits (e.g., asset tracking, such as the ability of hospitals to know the location of all wheel chairs). Numerous utilities across the country now actively promote this technology through their efficiency programs. For example, Commonwealth Edison, the utility serving Chicago and other parts of northern Illinois, is currently getting a significant portion of its commercial lighting savings from promotion of networked lighting controls | Added to measure list for 2024 study |

| Measure Suggestion | Stakeholder Comments | Action taken for FEECA Study |
|---|---|---|
| Ductless mini-split heat pumps to displace inefficient electric baseboard heating | While most Florida residential buildings with electric heat provide that heat with heat pumps, at least some (perhaps most likely being older multi-family rental buildings) still use inefficient electric resistance heat. Ductless mini- split heat pump retrofits can very efficiently displace such inefficient electric heat and should be added to the residential measure list. | Added to measure list for 2024 study |
| Air Source Heat Pump baseline assumptions | There are seven air source heat pump (ASHP) measures included in the residential measure list. Two of them – one at SEER 14 and a second at SEER 21 – are listed as relative to an electric resistance baseline. Five of them – SEER 15, SEER 16, SEER 17, SEER 18 and SEER 21 – appear to be relative to a baseline of a standard new ASHP. Are we interpreting this correctly? If so, we have a couple of comments/questions/suggestions:<br>• The efficiency standards assessed need to be modified to be consistent with new federal<br>standards, including new testing procedures.<br>• For cases where the baseline is "electric resistance", why only assessing two efficiency tiers (i.e.,<br>fewer than for standard ASHP baselines)? The same number of efficiency tiers should be<br>assessed for both baselines. | Incorporated suggestions into 2024 study, including updated baseline standard and assessing same efficiency tiers for both baselines |
| Heat Pump Water Heater Efficiency | The Res EE tab of the utilities draft measure list suggests that the efficiency of a heat pump water heater is an EF of 2.50. That is unrealistically low. In fact, of the 222 products listed on the Energy Star website, none had UEFs less than 2.80 and only 29 (13%) had UEFs that were less than 3.4; the average was 3.57. Indeed, the first product listed on a search of heat pump water heaters on Home Depot's website is a 50 gallon, Rheem (Pro Terra) product with a UEF of 3.75 and a cost of $1699. | Incorporated suggestion into 2024 study |
| New Construction Measure Packages | The measures lists did not appear to include packages of measures for building new residential and/or new commercial buildings to levels of efficiency beyond those required by code. Utilities in many jurisdictions run new construction efficiency programs supporting such measure packages. In the residential sector, many base their programs on the long-standing Federal Energy Star standard. However, increasingly utility programs are promoting additional efficiency tiers – often as part of all-electric new construction program offerings – that go well beyond the Energy Star standard. For example, Consumers Energy (Michigan) offers $1000 rebates to builders who construct Energy Star single family homes | Incorporated suggestion into 2024 study with 2 tiers of residential new construction whole-home improvement measures. |

| Measure Suggestion | Stakeholder Comments | Action taken for FEECA Study |
|---|---|---|
| | with a Home Energy Rating (HERS) score of 57 or less, but offer higher rebates for more efficient buildings – up to $4000 for all electric homes with a HERS score of 40 or less. The Florida utilities potential study should assess savings potential for both the Energy Star level and a tier or two of additional efficiency beyond that level. Similar assessments of new commercial building savings potential should also be assessed. | |
| Custom Industrial Measures | The utilities' list of industrial efficiency measures addresses common industrial efficiency opportunities. However, it does not address efficiency opportunities that may be unique to individual industries or even to individual industrial facilities. That can include such things as changes in types of materials used in manufacturing, reductions in waste streams, improved use of water delivered by agricultural irrigation systems, and/or other things that are not directly related to energy using equipment or controls of such equipment. It is obviously not possible to list all such measures. However, a potential study will understate savings potential if it does not include a way of capturing such potential in its estimates. One potential way to get a sense of such potential is to review results of comprehensive industrial efficiency programs run by other utilities to identify the portion of actual program savings from such unique custom measures – and then assume that portion of custom savings could be added to the savings estimated in the study for named measures. | Added to measure list for 2024 study |
| Electric Vehicle measures | Some EV chargers are more efficient than others. The Federal Energy Star program has a standard for them. Savings potential may not be huge, but should be considered in the study. With a growing number of EV sales, the study should also consider the potential savings from promoting the most efficient EVs within different size/style categories | Added to measure list for 2024 study |
| Removing screw-based LEDs | The screw-based LEDs on both the Residential and Commercial measure lists should now be considered baseline due to federal efficiency standards adopted earlier this year. Utility load forecasts for IRPs should reflect resulting improvements in end use efficiency. | Screw-based LEDs were included in the study but with limited applicability to reflect current market |
| Removing Commercial fluorescent lighting | LED technology – for both fixtures and lamps – has advanced significantly in recent years, to the point where it should be the only technology considered for commercial lighting. Measures such as high performance T-8 fluorescent fixtures and high bay T-5 fluorescent fixtures should be replaced with LED alternatives in the study. | Updated measure list for 2024 study to only include LED-based lamps for linear fluorescent replacements |

| Measure Suggestion | Stakeholder Comments | Action taken for FEECA Study |
|---|---|---|
| Removing fossil-gas fueled CHP | Fossil-fuel fired CHP systems should not be considered "renewable" and have questionable benefits if electric generation is expected to get increasingly more renewable and clean. Biogas-fueled CHP – such as systems installed in wastewater treatment facilities that use methane byproducts of processing waste – should be included in the study. | 2024 study will continue to assess all CHP options |
| Adding livestock methane power generation to renewables list | For example, see the "cow power" program currently being run by Green Mountain Power, Vermont's largest electric utility | 2024 study will continue to assess DSRE options consistent with prior study, including customer-sited solar, solar plus storage, and CHP |
| Adding EV managed charging to DR list | With national market shares for EVs growing, it is important that utilities consider programs for managing when charging occurs. Numerous utilities are currently running managed charging programs. This does not currently appear to be on the measure list and should be added to the Florida utilities' potential study. | Added to measure list for 2024 study |
| Residential "smart thermostat" measure can provide both efficiency savings and demand response potential | This is recognized in the inclusion of smart thermostats in both the Res EE and DR tabs of the measure list spreadsheet. We simply want to flag that it is important when assessing cost-effectiveness of this measure that these two potential benefits are considered together. In other words, the cost should be considered compared to the combined efficiency and DR potential rather than separately considered relative to just EE savings and then separately again compared to just DR potential | 2024 study will include interactive impacts of EE and DR opportunities |
| Emerging Technologies | The efficiency potential study measure list appears to be somewhat outdated. It does not include a number of new and emerging technologies. The potential list of such technologies is long. We suggest reviewing the attached list of emerging technologies developed almost two years ago by Consumers Energy (Michigan) and including them in the study. | Consumers Energy study was reviewed and commercially available measures were added to measure list for 2024 study, including heat pump water heaters - CEE advanced tier, heat pump clothes dryers, ozone laundry systems, and 21+ SEER HVAC units |

# Technical Potential Study of Demand Side Management

## Tampa Electric Company

Date: 03.07.2024

# Table of Contents

# Executive Summary

In October 2022, the six electric utilities subject to the Florida Energy Efficiency and Conservation Act (FEECA Utilities) retained Resource Innovations, Inc. for the purpose of identifying and characterizing the market for demand-side management (DSM) opportunities, including energy efficiency (EE) improvement and building retrofits, peak load reductions from demand response (DR), and demand-side renewable energy (DSRE) systems.

The main objective of the study was to assess the technical potential of demand-side resources for reducing customer electric energy consumption and seasonal peak capacity demands.

This report provides the detailed methodology and results for the technical potential analysis of Tampa Electric Company's (TECO) service territory.

## 1.1 Methodology

Resource Innovations estimates DSM savings potential by applying an analytical framework that aligns baseline market conditions for energy consumption and demand with DSM opportunities. After describing the baseline condition, Resource Innovations applies estimated measure savings to disaggregated consumption and demand data. The approach varies slightly according to the type of DSM resources and available data; the specific approaches used for each type of DSM are described below.

### 1.1.1 EE Potential

This study utilized Resource Innovations' proprietary EE modeling tool, TEA-POT (Technical / Economic / Achievable POTential). This modeling tool was built on a platform that provides the ability to create and analyze multiple scenarios and recalculate potential savings based on variable inputs such as sales/load forecasts, electricity prices, discount rates, and actual program savings. The methodology for the EE potential assessment was based on a hybrid "top-down/bottom-up" approach, which started with the current utility load forecast, then disaggregated it into its constituent customer-class and end-use components. Our assessment examined the effect of the range of EE measures and practices on each end-use, taking into account current market saturations, and technical feasibility. These unique impacts were aggregated to produce estimates of potential at the end-use, customer class, and system levels for TECO.

### 1.1.2 DR Potential

The assessment of DR potential in TECO's service territory was an analysis of mass market direct load control programs for residential and small commercial and industrial (C&I) customers, and an analysis of DR programs for large C&I customers. The direct load control program assessment focused on the potential for demand reduction through heating, ventilation, and air conditioning (HVAC), water heater, managed electric vehicle charging, and pool pump load control. These end-uses were of particular interest because of their large contribution to peak period system load. For this analysis, a range of direct load control measures were examined for each customer segment to highlight the range of potential. The assessment further accounted for existing DR programs for TECO when calculating the total DR potential.

### 1.1.3 DSRE Potential

The DSRE technologies included in this study are rooftop solar photovoltaic (PV) systems, battery storage systems charged from customers' PV systems, and combined heat and power (CHP) systems. The study leveraged the customer segmentation and load disaggregation data assembled for the EE and DR analyses, and applied our DSRE model, SPIDER™ (Spatial Penetration and Integration of Distributed Energy Resources), for economic and adoption analysis of solar and battery storage. This model dynamically responds to rapidly changing technologies and accounts for all key time-varying elements such as technology costs, incentives, tax credits, and electric rates. To estimate technical potential for CHP, the study utilized a series of unique distributed generation potential models for each primary market sector (commercial and industrial), calculating the average building consumption, assigning minimum facility size thresholds, and estimating building energy savings share percentage for each CHP technology based on its generation capacity.

## 1.2 Savings Potential

Technical potential for EE, DR, and DSRE are as follows:

### 1.2.1 EE Potential

EE technical potential describes the savings potential when all technically feasible EE measures are fully implemented, ignoring all non-technical constraints on electricity savings, such as cost-effectiveness and customer willingness to adopt EE.

The estimated EE technical potential results are summarized in Table 1.

Table 1. EE Technical Potential

| | Savings Potential | | |
|---|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) | Energy (GWh) |
| **Residential** | 992 | 445 | 3,197 |
| **Non-Residential**[1] | 398 | 334 | 2,272 |
| **Total** | 1,390 | 779 | 5,469 |

### 1.2.2 DR Potential

DR technical potential describes the magnitude of loads that can be managed during conditions when grid operators need peak capacity. For residential and small C&I customers where DR generally takes the form of direct utility control, technical potential for DR is limited by the loads that can be controlled remotely at scale such as heating, cooling, water heaters, managed electric vehicle charging, and pool pumps. For large C&I customers, this included their entire electric demand during a utility's system peak, as many of these types of customers will forego virtually all electric demand temporarily if the financial incentive is large enough.

The estimated DR technical potential results are summarized in Table 2.

Table 2. DR Technical Potential

| | Savings Potential | |
|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) |
| **Residential** | 1,541 | 1,439 |
| **Non-Residential** | 1,571 | 1,691 |
| **Total** | 3,112 | 3,130 |

[1] Non-Residential results include all commercial and industrial customer segments.

### 1.2.3 DSRE Potential

DSRE technical potential estimates quantify all technically feasible distributed generation opportunities from PV systems, battery storage systems charged from PV, and CHP technologies based on the customer characteristics of TECO's customer base.

The estimated DSRE technical potential results are summarized in Table 3.

Table 3. DSRE Technical Potential[2]

| | Savings Potential | | |
|---|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) | Energy (GWh) |
| **PV Systems** | | | |
| **Residential** | 484 | 51 | 8,000 |
| **Non-Residential** | 165 | 6 | 2,236 |
| **Total** | 649 | 57 | 10,236 |
| **Battery Storage charged from PV Systems** | | | |
| **Residential** | 598 | 876 | 0 |
| **Non-Residential** | 120 | 205 | 0 |
| **Total** | 718 | 1081 | 0 |
| **CHP Systems** | | | |
| **Total** | 358 | 286 | 1,768 |

[2] PV systems and CHP systems were independently analyzed for technical potential without consideration of the competition between technologies or customer preference for DSRE system.

# 2 Introduction

In October 2022, the six electric utilities subject to the Florida Energy Efficiency and Conservation Act (FEECA Utilities) retained Resource Innovations, Inc. for the purpose of identifying and characterizing the market for demand-side management (DSM) opportunities, including energy efficiency (EE) improvement and building retrofits, peak load reductions from demand response (DR), and demand-side renewable energy (DSRE) systems. The main objective of the study was:

- Assessing the technical potential of demand-side resources for reducing customer electric energy consumption and seasonal peak capacity demands.

This report provides the detailed methodology and results for the technical potential analysis of TECO's service territory.

The following deliverables were developed by Resource Innovations as part of the project and are addressed in this report:

- DSM measure list and detailed assumption workbooks
- Disaggregated baseline demand and energy use by year, sector, and end-use
- Baseline technology saturations, energy consumption, and demand
- Technical potential demand and energy savings
- Supporting calculation spreadsheets

## 2.1 Technical Potential Study Approach

Resource Innovations estimates technical potential according to the industry standard categorization, as follows:

> Technical Potential is the theoretical maximum amount of energy and capacity that could be displaced by DSM, regardless of cost and other barriers that may prevent the installation or adoption of a DSM measure.

For this study, technical potential included full application of commercially available DSM technologies to all residential, commercial, and industrial customers in the utility's service territory.

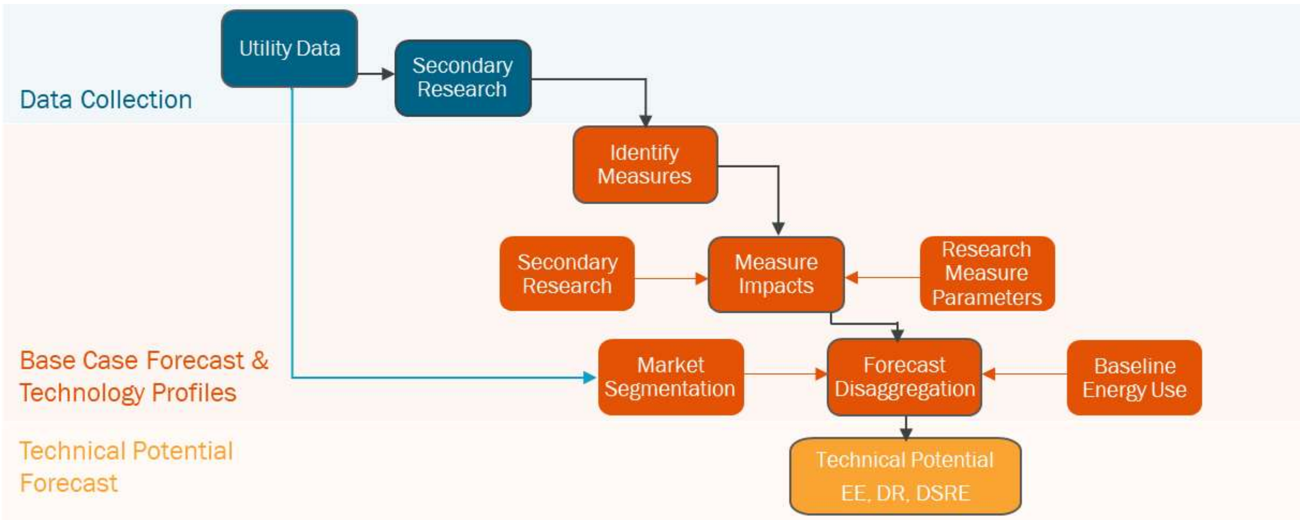
Quantifying DSM technical potential is the result of an analytical process that refines DSM opportunities that align with TECO's customers' electric consumption patterns. Resource Innovations' general methodology for estimating technical potential is a hybrid "top-

down/bottom-up" approach, which is described in detail in Sections 3 through 5 of this report and includes the following steps:

- Develop a baseline forecast: the study began with a disaggregation of the utility's official electric energy forecast to create a baseline electric energy forecast. This forecast does not include any utility-specific assumptions around DSM performance. Resource Innovations applied customer segmentation and consumption data from each utility and data from secondary sources to describe baseline customer-class and end-use components. Additional details on the forecast disaggregation are included in Section 3.
- Identify DSM opportunities: A comprehensive set of DSM opportunities applicable to TECO's climate and customers were analyzed to best depict DSM technical potential. Effects for a range of DSM technologies for each end-use could then be examined while accounting for current market saturations, technical feasibility, and impacts.
- Collect cost and impact data for measures: For those measures applicable to TECO's customers, Resource Innovations conducted primary and secondary research and estimated costs, energy savings, measure life, and demand savings. We differentiated between the type of cost (capital, installation labor, maintenance, etc.) to separately evaluate different implementation modes: retrofit (capital plus installation labor plus incremental maintenance); new construction (incremental capital and incremental maintenance); and burnout costs (incremental capital and incremental maintenance costs for replacement of appliances and equipment that has reached the end of its useful life). Additional details on measure development are included in Section 4.

Figure 1 provides an illustration of the technical potential modeling process conducted for TECO, with the assessment starting with the current utility load forecast, disaggregated into its constituent customer-class and end-use components, and calibrated to ensure consistency with the overall forecast. Resource Innovations considered the range of DSM measures and practices application to each end-use, accounting for current market saturations, and technical feasibility. These unique impacts were aggregated to produce estimates of potential at the technology, end-use, customer class, and system levels.

Figure 1. Approach to Technical Potential Modeling




Resource Innovations estimated DSM technical potential based on a combination of market research, utility load forecasts and customer data, and measure impact analysis, all in coordination with TECO. Resource Innovations examined the technical potential for EE, DR, and DSRE opportunities; this report is organized to offer detail on each DSM category, with additional details on technical potential methodology presented in Section 5.

## 2.2 EE Potential Overview

To estimate EE potential, this study utilized Resource Innovations' modeling tool, TEA-POT (Technical / Economic / Achievable POTential). This modeling tool was built on a platform that provides the ability to create and analyze multiple scenarios and recalculate potential savings based on variable inputs such as sales/load forecasts, electricity prices, discount rates, and actual utility program savings, as described in Section 5.1.1 below. While the analysis estimates the impacts of individual EE measures, the model accounts for interactions and overlap of individual measure impacts within an end-use or equipment type. The model provides transparency into the assumptions and calculations for estimating EE potential.

## 2.3 DR Potential Overview

To estimate DR market potential, Resource Innovations considered customer demand during utility peaking conditions and projected customer response to DR measures. Customer demand was determined by looking at account-level interval data for a sample of customers within each segment. For each segment, Resource Innovations determined the portion of a customer's load that could be curtailed during the system peak.

## 2.4 DSRE Potential Overview

The DSRE technologies included in this study are rooftop solar photovoltaic (PV) systems, battery storage systems charged from PV, and combined heat and power (CHP) systems. The study leveraged the customer segmentation and load disaggregation data assembled for the EE and DR analyses, and applied our DSRE model, SPIDER™ (Spatial Penetration and Integration of Distributed Energy Resources), for economic and adoption analysis of solar and battery storage. This model dynamically responds to rapidly changing technologies and accounts for all key time-varying elements such as technology costs, incentives, tax credits, and electric rates. To estimate technical potential for CHP, the study utilized a series of unique distributed generation potential models for each primary market sector (commercial and industrial), calculating the average building consumption, assigning minimum facility size thresholds, and estimating building energy savings share percentage for each CHP technology based on its generation capacity.

# 3 Baseline Forecast Development

## 3.1 Market Characterization

The TECO base year energy use and sales forecast provided the reference point to determine potential savings. The end-use market characterization of the base year energy use and reference case forecast included customer segmentation and load forecast disaggregation. The characterization is described in this section, while the subsequent section addresses the measures and market potential energy and demand savings scenarios.

### 3.1.1 Customer Segmentation

In order to estimate EE, DR, and DSRE potential, the sales forecast and peak load forecasts were segmented by customer characteristics. As electricity consumption patterns vary by customer type, Resource Innovations segmented customers into homogenous groups to identify which customer groups are eligible to adopt specific DSM technologies, have similar building characteristics and load profiles, or are able to provide DSM grid services.

Resource Innovations segmented customers according to the following:

1) By Sector – how much of TECO's energy sales, summer and winter peak demand forecast is attributable to the residential, commercial, and industrial sectors?
2) By Customer – how much electricity does each customer typically consume annually and during system peaking conditions?
3) By End-Use – within a home or business, what equipment is using electricity during the system peak? How much energy does this end-use consume over the course of a year?

Table 4 summarizes the segmentation within each sector. In addition to the segmentation described here for the EE and DSRE analyses, the residential customer segments were further segmented by heating type (electric heat, gas heat, or unknown) and by annual consumption bins within each sub-segment for the DR analysis.

**Table 4. Customer Segmentation**

| Residential | Commercial | | Industrial | |
|---|---|---|---|---|
| Single Family | Assembly | Miscellaneous | Agriculture and Assembly | Primary Resources Industries |
| Multi-Family | College and University | Offices | Chemicals and Plastics | Stone/Glass/ Clay/Concrete |
| Manufactured Homes | Grocery | Restaurant | Construction | Textiles and Leather |
| | Healthcare | Retail | Electrical and Electronic Equipment | Transportation Equipment |
| | Hospitals | Schools K-12 | Lumber/Furniture/ Pulp/Paper | Water and Wastewater |
| | Institutional | Warehouse | Metal Products and Machinery | Other |
| | Lodging/ Hospitality | | Miscellaneous Manufacturing | |

From an equipment and energy use perspective, each segment has variation within each building type or sub-sector. For example, the energy consuming equipment in a convenience store will vary significantly from the equipment found in a supermarket. To account for this variation, the selected end-uses describe energy consumption patterns that are consistent with those typically studied in national or regional surveys, such as the U.S. Energy Information Administration's (EIA) Residential Energy Consumption Survey (RECS), Commercial Building Energy Consumption Survey (CBECS) and Manufacturing Energy Consumption Survey (MECS), among others. The end-uses selected for this study are listed in Table 5.

**Table 5. End-Uses**

| Residential End-Uses | Commercial End-Uses | Industrial End-Uses |
|---|---|---|
| Space heating[3] | Space heating[3] | Process heating |
| Space cooling[3] | Space cooling[3] | Process cooling |
| Domestic hot water | Domestic hot water | Compressed air |
| Ventilation and circulation | Ventilation and circulation | Motors/pumps |

[3] Includes the contribution of building envelope measures and efficiencies.

| Residential End-Uses | Commercial End-Uses | Industrial End-Uses |
|---|---|---|
| Lighting | Interior lighting | Fan, blower motors |
| Cooking | Exterior lighting | Process-specific |
| Appliances | Cooking | Industrial lighting |
| Electronics | Refrigeration | Exterior lighting |
| Miscellaneous | Office equipment | HVAC[3] |
| | Miscellaneous | Other |

For DR, the end-uses targeted were those with controllable load for residential customers (i.e., HVAC, water heaters, pool pumps, and electric vehicles) and small C&I customers (HVAC and electric vehicles). For large C&I customers, all load during peak hours was included assuming these customers would potentially be willing to reduce electricity consumption for a limited time if offered a large enough incentive during temporary system peak demand conditions.

### 3.1.2 Forecast Disaggregation

A common understanding of the assumptions and granularity in the baseline load forecast was developed with input from TECO. Key discussion topics reviewed included:

- How current DSM offerings are reflected in the energy and demand forecast.
- Assumed weather conditions and hour(s) of the day when the system is projected to peak.
- Are there portions of the load forecast attributable to customers or equipment not eligible for DSM programs?
- How are projections of population increase, changes in appliance efficiency, and evolving distribution of end-use load shares accounted for in the peak demand forecast?

#### 3.1.2.1 Electricity Consumption (kWh) Forecast

Resource Innovations segmented TECO's electricity consumption forecast into electricity consumption load shares by customer class and end-use. The baseline customer segmentation represents the electricity market by describing how electricity was consumed within the service territory. Resource Innovations developed the forecast for the year 2025, and based it on data provided by TECO, primarily their 2023 Ten-Year Site Plan, which was the most recent plan available at the time the studies were initiated. The data addressed current baseline consumption, system load, and sales forecasts.

### 3.1.2.2 Peak Demand (kW) Forecast

A fundamental component of DR potential was establishing a baseline forecast of what loads or operational requirements would be absent due to existing dispatchable DR or time varying rates. This baseline was necessary to assess how DR can assist in meeting specific planning and operational requirements. We utilized TECO's summer and winter peak demand forecast, which was developed for system planning purposes.

### 3.1.2.3 Estimating Consumption by End-Use Technology

As part of the forecast disaggregation, Resource Innovations developed a list of electricity end-uses by sector (Table 5). To develop this list, Resource Innovations began with TECO's estimates of average end-use consumption by customer and sector. Resource Innovations combined these data with other information, such as utility residential appliance saturation surveys, as available, to develop estimates of customers' baseline consumption. Resource Innovations calibrated the utility-provided data with data available from public sources, such as the EIA's recurring data-collection efforts that describe energy end-use consumption for the residential, commercial, and manufacturing sectors.

To develop estimates of end-use electricity consumption by customer segment and end-use, Resource Innovations applied estimates of end-use and equipment-type saturation to the average energy consumption for each sector. The following data sources and adjustments were used in developing the base year 2025 sales by end-use:

**Residential Sector:**

- The disaggregation was based on TECO's rate class load shares and intensities.
- Baseline intensity was calibrated to account for differences in end-use saturation, fuel source, and equipment saturation as follows:
    - TECO rate class load share is based on average per customer.
    - Resource Innovations made conversions to usage estimates generated by applying TECO's customer audit & saturation survey, EIA RECS data, residential end-use study data received from other FEECA utilities, and EIA's Annual Energy Outlook (AEO) 2023.

**Commercial Sector:**

- The disaggregation was based on TECO's rate class load shares, intensities, and EIA CBECS data.
- Segment data from EIA and TECO.

- Baseline intensity was calibrated to account for differences in end-use saturation, fuel source, and equipment saturation as follows:
    - Rate class load share based on EIA CBECS and end-use forecasts from TECO.

**Industrial Sector:**

- The disaggregation was based on rate class load shares, intensities, and EIA MECS data.
- Segment data from EIA and TECO.
- Baseline intensity was calibrated to account for differences in end-use saturation, fuel source, and equipment saturation as follows:
    - Rate class load share based on EIA MECS and end-use forecasts from TECO.

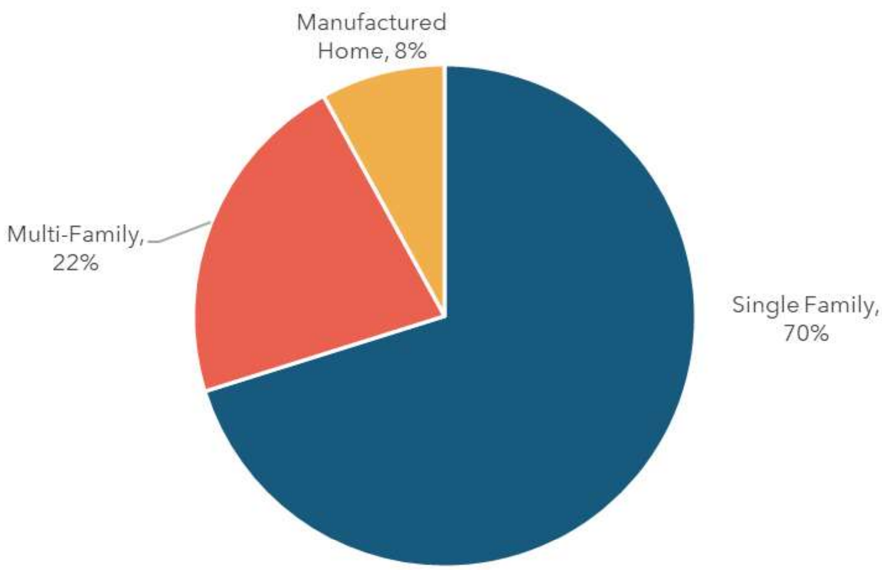
## 3.2 Analysis of Customer Segmentation

Customer segmentation is important to ensuring that a MPS examines DSM measure savings potential in a manner that reflects the diversity of energy savings opportunities existing across the utility's customer base. TECO provided Resource Innovations with data concerning the premise type and loads characteristics for all customers for the MPS analysis. Resource Innovations examined the provided data from multiple perspectives to identify customer segments. Resource Innovations' approach to segmentation varied slightly for non-residential and residential accounts, but the overall logic was consistent with the concept of expressing the accounts in terms that were relevant to DSM opportunities.

### 3.2.1 Residential Customers (EE, DR, and DSRE Analysis)

Segmentation of residential customer accounts enabled Resource Innovations to align DSM opportunities with appropriate DSM measures. Resource Innovations used utility customer data, supplemented with EIA data, to segment the residential sector by customer dwelling type (single family, multi-family, or manufactured home). The resulting distribution of customers according to dwelling unit type is presented in Figure 2.

Figure 2. Residential Customer Segmentation




### 3.2.2 Non-Residential (Commercial and Industrial) Customers (EE and DSRE Analysis)

For the EE and DSRE analysis, Resource Innovations segmented C&I accounts using the utility's North American Industry Classification System (NAICS) or Standard Industrial Classification (SIC) codes, supplemented by data produced by the EIA's CBECS and MECS. Resource Innovations classified the customers in this group as either commercial or industrial, on the basis of DSM measure information available and applicable to each. For example, agriculture and forestry DSM measures are commonly considered industrial savings opportunities. Resource Innovations based this classification on the types of DSM measures applicable by segment, rather than on the annual energy consumption or maximum instantaneous demand from the segment as a whole. The estimated energy sales distributions Resource Innovations applied are shown below in Figure 3 and Figure 4.

**Figure 3. Commercial Customer Segmentation**

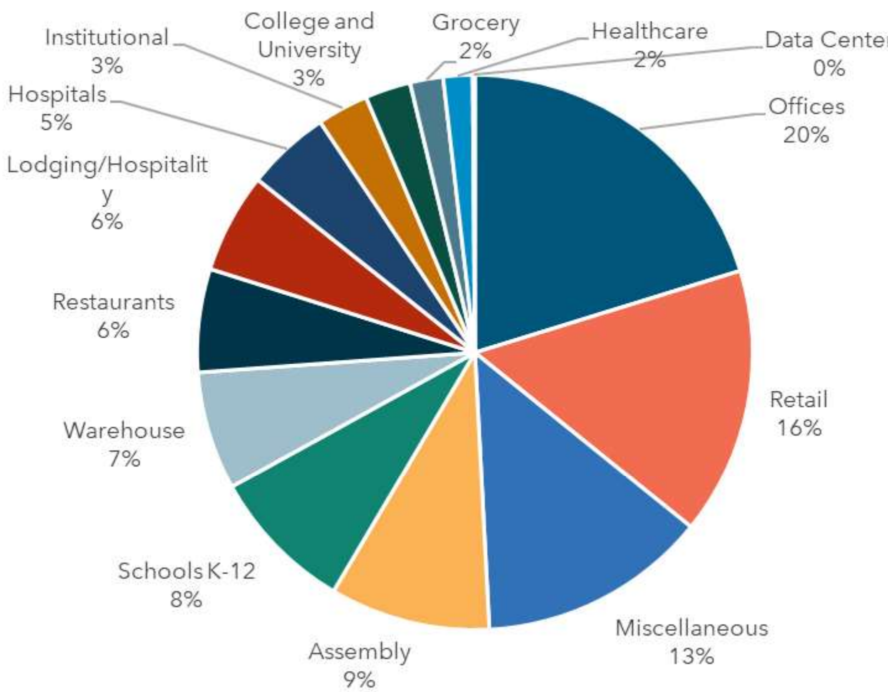
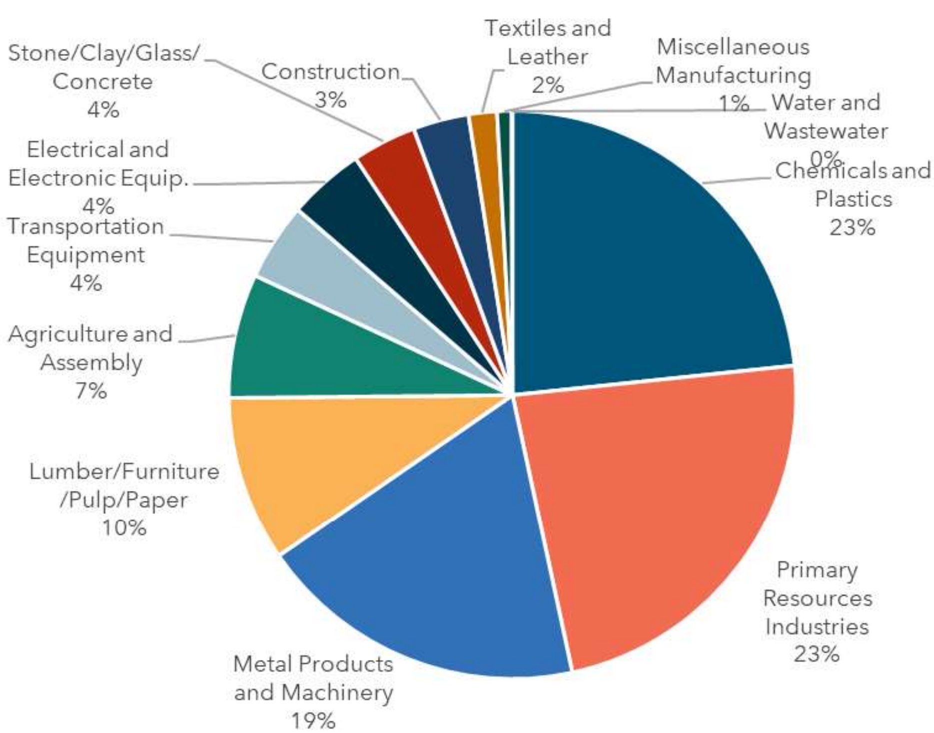



**Figure 4. Industrial Customer Segmentation**



### 3.2.3 Commercial and Industrial Accounts (DR Analysis)

For the DR analysis, Resource Innovations divided the non-residential customers into the two customer classes of small C&I and large C&I using rate class and annual consumption. For the purposes of this analysis, small C&I customers are those on the General Service (GS) tariff. Large C&I customers are all customers on the General Service Demand (GSD) tariff or on the General Service Large Demand (GSLD) tariff. Resource Innovations further segmented these two groups based on customer size. For small C&I, segmentation was determined using annual customer consumption and for large C&I the customer's maximum demand was used. Both customer maximum demand and customer annual consumption were calculated using billing data provided by TECO.

Table 6 shows the account breakout between small C&I and large C&I.

Table 6. Summary of Customer Classes for DR Analysis

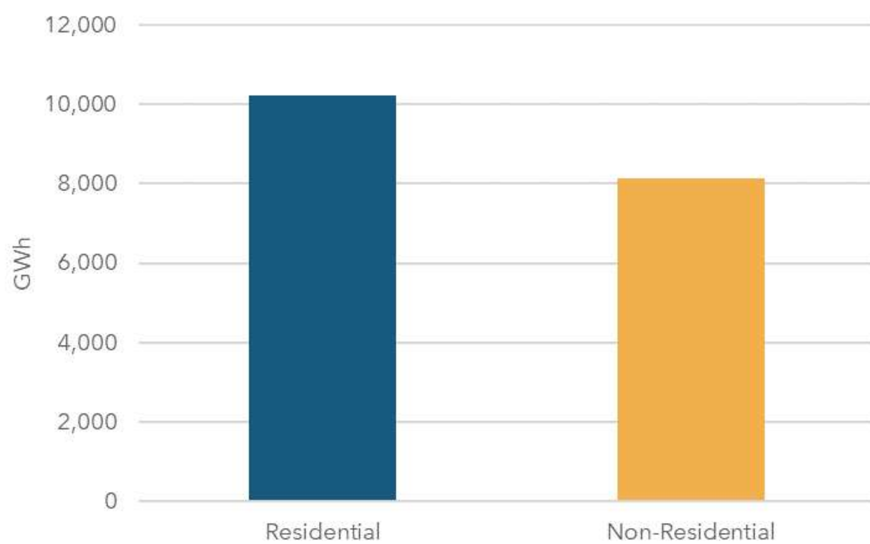
| Customer Class | Annual kWh | Estimated Number of Accounts |
|---|---|---|
| **Small C&I** | 0-15,000 kWh | 43,294 |
| | 15,001-25,000 kWh | 9,444 |
| | 25,001-50,000 kWh | 9,104 |
| | 50,001 kWh + | 3,304 |
| | Total | 65,146 |
| **Large C&I** | 0-50 kW | 8,716 |
| | 51-300 kW | 6,487 |
| | 301-500 kW | 738 |
| | 501 kW + | 738 |
| | Total | 16,679 |

## 3.3 Analysis of System Load

### 3.3.1 System Energy Sales

Technical potential is based on TECO's load forecast for the year 2025 from their 2023 Ten Year Site Plan, which is illustrated in Figure 5.

Figure 5. 2025 Electricity Sales Forecast by Sector




### 3.3.2 System Demand

To determine the technical potential for DR, Resource Innovations first established peaking conditions for each utility by looking at when each utility historically experienced its maximum demand. The primary data source used to determine when maximum DR impact was the historical system load for TECO. The data provided contained the system loads for all 8,760 hours of the most recent five years leading up to the study (2016-2021). The utility summer and winter peaks were then identified within the utility-defined peaking conditions. For TECO the summer peaking conditions were defined as August from 5:00-6:00 PM and the winter peaking conditions were defined as January from 7:00-8:00 AM. The seasonal peaks were then selected as the maximum demand during utility peaking conditions.

### 3.3.3 Load Disaggregation

The disaggregated annual electric loads[4] for the base year 2025 by sector and end-use are summarized in Figure 6, Figure 7, and Figure 8.

[4] Full disaggregation of system demand by end-use was not conducted, as DR potential for residential and small C&I customers focused on specific end-uses of particular interest because of their large contribution to peak period system load, and was not end-use specific for large C&I customers. A description of the end-use analysis for residential and small C&I customers is included in Section 5.1.2

**Figure 6. Residential Baseline (2025) Energy Sales by End-Use**

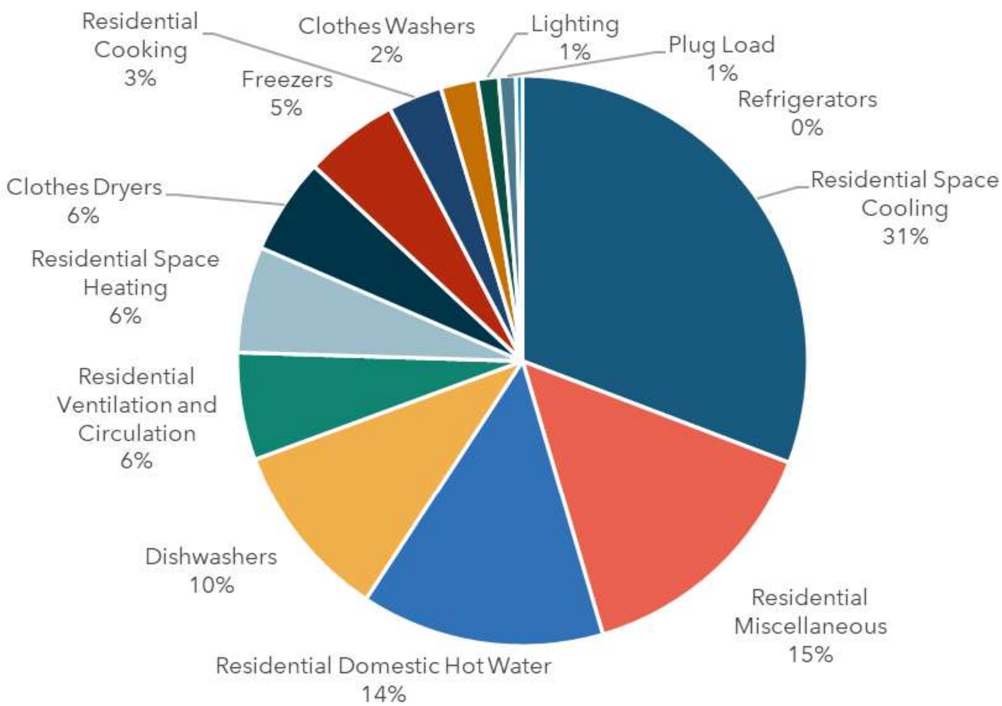



**Figure 7. Commercial Baseline (2025) Energy Sales by End-Use**

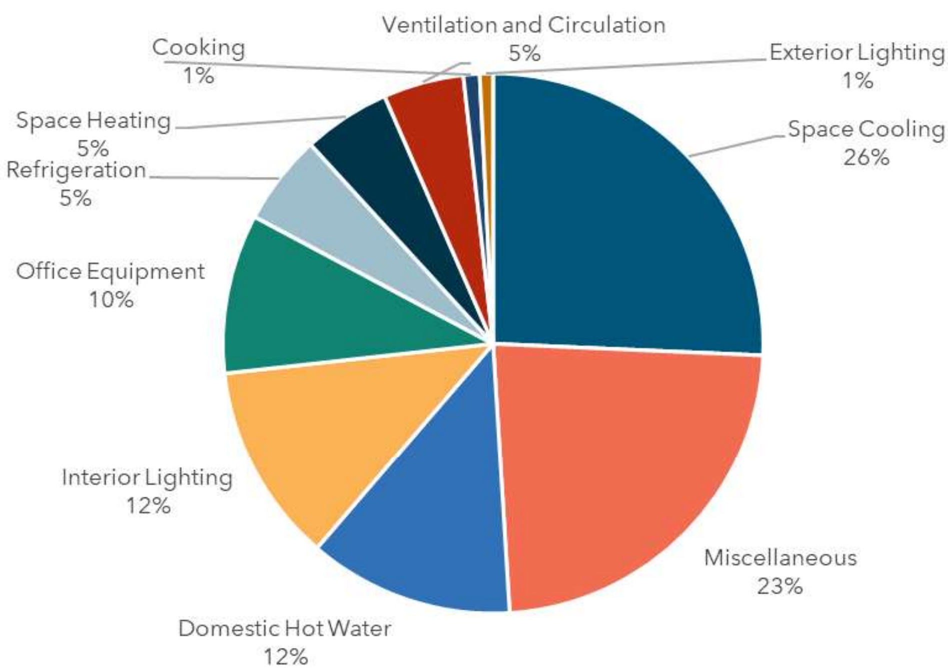
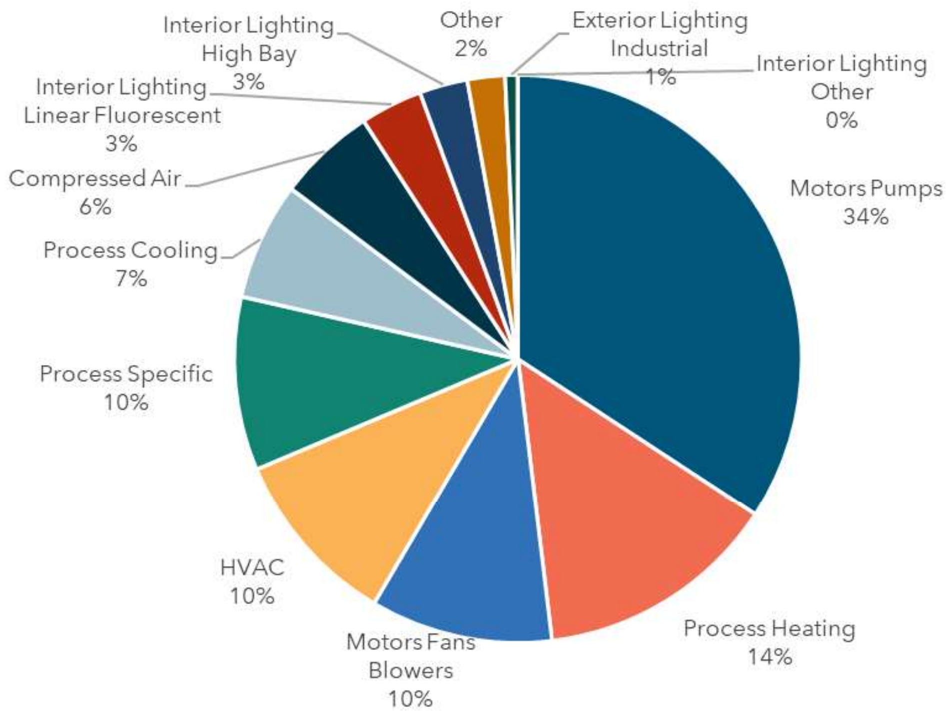


Figure 8. Industrial Baseline (2025) Energy Sales by End-Use



# 4 DSM Measure Development

DSM potential is described by comparing baseline market consumption with opportunities for savings. Describing these individual savings opportunities results in a list of DSM measures to analyze. This section presents the methodology to develop the EE, DR, and DSRE measure lists.

## 4.1 Methodology

Resource Innovations identified a comprehensive catalog of DSM measures for the study. The measure list is the same for all FEECA Utilities. The iterative vetting process with the utilities to develop the measure list began by initially examining the list of measures included in the 2019 Goals docket. This list was then adjusted based on proposed measure additions and revisions provided by the FEECA Utilities. Resource Innovations further refined the measure list based on reviews of Resource Innovations' DSM measure library, compiled from similar market potential studies conducted in recent years throughout the United States, as well as measures included in other utility programs where Resource Innovations is involved with program design, implementation, or evaluation. The FEECA Utilities also reached out to interested parties and received input with recommendations on measure additions to the 2019 measure list. Their measure suggestions were reviewed and incorporated into the study as appropriate. External measure suggestions and actions are summarized in Appendix D. The extensive, iterative review process involving multiple parties has ensured that the study included a robust and comprehensive set of DSM measures.

See Appendix A for the list of EE measures, Appendix B for the list of DR measures, and Appendix C for the list of DSRE measures analyzed in the study.

## 4.2 EE Measures

EE measures represent technologies applicable to the residential, commercial, and industrial customers in the FEECA Utilities' service territories. The development of EE measures included consideration of:

- EE technologies that are applicable to Florida and commercially available: Measures that are not applicable due to climate or customer characteristics were excluded, as were "emerging" technologies that are not currently commercially available to FEECA utility customers.
- Current and planned Florida Building Codes and Federal equipment standards (Codes & Standards) for baseline equipment: Measures included from prior studies

were adjusted to reflect current Codes & Standards as well as updated efficiency tiers, as appropriate.

- Eligibility for utility DSM offerings in Florida: For example, behavioral measures were excluded from consideration, as they historically have not been allowed to count towards utility DSM goals. Behavioral measures are intended to motivate customers to operate in a more energy-efficient manner (e.g., setting an air-conditioner thermostat to a higher temperature) without accompanying: a) physical changes to more efficient end-use equipment or to their building envelope, b) utility-provided products and tools to facilitate the efficiency improvements, or c) permanent operational changes that improve efficiency which are not easily revertible to prior conditions. These types of behavioral measures were excluded because of the variability in forecasting the magnitude and persistence of energy and demand savings from the utility's perspective. Additionally, decoupling behavioral measure savings from the installation of certain EE technologies like smart thermostats can be challenging and could result in overlapping potential with other EE measures included in the study.

Upon development of the final EE measure list, utility-specific measure details were developed. RI maintains a proprietary online database of energy efficiency measures for MPS studies, which was used as a starting point for measure development for this study. Measures are added or updated at the request of project stakeholders or because of changes to the EE marketplace (for example, new codes and standards, or current practice in the market). Measure data are refined as new data or algorithms are developed for estimating measure impacts, and updated for each study to incorporate inputs parameters specific to the service territory being analyzed. The database contains the following information for each of the measures:

- Measure description: measure classification by type, end-use, and subsector, and description of the base-case and the efficient-case scenarios.
- kWh savings: Energy savings associated with each measure were developed through engineering algorithms or building simulation modeling, taking climate data and customer segments into consideration as appropriate. Reference sources used for developing residential, commercial, and industrial measure savings included a variety of Florida-specific, as well as regional and national sources, such as utility-specific measurement & verification (M&V) data, technical reference manuals (TRM) from other jurisdictions, ENERGY STAR calculators, and manufacturer or retailer specifications for particular products.
- Energy savings were applied in RI's TEA-POT model as a percentage of total baseline consumption. Peak demand savings were determined using utility-specific load shapes or coincidence factors.

- Measure Expected Useful Lifetime: Sources included the Database for Energy Efficient Resources (DEER), the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Handbook, TRMs, and other regional and national measure databases and EE program evaluations.
- Measure Costs: Per-unit costs (full or incremental, depending on the application) associated with measure installations. Sources included: TRMs, ENERGY STAR calculator, online market research, FEECA utility program data, and other secondary sources.

The measure details from the online measure library are exported for use in RI's TEA-POT model, accompanied by utility-specific estimates of measure applicability. Measure applicability is a general term encompassing an array of factors, including technical feasibility of installation, and the measure's current saturation as well as factors to allocate savings associated with competing measures. Information used was primarily derived from data in current regional and national databases, as well as TECO's program tracking data. These factors are described in Table 7.

**Table 7. Measure Applicability Factors**

| Measure Impact | Explanation | Sources |
|---|---|---|
| Technical Feasibility | The percentage of buildings that can have the measure physically installed. Various factors may affect this, including, but not limited to, whether the building already has the baseline measure (e.g., dishwasher), and limitations on installation (e.g., size of unit and space available to install the unit). | Various secondary sources and engineering experience. |
| Measure Incomplete Factor | The percentage of buildings without the specific measure currently installed. | Utility RASS; EIA RECS, CBECS; MECS; ENERGY STAR sales figures; and engineering experience. |
| Measure Share | Used to distribute the percentage of market shares for competing measures (e.g., only blown-in ceiling insulation or spray foam insulation, not both would be installed in an attic). | Utility customer data, Various secondary sources and engineering experience. |

As shown in Table 8, the measure list includes 395 unique energy-efficiency measures. Expanding the measures to account for all appropriate installation scenarios resulted in

9,535 measure permutations, which are the application of individual measures to various customer segments, construction types, and end-uses (i.e., a single air-source heat pump "measure" can be installed in single family, multi-family, and manufactured homes, as well as new and existing vintages of each home type, and impacts both space cooling and space heating end-uses, resulting in twelve separate measure "permutations" analyzed).

Table 8. EE Measure Counts by Sector

| Sector | Unique Measures | Permutations |
|---|---|---|
| **Residential** | 119 | 1,173 |
| **Commercial** | 164 | 5,798 |
| **Industrial** | 112 | 2,564 |

## 4.3 DR Measures

The DR measures included in the measure list utilize the following DR strategies:

- **Direct Load Control.** Utility control of selected equipment at the customer's home or business, such as HVAC or water heaters.
- **Critical Peak Pricing (CPP) with Technology.** Electricity rate structures that vary based on time of day. Includes CPP when the rate is substantially higher for a limited number of hours or days per year (customers receive advance notification of CPP event) coupled with technology that enables customer to lower their usage in a specific end-use in response to the event (e.g., HVAC via smart thermostat).
- **Contractual DR.** Customers receive incentive payments or a rate discount for committing to reduce load by a pre-determined amount or to a pre-determined firm service level upon utility request.
- **Automated DR.** Utility dispatched control of specific end-uses at a customer facility.

DR initiatives that do not rely on the installation of a specific device or technology to implement (such as a voluntary curtailment program or time of use rates) were not included.

A workbook was developed for each measure which included the same measure inputs as previously described for the EE measures. In addition, the DR workbook included expected load reduction from the measure, based on utility technical potential, existing utility DR programs, and other nationwide DR programs if needed.

For technical potential, Resource Innovations did not break out results by specific measure or control technology because all of the developed measures target the end-uses estimated

for technical potential (i.e., potential is reported for space cooling end-use and not allocated to switches, smart thermostats, etc.).

## 4.4 DSRE Measures

The DSRE measure list includes rooftop PV systems, battery storage systems charged from PV systems, and CHP systems.

**PV Systems**

PV systems utilize solar panels (a packaged collection of PV cells) to convert sunlight into electricity. A system is constructed with multiple solar panels, a DC/AC inverter, a racking system to hold the panels, and electrical system interconnections. These systems are often roof-mounted systems that face south-west, south, and/or, south-east. The potential associated with roof-mounted systems installed on residential and commercial buildings was analyzed.

**Battery Storage Systems Charged from PV Systems**

Distributed battery storage systems included in this study consist of behind-the-meter battery systems installed in conjunction with an appropriately-sized PV system at residential and commercial customer facilities. These battery systems typically consist of a DC-charged battery, a DC/AC inverter, and electrical system interconnections to a PV system. On their own battery storage systems do not generate or conserve energy, but can collect and store excess PV generation to provide power during particular time periods, which for DSM purposes would be to offset customer demand during the utility's system peak.

**CHP Systems**

In most CHP applications, a heat engine creates shaft power that drives an electrical generator (fuel cells can produce electrical power directly from electrochemical reactions). The waste heat from the engine is then recovered to provide other on-site needs. Common prime mover technologies used in CHP applications and explored in this study include:

- Steam turbines
- Gas turbines
- Micro turbines
- Fuel Cells
- Internal combustion engines

A workbook was developed for each measure which included the inputs previously described for EE measures and prime mover operating parameters.

# 5 Technical Potential

In the previous sections, the approach for DSM measure development was summarized, and the 2025 base year load shares and reference-case load forecast were described. The outputs from these tasks provided the input for estimating the technical potential scenario, which is discussed in this section.

The technical potential scenario estimates the potential energy and demand savings when all technically feasible and commercially available DSM measures are implemented without regard for cost-effectiveness and customer willingness to adopt the most impactful EE, DR, or DSRE technologies. Since the technical potential does not consider the costs or time required to achieve these savings, the estimates provide a theoretical upper limit on electricity savings potential. Technical potential is only constrained by factors such as technical feasibility and applicability of measures. For this study, technical potential included full application of the commercially available DSM measures to all residential, commercial, and industrial customers in the utility's service territory.

## 5.1 Methodology

### 5.1.1 EE Technical Potential

EE technical potential refers to delivering less electricity to the same end-uses. In other words, technical potential might be summarized as "doing the same thing with less energy, regardless of the cost."

DSM measures were applied to the disaggregated utility electricity sales forecasts to estimate technical potential. This involved applying estimated energy savings from equipment and non-equipment measures to all electricity end-uses and customers. Technical potential consists of the total energy and demand that can be saved in the market which Resource Innovations reported as single numerical values for each utility's service territory.

The core equation used in the residential sector EE technical potential analysis for each individual efficiency measure is shown in Equation 1 below, while the core equation used in the nonresidential sector technical potential analysis for each individual efficiency measure is shown in Equation 2.

**Equation 1: Core Equation for Residential Sector EE Technical Potential**

Technical Potential of Efficient Measures = Total Number of Households × Base Case Equipment Energy Use Intensity (kWh/unit) × Saturation Shares × Percent Incomplete × Feasibility Factor × Savings Factor

Where:

- **Baseline Equipment Energy Use Intensity** = the electricity used per customer per year by each baseline technology in each market segment. In other words, the baseline equipment energy-use intensity is the consumption of the electrical energy using equipment that the efficient technology replaces or affects.
- **Saturation Share** = the fraction of the end-use electrical energy that is applicable for the efficient technology in a given market segment. For example, for residential cooling, the saturation share would be the fraction of all residential electric customers that have central air conditioners in their household.
- **Percent Incomplete** = the fraction of equipment that is not considered to already be energy efficient. To extend the example above, the fraction of central air conditioners that is not already energy efficient.
- **Feasibility Factor** = the fraction of units that is technically feasible for conversion to the most efficient available technology from an engineering perspective (i.e., it may not be possible to install LEDs in all light sockets in a home because the available styles may not fit in every socket).
- **Savings Factor** = the percentage reduction in electricity consumption resulting from the application of the efficient technology.

**Equation 2: Core Equation for Non-Residential Sector EE Technical Potential**

Technical Potential of Efficient Measures = Total Stock Sq. Footage by Building Type by EDC × Base Case Equipment Energy Use Intensity (kWh/unit) × Saturation Shares × Percent Incomplete × Feasibility Factor × Savings Factor

Where:

- **Total Stock Square Footage by Segment** = the forecasted square footage level for a given building type (e.g., square feet of office buildings).
- **Baseline Equipment Energy Use Intensity** = the electricity used per square foot per year by each baseline equipment type in each market segment.

- **Saturation Shares** = the fraction of total end-use energy consumption associated with the efficient technology in a given market segment. For example, for packaged terminal air-conditioner (PTAC), the saturation share would be the fraction of all space cooling kWh in a given market segment that is associated with PTAC equipment.
- **Percent Incomplete** = the fraction of equipment that is not considered to already be energy efficient.
- **Feasibility Factor** = the fraction of the equipment or practice that is technically feasible for conversion to the efficient technology from an engineering perspective (i.e., it may not be possible to install Variable Frequency Drives (VFD) on all motors in a given market segment).
- **Savings Factor** = the percentage reduction in electricity consumption resulting from the application of the efficient technology.

It is important to note that the technical potential estimate represents electricity savings potential at a specific point in time. In other words, the technical potential estimate is based on data describing status quo customer electricity use and technologies known to exist today. As technology and electricity consumption patterns evolve over time, the baseline electricity consumption will also change accordingly. For this reason, technical potential is a discrete estimate of a dynamic market. Resource Innovations reported the technical potential for 2025, based on currently known DSM measures and observed electricity consumption patterns.

**Measure Interaction and Competition (Overlap)**

While the technical potential equations listed above focus on the technical potential of a single measure or technology, Resource Innovations' modeling approach does recognize the overlap of individual measure impacts within an end-use or equipment type, and accounts for the following interactive effects:

- Measure interaction: Installing high-efficiency equipment could reduce energy savings in absolute terms (kWh) associated with non-equipment measures that impact the same end-use. For example, installing a high-efficiency heat pump will reduce heating and cooling consumption which will reduce the baseline against which attic insulation would be applied, thus reducing savings associated with installing insulation. To account for this interaction, Resource Innovations' TEA-POT model ranks measures that interact with one another and reduces the baseline consumption for the subsequent measure based on the savings achieved by the preceding measure. For technical potential, interactive measures are ranked based on total end-use energy savings percentage.
- Measure competition (overlap): The "measure share"—as defined above—accounted for competing measures, ensuring savings were not double-counted. This interaction

occurred when two or more measures "competed" for the same end-use. For example, a T-12 lamp could be replaced with a T-8 or linear LED lamp.

**Addressing Naturally-Occurring EE**

Naturally occurring energy efficiency includes actions taken by customers to improve the efficiency of their homes and businesses in the absence of utility program intervention. For the analysis of technical potential, Resource Innovations verified with TECO's forecasting group that the baseline sales forecasts incorporated two known sources of naturally-occurring efficiency:

- Codes and Standards: The sales forecasts already incorporated the impacts of known Code & standards changes.
- Baseline Measure Adoption: The sales forecast excluded the projected impacts of future DSM efforts but included already implemented DSM penetration.

By properly accounting for these factors, the technical potential analysis estimated the additional EE opportunities beyond what is already included in the utility sales forecast.

### 5.1.2 DR Technical Potential

The concept of technical potential applies differently to DR than for EE. Technical potential for DR is effectively the magnitude of loads that can be curtailed during conditions when utilities need peak capacity reductions. In evaluating this potential at peak capacity, the following were considered: which customers are consuming electricity at those times? What end-uses are in play? Can those end-use loads be managed? Large C&I accounts generally do not provide the utility with direct control over particular end-uses. Instead, many of these customers will forego electric demand temporarily if the financial incentive is large enough. For residential and small C&I customers where DR generally takes the form of direct utility control, technical potential for DR is limited by the loads that can be controlled remotely at scale.

This framework makes end-use disaggregation an important element for understanding DR potential, particularly in the residential and small C&I sectors. When done properly, end-use disaggregation not only provides insights into which loads are on and off when specific grid services are needed, it also provides insight concerning how key loads and end-uses, such as air conditioning use, vary across customers. Resource Innovations' approach used for load disaggregation is more advanced than what is used for most potential studies. Instead of disaggregating annual consumption or peak demand, Resource Innovations produced end-use load disaggregation for all 8,760 hours. This was needed because the loads available at times when different grid applications are needed can vary substantially. Instead

of producing disaggregated loads for the average customer, the study was produced for several customer segments. For TECO, Resource Innovations examined three residential segments based on customer housing type, four different small C&I segments based on customer size, and four different large C&I segments based on customer size, for a total of 11 different customer segments.

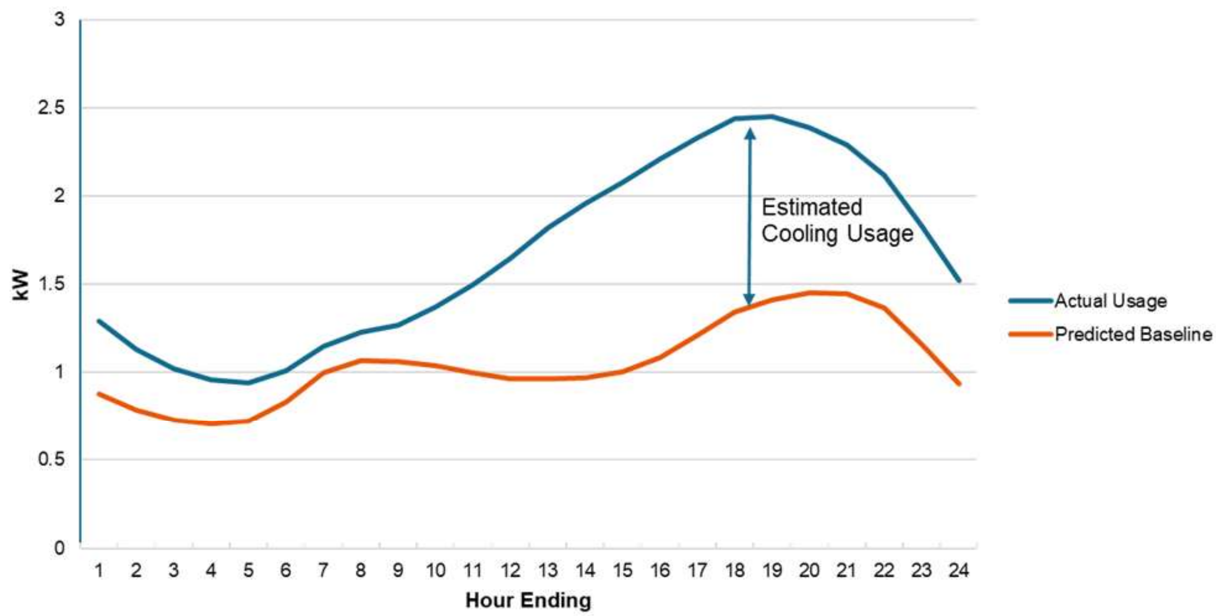
Technical potential, in the context of DR, is defined as the total amount of load available for reduction that is coincident with the period of interest; in this case, the system peak hour for the summer and winter seasons. Thus, two sets of capacity values are estimated: a summer capacity and a winter capacity.

As previously mentioned, for technical potential purposes, all coincident large C&I load is considered dispatchable, while residential and small C&I DR capacity is based on specific end-uses. Summer DR capacity for residential customers was comprised of air-conditioning (AC), pool pumps, water heaters, and managed electric vehicle charging. For small C&I customers, summer capacity was based on AC load. For winter DR capacity, residential was based on electric heating, pool pumps, and water heaters. For small C&I customers, winter capacity was based on electric heating.

AC and heating load profiles were generated for residential and small C&I customers using a sample of customers' interval data provided by TECO. This sample included a customer breakout based on housing type for residential customers and size for small C&I customers. Resource Innovations then used the interval data from these customers to create an average load profile for each customer segment.

The average load profile for each customer segment was combined with historical weather data, and used to estimate hourly load as a function of weather conditions. AC and heating loads were estimated by first calculating the baseline load on days when cooling degree days (CDD) and heating degree days (HDD) were equal to zero, and then subtracting this baseline load. This methodology is illustrated by Figure 9 (a similar methodology was used to predict heating loads).

Figure 9: Methodology for Estimating Cooling Loads




This method was able to produce estimates for average AC/heating load profiles for the seven different customer segments within the residential and small C&I sectors.

Profiles for residential water heater and pool pump loads were estimated by utilizing end-use load data from NREL's residential end-use load profile database.

For all eligible loads, the technical potential was defined as the amount that was coincident with system peak hours for each season, which are August from 5:00-6:00 PM for summer, and January from 7:00-8:00 AM for winter. As mentioned in Section 4, for technical potential there was also no measure breakout needed, because all measures will target the end-uses' estimated total loads.

### 5.1.3 DSRE Technical Potential

#### 5.1.3.1 PV Systems

To determine technical potential for PV systems, RI estimated the percentage of rooftop square footage in Florida that is suitable for hosting PV technology. Our estimate of technical potential for PV systems in this report is based in part on the available roof area and consisted of the following steps:

- Step 1: Outcomes from the forecast disaggregation analysis were used to characterize the existing and new residential, commercial, and industrial building stocks.
    - To calculate the total roof area for residential buildings, the average roof area per household is multiplied by the number of households.
    - For commercial and industrial buildings, RI calculated the total roof area by first dividing the load forecast by the energy usage intensity, which provides an estimate of the total building square footage. This result is then divided by the average number of floors to derive the total roof area.
- Step 2: The total available roof area feasible for installing PV systems was calculated. Relevant parameters included unusable area due to other rooftop equipment and setback requirements, in addition to possible shading from trees and limitations of roof orientation (factored into a “technical suitability” multiplier).
- Step 3: Estimated the expected power density (kW per square foot of roof area).
- Step 4: Estimated the hourly PV generation profile using NREL’s PV Watts Calculator
- Step 5: Calculated total energy and coincident peak demand potential by applying RI’s Spatial Penetration and Integration of Distributed Energy Resources (SPIDER) Model.

The methodology presented in this report uses the following formula to estimate overall technical potential of PVs:

**Equation 3: Core Equation for Solar DSRE Technical Energy Potential**

PV Technical Energy Potential = Suitable Rooftop PV Area (Sq Ft) × PV Power Density (kW-DC/Sq Ft) × Generation Factor (kWh/kW-DC)

Where:

- **Suitable Rooftop PV Area for Residential [Square Feet]:** Number of Residential Buildings x Average Roof Area Per Building x Technical Suitability Factor
- **Suitable Rooftop PV Area for Commercial [Square Feet] :** Energy Consumption [kWh] / Energy Intensity [kWh / Square Feet] / Average No. of Stories Per Building x Technical Suitability Factor
- **PV Power Density [kW-DC/Square Feet]:** Maximum power generated in Watts per square foot of solar panel.
- **Generation Factor:** Annual Energy Generation Factor for PV, from PV Watts (dependent on local solar irradiance)

#### 5.1.3.2 Battery Storage Systems Charged from PV Systems

Battery storage systems on their own do not generate power or create efficiency improvements, but store power for use at different times. Therefore, in analyzing the technical potential for battery storage systems, the source of the stored power and overlap with technical potential identified in other categories was considered.

Battery storage systems that are powered directly from the grid do not produce annual energy savings but may be used to shift or curtail load during particular time periods. As the DR technical potential analyzes curtailment opportunities for the summer and winter peak period, and battery storage systems can be used as a DR technology, the study concluded that no additional technical potential should be claimed for grid-powered battery systems beyond that already attributed to DR.

Battery storage systems that are connected to on-site PV systems also do not produce additional energy savings beyond the energy produced from the PV system[5]. However, PV-connected battery systems do create the opportunity to store energy during period when the PV system is generating more than the home or business is consuming and use that stored power during utility system peak periods.

To determine the additional technical potential peak demand savings for "solar plus storage" systems, our methodology consisted of the following steps:

- Assume that every PV system included in PV Technical Potential is installed with a paired storage system.
- Size the storage system assuming peak storage power is equal to peak PV generation and energy storage duration is three hours.
- Apply RI's hourly dispatch optimization module in SPIDER to create an hourly storage dispatch profile that flattens the individual customer's load profile to the greatest extent possible accounting for a) customer hourly load profile, b) hourly PV generation profile, and c) battery peak demand, energy capacity, and roundtrip charge/discharge efficiency.
- Calculate the effective hourly impact for the utility using the above storage dispatch profile, aligned with the utility's peak hour (calculated separately for summer and winter)
- Report the output storage kW impact on utility coincident peak demand in summer and winter.

[5] PV-connected battery systems experience some efficiency loss due to storage, charging, and discharging. However, for this study, these losses were not quantified.

#### 5.1.3.3 CHP Systems

The CHP analysis created a series of unique distributed generation potential models for each primary market sector (commercial and industrial).

Only non-residential customer segments whose electric and thermal load profiles allow for the application of CHP were considered. The technical potential analysis followed a three-step process. First, minimum facilities size thresholds were determined for each non-residential customer segment. Next, the full population of non-residential customers were segmented and screened based on the size threshold established for that segment. Finally, the facilities that were of sufficient size were matched with the appropriately sized CHP technology.

To determine the minimum threshold for CHP suitability, a thermal factor was applied to potential candidate customer loads to reflect thermal load considerations in CHP sizing. In most cases, on-site thermal energy demand is smaller than electrical demand. Thus, CHP size is usually dictated by the thermal load in order to achieve improved efficiencies.

The study collected electric and thermal intensity data from other recent CHP studies. For industrial customers, Resource Innovations assumed that the thermal load would primarily be used for process operations and was not modified from the secondary data sources for Florida climate conditions. For commercial customers, the thermal load is more commonly made up of water heating, space heating, and space cooling (through the use of an absorption chiller). Therefore, to account for the hot and humid climate in Florida, which traditionally limits weather-dependent internal heating loads, commercial customers' thermal loads were adjusted to incorporate a higher proportion of space cooling to space heating as available opportunities for waste heat recovery.

Resource Innovations worked with the utility-provided customer data, focusing on annual consumption due to the absence of NAICS or SIC codes for this utility data. Non-residential customers were subsequently classified based on annual consumption and size. Since NAICS or SIC codes were unavailable, no formal segmentation occurred. Instead, the analysis focused exclusively on annual utility usage. Facilities with annual loads below the kWh thresholds were deemed unlikely to possess the consistent electric and thermal loads necessary to support CHP and were consequently excluded from consideration. Conversely, those meeting the size criteria were aligned with the corresponding CHP technology.

In general, internal combustion engines are the prime mover for systems under 500kW with gas turbines becoming progressively more popular as system size increases above that. Based on the available load by customer, adjusted by the estimated thermal factor for each

segment, CHP technologies were assigned to utility customers in a top-down fashion (i.e., starting with the largest CHP generators).

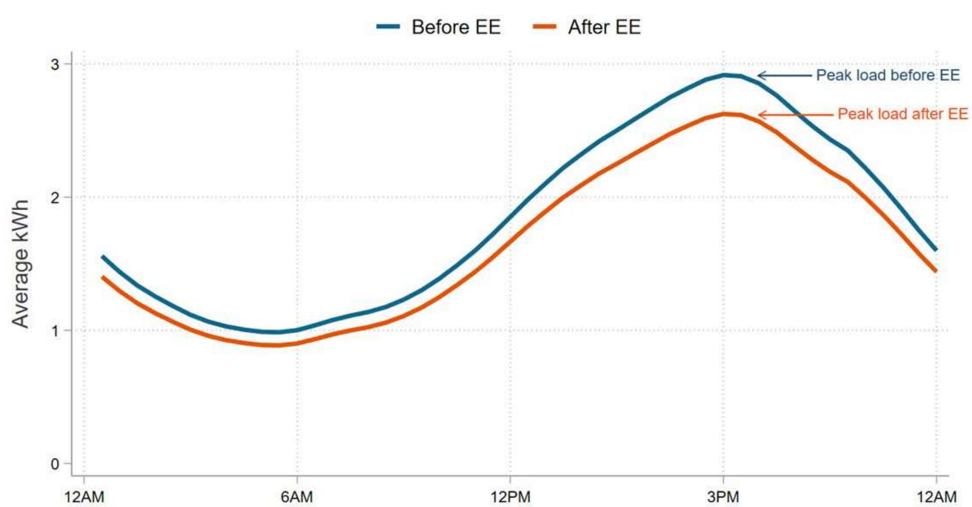
**Measure Interaction**

PV systems and battery storage charged from PV systems were analyzed collectively due to their common power generation source; and therefore, the identified technical potential for these systems is additive. However, CHP systems were independently analyzed for technical potential without consideration of the competition between DSRE technologies or customer preference for a particular DSRE system. Therefore, results for CHP technical potential should not be combined with PV systems or battery storage systems for overall DSRE potential but used as independent estimates.

### 5.1.4 Interaction of Technical Potential Impacts

As described above, the technical potential was estimated using separate models for EE, DR, and DSRE systems. However, there is interaction between these technologies; for example, a more efficient HVAC system would result in a reduced peak demand available for DR curtailment, as illustrated in Figure 10.

Figure 10: Illustration of EE Impacts on HVAC System Load Shape




Therefore, after development of the independent models, the interaction between EE, DR, and DSRE was incorporated as follows:

- The EE technical potential was assumed to be implemented first, followed by DR technical potential and DSRE technical potential.

- To account for the impact of EE technical potential on DR, the baseline load forecast for the applicable end-uses was adjusted by the EE technical potential, resulting in a reduction in baseline load available for curtailment.
- For DSRE systems, the EE and DR technical potential was incorporated in a similar fashion, adjusting the baseline load used to estimate DSRE potential.
    - For the PV analysis, this did not impact the results as the EE and DR technical potential did not affect the amount of PV that could be installed on available rooftops.
    - For the battery storage charged from PV systems, the reduced baseline load from EE resulted in additional PV-generated energy being available for the battery systems and for use during peak periods. The impact of DR events during the assumed curtailment hours was incorporated into the modeling of available battery storage and discharge loads.
- For CHP systems, the reduced baseline load from EE resulted in a reduction in the number of facilities that met the annual energy threshold needed for CHP installations. Installed DR capacity was assumed to not impact CHP potential as the CHP system feasibility was determined based on energy and thermal consumption at the facility. It should be noted that CHP systems not connected to the grid could impact the amount of load available for curtailment with utility-sponsored DR. Therefore, CHP technical potential should not be combined with DR potential but used as independent estimates.

## 5.2 EE Technical Potential

### 5.2.1 Summary

Table 9 summarizes the EE technical potential by sector:

**Table 9. EE Technical Potential**

| | Savings Potential | | |
|---|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) | Energy (GWh) |
| **Residential** | 992 | 445 | 3,197 |
| **Non-Residential**[6] | 398 | 334 | 2,272 |
| **Total** | 1,390 | 779 | 5,469 |

[6] Non-Residential results include all commercial and industrial customer segments.

### 5.2.2 Residential

Figure 11, Figure 12, and Figure 13 summarize the residential sector EE technical potential by end-use.

Figure 11: Residential EE Technical Potential by End-Use (Summer Peak Savings)

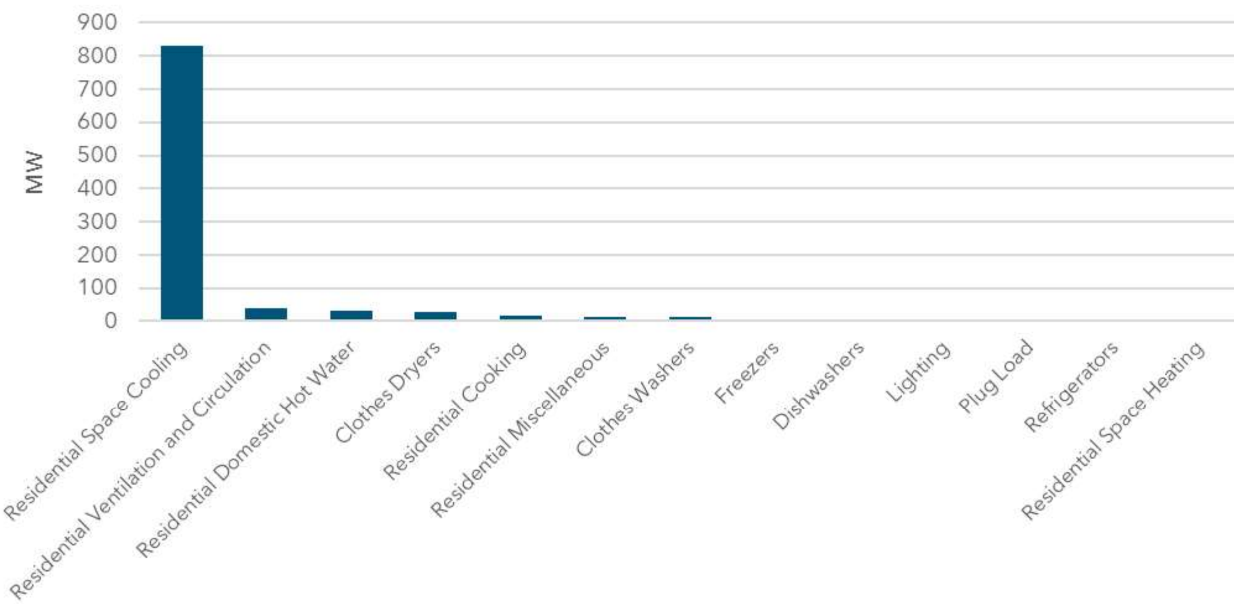


Figure 12: Residential EE Technical Potential by End-Use (Winter Peak Savings)

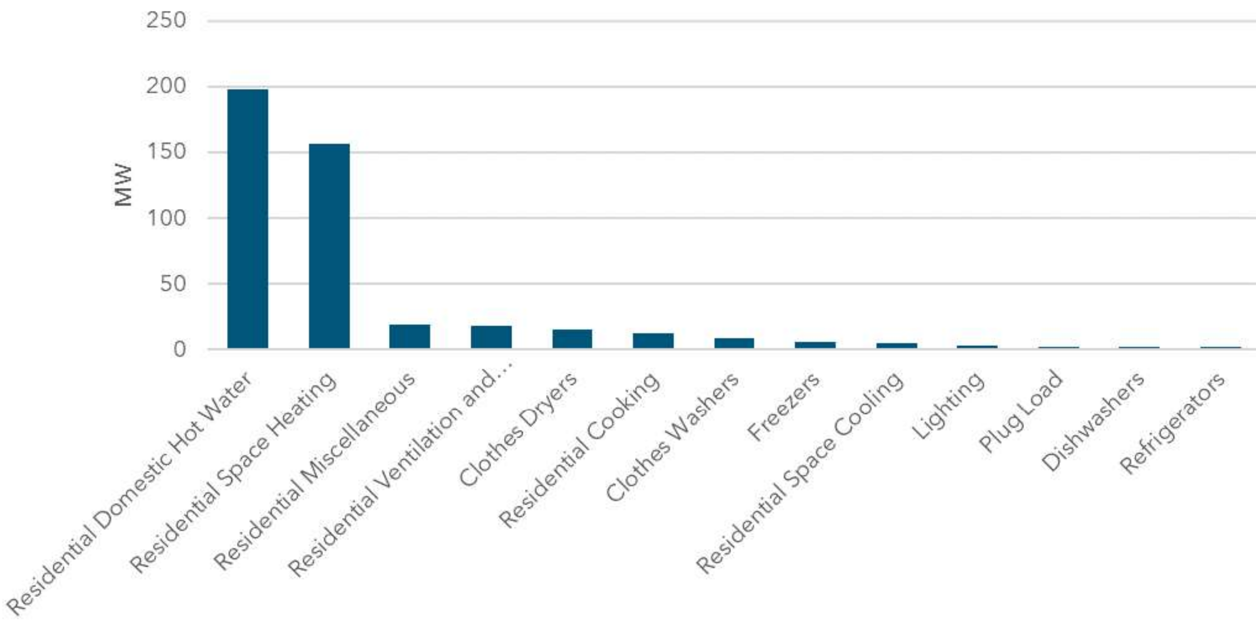
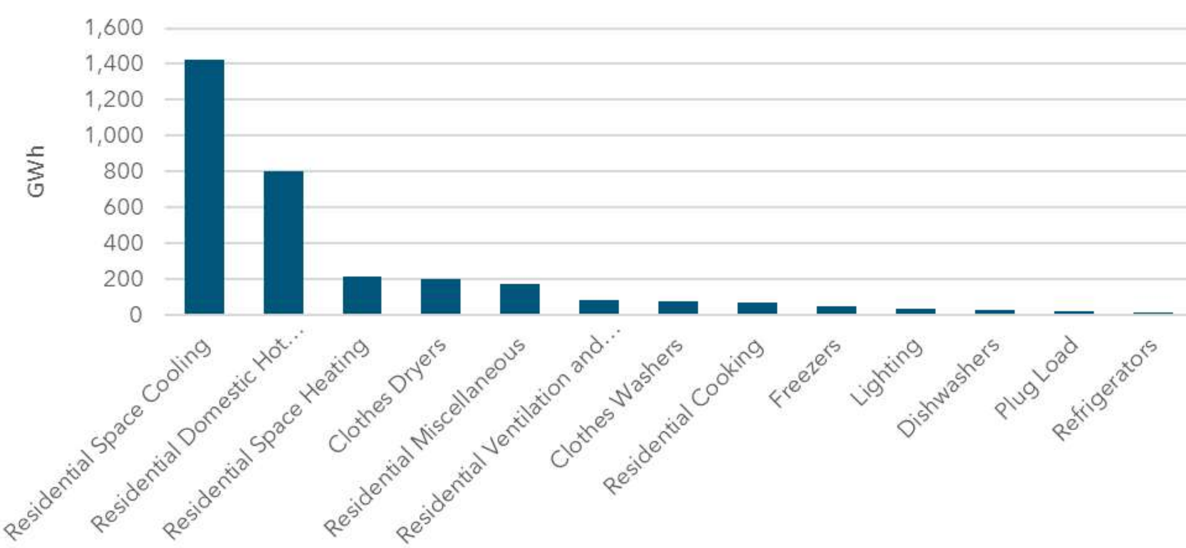



Figure 13: Residential EE Technical Potential by End-Use (Energy Savings)



## 5.2.3 Non-Residential

### 5.2.3.1 Commercial Segments

Figure 14, Figure 15, and Figure 16 summarize the commercial sector EE technical potential by end-use.

Figure 14: Commercial EE Technical Potential by End-Use (Summer Peak Savings)

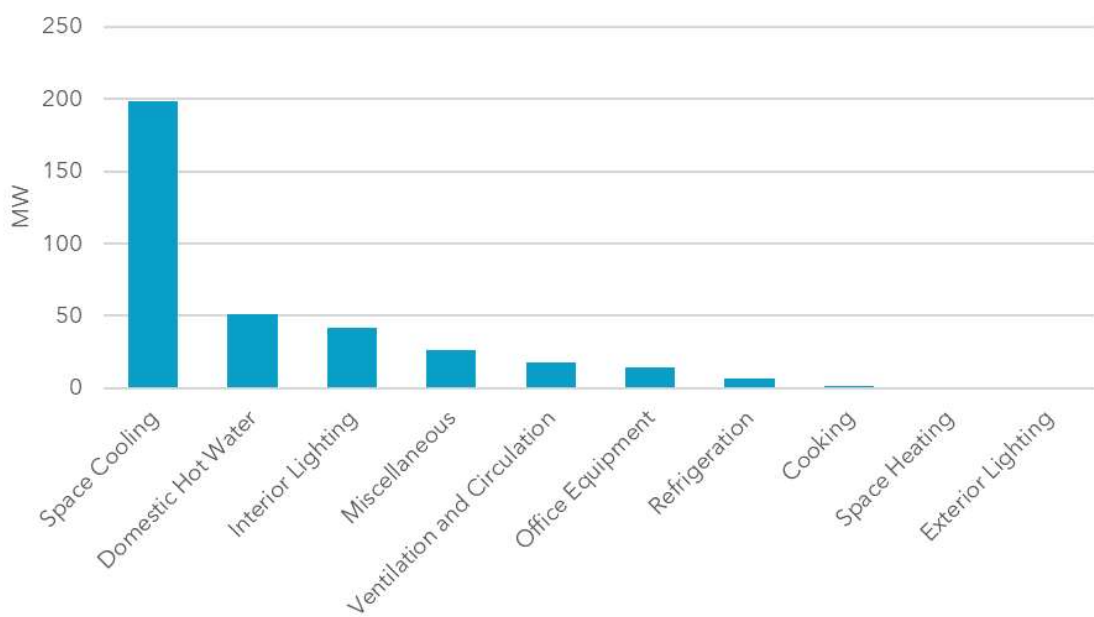


Figure 15: Commercial EE Technical Potential by End-Use (Winter Peak Savings)

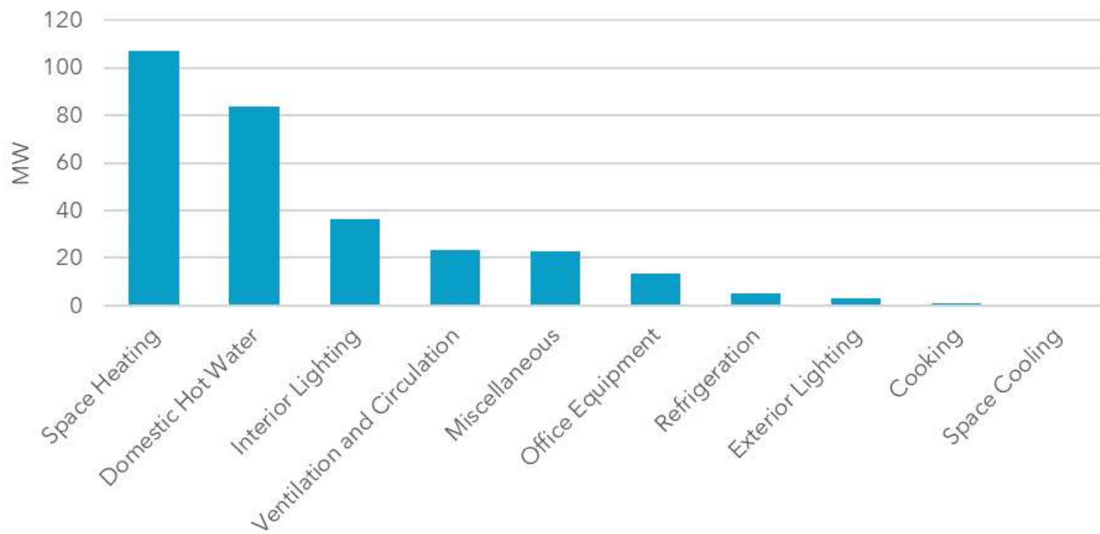
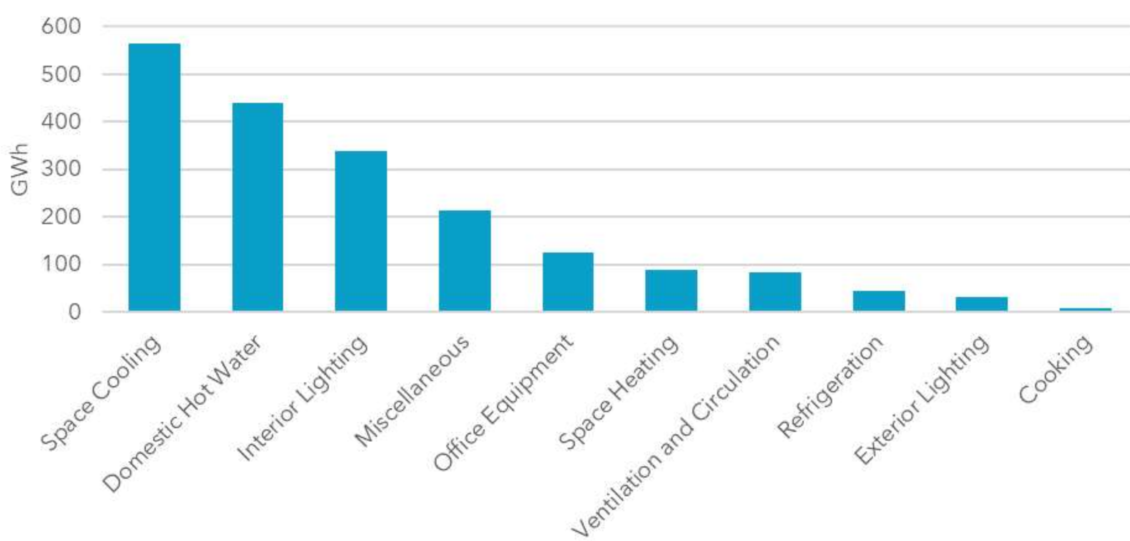



Figure 16: Commercial EE Technical Potential by End-Use (Energy Savings)




### 5.2.3.2 Industrial Segments

Figure 17, Figure 18, and Figure 19 summarize the industrial sector EE technical potential by end-use.

Figure 17: Industrial EE Technical Potential by End-Use (Summer Peak Savings)

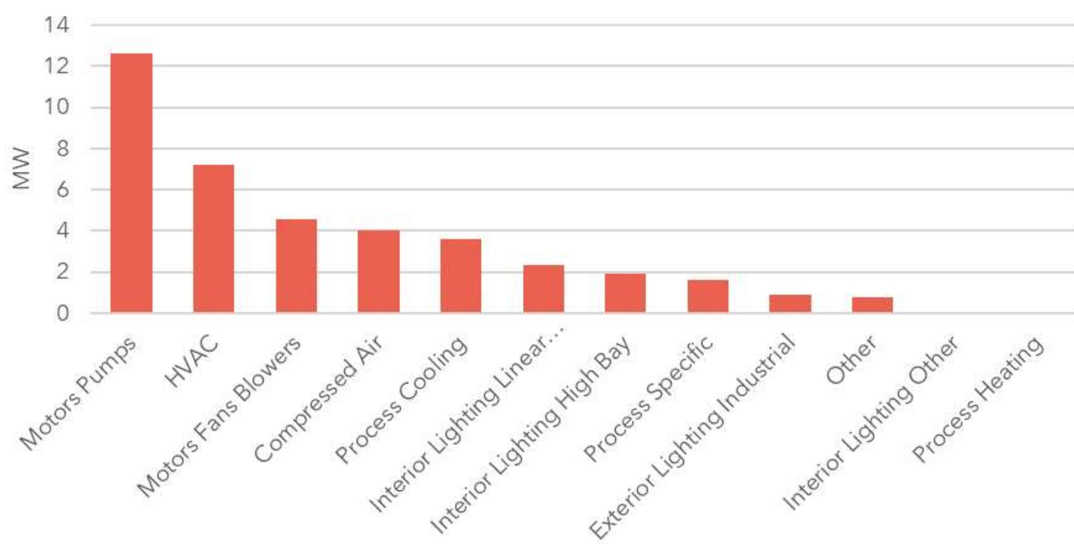



Figure 18: Industrial EE Technical Potential by End-Use (Winter Peak Savings)

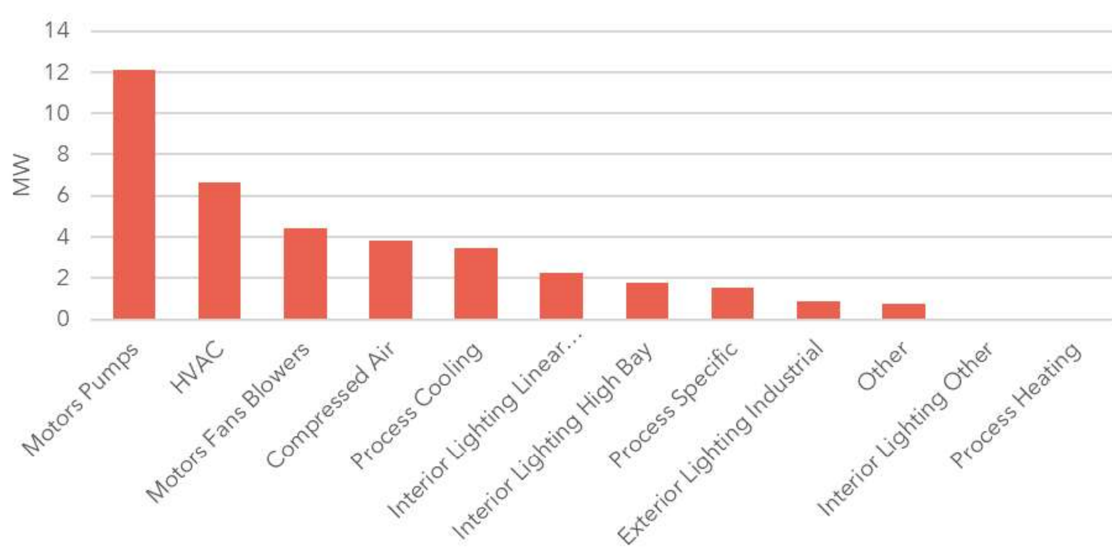
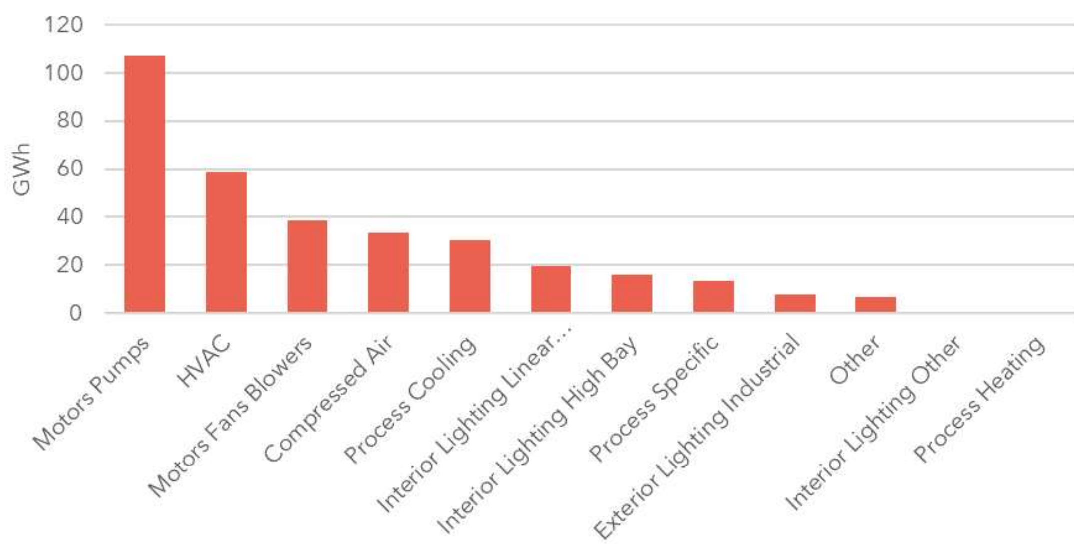


Figure 19: Industrial EE Technical Potential by End-Use (Energy Savings)




## 5.3 DR Technical Potential

Technical potential for DR is defined for each class of customers as follows:

- Residential & Small C&I customers – Technical potential is equal to the aggregate load for all end-uses that can participate in TECO's current programs plus DR measures not currently offered in which the utility uses specialized devices to control loads (i.e., direct load control programs). This includes cooling and heating loads for residential and small C&I customers and water heater and pool pump loads for residential customers. Not all demand reductions are delivered via direct load control of end-uses. The magnitude of demand reductions from non-direct load control such as time varying pricing, peak time rebates and targeted notifications is linked to cooling and heating loads.
- Large C&I customers – Technical potential is equal to the total amount of load for each customer segment (i.e., that customers reduce their total load to zero when called upon).

Table 10 summarizes the seasonal DR technical potential by sector:

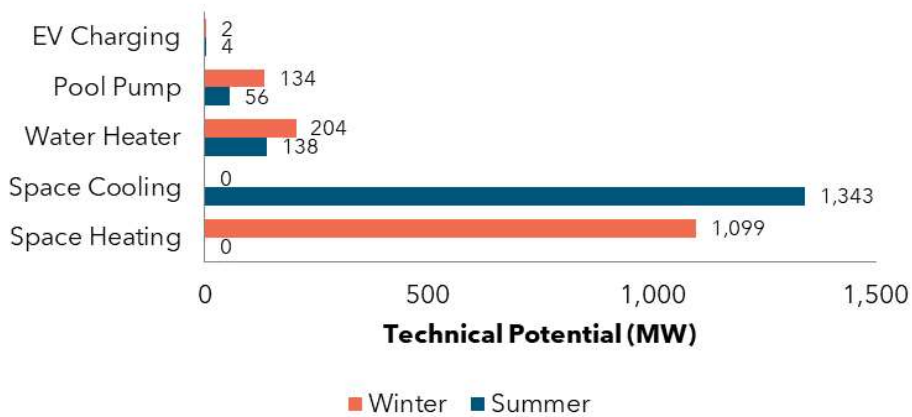
Table 10. DR Technical Potential

| | Savings Potential | |
|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) |
| **Residential** | 1,541 | 1,439 |
| **Non-Residential** | 1,571 | 1,691 |
| **Total** | 3,112 | 3,130 |

## 5.3.1 Residential

Residential technical potential is summarized in Figure 20.

Figure 20: Residential DR Technical Potential by End-Use

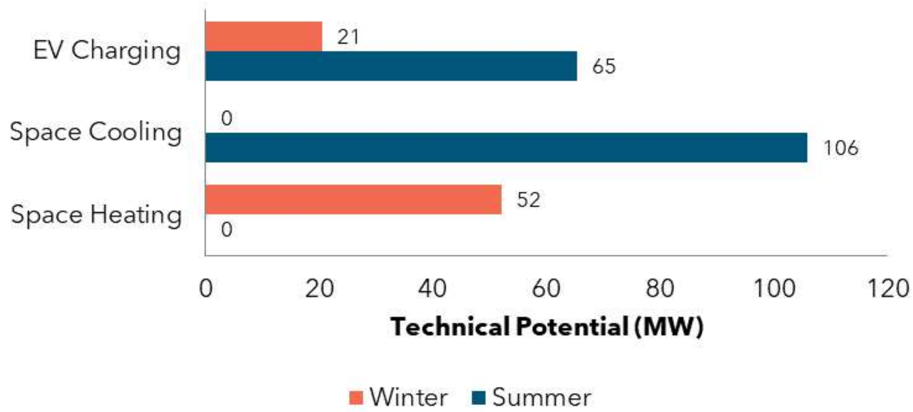



## 5.3.2 Non-Residential

### 5.3.2.1 Small C&I Customers

For small C&I technical potential, Resource Innovations looked at cooling and heating loads only. Small C&I technical potential is provided in Figure 21.

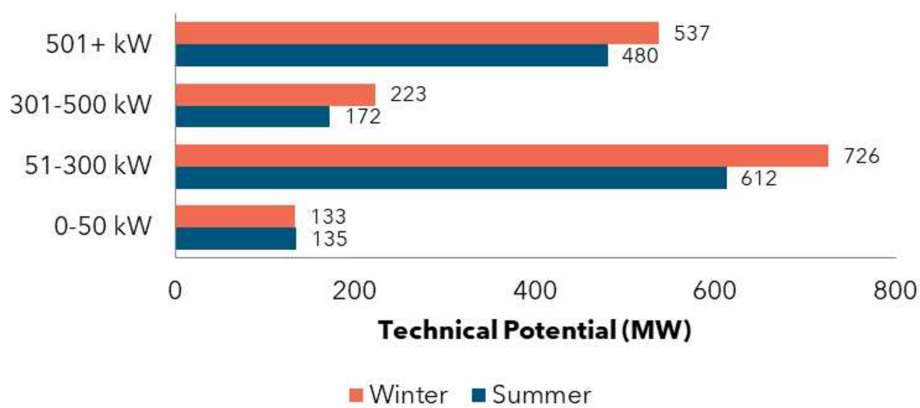
Figure 21: Small C&I DR Technical Potential by End-Use




#### 5.3.2.2 Large C&I Customers

Figure 22 provides the technical potential for large C&I customers, broken down by customer size.

Figure 22: Large C&I DR Technical Potential by Segment




## 5.4 DSRE Technical Potential

Table 11 provides the results of the DSRE technical potential for each customer segment:

Table 11. DSRE Technical Potential[7]

| | Savings Potential | | |
|---|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) | Energy (GWh) |
| PV Systems | | | |
| **Residential** | 484 | 51 | 8,000 |
| **Non-Residential** | 165 | 6 | 2,236 |
| **Total** | 649 | 57 | 10,236 |
| Battery Storage charged from PV Systems | | | |
| **Residential** | 598 | 876 | 0 |
| **Non-Residential** | 120 | 205 | 0 |
| **Total** | 718 | 1081 | 0 |
| CHP Systems | | | |
| **Total** | 358 | 286 | 1,768 |

[7] PV systems and CHP systems were independently analyzed for technical potential without consideration of the competition between technologies or customer preference for DSRE system.

# Appendix A EE Measure List

For information on how Resource Innovations developed this list, please see Section 4.

Table 12: Residential EE Measures

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| 120v Heat Pump Water Heater 50 Gallons | Residential Domestic Hot Water | 120v Heat Pump Water Heater 50 Gallons | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Air Sealing-Infiltration Control | Residential Space Cooling, Residential Space Heating | Standard Heating and Cooling System with Improved Infiltration Control | Standard Heating and Cooling System with Standard Infiltration Control |
| Air-to-Water Heat Pump | Residential Space Cooling, Residential Space Heating | Energy Star Air-to-Water Heat Pump, 25 SEER, 13 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - 15 SEER/14.3 SEER2 from base electric resistance | Residential Space Cooling, Residential Space Heating | ASHP 15 SEER from base electric resistance | Base AC, 15 SEER, Electric resistance heating |
| ASHP - 24 SEER/22.9 SEER2 (from elec resistance) | Residential Space Cooling, Residential Space Heating | ASHP: 24/22.9 SEER/SEER2, 10.5 HSPF | Base AC, 15 SEER, Electric resistance heating |
| ASHP - 24 SEER/22.9 SEER2, 10.5 HSPF | Residential Space Cooling, Residential Space Heating | ASHP: 24/22.9 SEER/SEER2, 10.5 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - CEE Advanced Tier: 17.8 SEER/17 SEER2; 10.0 HSPF | Residential Space Cooling, Residential Space Heating | CEE Advanced Tier ASHP:17.8/17 SEER/SEER2; 10.0 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - CEE Advanced Tier: 17.8 SEER/17 SEER2; 10.0 HSPF (from elec resistance) | Residential Space Cooling, Residential Space Heating | CEE Advanced Tier ASHP:17.8/17 SEER/SEER2; 10.0 HSPF | Base AC, 15 SEER, Electric resistance heating |
| ASHP - CEE Tier 2: 16.8 SEER/16 SEER2; 9.0 HSPF | Residential Space Cooling, Residential Space Heating | CEE Tier 2 ASHP: 16.8/16 SEER/SEER2; 9.0 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - CEE Tier 2: 16.8 SEER/16 SEER2; 9.0 HSPF (from elec resistance) | Residential Space Cooling, Residential Space Heating | CEE Tier 2 ASHP: 16.8/16 SEER/SEER2; 9.0 HSPF | Base AC, 15 SEER, Electric resistance heating |

| Measure | End-Use | Description | Baseline |
| --- | --- | --- | --- |
| ASHP - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 (from elect resistance) | Residential Space Cooling, Residential Space Heating | ENERGY STAR/CEE Tier 1 ASHP: 16/15.2 SEER/SEER2, 9.0 HSPF | Base AC, 15 SEER, Electric resistance heating |
| ASHP - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2, 9.0 HSPF | Residential Space Cooling, Residential Space Heating | ENERGY STAR/CEE Tier 1 ASHP: 16/15.2 SEER/SEER2, 9.0 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| Basement or Crawlspace Wall Insulation R-15 | Residential Space Cooling, Residential Space Heating | Increased Basement or Crawlspace Wall Insulation (R-15) | Code-Compliant Exterior Below-Grade Wall Insulation (R-10) |
| Bathroom Faucet Aerators | Residential Domestic Hot Water | Low-Flow Faucet Aerator with Flow Rate of 1.5 gpm | Faucet Aerator with Federal Standard Flow Rate of 2.2 gpm |
| CEE Advanced Tier Clothes Dryer | Clothes Dryers | CEE Advanced Tier Clothes Dryer | One Clothes Dryer meeting Federal Standard |
| CEE Advanced Tier Clothes Washer | Clothes Washers | Tier 3 CEE Clothes washer | One Clothes Washer meeting Federal Standard |
| CEE Tier 3 Refrigerator | Refrigerators | Residential Tier 3 Refrigerator | One Refrigerator meeting Federal Standard |
| Ceiling Insulation (R11 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-1985) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R11 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-1985) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R19 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-2020) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R19 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-2020) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R2 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, older (pre-1982) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R2 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, older (pre-1982) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R30 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1986-2020) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R30 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1986-2020) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Ceiling Insulation (R38 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1986-2020) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Central AC - CEE Tier 2: 16.8 SEER/16 SEER2 | Residential Space Cooling | Central AC - CEE Tier 2: 16.8 SEER/16 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC - 24 SEER/22.9 SEER2 | Residential Space Cooling | Central AC - 24 SEER/22.9 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC - CEE Advanced Tier: 17.8 SEER/17 SEER2 | Residential Space Cooling | Central AC - CEE Advanced Tier: 17.8 SEER/17 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 | Residential Space Cooling | Central AC - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC Tune Up | Residential Space Cooling | System tune-up, including coil cleaning, refrigerant charging, and other diagnostics | Existing Typical Central AC without Regular Maintenance/tune-up |
| Dehumidifier Recycling | Plug Load | No dehumidifier | One Dehumidifier meeting Federal Standard |
| Drain Water Heat Recovery | Residential Domestic Hot Water | 50 Gallon Electric Resistance Heater and Drain Water Heat Exchanger | 50 Gallon Electric Resistance Heater, No Drain Water Heat Recovery |
| Duct Insulation | Residential Space Cooling, Residential Space Heating | Standard Electric Heating and Central AC with Insulated Ductwork | Standard Electric Heating and Central AC with Uninsulated Ductwork |
| Duct Repair | Residential Space Cooling, Residential Space Heating | Duct Repair to eliminate/minimize leaks, includes testing and sealing | Standard Electric Heating and Central AC with typical duct leakage |
| ECM Circulator Pump | Residential Miscellaneous | Install ECM Circulator Pump | Install Standard Circulator Pump |
| Energy Star Air Purifier | Plug Load | One Air Purifier meeting ENERGY STAR 2.0 Standards | One Standard Conventional Air Purifier |
| Energy Star Audio-Video Equipment | Plug Load | One DVD/Blu-Ray Player meeting current ENERGY STAR Standards | One Market Average DVD/Blu-Ray Player |
| Energy Star Bathroom Ventilating Fan | Residential Ventilation and Circulation | Bathroom Exhaust Fan meeting current ENERGY STAR Standards | Bathroom Exhaust Fan meeting Federal Standard |
| Energy Star Ceiling Fan | Residential Miscellaneous | 60" Ceiling Fan Meeting ENERGY STAR 3.1 Standards | Standard 60" Ceiling Fan |
| Energy Star Clothes Dryer | Clothes Dryers | One Electric Resistance Clothes Dryer meeting ENERGY STAR 1.1 Standards | One Clothes Dryer meeting Federal Standard |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Energy Star Clothes Washer | Clothes Washers | One Clothes Washer meeting ENERGY STAR 8.1 Standards | One Clothes Washer meeting Federal Standard |
| Energy Star Dehumidifier | Plug Load | One Dehumidifier meeting ENERGY STAR 5.0 Standards | One Dehumidifier meeting Federal Standard |
| Energy Star Dishwasher | Dishwashers | One Dishwasher meeting ENERGY STAR 7.0 Requirements (effective on July 19, 2023), electric water heating | One Dishwasher meeting Federal Standard |
| Energy Star Dishwasher (Gas Water Heating) | Dishwashers | One Dishwasher meeting ENERGY STAR 7.0 Requirements, gas water heating | One Dishwasher meeting Federal Standard; gas water heating |
| Energy Star Door | Residential Space Cooling, Residential Space Heating | 100ft2 of Opaque Door meeting Energy Star Version 6.0 Requirements (U-Value: 0.17) | 100ft2 of Opaque Door meeting current FL Code Requirements |
| ENERGY STAR EV supply equipment (level 2 charger) | Residential Miscellaneous | Level 2 Electric Vehicle Supply Equipment (EVSE) | Level 1 Electric Vehicle Supply Equipment (EVSE) |
| Energy Star Freezer | Freezers | One Freezer meeting current ENERGY STAR 5.1 Standards | One Freezer meeting Federal Standard |
| Energy Star Ground Source Heat Pump | Residential Space Cooling, Residential Space Heating | Energy Star GSHP, 17.1 SEER, 12 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF |
| Energy Star Imaging Equipment | Plug Load | One imaging device meeting current ENERGY STAR Standards | One non-ENERGY STAR imaging device |
| Energy Star Monitor | Plug Load | One Monitor meeting ENERGY STAR 8.0 Standards | One Standard Monitor |
| Energy Star Personal Computer | Plug Load | One Personal Computer meeting ENERGY STAR 8.0 Standards | One Personal Computer meeting ENERGY STARÂ® 3.0 Standards |
| Energy Star Refrigerator | Refrigerators | One Refrigerator/Freezer meeting ENERGY STAR 5.1 Standards | One Refrigerator/Freezer meeting Federal Standard |
| Energy Star Room AC | Residential Space Cooling | Room AC meeting current ENERGY STAR standards | Code-Compliant Room AC |
| Energy Star Set-Top Receiver | Plug Load | One Set-top Box meeting ENERGY STAR 4.1 Standards | One Market Average Set-top Box |
| Energy Star TV | Plug Load | One Television meeting ENERGY STAR 9.0 Standards | One non-ENERGY STAR Television |
| Energy Star Windows | Residential Space Cooling, Residential Space Heating | 100ft2 of Window meeting Energy Star Version 6.0 Requirements (U-Value: 0.27, SHGC: 0.21) | 100ft2 of Window current FL energy code requirements |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Exterior Wall Insulation | Residential Space Cooling, Residential Space Heating | Increased Exterior Above-Grade Wall Insulation (R-13) | Market Average Existing Exterior Above-Grade Wall Insulation |
| Filter Whistle | Residential Ventilation and Circulation | Install the Furnace Filter Alarm | No Furnace Filter Alarm on a Central Forced-Air Furnace |
| Floor Insulation | Residential Space Heating | Increased Floor Insulation (R-30) | Code-Compliant Floor Insulation |
| Freezer Recycling | Freezers | No Freezer | Current Market Freezer |
| Green Roof | Residential Space Cooling | Vegetated Roof Surface on top of Standard Roof | Standard Black Roof |
| Heat Pump Clothes Dryer | Clothes Dryers | One Heat Pump Clothes Dryer | One Clothes Dryer meeting Federal Standard |
| Heat Pump Pool Heater | Residential Miscellaneous | Heat Pump Swimming Pool Heater | Electric Resistance Swimming Pool Heater |
| Heat Pump Tune Up | Residential Space Cooling, Residential Space Heating | System tune-up, including coil cleaning, refrigerant charging, and other diagnostics | Standard Heating and Cooling System without Regular Maintenance/tune-up |
| Heat Pump Water Heater 50 Gallons-CEE Advanced Tier | Residential Domestic Hot Water | CEE Advanced Tier Heat Pump Water Heater 50 Gallons | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Heat Pump Water Heater 50 Gallons-ENERGY STAR | Residential Domestic Hot Water | Heat Pump Water Heater 50 Gallons | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Heat Pump Water Heater 80 Gallons-ENERGY STAR | Residential Domestic Hot Water | Energy Star Heat Pump Water Heater 80 Gallons | Code-Compliant 80 Gallon Electric Resistance Water Heater |
| Heat Trap | Residential Domestic Hot Water | Heat Trap | Existing Water Heater without heat trap |
| High Efficiency Convection Oven | Residential Cooking | One Full-Size Convection Oven meeting ENERGY STAR 3.0 Standards | One Standard Economy-Grade Full-Size Oven |
| High Efficiency Induction Cooktop | Residential Cooking | One residential induction cooktop | One standard residential electric cooktop |
| Home Energy Management System | Lighting, Plug Load, Residential Space Cooling, Residential Space Heating | Typical HVAC by Building Type Controlled by Energy Management System | Typical HVAC by Building Type, Manually Controlled |
| Hot Water Pipe Insulation | Residential Domestic Hot Water | 1' of Insulated Pipe in Unconditioned Spaces, Insulation of R-5 | 1' of Pipe in Unconditioned Spaces with Code Minimum of 1"of Insulation |
| HVAC ECM Motor | Residential Ventilation and Circulation | A brushless permanent magnet (ECM) blower motor for electric furnace | Permanent Split Capacitor Motor for Electric Furnace |
| HVAC Economizer | Residential Space Cooling | Install residential economizer | No economizer |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| HVAC Zoning System | Residential Space Cooling, Residential Space Heating | Install dampers in the ducts, dividing home into multiple zones, each controlled by its own thermostat | Single zone HVAC system |
| Indoor Daylight Sensor | Lighting | Install Indoor Daylight Sensors, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Induction Range | Residential Cooking | Residential induction range | Electric range |
| Instantaneous Hot Water System | Residential Domestic Hot Water | Instantaneous Hot Water System | Standard Efficiency Storage Tank Water Heater |
| Kitchen Faucet Aerators | Residential Domestic Hot Water | Low-Flow Faucet Aerator with Flow Rate of 1.5 gpm | Faucet Aerator with Federal Standard Flow Rate of 2.2 gpm |
| LED - 9W_CFL Baseline | Lighting | LED (assume 9W) replacing CFL baseline lamp | 14W CFL (60W equivalent) |
| LED - 9W_Halogen Baseline | Lighting | LED (assume 9W) replacing EISA-2020 compliant baseline lamp | EISA-2020 compliant baseline lamp (60W equivalent) |
| LED Specialty Lamps-5W Chandelier | Lighting | 5 W Chandelier LED | Standard incandescent chandelier lamp |
| Linear LED | Lighting | Linear LED Lamps in Linear Fluorescent Fixture | Standard (32w) T8 lamps in Linear Fluorescent Fixture |
| Low Flow Showerhead | Residential Domestic Hot Water | Low-Flow Handheld Showerhead, Flow Rate: 1.60 gpm | Standard Handheld Showerhead, Flow Rate: 2.50 gpm |
| New Construction - Whole Home Improvements - Tier 1 | Whole Home | Performance-based improvements in new homes - 20% savings | Residential New Construction (Baseline Efficiency) |
| New Construction - Whole Home Improvements - Tier 2 | Whole Home | Performance-based improvements in new homes - 35% savings | Residential New Construction (Baseline Efficiency) |
| Occupancy Sensors Switch Mounted | Lighting | Switch Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor Lighting Timer | Lighting | Timer on Outdoor Lighting, Controlling 120 Watts | 120 Watts of Lighting, Manually Controlled |
| Outdoor Motion Sensor | Lighting | Motion Sensor on Outdoor Lighting, Controlling 120 Watts | 120 Watts of Lighting, Manually Controlled |
| Ozone Laundry | Clothes Washers | Add a New, Single-Unit Ozone Laundry System to the Clothes Washer | One Clothes Washer meeting Federal Standard |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Programmable Thermostat | Residential Space Cooling, Residential Space Heating | Standard Heating and Cooling System with Programmable Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Properly Sized CAC | Residential Space Cooling | Properly Sized Central Air Conditioning | Standard Central Air Conditioning, Oversized |
| Radiant Barrier | Residential Space Cooling | Radiant Barrier | No radiant barrier |
| Reflective Roof | Residential Space Cooling | Reflective Roof Treatment | Standard dark shingle |
| Refrigerator Coil Cleaning | Refrigerators | Refrigerator Coil Cleaning | |
| Refrigerator Recycling | Refrigerators | No Refrigerator | Current Market Average Refrigerator |
| Residential Whole House Fan | Residential Space Cooling | Standard Central Air Conditioning with Whole House Fan | Standard Central Air Conditioning, No Whole House Fan |
| Sealed crawlspace | Residential Space Cooling, Residential Space Heating | Encapsulated and semi-conditioned crawlspace | Naturally vented, unconditioned crawlspace |
| Smart Breaker | Whole Home | Smart Breaker | standard electric breakers |
| Smart Panel | Whole Home | Multi-channel device that attaches to customer's circuit breaker to enable monitoring and control of major end-use appliances by customer | standard electric panel |
| Smart Power Strip | Plug Load | Smart plug strips for entertainment centers and home office | Standard entertainment center or home office usage, no smart strip controls |
| Smart Thermostat | Residential Space Cooling, Residential Space Heating | Standard Heating and Cooling System with Smart Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Solar Attic Fan | Residential Space Cooling | Standard Central Air Conditioning with Solar Attic Fan | Standard Central Air Conditioning, No Solar Attic Fan |
| Solar Pool Heater | Residential Miscellaneous | Solar Swimming Pool Heater | Electric Resistance Swimming Pool Heater |
| Solar Powered Pool Pumps | Residential Miscellaneous | Solar Powered Pool Pump | Variable Speed Pool Pump Motor |
| Solar Thermal Water Heating System | Residential Domestic Hot Water | Solar Thermal System with Electric Backup | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Spray Foam Insulation(Base R11) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in existing (1982-1985) homes | Existing ceiling insulation based on building code at time of construction |
| Spray Foam Insulation(Base R19) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in existing (1982-1985) homes | Existing ceiling insulation based on building code at time of construction |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Spray Foam Insulation(Base R2) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in older (pre-1982) homes | Existing ceiling insulation based on building code at time of construction |
| Spray Foam Insulation(Base R30) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in existing (1986-2020) homes | Existing ceiling insulation based on building code at time of construction |
| Thermostatic Shower Restriction Valve | Residential Domestic Hot Water | 50 Gallon Electric Resistance Heater and Thermostatic Shower Valves | 50 Gallon Electric Resistance Heater and Standard Shower Valves |
| Variable Refrigerant Flow (VRF) HVAC Systems | Residential Space Cooling, Residential Space Heating | Variable Refrigerant Flow (VRF) HVAC Systems | Code-Compliant ASHP, 15 SEER, 8.8 HSPF |
| Water Heater Blanket | Residential Domestic Hot Water | 50 Gallon Electric Resistance Water Heater with Insulated Tank Wrap | Code-Compliant 50 Gallon Electric Resistance Water Heater, No Tank Wrap |
| Water Heater Thermostat Setback | Residential Domestic Hot Water | 50 Gallon Electric Resistance Water Heater with Temperature Setpoint of 119°F | Code-Compliant 50 Gallon Electric Resistance Water Heater (Temp. Setpoint = 130Â°F) |
| Water Heater Timeclock | Residential Domestic Hot Water | Water Heater Timeclock | Existing Water Heater without time clock |
| Weather stripping | Residential Space Cooling, Residential Space Heating | Specific quantity of weather stripping to seal | |
| Window Caulking | Residential Space Cooling, Residential Space Heating | Window caulking | |
| Window Sun Protection | Residential Space Cooling | Window Film Applied to Standard Window | Standard Window with below Code Required Minimum SHGC |

**Table 13: Commercial EE Measures**

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| 1.5HP Open Drip-Proof (ODP) Motor | Ventilation and Circulation | High Efficiency 1.5 HP Open-Drip Proof Motor | 1.5HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 10HP Open Drip-Proof (ODP) Motor | Ventilation and Circulation | High Efficiency 10 HP Open-Drip Proof Motor | 10HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 20HP Open Drip-Proof (ODP) Motor | Ventilation and Circulation | High Efficiency 20 HP Open-Drip Proof Motor | 20HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Advanced Rooftop Controller | Ventilation and Circulation | Advanced Rooftop Controller | Without Advanced Rooftop Controller |
| Air Compressor Optimization | Miscellaneous | Performing Routine Maintenance on 20HP Inlet Modulation Fixed-Speed Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| Air Curtains | Space Cooling, Space Heating | Air Curtain across door opening | Door opening with no air curtain |
| Airside Economizer | Space Cooling | Airside Economizer | No economizer |
| Anti-Sweat Controls | Refrigeration | One Medium Temperature Reach-In Case with Anti-Sweat Heater Controls | One Medium Temperature Reach-In Case without Anti-Sweat Heater Controls |
| Auto Off Time Switch | Interior Lighting | Auto-Off Time Switch on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Automatic Door Closer for Walk-in Coolers and Freezers | Refrigeration | One Medium Temperature Walk-In Refrigerator Door with Auto-Closer | One Medium Temperature Walk-In Refrigerator Door without Auto-Closer |
| Beverage Vending Machine Controls | Refrigeration | One non-ENERGY STAR beverage vending machine equipped with infrared occupancy sensing controls | One non-ENERGY STAR beverage vending machine, no controls |
| Bi-Level Lighting Control (Exterior) | Exterior Lighting | Bi-Level Controls on Exterior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Bi-Level Lighting Control (Interior) | Interior Lighting | Bi-Level Controls on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Ceiling Insulation(R19 to R38) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation(R19 to R49) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic - Beyond Code | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation(R2 to R38) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation(R2 to R49) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic - Beyond Code | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Chilled Water Reset | Space Cooling | One Chiller with Reset of Chilled Water Temperature Setpoint | One Chiller with Fixed Chilled Water Temperature |
| Chiller maintenance | Space Cooling | O&M improvements to restore chiller performance | |
| CO Sensors for Parking Garage Exhaust | Miscellaneous | Enclosed Parking Garage Exhaust with CO Control | Constant Volume Enclosed Parking Garage Exhaust |
| Commercial Duct Sealing | Space Cooling, Space Heating | Standard Electric Heating and Central AC with Improved Duct Sealing | Standard Electric Heating and Central AC, Standard Duct Sealing |
| Commercial Strategic Energy Management | Whole Building | Commercial Strategic Energy Management | No active energy management |
| Custom measure - Non-lighting | Space Cooling, Space Heating | Custom Improvement to Facility's Operations | Baseline Technology/Process |
| Data Center Hot Cold Aisle | Office Equipment | Equipment configuration that saves HVAC | No hot, cold aisle containment |
| Dedicated Outside Air System (DOAS) | Space Cooling, Space Heating | Install Dedicated Outside Air System (DOAS) | Typical HVAC by Building Type |
| Demand Controlled Circulating Systems | Domestic Hot Water | Recirculation Pump with Demand Control Mechanism | Uncontrolled Recirculation Pump |
| Demand Controlled Ventilation | Ventilation and Circulation | Return Air System with CO2 Sensors | Standard Return Air System, No Sensors |
| Demand Defrost | Refrigeration | Walk-In Freezer System with Demand-Controlled Electric Defrost Cycle | Walk-In Freezer System with Timer-Controlled Electric Defrost Cycle |
| Destratification Fans | Space Heating | Destratification Fans improve temperature distribution by circulating warmer air from the ceiling back down to the floor level | No destratification fan |
| Door Gasket (Cooler) | Refrigeration | New Door Gasket on One-Door Medium Temperature Reach-In Case | Worn or Damaged Door Gasket on One-Door Medium Temperature Reach-In Case |
| Door Gasket (Freezer) | Refrigeration | New Door Gasket on One-Door Medium Temperature Reach-In Case | Worn or Damaged Door Gasket on One-Door Medium Temperature Reach-In Case |
| Drain water heat recovery | Domestic Hot Water | Hot Water Loop with 50 Gallon Electric Resistance Heater and Drain Water Heat Exchanger | Standard Hot Water Loop with 50 Gallon Electric Resistance Heater, No Drain Water Heat Recovery |
| Dual Enthalpy Economizer | Ventilation and Circulation | Standard HVAC Unit with an economizer and dual enthalpy differential control | HVAC unit with no economizer or with a non-functional disabled economizer |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Duct Insulation | Space Cooling, Space Heating | Standard Electric Heating and Central AC with Insulated Ductwork (R-8) | Standard Electric Heating and Central AC with Uninsulated Ductwork (R-4) |
| Ductless Mini-Split AC | Space Cooling | Ductless Mini-Split AC, 4 Ton, 16 SEER | Code-Compliant AC Unit, 4 Ton, 15 SEER |
| Ductless Mini-Split HP | Space Cooling, Space Heating | Ductless Mini-Split HP, 17 SEER, 9.5 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF |
| DX Coil Cleaning | Space Cooling | DX Coil Cleaning | DX Coil Not Cleaned |
| ECM Motors on Furnaces | Space Heating | Variable Speed Electronically Commutated Motor for an Electric Furnace | Permanent Split Capacitor Motor for Electric Furnace |
| Efficient Battery Charger | Miscellaneous | Efficient Battery Charger | FR or SCR charging stations with power conversion efficiency < 89% or > 10 W |
| Efficient Exhaust Hood | Cooking | Kitchen ventilation with automatically adjusting fan controls | Kitchen ventilation with constant speed ventilation motor |
| Efficient Motor Belts | Miscellaneous | Synchronous belt, 98% efficiency | Standard V-belt drive |
| Efficient New Construction Lighting | Interior Lighting | Efficient New Construction Lighting, 15% Better than Code | New Construction with Lighting Power Density meeting Code Minimum |
| Energy Recovery Ventilation System (ERV) | Space Cooling | Unitary Cooling Equipment that Incorporates Energy Recovery | Current Market Packaged or Split DX Unit |
| Energy Star Combination Oven | Cooking | Energy Star Combination Oven meeting ENERGY STAR Version 3.0 Standards | One Standard Economy-Grade 10-Pan Combination Oven |
| Energy Star Commercial Clothes Washer | Miscellaneous | One Commercial Clothes Washer meeting current ENERGY STAR Version 8.1 Standards | One Commercial Clothes Washer meeting Federal Standard |
| Energy Star Commercial Dishwasher | Domestic Hot Water | One Commercial Dishwasher meeting ENERGY STAR Version 3.0 Standards | One Dishwasher meeting Federal Standard |
| Energy Star Commercial Glass Door Freezer | Refrigeration | One Glass Door Freezer meeting ENERGY STAR Version 5.0 Standards | One Glass Door Freezer meeting Federal Standards |
| Energy Star Commercial Glass Door Refrigerator | Refrigeration | One Glass Door Refrigerator meeting ENERGY STAR Version 5.0 Standards | One Glass Door Refrigerator meeting Federal Standards |
| Energy Star Commercial Solid Door Freezer | Refrigeration | One Solid Door Freezer meeting ENERGY STAR Version 5.0 Standards | One Solid Door Freezer meeting Federal Standards |
| Energy Star Commercial Solid Door Refrigerator | Refrigeration | One Solid Door Refrigerator meeting ENERGY STAR Version 5.0 Standards | One Solid Door Refrigerator meeting Federal Standards |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Energy Star convection oven | Cooking | Energy Star convection oven meeting ENERGY STAR Version 3.0 Standards | One Standard Economy-Grade Full-Size Convection Oven |
| Energy Star EV Chargers | Miscellaneous | Level 2 Electric Vehicle Supply Equipment (EVSE) | Level 1 Electric Vehicle Supply Equipment (EVSE) |
| Energy Star Fryer | Cooking | One Standard Vat Electric Fryer meeting ENERGY STAR Version 3.0 Standards | One Standard Economy-Grade Standard Vat Electric Fryer |
| Energy Star Griddle | Cooking | One Griddle meeting current ENERGY STAR Version 1.2 Standards | One Conventional Griddle |
| Energy Star Hot Food Holding Cabinet | Cooking | One Hot Food Holding Cabinet meeting current ENERGY STAR Version 2.0 Standards | One Standard Hot Food Holding Cabinet |
| Energy Star Ice Maker | Refrigeration | One Continuous Self-Contained Ice Maker meeting ENERGY STAR Version 3.0 Standards | One Continuous Self-Contained Ice Maker meeting Federal Standard |
| ENERGY STAR Imaging Equipment | Office Equipment | One imaging device meeting current ENERGY STAR Standards | One non-ENERGY STAR imaging device |
| Energy Star LED Directional Lamp | Interior Lighting | Energy Star 7.6W Directional LED lamp | 50W Incandescent lamp |
| Energy Star Monitors | Office Equipment | One Monitor meeting ENERGY STAR 8.0 Standards | One Standard Monitor |
| Energy Star PCs | Office Equipment | One Personal Computer (desktop or laptop) meeting current ENERGY STARÂ® Standards | One non-ENERGY STARÂ® Personal Computer |
| Energy Star room AC | Space Cooling | Room AC meeting current ENERGY STAR standards | Code-Compliant Room AC, 1 Ton, 10.9 CEER |
| Energy Star Servers | Office Equipment | One Server meeting ENERGY STAR 2.0 Standards | One Standard Server |
| Energy Star Steamer | Cooking | One 4-Pan Electric Steamer meeting ENERGY STARÂ® 2.0 Standards | One Standard Economy-Grade 4-Pan Steamer |
| Energy Star Uninterruptable Power Supply | Office Equipment | Standard Desktop Plugged into Energy Star Uninterruptable Power Supply at 25% Load | Standard Desktop Plugged into Average Rotary Uninterruptable Power Supply at 25% Load |
| Energy Star Vending Machine | Refrigeration | One Refrigerated Vending Machine meeting ENERGY STAR Version 4.0 Standards | One Refrigerated Vending Machine meeting ENERGY STARÂ® 1.0 Standards |
| ENERGY STAR Water Cooler | Miscellaneous | One Storage Type Hot/Cold Water Cooler Unit meeting | One Standard Storage Type Hot/Cold Water Cooler Unit |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| | | ENERGY STAR Version 3.0 Standards | |
| Energy Star windows | Space Cooling, Space Heating | 100ft2 of Window meeting Energy Star Version 6.0 Requirements (U-Value: 0.27, SHGC: 0.21) | 100ft2 of Window meeting Energy Star Version 5.0 Requirements (U-Value: 0.3, SHGC: 0.3) |
| Engine Block Timer | Miscellaneous | Plug-in timer that activates engine block timer to reduce unnecessary run time | Engine block heater (typically used for backup generators) running continuously |
| Escalator Motor Efficiency Controller | Miscellaneous | Install Escalator Motor Efficiency Controller | Escalator without Motor Efficiency Controller |
| Facility Commissioning | Space Cooling, Space Heating, Ventilation and Circulation | Perform facility commissioning to optimize building operations in new facilities | Standard new construction facility with no commissioning |
| Facility Energy Management System | Space Cooling, Space Heating, Ventilation and Circulation | Typical HVAC by Building Type Controlled by Energy Management System | Standard/manual facility equipment controls |
| Faucet Aerator | Domestic Hot Water | Low-flow lavatory faucet aerator, flow rate: 1.0 gpm | Federal lavatory flow rate standard, 1994, flow rate: 2.2 gpm |
| Floating Head Pressure Controls | Refrigeration | Medium-Temperature Refrigeration System with 5HP Compressor and Adjustable Condenser Head Pressure Control Valve | Medium-Temperature Refrigeration System with 5 HP Compressor without Adjustable Condenser Head Pressure Control Valve |
| Floor Insulation | Space Cooling, Space Heating | Increased Floor Insulation (R-19) | Market Average Existing Floor Insulation |
| Geothermal Heat Pump | Space Cooling, Space Heating | Geothermal Heat Pump | Code-Compliant Air Source Heat Pump |
| Green roof | Space Cooling, Space Heating | Vegetated Roof Surface on top of Standard Roof | Standard Black Roof |
| HE Air Cooled Chiller - All Compressor Types - 100 Tons | Space Cooling | HE Air Cooled Chiller - Air Compressor Types - 100 Tons | Code-Compliant Air Cooled Positive Displacement Chiller, 100 Tons |
| HE DX 11.25-20.0 Tons Elec Heat | Space Cooling, Space Heating | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 11.25-20.0 Tons Other Heat | Space Cooling | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Elect Heat | Space Cooling, Space Heating | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| HE DX 5.4-11.25 Tons Other Heat | Space Cooling | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX Less than 5.4 Tons Elect Heat | Space Cooling, Space Heating | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE DX Less than 5.4 Tons Other Heat | Space Cooling | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE Water Cooled Chiller - Centrifugal Compressor - 200 Tons | Space Cooling | Water Cooled Centrifugal Chiller with Integral VFD, 200 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 200 Tons |
| HE Water Cooled Chiller - Centrifugal Compressor - 500 Tons | Space Cooling | Water Cooled Centrifugal Chiller with Integral VFD, 500 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 500 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 175 Tons | Space Cooling | Water Cooled Positive Displacement Chiller with Integral VFD, 175 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 175 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 50 Tons | Space Cooling | Water Cooled Positive Displacement Chiller with Integral VFD, 50 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 50 Tons |
| Heat Pump Pool Heater Commercial | Miscellaneous | High Efficiency Pool Heater Eff. >=84% | Standard Efficiency Pool Heater 78% Eff. |
| Heat Pump Water Heater | Domestic Hot Water | Efficient 50 Gallon Electric Heat Pump Water Heater | Code-Compliant 50 Gallon Electric Heat Pump Water Heater |
| High Efficiency Air Compressor | Miscellaneous | 20 HP VFD Air Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| High Efficiency Data Center Cooling | Space Cooling | High Efficiency CRAC (computer room air conditioner) | Standard Efficiency CRAC |
| High Efficiency PTAC | Space Cooling | High Efficiency PTAC | Code-Compliant PTAC |
| High Efficiency PTHP | Space Cooling, Space Heating | High Efficiency PTHP | Code-Compliant PTHP |
| High Efficiency Refrigeration Compressor_Discus | Refrigeration | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Efficiency Refrigeration Compressor_Scroll | Refrigeration | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Speed Fans | Ventilation and Circulation | High Speed Fan, 24" - 35" Blade Diameter | Standard Speed Fan, 24" - 35" Blade Diameter |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Hot water pipe insulation | Domestic Hot Water | 1' of Insulated Pipe in Unconditioned Spaces, Insulation of R-4 | 1' of Pipe in Unconditioned Spaces with Code Minimum of 1"of Insulation |
| Hotel Card Energy Control Systems | Space Cooling, Space Heating | Guest Room HVAC Unit Controlled by Hotel-Key-Card Activated Energy Control System | Guest Room HVAC Unit, Manually Controlled by Guest |
| Indoor daylight sensor | Interior Lighting | Install Indoor Daylight Sensors, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Induction Cooktops | Cooking | Efficient Induction Cooktop | One Standard Electric Cooktop |
| Infiltration Reduction - Air Sealing | Space Cooling, Space Heating | Reduced leakage through caulking, weather-stripping | Standard Heating and Cooling System with Moderate Infiltration |
| Instantaneous Hot Water System Commercial | Domestic Hot Water | Instantaneous Hot Water System | Code-Compliant Electric Storage Water Heater |
| LED - 14W_CFL Baseline | Interior Lighting | LED (assume 14W) replacing CFL | 100W equivalent CFL |
| LED - 9W Flood_CFL Baseline | Exterior Lighting | LED (assume 9W) replacing CFL | 14W CFL |
| LED Canopy Lighting (Exterior) | Exterior Lighting | One 67.2W LED Canopy Light | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED Display Lighting (Exterior) | Exterior Lighting | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED Display Lighting (Interior) | Interior Lighting | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED Exit Sign | Interior Lighting | One 5W Single-Sided LED Exit Sign | One 9W Single-Sided CFL Exit Sign |
| LED Exterior Wall Packs | Exterior Lighting | One 35W LED Wall Pack | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED High Bay_HID Baseline | Interior Lighting | One 140W High Bay LED Fixture | Lumen-Equivalent HID High Bay Fixture |
| LED High Bay_LF Baseline | Interior Lighting | One 140W High Bay LED Fixture | Lumen-Equivalent Linear Fluorescent High Bay Fixture |
| LED Linear - Fixture Replacement | Interior Lighting | 2x4 LED Troffer | Lumen-Equivalent 32-Watt T8 Lamp |
| LED Linear - Lamp Replacement | Interior Lighting | Linear LED (16W) | Lumen-Equivalent 32-Watt T8 Lamp |
| LED Parking Lighting | Exterior Lighting | One 160W LED Area Light | Average Lumen Equivalent Exterior HID Area Lighting |
| LEED New Construction Whole Building | Space Cooling, Space Heating | LEED New Construction Whole Building | Comparable facility, code-compliance construction |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Light Tube | Interior Lighting | One 14" Light Tube, Delivering light to 250 S.F. of Commercial Space | 250 S.F. of Commercial Space Lit by Typical Lighting Strategies |
| Low Flow Shower Head | Domestic Hot Water | Low-Flow Handheld Showerhead, Flow Rate: 1.50 gpm | Standard Handheld Showerhead, Flow Rate: 2.50 gpm |
| Low-Flow Pre-Rinse Sprayers | Domestic Hot Water | Low-Flow Pre-Rinse Sprayer with Flow Rate of 1.6 gpm | Pre-Rinse Sprayer with Federal Standard Flow Rate of 2.25 gpm |
| Network PC Power Management | Office Equipment | One computer and monitor attached to centralized energy management system that controls when desktop computers and monitors plugged into a n | One computer and monitor, manually controlled |
| Networked Lighting Controls | Interior Lighting | Install Networked Lighting Controls System on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Controlled either Manually or by Sensor as Specified by Code |
| Night Covers for Display Cases | Refrigeration | One Open Vertical Case with Night Covers | One Existing Open Vertical Case, No Night Covers |
| Occupancy Sensors, Ceiling Mounted | Interior Lighting | Ceiling Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Occupancy Sensors, Switch Mounted | Interior Lighting | Switch Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor Lighting Controls | Exterior Lighting | Install Exterior Photocell Dimming Controls, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor motion sensor | Exterior Lighting | Install Exterior Motion Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Ozone Laundry Commercial | Miscellaneous | Add a new ozone laundry system onto a commercial clothes washer | One commercial clothes washer without ozone laundry system |
| Programmable thermostat | Space Cooling, Space Heating | Pre-set programmable thermostat that replaces manual thermostat | Standard Heating and Cooling System with Manual Thermostat |
| PSC to ECM Evaporator Fan Motor (Reach-In) | Refrigeration | Medium Temperature Reach-In Case with equivalent size Electronically Commutated Evaporator Fan Motor | Medium Temperature Reach-In Case with Permanent Split Capacitor Evaporator Fan Motor |
| PSC to ECM Evaporator Fan Motor (Walk-In, Refrigerator) | Refrigeration | Medium Temperature Walk-In Case with Electronically Commutated Evaporator Fan Motor | Medium Temperature Walk-In Case with Permanent Split Capacitor Evaporator Fan Motor |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Q-Sync Evaporator Fan Motor | Refrigeration | Medium Temperature Reach-In Case with equivalent size Q-Sync Evaporator Fan Motor | Medium Temperature Reach-In Case with 20W Permanent Split Capacitor Fan Motor |
| Reflective Roof Treatment | Space Cooling | Reflective Roof Treatment | Standard Black Roof |
| Refrigerated Display Case LED Lighting | Refrigeration | 60" Refrigerated Case LED Strip | Lumen-Equivalent 32-Watt T8 Fixture |
| Refrigerated Display Case Lighting Controls | Refrigeration | Occupancy Sensors for Refrigerated Case Lighting to reduce run time | Market-Share Weighted Existing Linear Fluorescent Fixture |
| Refrigeration Commissioning | Refrigeration | Commissioned Refrigeration System | Non-Commissioned Refrigeration System |
| Refrigeration Economizer | Refrigeration | Walk-in refrigerator with economizer | Walk-in refrigerator without economizer |
| Regenerative Drive Elevator Motor | Miscellaneous | Regenerative drive produced energy when motor in overhaul condition | Standard motor |
| Retro-Commissioning (Existing Construction) | Space Cooling, Space Heating, Ventilation and Circulation | Perform facility retro-commissioning, including assessment, process improvements, and optimization of energy-consuming equipment and systems | |
| Roof Insulation | Space Cooling, Space Heating | Roof Insulation (built-up roof applicable to flat/low slope roofs) | Code-Compliant Flat Roof |
| Server Virtualization | Office Equipment | 2 Virtual Host Server | 20 Single Application Servers |
| Smart Strip Plug Outlet | Office Equipment | One Smart Strip Plug Outlet | One Standard plug strip/outlet |
| Smart thermostat | Space Cooling, Space Heating | Thermostats that include "smart" features such as occupancy sensors, geo-fencing, multi-zone sensors | Standard Heating and Cooling System with Manual Thermostat |
| Solar Pool Heater Commercial | Miscellaneous | Solar Swimming Pool Heater | Electric Resistance Swimming Pool Heater |
| Solar Powered Pool Pump | Miscellaneous | Solar Powered Pool Pump Motor | Variable Speed Pool Pump Motor |
| Solar Thermal Water Heating System Commercial | Domestic Hot Water | Solar Thermal System with Electric Backup | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Strip Curtains - Freezers | Refrigeration | Walk-in freezer with strip curtains at least 0.06 inches thick covering the entire area of the doorway | Walk-in freezer without strip curtains |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Strip Curtains - Refrigerators | Refrigeration | Walk-in cooler with strip curtains at least 0.06 inches thick covering the entire area of the doorway | Walk-in cooler without strip curtains |
| Suction Pipe Insulation - Freezers | Refrigeration | Suction Pipe Insulation - Freezers | Uninsulated freezer suction lines |
| Suction Pipe Insulation - Refrigerators | Refrigeration | Suction Pipe Insulation - Refrigerators | Uninsulated refrigeration suction lines |
| Thermal Energy Storage | Space Cooling | Deploy thermal energy storage technology (ice harvester, etc.) to shift load | Code compliant chiller |
| Thermostatic Shower Restriction Valve Commercial | Domestic Hot Water | Hot Water Loop with 50 Gallon Electric Resistance Heater and Pressure Balance Shower Valves | Standard Hot Water Loop with 50 Gallon Electric Resistance Heater and Standard Shower Valves |
| Time Clock Control | Interior Lighting | Time Clock Controlled Lighting, 500 Watts Controlled | 500 Watts of Lighting, Controlled either Manually or by Sensor as Specified by Code |
| Variable Refrigerant Flow (VRF) HVAC Systems | Space Cooling, Space Heating | Variable Refrigerant Flow (VRF) HVAC Systems | Code-Compliant PTHP |
| VAV System | Ventilation and Circulation | Variable Air Volume Distribution System | Constant Air Volume Distribution System |
| VFD on Cooling Tower Fans | Space Cooling | Cooling Tower Fans with VFD Control | Cooling Tower Fans without VFD Control |
| VFD on HVAC Pump | Space Cooling, Space Heating | VFD on HVAC Pump | 7.5 HP HVAC Pump Motor, no VFD Control |
| VSD Controlled Compressor | Refrigeration | Refrigeration System with VSD Control | Refrigeration System with Standard Slide-Valve Control System |
| Wall Insulation | Space Cooling, Space Heating | Increased Exterior Above-Grade Wall Insulation | Market Average Existing Exterior Above-Grade Wall Insulation |
| Warehouse Loading Dock Seals | Space Cooling, Space Heating | Seals to reduce infiltration losses at loading dock | Loading dock with no seals |
| Water Cooled Refrigeration Heat Recovery | Domestic Hot Water | The heat reclaim system transfers waste heat from refrigeration system to space heating or hot water | No heat recovery |
| Water Heater Setback | Domestic Hot Water | A 50 gallon electric hot water tank with a thermostat setting reduced to no lower than 120 degrees. | A 50 gallon electric hot water tank with a thermostat setting that is higher than 120 degrees, typically hot water tanks with settings of 130 degrees or higher. |
| Water source heat pump | Space Cooling, Space Heating | Water Source Heat Pump, 2.5 Tons, 17.4 EER, 4.4 COP | Code-Compliant ASHP |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Waterside Economizer | Space Cooling | Waterside Economizer | No economizer |
| Window shade film | Space Cooling | Window Film with SHGC of 0.35 Applied to Standard Window | Standard Window with below Code Required Minimum SHGC |
| Zero Energy Doors | Refrigeration | Install zero energy doors for a reach-in refrigerated cooler or freezer | Standard vertical reach-in refrigerated cooler or freezer with anti-sweat heaters on the glass surface of the doors |

**Table 14: Industrial EE Measures**

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| 1.5HP Open Drip-Proof (ODP) Motor | Motors Pumps | High Efficiency 1.5 HP Open-Drip Proof Motor | 1.5HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 10HP Open Drip-Proof (ODP) Motor | Motors Pumps | High Efficiency 10 HP Open-Drip Proof Motor | 10HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 20HP Open Drip-Proof (ODP) Motor | Motors Pumps | High Efficiency 20 HP Open-Drip Proof Motor | 20HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 3-phase High Frequency Battery Charger - 1 shift | Other | 3-phase High Frequency Battery Charger | Standard Charger |
| Advanced Rooftop Controller | HVAC | Advanced Rooftop Controller | Without Advanced Rooftop Controller |
| Air Compressor Optimization | Compressed Air | Performing Routine Maintenance on 20HP Inlet Modulation Fixed-Speed Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| Air curtains | HVAC | Air Curtain across door opening | Door opening with no air curtain |
| Airside economizer | HVAC | Airside Economizer | No economizer |
| Auto Closer on Refrigerator Door | Process Cooling | One Medium Temperature Walk-In Refrigerator Door with Auto-Closer | One Medium Temperature Walk-In Refrigerator Door without Auto-Closer |
| Auto Off Time Switch | Interior Lighting High Bay | Auto-Off Time Switch on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Bi-Level Lighting Control (Exterior) | Exterior Lighting Industrial | Install Exterior Bi-Level Lighting Control, 500 Watts Controlled | 500 Watts of Lighting, No Dim Setting |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Bi-Level Lighting Control (Interior) | Interior Lighting High Bay | Bi-Level Controls on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, No Dim Setting |
| Chilled Water Reset | HVAC | One Chiller with Reset of Chilled Water Temperature Setpoint | One Chiller with Fixed Chilled Water Temperature |
| Cogged Belt on 15hp ODP Motor | Motors Pumps | 15HP ODP Motor with Cogged Belts Installed on Supply and/or Return Air Fans | 15HP ODP Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Cogged Belt on 40hp ODP Motor | Motors Pumps | 40HP ODP Motor with Cogged Belts Installed on Supply and/or Return Air Fans | 40HP ODP Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Compressed Air Desiccant Dryer | Process Specific | heated regenerative desiccant dryer without dew point demand controls | heatless regenerative desiccant dryer without dew point demand controls |
| Compressed Air No-Loss Condensate Drains | Process Specific | Install no-loss condensate drains | Install standard condensate drains |
| Compressed Air Storage Tank | Compressed Air | 20 HP Inlet Modulation Fixed-Speed Compressor with Receiver Tank | 20 HP Inlet Modulation Fixed-Speed Compressor, No Receiver Tank |
| Custom Measure - Non-Lighting | HVAC | Custom Improvement to Facility's Operations | Baseline Technology/Process |
| Dairy Refrigeration Heat Recovery | Other | refrigeration equipment with refrigeration heat recovery tank installed | existing dairy farm with refrigeration equipment and a water heater unit without an RHR unit |
| Dedicated Outside Air System (DOAS) | HVAC | Install Dedicated Outside Air System (DOAS) | Typical HVAC by Building Type |
| Demand Controlled Ventilation | HVAC | Return Air System with CO2 Sensors | Standard Return Air System, No Sensors |
| Demand Defrost | Process Cooling | Walk-In Freezer System with Demand-Controlled Electric Defrost Cycle | Walk-In Freezer System with Timer-Controlled Electric Defrost Cycle |
| Dew Point Sensor Control for Dessicant CA Dryer | Compressed Air | 1000 CFM Heated Desicant Air Dryer with Dew Point Controls | 1000 CFM Modulating Heated Desicant Air Dryer |
| Drip Irrigation Nozzles | Other | Flow Control Nozzles | Standard Irrigation Nozzles |
| Dual Enthalpy Economizer | Process Cooling | Standard HVAC Unit with an economizer and dual enthalpy differential control | HVAC unit with no economizer or with a non-functional disabled economizer |
| DX Coil Cleaning | HVAC | DX Coil Cleaning | DX Coil Not Cleaned |
| Efficient Compressed Air Nozzles | Compressed Air | 1/4" Engineered Air Nozzle | 1/4" Open-End Air Nozzle |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Efficient New Construction Lighting | Interior Lighting High Bay | Efficient New Construction Lighting, 15% Better than Code | New Construction with Lighting Power Density meeting Code Minimum |
| Electric Actuators | Other | Electric Actuator | Pneumatic Actuator |
| Energy Efficient Laboratory Fume Hood | HVAC | Variable Air Volume High Performance Fume Hood | Constant Volume Conventional Bypass Fume Hood |
| Energy Efficient Transformers | Other | Energy Efficient Dry Type Transformer (CSL-3) | Standard Transformer (TP-1) |
| Energy Recovery Ventilation System | HVAC | Unitary Cooling Equipment that Incorporates Energy Recovery | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11.2 EER |
| Energy Star LED Directional Lamp | Interior Lighting Other | Energy Star 7.6W Directional LED lamp | 50W Incandescent lamp |
| Energy Star room ac | HVAC | Room AC meeting current ENERGY STAR standards | Code-Compliant Room AC |
| Energy Star windows | HVAC | 100ft2 of Window meeting Energy Star Version 6.0 Requirements (U-Value: 0.27, SHGC: 0.21) | 100ft2 of Window meeting Energy Star Version 5.0 Requirements (U-Value: 0.3, SHGC: 0.3) |
| Engine Block Timer | Other | An engine block heater operated by an outdoor plug-in timer | An engine block heater that is manually plugged in |
| Facility Commissioning | HVAC | Perform facility commissioning | Comparable facility, no commissioning |
| Facility Energy Management System | HVAC | Typical HVAC by Building Type Controlled by Energy Management System | Typical HVAC by Building Type, Manually Controlled |
| Fan Thermostat Controller | HVAC | Typical HVAC by Building Type with Fan Thermostat Controller Installed | Typical HVAC by Building Type with Programmable Thermostat |
| Floating Head Pressure Controller | Process Cooling | Medium-Temperature Refrigeration System with 5HP Compressor and Adjustable Condenser Head Pressure Control Valve | Medium-Temperature Refrigeration System with 5 HP Compressor without Adjustable Condenser Head Pressure Control Valve |
| Grain Bin Aeration Control System | Process Specific | Grain Storage Fan System with Automatic Controls | Grain Storage Fan System with Manual Controls |
| HE Air Cooled Chiller - All Compressor Types - 100 Tons | HVAC | HE Air Cooled Chiller - All Compressor Types - 100 Tons | Code-Compliant Air Cooled Positive Displacement Chiller, 100 Tons |
| HE Air Cooled Chiller - All Compressor Types - 300 Tons | HVAC | Air Cooled Positive Displacement Chiller with Integral VFD, 300 Tons, 13.7 EER | Code-Compliant Air Cooled Positive Displacement Chiller, 300 Tons, 12.5 EER |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| HE DX 11.25-20.0 Tons Elec Heat | HVAC | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 11.25-20.0 Tons Other Heat | HVAC | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Elect Heat | HVAC | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Other Heat | HVAC | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX Less than 5.4 Tons Elect Heat | HVAC | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE DX Less than 5.4 Tons Other Heat | HVAC | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE Water Cooled Chiller - Centrifugal Compressor - 200 Tons | HVAC | Water Cooled Centrifugal Chiller with Integral VFD, 200 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 200 Tons |
| HE Water Cooled Chiller - Centrifugal Compressor - 500 Tons | HVAC | Water Cooled Centrifugal Chiller with Integral VFD, 500 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 500 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 175 Tons | HVAC | Water Cooled Positive Displacement Chiller with Integral VFD, 175 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 175 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 50 Tons | HVAC | Water Cooled Positive Displacement Chiller with Integral VFD, 50 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 50 Tons |
| High Bay Occupancy Sensors, Ceiling Mounted | Interior Lighting High Bay | Ceiling Mounted Occupancy Sensor, 800 Watts Controlled | 800 Watts of Lighting, Manually Controlled |
| High Efficiency Air Compressor | Compressed Air | 20 HP VFD Air Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| High Efficiency Refrigeration Compressor - Discus | Process Cooling | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Efficiency Refrigeration Compressor - Scroll | Process Cooling | High Efficiency Refrigeration Compressors | Standard Compressor |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| High Efficiency Welder | Process Specific | High Efficiency Welder | Standard Welding Practices |
| High Speed Fans | HVAC | High Speed Fan, 24" - 35" Blade Diameter | Standard Speed Fan, 24" - 35" Blade Diameter |
| High Volume Low Speed Fan (HVLS) | Motors Fans Blowers | 20' High Volume Low Speed Fan | Conventional Circulating Fan |
| Indoor Agriculture - LED Grow Lights | Interior Lighting High Bay | LED grow light | 1000W High Pressure Sodium |
| Indoor daylight sensor | Interior Lighting High Bay | Install Indoor Daylight Sensors, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Industrial Duct Sealing | HVAC | Standard Electric Heating and Central AC with Improved Duct Sealing | Standard Electric Heating and Central AC, Standard Duct Sealing |
| Injection Mold and Extruder Barrel Wraps | Other | 2' Diameter, 20' Long Machine Barrel with 1" Insulation | 2' Diameter, 20' Long Machine Barrel with no Insulation |
| Insulated Pellet Dryer Tanks and Ducts | Process Heating | Insulation for Pellet Tank and Duct | Uninsulated Pellet Tank and Duct |
| LED - 14W_CFL Baseline | Interior Lighting Other | LED (assume 14W) replacing CFL | 100W equivalent CFL |
| LED Canopy Lighting (Exterior) | Exterior Lighting Industrial | One 67.2W LED Canopy Light | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED Display Lighting (Exterior) | Exterior Lighting Industrial | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED Display Lighting (Interior) | Interior Lighting Other | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED exit sign | Interior Lighting Other | One 5W Single-Sided LED Exit Sign | One 9W Single-Sided CFL Exit Sign |
| LED Exterior Wall Packs | Exterior Lighting Industrial | One 35W LED Wall Pack | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED High Bay_HID Baseline | Interior Lighting High Bay | One 140W High Bay LED Fixture | Lumen-Equivalent HID High Bay Fixture |
| LED High Bay_LF Baseline | Interior Lighting High Bay | One 140W High Bay LED Fixture | Lumen-Equivalent Linear Fluorescent High Bay Fixture |
| LED Linear - Fixture Replacement | Interior Lighting Linear Fluorescent | 2x4 LED Troffer Fixture | Lumen-Equivalent 32-Watt T8 Fixture |
| LED Linear - Lamp Replacement | Interior Lighting Linear Fluorescent | Linear LED | Lumen-Equivalent 32-Watt T8 Lamp |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| LED Parking Lighting | Exterior Lighting Industrial | One 160W LED Area Light | Average Lumen Equivalent Exterior HID Area Lighting |
| LEED New Construction Whole Building | HVAC | LEED Qualifying New Construction | Comparable facility, code-compliance construction |
| Light Tube | Interior Lighting Other | One 14" Light Tube, Delivering light to 250 S.F. of Industrial Space | 250 S.F. of Industrial Space Lit by Typical Lighting Strategies |
| Low Energy Livestock Waterer | Motors Pumps | Install Thermostatically Controlled Livestock Watering System | Standard Livestock Watering System |
| Low Pressure Sprinkler Nozzles | Motors Pumps | Low Pressure Irrigation Nozzles operate at 35 psi or lower | Standard high pressure irrigation nozzles that operate at 50 psi or greater |
| Low Pressure-drop Filters | Compressed Air | 20 HP Inlet Modulation Fixed-Speed Compressor with Low Pressure Drop Filter | 20 HP Inlet Modulation Fixed-Speed Compressor, No Particulate Removal |
| Milk Pre-Cooler | Other | Installed pre-cooler heat exchanger | no pre-cooler heat exchanger installed |
| Networked Lighting Controls | Interior Lighting Linear Fluorescent | Install Networked Lighting Controls System on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Controlled either Manually or by Sensor as Specified by Code |
| Occupancy Sensors, Ceiling Mounted | Interior Lighting High Bay | Ceiling Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Occupancy sensors, switch mounted | Interior Lighting Linear Fluorescent | Switch Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor Lighting Controls | Exterior Lighting Industrial | Install Exterior Photocell Dimming Controls, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor motion sensor | Exterior Lighting Industrial | Install Exterior Motion Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Packaged Terminal AC | HVAC | High Efficiency Packaged Terminal AC | Code-Compliant PTAC, 10.9 EER |
| Process Cooling Ventilation Reduction | Process Cooling | Standard Process Cooling with Reduced Ventilation | Standard Process Cooling |
| Programmable thermostat | HVAC | Standard Heating and Cooling System with Programmable Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Reflective Roof Treatment | HVAC | Reflective Roof Treatment | Standard Black Roof |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Refrigeration Commissioning | Process Cooling | Commissioned Refrigeration System | Non-Commissioned Refrigeration System |
| Retro-Commissioning (Existing Construction) | HVAC | Perform Facility Retro-commissioning | |
| Roof insulation | HVAC | Roof Insulation (built-up roof applicable to flat/low slope roofs) | Code-Compliant Flat Roof |
| Smart thermostat | HVAC | Standard Heating and Cooling System with Smart Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Strategic Energy Management | HVAC | SEM goal setting and tracking | No active energy management |
| Synchronous Belt on 15hp ODP Motor | Motors Pumps | 15 HP Open-Drip Proof Motor with Synchronous Belts Installed on Supply and/or Return Air Fans | 15 HP Open-Drip Proof Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Synchronous Belt on 5hp ODP Motor | Motors Pumps | 5 HP Open-Drip Proof Motor with Synchronous Belts Installed on Supply and/or Return Air Fans | 5 HP Open-Drip Proof Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Synchronous Belt on 75hp ODP Motor | Motors Pumps | 75 HP Open-Drip Proof Motor with Synchronous Belts Installed on Supply and/or Return Air Fans | 75 HP Open-Drip Proof Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Thermal energy storage | HVAC | Deploy thermal energy storage technology (ice harvester, etc.) to shift load | Code compliant chiller |
| Time Clock Control | Interior Lighting High Bay | Time Clock Controlled Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| VAV System | HVAC | Variable Air Volume Distribution System | Constant Air Volume Distribution System |
| VFD on Air Compressor | Compressed Air | 20 HP VFD Air Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| VFD on Cooling Tower Fans | Process Cooling | Cooling Tower Fans with VFD Control | Cooling Tower Fans without VFD Control |
| VFD on HVAC Fan | Motors Fans Blowers | 5 HP HVAC Fan Motor, with VFD Control | 5 HP HVAC Fan Motor, no VFD Control |
| VFD on HVAC Pump | Motors Pumps | VFD on HVAC Pump | 7.5 HP HVAC Pump Motor, no VFD Control |
| VFD on process pump | Motors Pumps | 20 HP Process Pump Equipped with VFD Control | 20 HP Process Pump, Constant Speed |
| VSD Controlled Compressor | Process Cooling | Refrigeration System with VSD Control | Refrigeration System with Standard Slide-Valve Control System |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Water source heat pump | HVAC | Water Source Heat Pump, 2.5 Tons, 17.4 EER, 4.4 COP | Code-Compliant ASHP |
| Waterside economizer | HVAC | Waterside Economizer | No economizer |
| Window shade film | HVAC | Window Film with SHGC of 0.35 Applied to Standard Window | Standard Window with below Code Required Minimum SHGC |

The following EE measures from the 2019 Technical Potential Study were eliminated from the current study[8]:

**Table 15: 2019 EE Measures Eliminated from Current Study**

| Sector | Measure | End-Use | Reason for Removal |
|---|---|---|---|
| Residential | CFL – 15W Flood | Lighting | Better technology (LED) available |
| Residential | CFL – 15W Flood (Exterior) | Lighting | Better technology (LED) available |
| Residential | CFL – 13W | Lighting | Better technology (LED) available |
| Residential | CFL – 23W | Lighting | Better technology (LED) available |
| Residential | Low Wattage T8 Fixture | Lighting | Better technology (LED) available |
| Residential | 15 SEER Central AC | Space Cooling | Updated Federal Standard |
| Residential | 15 SEER Air Source Heat Pump | Space Cooling, Space Heating | Updated Federal Standard |
| Residential | 14 SEER ASHP from base electric resistance heating | Space Cooling, Space Heating | Updated Federal Standard |
| Residential | Two Speed Pool Pump | Miscellaneous | Updated Florida Energy Code |
| Residential | Variable Speed Pool Pump | Miscellaneous | Updated Florida Energy Code |
| Residential | Storm Door | Space Cooling, Space Heating | Minimal/uncertain energy savings |
| Commercial | CFL – 15W Flood | Exterior Lighting | Better technology (LED) available |
| Commercial | High Efficiency HID Lighting | Exterior Lighting | Better technology (LED) available |

[8] Additional measures from the 2019 study were updated to reflect current vintage/technology for the current study.

| Sector | Measure | End-Use | Reason for Removal |
|---|---|---|---|
| Commercial | LED Street Lights | Exterior Lighting | Market standard |
| Commercial | LED Traffic and Crosswalk Lighting | Exterior Lighting | Market standard |
| Commercial | CFL-23W | Interior Lighting | Better technology (LED) available |
| Commercial | High Bay Fluorescent (T5) | Interior Lighting | Better technology (LED) available |
| Commercial | Premium T8 - Fixture Replacement | Interior Lighting | Better technology (LED) available |
| Commercial | Premium T8 - Lamp Replacement | Interior Lighting | Better technology (LED) available |
| Commercial | Two Speed Pool Pump | Miscellaneous | Updated Florida Energy Code |
| Commercial | Variable Speed Pool Pump | Miscellaneous | Updated Florida Energy Code |
| Commercial | Tank Wrap on Water Heater | Domestic Hot Water | Limited applicability |
| Commercial | Ceiling Insulation (R12 to R38) | Space Cooling, Space Heating | Consolidated measure baseline assumptions |
| Commercial | Ceiling Insulation (R30 to R38) | Miscellaneous | Consolidated measure baseline assumptions |

# Appendix B DR Measure List

Table 16: Residential DR Measures

| Measure | Type | Season | Description |
|---|---|---|---|
| Central air conditioner - Load Shed | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central Heating - Load Shed | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central air conditioner - 50% cycling | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Central Heating - 50% cycling | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Smart thermostats - Utility Installation | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| Smart thermostats – BYOT | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| CPP + Tech | Pricing | Summer and Winter | Electricity rate that varies based on time of day. Can be same rate schedule for every day during a given season (time of use, or TOU) and with critical peak pricing (CPP) days when peak period rates are substantially higher for a limited number of days per year (customers receive advance notification of CPP event). Customers also receive technology that they can pre-program to curtail load when an event is called. |
| Water heater control | Direct load control | Summer and Winter | Load control installed on a water heater (integrated or external switch) |
| Pool pump switches | Direct load control | Summer and Winter | Load control program with switch installed on pool pump |
| Room AC | Direct load control | Summer | Load control program that is focused on room AC units rather than central AC |
| Managed EV Charging – switch | Direct load control | Summer and Winter | Load control switch that is installed on an EV charger |
| Managed EV Charging – telematics | Direct load control | Summer and Winter | Direct load control program leveraging EV smart charging software |
| Battery Storage with PV | Pricing/Direct load control | Summer and Winter | PV charges battery and battery discharges to grid |

Table 17: Small C&I DR Measures

| Measure | Type | Season | Description |
|---|---|---|---|
| Central air conditioner - Load Shed | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central Heating - Load Shed* | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central air conditioner - 50% cycling | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Central Heating - 50% cycling* | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Smart thermostats - Utility Installation* | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| Smart thermostats – BYOT* | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| CPP + Tech | Pricing | Summer and Winter | Electricity rate that varies based on time of day. Can be same rate schedule for every day during a given season (time of use, or TOU) and with critical peak pricing (CPP) days when peak period rates are substantially higher for a limited number of days per year (customers receive advance notification of CPP event). Customers also receive technology that they can pre-program to curtail load when an event is called. |
| Managed EV Charging – switch | Direct load control | Summer and Winter | Load control switch that is installed on an EV charger |
| Managed EV Charging – telematics | Direct load control | Summer and Winter | Direct load control program leveraging EV smart charging software |
| Battery Storage with PV | Pricing/Direct load control | Summer and Winter | PV charges battery and battery discharges to grid |

Table 18: Large C&I DR Measures

| Measure | Type | Season | Description |
|---|---|---|---|
| CPP + Tech | Pricing | Summer and Winter | Electricity rate that varies based on time of day. Can be same rate schedule for every day during a given season (time of use, or TOU) and with critical peak pricing (CPP) days when peak period rates are substantially higher for a limited number of days per year (customers receive advance notification of |

| Measure | Type | Season | Description |
|---|---|---|---|
| | | | CPP event). Customers also receive technology that they can pre-program to curtail load when an event is called. |
| Auto DR | Utility-controlled loads | Summer and Winter | Custom load control of specific end-uses/processes that is triggered by utility signal to building management system; customer can sometimes opt-out of specific events |
| Firm Service Level | Contractual | Summer and Winter | Customer commits to a maximum usage level during peak periods and, when notified by the utility, agrees to cut usage to that level. |
| Guaranteed Load Drop | Contractual | Summer and Winter | Customer agrees to reduce usage by an agreed upon amount when notified |

No DR measures from the 2019 Technical Potential Study were eliminated from the current study.

# Appendix C DSRE Measure List

Table 19: Residential DSRE Measures

| Measure | Description |
|---|---|
| PV System | Roof-mounted system, including multiple panels, AC/DC inverter, racking system, and electrical system interconnections |
| Battery Storage from PV System | Lithium-ion battery system designed to integrate with an on-site PV system to store and discharge excess energy from PV generation |

Table 20: Non-Residential DSRE Measures

| Measure | Description |
|---|---|
| PV System | Roof-mounted system, including multiple panels, AC/DC inverter, racking system, and electrical system interconnections |
| Battery Storage from PV System | Lithium-ion battery system designed to integrate with an on-site PV system to store and discharge excess energy from PV generation |
| CHP – Fuel Cell | An electrochemical cell-based generator that reacts hydrogen fuel with oxygen |
| CHP – Micro Turbine | Small combustion turbine that burns gaseous or liquid fuel to drive a generator |
| CHP – Gas Turbine | A combustion turbine that burns gaseous or liquid fuel to drive a generator |
| CHP – Reciprocating Engine | An engine that uses one or more pistons to convert pressure into rotational motion |
| CHP - Steam Turbine | A turbine that extracts thermal energy from pressured steam to drive a generator |

No DSRE measures from the 2019 Technical Potential Study were eliminated from the current study.

# Appendix D External Measure Suggestions

**Table 21: External Measure Suggestions and Actions**

| Measure Suggestion | Stakeholder Comments | Action taken for FEECA Study |
|---|---|---|
| Efficient Electrification Measures | All measures that can produce substantial site energy savings by converting from natural gas or other fossil fuels should be included in the Florida electric utilities' next efficiency potential study. Key examples include efficient heat pumps to displace gas furnaces and efficient heat pump water heaters to displace gas water heaters. It is important to note that these electrification measures provide not only heating energy savings and water heating energy savings, but can also potentially provide cooling efficiency benefits as well. In the case of heat pumps, that can occur because efficient heat pumps can operate in cooling mode more efficiently than standard central air conditioners. In the case of heat pump water heaters, cooling and dehumidification benefits can occur when/if the water heater is in conditioned space because they transfer heat (particularly latent heat) from the air around them to the water they are heating. A growing number of jurisdictions – including Illinois, Minnesota and some northeastern states – have begun to include efficient electrification measures in their efficiency programs portfolios. | Fuel-switching and electrification are outside the scope of this study |
| Networked Lighting Controls | LED lighting technology has become increasingly accepted and installed in commercial buildings. The next big efficiency opportunity in commercial lighting efficiency is in sophisticated controls integrated into the light fixtures themselves – both luminaire level lighting controls and networked lighting controls. For example, a 2017 report for both the Northwest Energy Efficiency Alliance and the Design Lights Consortium, a non-profit that works with utilities and manufacturers of lighting products (and which many utilities across the country reference for determination of eligibility of lighting products for efficiency program rebates), found that networked lighting controls can provide on the order of 50% additional savings after LED conversion. Other studies have also found the national savings potential from such products to be enormous. Moreover, these products can be designed to provide not only lighting energy savings but also a number of other non-energy benefits (e.g., asset tracking, such as the ability of hospitals to know the location of all wheel chairs). Numerous utilities across the country now actively promote this technology through their efficiency programs. For example, Commonwealth Edison, the utility serving Chicago and other parts of northern Illinois, is currently getting a significant portion of its commercial lighting savings from promotion of networked lighting controls | Added to measure list for 2024 study |

| Measure Suggestion | Stakeholder Comments | Action taken for FEECA Study |
| --- | --- | --- |
| Ductless mini-split heat pumps to displace inefficient electric baseboard heating | While most Florida residential buildings with electric heat provide that heat with heat pumps, at least some (perhaps most likely being older multi-family rental buildings) still use inefficient electric resistance heat. Ductless mini- split heat pump retrofits can very efficiently displace such inefficient electric heat and should be added to the residential measure list. | Added to measure list for 2024 study |
| Air Source Heat Pump baseline assumptions | There are seven air source heat pump (ASHP) measures included in the residential measure list. Two of them – one at SEER 14 and a second at SEER 21 – are listed as relative to an electric resistance baseline. Five of them – SEER 15, SEER 16, SEER 17, SEER 18 and SEER 21 – appear to be relative to a baseline of a standard new ASHP. Are we interpreting this correctly? If so, we have a couple of comments/questions/suggestions:<br>• The efficiency standards assessed need to be modified to be consistent with new federal<br>standards, including new testing procedures.<br>• For cases where the baseline is "electric resistance", why only assessing two efficiency tiers (i.e.,<br>fewer than for standard ASHP baselines)? The same number of efficiency tiers should be<br>assessed for both baselines. | Incorporated suggestions into 2024 study, including updated baseline standard and assessing same efficiency tiers for both baselines |
| Heat Pump Water Heater Efficiency | The Res EE tab of the utilities draft measure list suggests that the efficiency of a heat pump water heater is an EF of 2.50. That is unrealistically low. In fact, of the 222 products listed on the Energy Star website, none had UEFs less than 2.80 and only 29 (13%) had UEFs that were less than 3.4; the average was 3.57. Indeed, the first product listed on a search of heat pump water heaters on Home Depot's website is a 50 gallon, Rheem (Pro Terra) product with a UEF of 3.75 and a cost of $1699. | Incorporated suggestion into 2024 study |
| New Construction Measure Packages | The measures lists did not appear to include packages of measures for building new residential and/or new commercial buildings to levels of efficiency beyond those required by code. Utilities in many jurisdictions run new construction efficiency programs supporting such measure packages. In the residential sector, many base their programs on the long-standing Federal Energy Star standard. However, increasingly utility programs are promoting additional efficiency tiers – often as part of all-electric new construction program offerings – that go well beyond the Energy Star standard. For example, Consumers Energy (Michigan) offers $1000 rebates to builders who construct Energy Star single family homes | Incorporated suggestion into 2024 study with 2 tiers of residential new construction whole-home improvement measures. |

| Measure Suggestion | Stakeholder Comments | Action taken for FEECA Study |
|---|---|---|
| | with a Home Energy Rating (HERS) score of 57 or less, but offer higher rebates for more efficient buildings – up to $4000 for all electric homes with a HERS score of 40 or less. The Florida utilities potential study should assess savings potential for both the Energy Star level and a tier or two of additional efficiency beyond that level. Similar assessments of new commercial building savings potential should also be assessed. | |
| Custom Industrial Measures | The utilities' list of industrial efficiency measures addresses common industrial efficiency opportunities. However, it does not address efficiency opportunities that may be unique to individual industries or even to individual industrial facilities. That can include such things as changes in types of materials used in manufacturing, reductions in waste streams, improved use of water delivered by agricultural irrigation systems, and/or other things that are not directly related to energy using equipment or controls of such equipment. It is obviously not possible to list all such measures. However, a potential study will understate savings potential if it does not include a way of capturing such potential in its estimates. One potential way to get a sense of such potential is to review results of comprehensive industrial efficiency programs run by other utilities to identify the portion of actual program savings from such unique custom measures – and then assume that portion of custom savings could be added to the savings estimated in the study for named measures. | Added to measure list for 2024 study |
| Electric Vehicle measures | Some EV chargers are more efficient than others. The Federal Energy Star program has a standard for them. Savings potential may not be huge, but should be considered in the study. With a growing number of EV sales, the study should also consider the potential savings from promoting the most efficient EVs within different size/style categories | Added to measure list for 2024 study |
| Removing screw-based LEDs | The screw-based LEDs on both the Residential and Commercial measure lists should now be considered baseline due to federal efficiency standards adopted earlier this year. Utility load forecasts for IRPs should reflect resulting improvements in end use efficiency. | Screw-based LEDs were included in the study but with limited applicability to reflect current market |
| Removing Commercial fluorescent lighting | LED technology – for both fixtures and lamps – has advanced significantly in recent years, to the point where it should be the only technology considered for commercial lighting. Measures such as high performance T-8 fluorescent fixtures and high bay T-5 fluorescent fixtures should be replaced with LED alternatives in the study. | Updated measure list for 2024 study to only include LED-based lamps for linear fluorescent replacements |

| Measure Suggestion | Stakeholder Comments | Action taken for FEECA Study |
|---|---|---|
| Removing fossil-gas fueled CHP | Fossil-fuel fired CHP systems should not be considered "renewable" and have questionable benefits if electric generation is expected to get increasingly more renewable and clean. Biogas-fueled CHP – such as systems installed in wastewater treatment facilities that use methane byproducts of processing waste – should be included in the study. | 2024 study will continue to assess all CHP options |
| Adding livestock methane power generation to renewables list | For example, see the "cow power" program currently being run by Green Mountain Power, Vermont's largest electric utility | 2024 study will continue to assess DSRE options consistent with prior study, including customer-sited solar, solar plus storage, and CHP |
| Adding EV managed charging to DR list | With national market shares for EVs growing, it is important that utilities consider programs for managing when charging occurs. Numerous utilities are currently running managed charging programs. This does not currently appear to be on the measure list and should be added to the Florida utilities' potential study. | Added to measure list for 2024 study |
| Residential "smart thermostat" measure can provide both efficiency savings and demand response potential | This is recognized in the inclusion of smart thermostats in both the Res EE and DR tabs of the measure list spreadsheet. We simply want to flag that it is important when assessing cost-effectiveness of this measure that these two potential benefits are considered together. In other words, the cost should be considered compared to the combined efficiency and DR potential rather than separately considered relative to just EE savings and then separately again compared to just DR potential | 2024 study will include interactive impacts of EE and DR opportunities |
| Emerging Technologies | The efficiency potential study measure list appears to be somewhat outdated. It does not include a number of new and emerging technologies. The potential list of such technologies is long. We suggest reviewing the attached list of emerging technologies developed almost two years ago by Consumers Energy (Michigan) and including them in the study. | Consumers Energy study was reviewed and commercially available measures were added to measure list for 2024 study, including heat pump water heaters - CEE advanced tier, heat pump clothes dryers, ozone laundry systems, and 21+ SEER HVAC units |

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resource innovations

# Technical Potential Study of Demand Side Management

## Florida Public Utilities Company

Date: 03.07.2024

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# Executive Summary

In October 2022, the six electric utilities subject to the Florida Energy Efficiency and Conservation Act (FEECA Utilities) retained Resource Innovations, Inc. for the purpose of identifying and characterizing the market for demand-side management (DSM) opportunities, including energy efficiency (EE) improvement and building retrofits, peak load reductions from demand response (DR), and demand-side renewable energy (DSRE) systems.

The main objective of the study was to assess the technical potential of demand-side resources for reducing customer electric energy consumption and seasonal peak capacity demands.

This report provides the detailed methodology and results for the technical potential analysis of Florida Public Utilities Company's (FPUC) service territory.

## 1.1 Methodology

Resource Innovations estimates DSM savings potential by applying an analytical framework that aligns baseline market conditions for energy consumption and demand with DSM opportunities. After describing the baseline condition, Resource Innovations applies estimated measure savings to disaggregated consumption and demand data. The approach varies slightly according to the type of DSM resources and available data; the specific approaches used for each type of DSM are described below.

### 1.1.1 EE Potential

This study utilized Resource Innovations' proprietary EE modeling tool, TEA-POT (Technical / Economic / Achievable POTential). This modeling tool was built on a platform that provides the ability to create and analyze multiple scenarios and recalculate potential savings based on variable inputs such as sales/load forecasts, electricity prices, discount rates, and actual program savings. The methodology for the EE potential assessment was based on a hybrid "top-down/bottom-up" approach, which started with the current utility load forecast, then disaggregated it into its constituent customer-class and end-use components. Our assessment examined the effect of the range of EE measures and practices on each end-use, taking into account current market saturations, and technical feasibility. These unique impacts were aggregated to produce estimates of potential at the end-use, customer class, and system levels for FPUC.

### 1.1.2 DR Potential

The assessment of DR potential in FPUC's service territory was an analysis of mass market direct load control programs for residential and small commercial and industrial (C&I) customers, and an analysis of DR programs for large C&I customers. The direct load control program assessment focused on the potential for demand reduction through heating, ventilation, and air conditioning (HVAC), water heater, managed electric vehicle charging, and pool pump load control. These end-uses were of particular interest because of their large contribution to peak period system load. For this analysis, a range of direct load control measures were examined for each customer segment to highlight the range of potential. The assessment further accounted for existing DR programs for FPUC when calculating the total DR potential.

### 1.1.3 DSRE Potential

The DSRE technologies included in this study are rooftop solar photovoltaic (PV) systems, battery storage systems charged from customers' PV systems, and combined heat and power (CHP) systems. The study leveraged the customer segmentation and load disaggregation data assembled for the EE and DR analyses, and applied our DSRE model, SPIDER™ (Spatial Penetration and Integration of Distributed Energy Resources), for economic and adoption analysis of solar and battery storage. This model dynamically responds to rapidly changing technologies and accounts for all key time-varying elements such as technology costs, incentives, tax credits, and electric rates. To estimate technical potential for CHP, the study utilized a series of unique distributed generation potential models for each primary market sector (commercial and industrial), calculating the average building consumption, assigning minimum facility size thresholds, and estimating building energy savings share percentage for each CHP technology based on its generation capacity.

## 1.2 Savings Potential

Technical potential for EE, DR, and DSRE are as follows:

### 1.2.1 EE Potential

EE technical potential describes the savings potential when all technically feasible EE measures are fully implemented, ignoring all non-technical constraints on electricity savings, such as cost-effectiveness and customer willingness to adopt EE.

The estimated EE technical potential results are summarized in Table 1.

Table 1. EE Technical Potential

| | Savings Potential | | |
|---|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) | Energy (GWh) |
| **Residential** | 26 | 15 | 97 |
| **Non-Residential**[1] | 14 | 12 | 71 |
| **Total** | 40 | 27 | 168 |

### 1.2.2 DR Potential

DR technical potential describes the magnitude of loads that can be managed during conditions when grid operators need peak capacity. For residential and small C&I customers where DR generally takes the form of direct utility control, technical potential for DR is limited by the loads that can be controlled remotely at scale such as heating, cooling, water heaters, managed electric vehicle charging, and pool pumps. For large C&I customers, this included their entire electric demand during a utility's system peak, as many of these types of customers will forego virtually all electric demand temporarily if the financial incentive is large enough.

The estimated DR technical potential results are summarized in Table 2.

Table 2. DR Technical Potential

| | Savings Potential | |
|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) |
| **Residential** | 41 | 65 |
| **Non-Residential** | 27 | 24 |
| **Total** | 68 | 89 |

[1] Non-Residential results include all commercial and industrial customer segments.

### 1.2.3 DSRE Potential

DSRE technical potential estimates quantify all technically feasible distributed generation opportunities from PV systems, battery storage systems charged from PV, and CHP technologies based on the customer characteristics of FPUC's customer base.

The estimated DSRE technical potential results are summarized in Table 3.

Table 3. DSRE Technical Potential[2]

| | Savings Potential | | |
|---|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) | Energy (GWh) |
| PV Systems | | | |
| **Residential** | 17 | 10 | 152 |
| **Non-Residential** | 9 | 3 | 70 |
| **Total** | 26 | 13 | 222 |
| Battery Storage charged from PV Systems | | | |
| **Residential** | 5 | 2 | 0 |
| **Non-Residential** | 0 | 1 | 0 |
| **Total** | 5 | 3 | 0 |
| CHP Systems | | | |
| **Total** | 23 | 13 | 108 |

[2] PV systems and CHP systems were independently analyzed for technical potential without consideration of the competition between technologies or customer preference for DSRE system.

# 2 Introduction

In October, 2022, the six electric utilities subject to the Florida Energy Efficiency and Conservation Act (FEECA Utilities) retained Resource Innovations, Inc. for the purpose of identifying and characterizing the market for demand-side management (DSM) opportunities, including energy efficiency (EE) improvement and building retrofits, peak load reductions from demand response (DR), and demand-side renewable energy (DSRE) systems. The main objective of the study was:

- Assessing the technical potential of demand-side resources for reducing customer electric energy consumption and seasonal peak capacity demands.

This report provides the detailed methodology and results for the technical potential analysis of FPUC's service territory.

The following deliverables were developed by Resource Innovations as part of the project and are addressed in this report:

- DSM measure list and detailed assumption workbooks
- Disaggregated baseline demand and energy use by year, sector, and end-use
- Baseline technology saturations, energy consumption, and demand
- Technical potential demand and energy savings
- Supporting calculation spreadsheets

## 2.1 Technical Potential Study Approach

Resource Innovations estimates technical potential according to the industry standard categorization, as follows:

> Technical Potential is the theoretical maximum amount of energy and capacity that could be displaced by DSM, regardless of cost and other barriers that may prevent the installation or adoption of a DSM measure.

For this study, technical potential included full application of commercially available DSM technologies to all residential, commercial, and industrial customers in the utility's service territory.

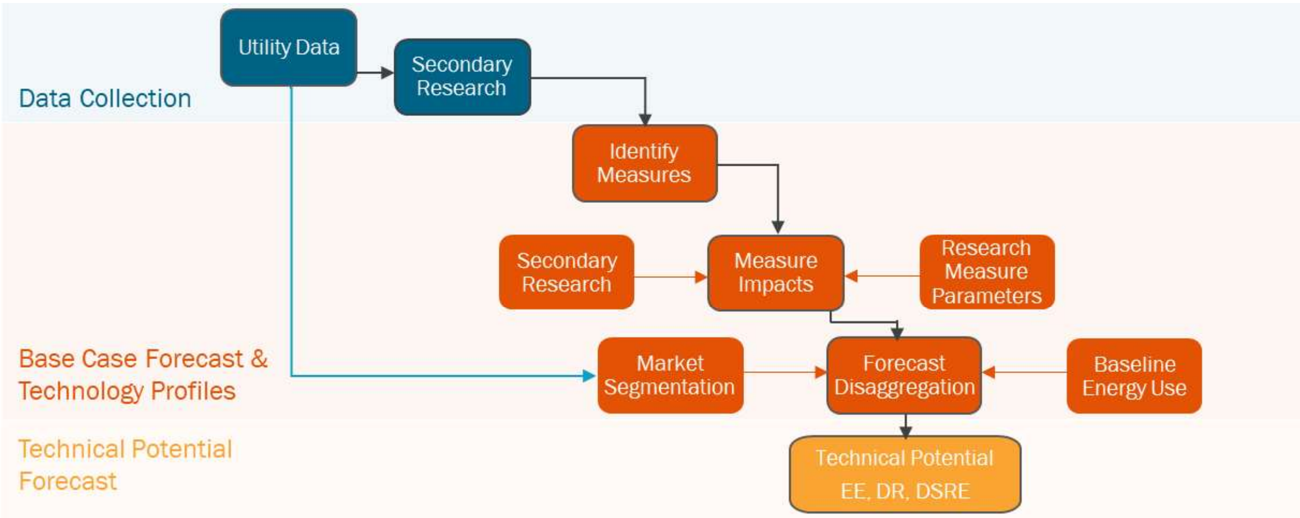
Quantifying DSM technical potential is the result of an analytical process that refines DSM opportunities that align with FPUC's customers' electric consumption patterns. Resource Innovations' general methodology for estimating technical potential is a hybrid "top-

down/bottom-up" approach, which is described in detail in Sections 3 through 5 of this report and includes the following steps:

- Develop a baseline forecast: the study began with a disaggregation of the utility's official electric energy forecast to create a baseline electric energy forecast. This forecast does not include any utility-specific assumptions around DSM performance. Resource Innovations applied customer segmentation and consumption data from each utility and data from secondary sources to describe baseline customer-class and end-use components. Additional details on the forecast disaggregation are included in Section 3.
- Identify DSM opportunities: A comprehensive set of DSM opportunities applicable to FPUC's climate and customers were analyzed to best depict DSM technical potential. Effects for a range of DSM technologies for each end-use could then be examined while accounting for current market saturations, technical feasibility, and impacts.
- Collect cost and impact data for measures: For those measures applicable to FPUC's customers, Resource Innovations conducted primary and secondary research and estimated costs, energy savings, measure life, and demand savings. We differentiated between the type of cost (capital, installation labor, maintenance, etc.) to separately evaluate different implementation modes: retrofit (capital plus installation labor plus incremental maintenance); new construction (incremental capital and incremental maintenance); and burnout costs (incremental capital and incremental maintenance costs for replacement of appliances and equipment that has reached the end of its useful life). Additional details on measure development are included in Section 4.

Figure 1 provides an illustration of the technical potential modeling process conducted for FPUC, with the assessment starting with the current utility load forecast, disaggregated into its constituent customer-class and end-use components, and calibrated to ensure consistency with the overall forecast. Resource Innovations considered the range of DSM measures and practices application to each end-use, accounting for current market saturations, and technical feasibility. These unique impacts were aggregated to produce estimates of potential at the technology, end-use, customer class, and system levels.

Figure 1. Approach to Technical Potential Modeling




Resource Innovations estimated DSM technical potential based on a combination of market research, utility load forecasts and customer data, and measure impact analysis, all in coordination with FPUC. Resource Innovations examined the technical potential for EE, DR, and DSRE opportunities; this report is organized to offer detail on each DSM category, with additional details on technical potential methodology presented in Section 5.

## 2.2 EE Potential Overview

To estimate EE potential, this study utilized Resource Innovations' modeling tool, TEA-POT (Technical / Economic / Achievable POTential). This modeling tool was built on a platform that provides the ability to create and analyze multiple scenarios and recalculate potential savings based on variable inputs such as sales/load forecasts, electricity prices, discount rates, and actual utility program savings, as described in Section 5.1.1 below. While the analysis estimates the impacts of individual EE measures, the model accounts for interactions and overlap of individual measure impacts within an end-use or equipment type. The model provides transparency into the assumptions and calculations for estimating EE potential.

## 2.3 DR Potential Overview

To estimate DR market potential, Resource Innovations considered customer demand during utility peaking conditions and projected customer response to DR measures. Customer demand was determined by looking at account-level interval data for each customer segment. For each segment, Resource Innovations determined the portion of a customer's load that could be curtailed during the system peak. FPUC customer interval data was unavailable and therefore, a sample of FPL customers' load data was used as proxy to estimate peak load profiles and demand response potential.

## 2.4 DSRE Potential Overview

The DSRE technologies included in this study are rooftop solar photovoltaic (PV) systems, battery storage systems charged from PV, and combined heat and power (CHP) systems. The study leveraged the customer segmentation and load disaggregation data assembled for the EE and DR analyses, and applied our DSRE model, SPIDER™ (Spatial Penetration and Integration of Distributed Energy Resources), for economic and adoption analysis of solar and battery storage. This model dynamically responds to rapidly changing technologies and accounts for all key time-varying elements such as technology costs, incentives, tax credits, and electric rates. To estimate technical potential for CHP, the study utilized a series of unique distributed generation potential models for each primary market sector (commercial and industrial), calculating the average building consumption, assigning minimum facility size thresholds, and estimating building energy savings share percentage for each CHP technology based on its generation capacity.

# 3 Baseline Forecast Development

## 3.1 Market Characterization

The FPUC base year energy use and sales forecast provided the reference point to determine potential savings. The end-use market characterization of the base year energy use and reference case forecast included customer segmentation and load forecast disaggregation. The characterization is described in this section, while the subsequent section addresses the measures and market potential energy and demand savings scenarios.

### 3.1.1 Customer Segmentation

In order to estimate EE, DR, and DSRE potential, the sales forecast and peak load forecasts were segmented by customer characteristics. As electricity consumption patterns vary by customer type, Resource Innovations segmented customers into homogenous groups to identify which customer groups are eligible to adopt specific DSM technologies, have similar building characteristics and load profiles, or are able to provide DSM grid services.

Resource Innovations segmented customers according to the following:

1) By Sector – how much of FPUC's energy sales, summer and winter peak demand forecast is attributable to the residential, commercial, and industrial sectors?
2) By Customer – how much electricity does each customer typically consume annually and during system peaking conditions?
3) By End-Use – within a home or business, what equipment is using electricity during the system peak? How much energy does this end-use consume over the course of a year?

Table 4 summarizes the segmentation within each sector. In addition to the segmentation described here for the EE and DSRE analyses, the residential customer segments were further segmented by heating type (electric heat, gas heat, or unknown) and by annual consumption bins within each sub-segment for the DR analysis.

**Table 4. Customer Segmentation**

| Residential | Commercial | | Industrial | |
|---|---|---|---|---|
| Single Family | Assembly | Miscellaneous | Agriculture and Assembly | Primary Resources Industries |
| Multi-Family | College and University | Offices | Chemicals and Plastics | Stone/Glass/ Clay/Concrete |
| Manufactured Homes | Grocery | Restaurant | Construction | Textiles and Leather |
| | Healthcare | Retail | Electrical and Electronic Equipment | Transportation Equipment |
| | Hospitals | Schools K-12 | Lumber/Furniture/ Pulp/Paper | Water and Wastewater |
| | Institutional | Warehouse | Metal Products and Machinery | Other |
| | Lodging/ Hospitality | | Miscellaneous Manufacturing | |

From an equipment and energy use perspective, each segment has variation within each building type or sub-sector. For example, the energy consuming equipment in a convenience store will vary significantly from the equipment found in a supermarket. To account for this variation, the selected end-uses describe energy consumption patterns that are consistent with those typically studied in national or regional surveys, such as the U.S. Energy Information Administration's (EIA) Residential Energy Consumption Survey (RECS), Commercial Building Energy Consumption Survey (CBECS) and Manufacturing Energy Consumption Survey (MECS), among others. The end-uses selected for this study are listed in Table 5.

**Table 5. End-Uses**

| Residential End-Uses | Commercial End-Uses | Industrial End-Uses |
|---|---|---|
| Space heating[3] | Space heating[3] | Process heating |
| Space cooling[3] | Space cooling[3] | Process cooling |
| Domestic hot water | Domestic hot water | Compressed air |
| Ventilation and circulation | Ventilation and circulation | Motors/pumps |

[3] Includes the contribution of building envelope measures and efficiencies.

| Residential End-Uses | Commercial End-Uses | Industrial End-Uses |
|---|---|---|
| Lighting | Interior lighting | Fan, blower motors |
| Cooking | Exterior lighting | Process-specific |
| Appliances | Cooking | Industrial lighting |
| Electronics | Refrigeration | Exterior lighting |
| Miscellaneous | Office equipment | HVAC[3] |
| | Miscellaneous | Other |

For DR, the end-uses targeted were those with controllable load for residential customers (i.e., HVAC, water heaters, pool pumps, and electric vehicles) and small C&I customers (HVAC and electric vehicles). For large C&I customers, all load during peak hours was included assuming these customers would potentially be willing to reduce electricity consumption for a limited time if offered a large enough incentive during temporary system peak demand conditions.

### 3.1.2 Forecast Disaggregation

A common understanding of the assumptions and granularity in the baseline load forecast was developed with input from FPUC. Key discussion topics reviewed included:

- How current DSM offerings are reflected in the energy and demand forecast.
- Assumed weather conditions and hour(s) of the day when the system is projected to peak.
- Are there portions of the load forecast attributable to customers or equipment not eligible for DSM programs?
- How are projections of population increase, changes in appliance efficiency, and evolving distribution of end-use load shares accounted for in the peak demand forecast?

#### 3.1.2.1 Electricity Consumption (kWh) Forecast

Resource Innovations segmented FPUC's electricity consumption forecast into electricity consumption load shares by customer class and end-use. The baseline customer segmentation represents the electricity market by describing how electricity was consumed within the service territory. Resource Innovations developed the forecast for the year 2025, and based it on data provided by FPUC, primarily their 2022 Long-Term Projections of Electricity Energy and Demand, which was the most recent plan available at the time the studies were initiated. The data addressed current baseline consumption, system load, and sales forecasts.

#### 3.1.2.2 Peak Demand (kW) Forecast

A fundamental component of DR potential was establishing a baseline forecast of what loads or operational requirements would be absent due to existing dispatchable DR or time varying rates. This baseline was necessary to assess how DR can assist in meeting specific planning and operational requirements. We utilized FPUC's summer and winter peak demand forecast, which was developed for system planning purposes.

#### 3.1.2.3 Estimating Consumption by End-Use Technology

As part of the forecast disaggregation, Resource Innovations developed a list of electricity end-uses by sector (Table 5). To develop this list, Resource Innovations began with FPUC's estimates of average end-use consumption by customer and sector. Resource Innovations combined these data with other information, such as utility residential appliance saturation surveys, as available, to develop estimates of customers' baseline consumption. Resource Innovations calibrated the utility-provided data with data available from public sources, such as the EIA's recurring data-collection efforts that describe energy end-use consumption for the residential, commercial, and manufacturing sectors.

To develop estimates of end-use electricity consumption by customer segment and end-use, Resource Innovations applied estimates of end-use and equipment-type saturation to the average energy consumption for each sector. The following data sources and adjustments were used in developing the base year 2025 sales by end-use:

**Residential Sector:**

- The disaggregation was based on FPUC's rate class load shares and intensities.
- Baseline intensity was calibrated to account for differences in end-use saturation, fuel source, and equipment saturation as follows:
    - FPUC rate class load share is based on average per customer.
    - Resource Innovations made conversions to usage estimates generated by applying EIA RECS data, residential end-use study data from other FEECA utilities and EIA's Annual Energy Outlook (AEO) 2023.

**Commercial Sector:**

- The disaggregation was based on FPUC's rate class load shares, intensities, and EIA CBECS data.

- Segment data from EIA and FPUC.
- Baseline intensity was calibrated to account for differences in end-use saturation, fuel source, and equipment saturation as follows:
    - Rate class load share based on EIA CBECS and end-use forecasts from FPUC.

**Industrial Sector:**

- The disaggregation was based on rate class load shares, intensities, and EIA MECS data.
- Segment data from EIA and FPUC.
- Baseline intensity was calibrated to account for differences in end-use saturation, fuel source, and equipment saturation as follows:
    - Rate class load share based on EIA MECS and end-use forecasts from FPUC.

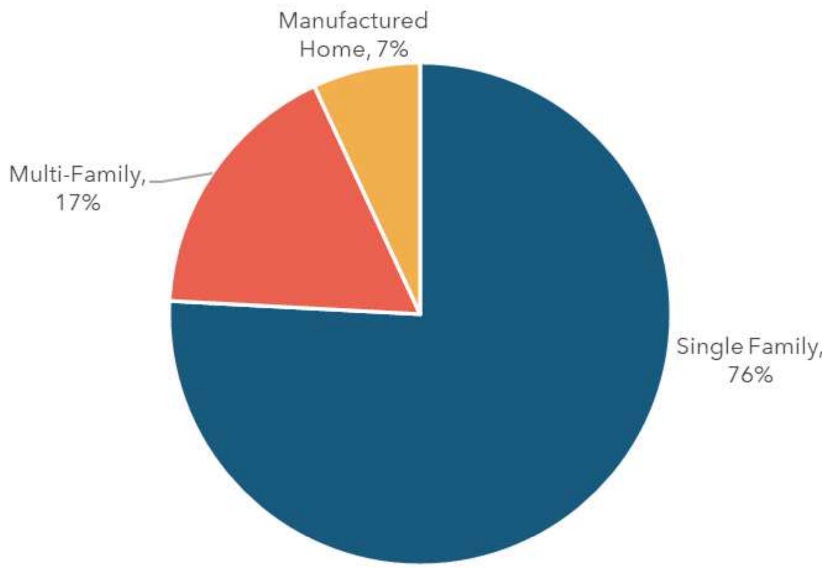
## 3.2 Analysis of Customer Segmentation

Customer segmentation is important to ensuring that a MPS examines DSM measure savings potential in a manner that reflects the diversity of energy savings opportunities existing across the utility's customer base. FPUC provided Resource Innovations with data concerning the premise type and loads characteristics for all customers for the MPS analysis. Resource Innovations examined the provided data from multiple perspectives to identify customer segments. Resource Innovations' approach to segmentation varied slightly for non-residential and residential accounts, but the overall logic was consistent with the concept of expressing the accounts in terms that were relevant to DSM opportunities.

### 3.2.1 Residential Customers (EE, DR, and DSRE Analysis)

Segmentation of residential customer accounts enabled Resource Innovations to align DSM opportunities with appropriate DSM measures. Resource Innovations used utility customer data, supplemented with EIA data, to segment the residential sector by customer dwelling type (single family, multi-family, or manufactured home). The resulting distribution of customers according to dwelling unit type is presented in Figure 2.

Figure 2. Residential Customer Segmentation




### 3.2.2 Non-Residential (Commercial and Industrial) Customers (EE and DSRE Analysis)

For the EE and DSRE analysis, Resource Innovations segmented C&I accounts using the utility's North American Industry Classification System (NAICS) or Standard Industrial Classification (SIC) codes, supplemented by data produced by the EIA's CBECS and MECS. Resource Innovations classified the customers in this group as either commercial or industrial, on the basis of DSM measure information available and applicable to each. For example, agriculture and forestry DSM measures are commonly considered industrial savings opportunities. Resource Innovations based this classification on the types of DSM measures applicable by segment, rather than on the annual energy consumption or maximum instantaneous demand from the segment as a whole. The estimated energy sales distributions Resource Innovations applied are shown below in Figure 3 and Figure 4.

**Figure 3. Commercial Customer Segmentation**

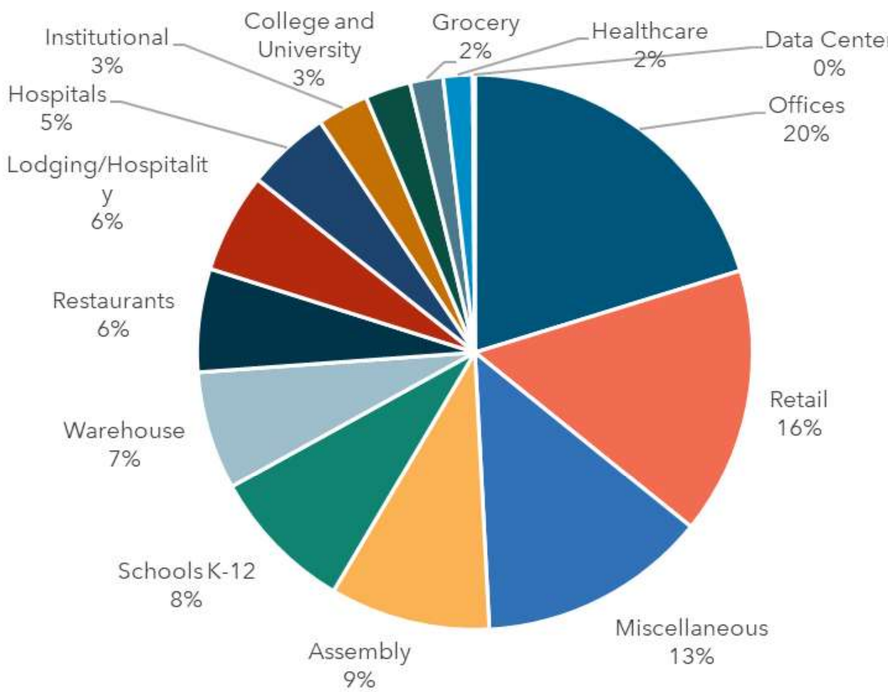
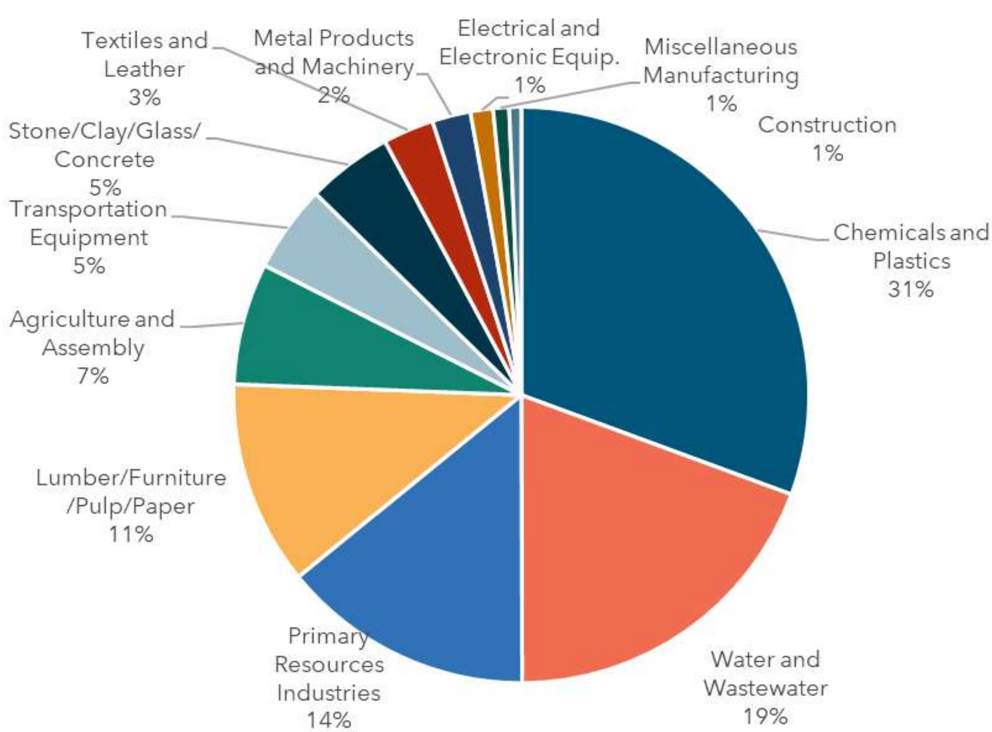



**Figure 4. Industrial Customer Segmentation**



### 3.2.3 Commercial and Industrial Accounts (DR Analysis)

For the DR analysis, Resource Innovations divided the non-residential customers into the two customer classes of small C&I and large C&I using rate class and annual consumption. For the purposes of this analysis, small C&I customers are those on the General Service (GS) tariff. Large C&I customers are all customers on the General Service Demand (GSD) tariff or on the General Service Large Demand (GSLD) tariff. Resource Innovations further segmented these two groups based on customer size. For small C&I, segmentation was determined using annual customer consumption and for large C&I the customer's maximum demand was used. Both customer maximum demand and customer annual consumption were calculated using billing data provided by FPUC.

Table 6 shows the account breakout between small C&I and large C&I.

Table 6. Summary of Customer Classes for DR Analysis

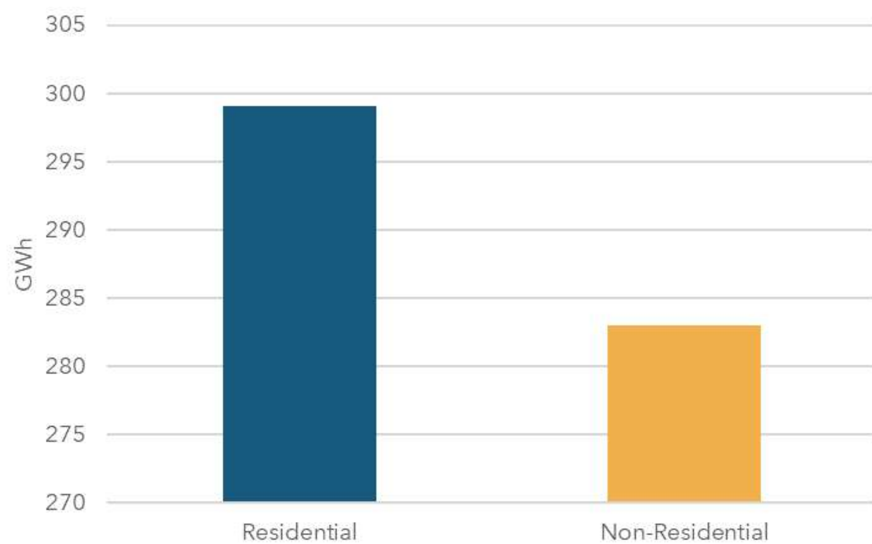
| Customer Class | Annual kWh | Estimated Number of Accounts |
|---|---|---|
| **Small C&I** | 0-15,000 kWh | 2,559 |
| | 15,001-25,000 kWh | 566 |
| | 25,001-50,000 kWh | 457 |
| | 50,001 kWh + | 246 |
| | Total | 3,828 |
| **Large C&I** | 0-50 kW | 269 |
| | 51-300 kW | 327 |
| | 301-500 kW | 14 |
| | 501 kW + | 8 |
| | Total | 618 |

## 3.3 Analysis of System Load

### 3.3.1 System Energy Sales

Technical potential is based on FPUC's load forecast for the year 2025 from their 2022 Long-Term Projections of Electricity Energy and Demand, which is illustrated in Figure 5.

Figure 5. 2025 Electricity Sales Forecast by Sector



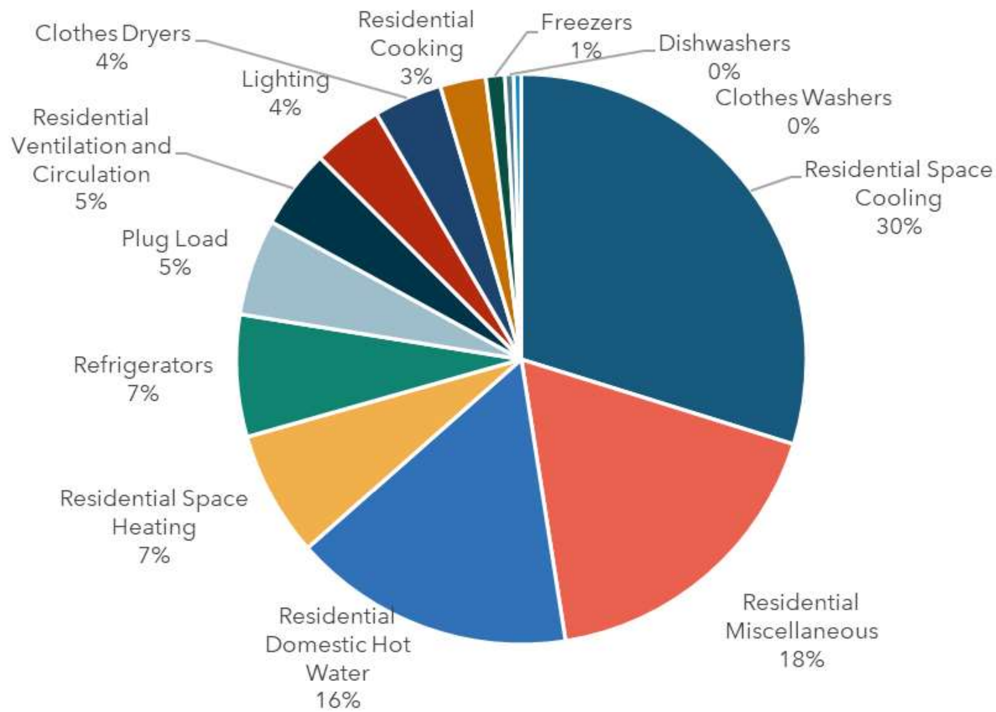

### 3.3.2 System Demand

To determine the technical potential for DR, Resource Innovations first established peaking conditions for each utility by looking at when each utility historically experienced its maximum demand. The primary data source used to determine when maximum DR impact was the historical system load for FPUC. The data provided contained the system loads for all 8,760 hours of the most recent five years leading up to the study (2016-2021). The utility summer and winter peaks were then identified within the utility-defined peaking conditions. For FPUC the summer peaking conditions were defined as August from 4:00-5:00 PM and the winter peaking conditions were defined as January from 7:00-8:00 AM. The seasonal peaks were then selected as the maximum demand during utility peaking conditions.

### 3.3.3 Load Disaggregation

The disaggregated annual electric loads[4] for the base year 2025 by sector and end-use are summarized in Figure 6, Figure 7, and Figure 8.

Figure 6. Residential Baseline (2025) Energy Sales by End-Use




[4] Full disaggregation of system demand by end-use was not conducted, as DR potential for residential and small C&I customers focused on specific end-uses of particular interest because of their large contribution to peak period system load, and was not end-use specific for large C&I customers. A description of the end-use analysis for residential and small C&I customers is included in Section 5.1.2

Figure 7. Commercial Baseline (2025) Energy Sales by End-Use

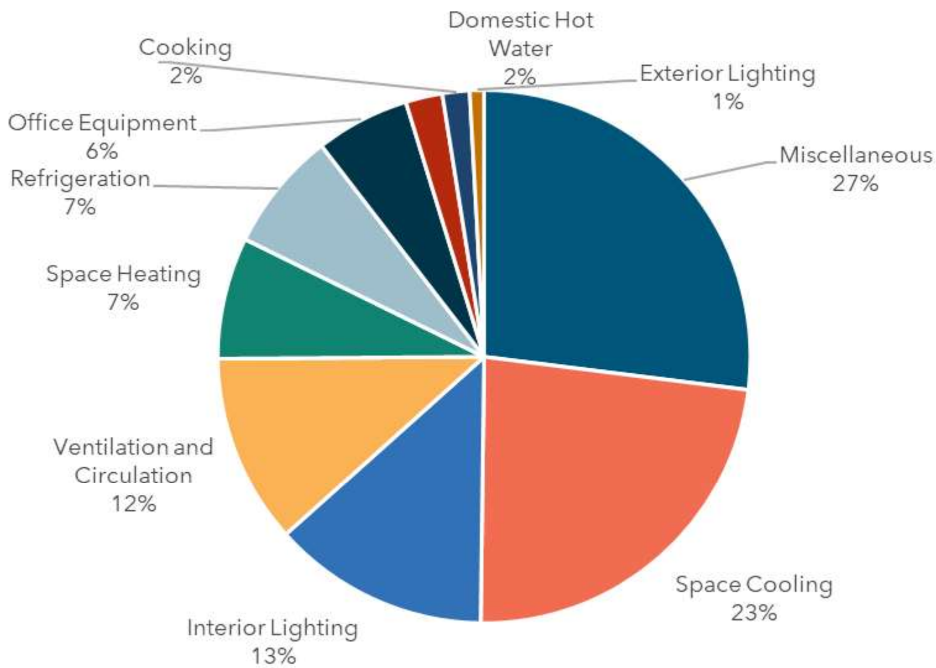
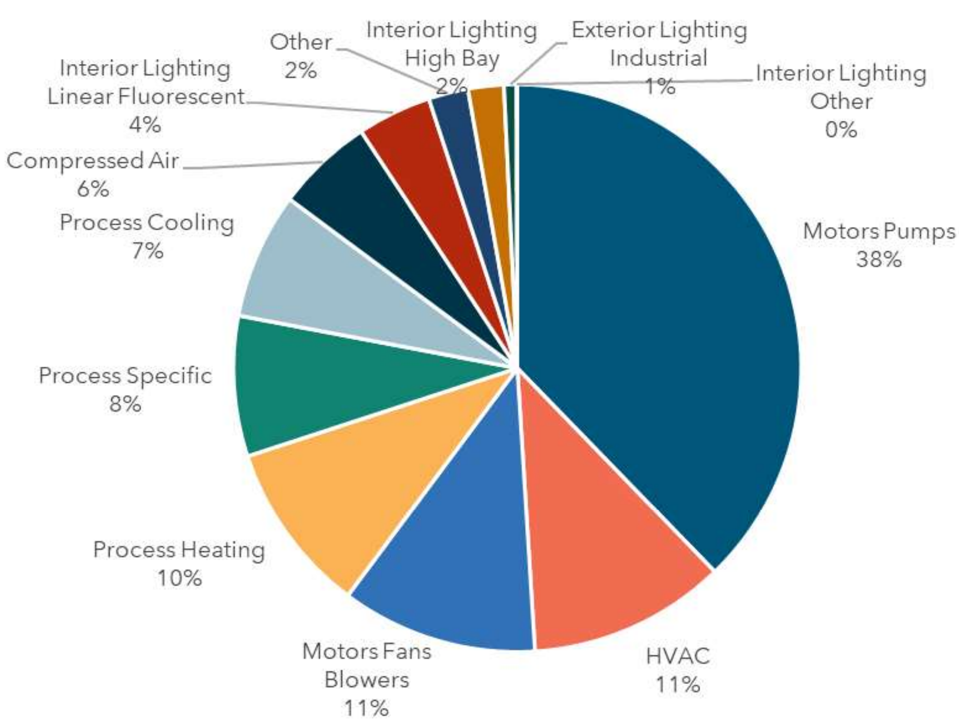



Figure 8. Industrial Baseline (2025) Energy Sales by End-Use



# 4 DSM Measure Development

DSM potential is described by comparing baseline market consumption with opportunities for savings. Describing these individual savings opportunities results in a list of DSM measures to analyze. This section presents the methodology to develop the EE, DR, and DSRE measure lists.

## 4.1 Methodology

Resource Innovations identified a comprehensive catalog of DSM measures for the study. The measure list is the same for all FEECA Utilities. The iterative vetting process with the utilities to develop the measure list began by initially examining the list of measures included in the 2019 Goals docket. This list was then adjusted based on proposed measure additions and revisions provided by the FEECA Utilities. Resource Innovations further refined the measure list based on reviews of Resource Innovations' DSM measure library, compiled from similar market potential studies conducted in recent years throughout the United States, as well as measures included in other utility programs where Resource Innovations is involved with program design, implementation, or evaluation. The FEECA Utilities also reached out to interested parties and received input with recommendations on measure additions to the 2019 measure list. Their measure suggestions were reviewed and incorporated into the study as appropriate. External measure suggestions and actions are summarized in Appendix D. The extensive, iterative review process involving multiple parties has ensured that the study included a robust and comprehensive set of DSM measures.

See Appendix A for the list of EE measures, Appendix B for the list of DR measures, and Appendix C for the list of DSRE measures analyzed in the study.

## 4.2 EE Measures

EE measures represent technologies applicable to the residential, commercial, and industrial customers in the FEECA Utilities' service territories. The development of EE measures included consideration of:

- EE technologies that are applicable to Florida and commercially available: Measures that are not applicable due to climate or customer characteristics were excluded, as were "emerging" technologies that are not currently commercially available to FEECA utility customers.
- Current and planned Florida Building Codes and Federal equipment standards (Codes & Standards) for baseline equipment: Measures included from prior studies

were adjusted to reflect current Codes & Standards as well as updated efficiency tiers, as appropriate.
- Eligibility for utility DSM offerings in Florida: For example, behavioral measures were excluded from consideration, as they historically have not been allowed to count towards utility DSM goals. Behavioral measures are intended to motivate customers to operate in a more energy-efficient manner (e.g., setting an air-conditioner thermostat to a higher temperature) without accompanying: a) physical changes to more efficient end-use equipment or to their building envelope, b) utility-provided products and tools to facilitate the efficiency improvements, or c) permanent operational changes that improve efficiency which are not easily revertible to prior conditions. These types of behavioral measures were excluded because of the variability in forecasting the magnitude and persistence of energy and demand savings from the utility's perspective. Additionally, decoupling behavioral measure savings from the installation of certain EE technologies like smart thermostats can be challenging and could result in overlapping potential with other EE measures included in the study.

Upon development of the final EE measure list, utility-specific measure details were developed. RI maintains a proprietary online database of energy efficiency measures for MPS studies, which was used as a starting point for measure development for this study. Measures are added or updated at the request of project stakeholders or because of changes to the EE marketplace (for example, new codes and standards, or current practice in the market). Measure data are refined as new data or algorithms are developed for estimating measure impacts, and updated for each study to incorporate inputs parameters specific to the service territory being analyzed. The database contains the following information for each of the measures:

- Measure description: measure classification by type, end-use, and subsector, and description of the base-case and the efficient-case scenarios.
- kWh savings: Energy savings associated with each measure were developed through engineering algorithms or building simulation modeling, taking climate data and customer segments into consideration as appropriate. Reference sources used for developing residential, commercial, and industrial measure savings included a variety of Florida-specific, as well as regional and national sources, such as utility-specific measurement & verification (M&V) data, technical reference manuals (TRM) from other jurisdictions, ENERGY STAR calculators, and manufacturer or retailer specifications for particular products.
- Energy savings were applied in RI's TEA-POT model as a percentage of total baseline consumption. Peak demand savings were determined using utility-specific load shapes or coincidence factors.

- Measure Expected Useful Lifetime: Sources included the Database for Energy Efficient Resources (DEER), the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Handbook, TRMs, and other regional and national measure databases and EE program evaluations.
- Measure Costs: Per-unit costs (full or incremental, depending on the application) associated with measure installations. Sources included: TRMs, ENERGY STAR calculator, online market research, FEECA utility program data, and other secondary sources.

The measure details from the online measure library are exported for use in RI's TEA-POT model, accompanied by utility-specific estimates of measure applicability. Measure applicability is a general term encompassing an array of factors, including technical feasibility of installation, and the measure's current saturation as well as factors to allocate savings associated with competing measures. Information used was primarily derived from data in current regional and national databases, as well as FPUC's program tracking data. These factors are described in Table 7.

**Table 7. Measure Applicability Factors**

| Measure Impact | Explanation | Sources |
|---|---|---|
| Technical Feasibility | The percentage of buildings that can have the measure physically installed. Various factors may affect this, including, but not limited to, whether the building already has the baseline measure (e.g., dishwasher), and limitations on installation (e.g., size of unit and space available to install the unit). | Various secondary sources and engineering experience. |
| Measure Incomplete Factor | The percentage of buildings without the specific measure currently installed. | Utility RASS; EIA RECS, CBECS; MECS; ENERGY STAR sales figures; and engineering experience. |
| Measure Share | Used to distribute the percentage of market shares for competing measures (e.g., only blown-in ceiling insulation or spray foam insulation, not both would be installed in an attic). | Utility customer data, Various secondary sources and engineering experience. |

As shown in Table 8, the measure list includes 395 unique energy-efficiency measures. Expanding the measures to account for all appropriate installation scenarios resulted in

9,535 measure permutations, which are the application of individual measures to various customer segments, construction types, and end-uses (i.e., a single air-source heat pump "measure" can be installed in single family, multi-family, and manufactured homes, as well as new and existing vintages of each home type, and impacts both space cooling and space heating end-uses, resulting in twelve separate measure "permutations" analyzed).

Table 8. EE Measure Counts by Sector

| Sector | Unique Measures | Permutations |
|---|---|---|
| **Residential** | 119 | 1,173 |
| **Commercial** | 164 | 5,798 |
| **Industrial** | 112 | 2,564 |

## 4.3 DR Measures

The DR measures included in the measure list utilize the following DR strategies:

- **Direct Load Control.** Utility control of selected equipment at the customer's home or business, such as HVAC or water heaters.
- **Critical Peak Pricing (CPP) with Technology.** Electricity rate structures that vary based on time of day. Includes CPP when the rate is substantially higher for a limited number of hours or days per year (customers receive advance notification of CPP event) coupled with technology that enables customer to lower their usage in a specific end-use in response to the event (e.g., HVAC via smart thermostat).
- **Contractual DR.** Customers receive incentive payments or a rate discount for committing to reduce load by a pre-determined amount or to a pre-determined firm service level upon utility request.
- **Automated DR.** Utility dispatched control of specific end-uses at a customer facility.

DR initiatives that do not rely on the installation of a specific device or technology to implement (such as a voluntary curtailment program or time of use rates) were not included.

A workbook was developed for each measure which included the same measure inputs as previously described for the EE measures. In addition, the DR workbook included expected load reduction from the measure, based on utility technical potential, existing utility DR programs, and other nationwide DR programs if needed.

For technical potential, Resource Innovations did not break out results by specific measure or control technology because all of the developed measures target the end-uses estimated

for technical potential (i.e., potential is reported for space cooling end-use and not allocated to switches, smart thermostats, etc.).

## 4.4 DSRE Measures

The DSRE measure list includes rooftop PV systems, battery storage systems charged from PV systems, and CHP systems.

**PV Systems**

PV systems utilize solar panels (a packaged collection of PV cells) to convert sunlight into electricity. A system is constructed with multiple solar panels, a DC/AC inverter, a racking system to hold the panels, and electrical system interconnections. These systems are often roof-mounted systems that face south-west, south, and/or, south-east. The potential associated with roof-mounted systems installed on residential and commercial buildings was analyzed.

**Battery Storage Systems Charged from PV Systems**

Distributed battery storage systems included in this study consist of behind-the-meter battery systems installed in conjunction with an appropriately-sized PV system at residential and commercial customer facilities. These battery systems typically consist of a DC-charged battery, a DC/AC inverter, and electrical system interconnections to a PV system. On their own battery storage systems do not generate or conserve energy, but can collect and store excess PV generation to provide power during particular time periods, which for DSM purposes would be to offset customer demand during the utility's system peak.

**CHP Systems**

In most CHP applications, a heat engine creates shaft power that drives an electrical generator (fuel cells can produce electrical power directly from electrochemical reactions). The waste heat from the engine is then recovered to provide other on-site needs. Common prime mover technologies used in CHP applications and explored in this study include:

- Steam turbines
- Gas turbines
- Micro turbines
- Fuel Cells
- Internal combustion engines

A workbook was developed for each measure which included the inputs previously described for EE measures and prime mover operating parameters.

# 5 Technical Potential

In the previous sections, the approach for DSM measure development was summarized, and the 2025 base year load shares and reference-case load forecast were described. The outputs from these tasks provided the input for estimating the technical potential scenario, which is discussed in this section.

The technical potential scenario estimates the potential energy and demand savings when all technically feasible and commercially available DSM measures are implemented without regard for cost-effectiveness and customer willingness to adopt the most impactful EE, DR, or DSRE technologies. Since the technical potential does not consider the costs or time required to achieve these savings, the estimates provide a theoretical upper limit on electricity savings potential. Technical potential is only constrained by factors such as technical feasibility and applicability of measures. For this study, technical potential included full application of the commercially available DSM measures to all residential, commercial, and industrial customers in the utility's service territory.

## 5.1 Methodology

### 5.1.1 EE Technical Potential

EE technical potential refers to delivering less electricity to the same end-uses. In other words, technical potential might be summarized as "doing the same thing with less energy, regardless of the cost."

DSM measures were applied to the disaggregated utility electricity sales forecasts to estimate technical potential. This involved applying estimated energy savings from equipment and non-equipment measures to all electricity end-uses and customers. Technical potential consists of the total energy and demand that can be saved in the market which Resource Innovations reported as single numerical values for each utility's service territory.

The core equation used in the residential sector EE technical potential analysis for each individual efficiency measure is shown in Equation 1 below, while the core equation used in the nonresidential sector technical potential analysis for each individual efficiency measure is shown in Equation 2.

**Equation 1: Core Equation for Residential Sector EE Technical Potential**

Technical Potential of Efficient Measures = Total Number of Households × Base Case Equipment Energy Use Intensity (kWh/unit) × Saturation Shares × Percent Incomplete × Feasibility Factor × Savings Factor

Where:

- **Baseline Equipment Energy Use Intensity** = the electricity used per customer per year by each baseline technology in each market segment. In other words, the baseline equipment energy-use intensity is the consumption of the electrical energy using equipment that the efficient technology replaces or affects.
- **Saturation Share** = the fraction of the end-use electrical energy that is applicable for the efficient technology in a given market segment. For example, for residential cooling, the saturation share would be the fraction of all residential electric customers that have central air conditioners in their household.
- **Percent Incomplete** = the fraction of equipment that is not considered to already be energy efficient. To extend the example above, the fraction of central air conditioners that is not already energy efficient.
- **Feasibility Factor** = the fraction of units that is technically feasible for conversion to the most efficient available technology from an engineering perspective (i.e., it may not be possible to install LEDs in all light sockets in a home because the available styles may not fit in every socket).
- **Savings Factor** = the percentage reduction in electricity consumption resulting from the application of the efficient technology.

**Equation 2: Core Equation for Non-Residential Sector EE Technical Potential**

Technical Potential of Efficient Measures = Total Stock Sq. Footage by Building Type by EDC × Base Case Equipment Energy Use Intensity (kWh/unit) × Saturation Shares × Percent Incomplete × Feasibility Factor × Savings Factor

Where:

- **Total Stock Square Footage by Segment** = the forecasted square footage level for a given building type (e.g., square feet of office buildings).
- **Baseline Equipment Energy Use Intensity** = the electricity used per square foot per year by each baseline equipment type in each market segment.

- **Saturation Shares** = the fraction of total end-use energy consumption associated with the efficient technology in a given market segment. For example, for packaged terminal air-conditioner (PTAC), the saturation share would be the fraction of all space cooling kWh in a given market segment that is associated with PTAC equipment.
- **Percent Incomplete** = the fraction of equipment that is not considered to already be energy efficient.
- **Feasibility Factor** = the fraction of the equipment or practice that is technically feasible for conversion to the efficient technology from an engineering perspective (i.e., it may not be possible to install Variable Frequency Drives (VFD) on all motors in a given market segment).
- **Savings Factor** = the percentage reduction in electricity consumption resulting from the application of the efficient technology.

It is important to note that the technical potential estimate represents electricity savings potential at a specific point in time. In other words, the technical potential estimate is based on data describing status quo customer electricity use and technologies known to exist today. As technology and electricity consumption patterns evolve over time, the baseline electricity consumption will also change accordingly. For this reason, technical potential is a discrete estimate of a dynamic market. Resource Innovations reported the technical potential for 2025, based on currently known DSM measures and observed electricity consumption patterns.

### Measure Interaction and Competition (Overlap)

While the technical potential equations listed above focus on the technical potential of a single measure or technology, Resource Innovations' modeling approach does recognize the overlap of individual measure impacts within an end-use or equipment type, and accounts for the following interactive effects:

- Measure interaction: Installing high-efficiency equipment could reduce energy savings in absolute terms (kWh) associated with non-equipment measures that impact the same end-use. For example, installing a high-efficiency heat pump will reduce heating and cooling consumption which will reduce the baseline against which attic insulation would be applied, thus reducing savings associated with installing insulation. To account for this interaction, Resource Innovations' TEA-POT model ranks measures that interact with one another and reduces the baseline consumption for the subsequent measure based on the savings achieved by the preceding measure. For technical potential, interactive measures are ranked based on total end-use energy savings percentage.
- Measure competition (overlap): The "measure share"—as defined above—accounted for competing measures, ensuring savings were not double-counted. This interaction

occurred when two or more measures "competed" for the same end-use. For example, a T-12 lamp could be replaced with a T-8 or linear LED lamp.

**Addressing Naturally-Occurring EE**

Naturally occurring energy efficiency includes actions taken by customers to improve the efficiency of their homes and businesses in the absence of utility program intervention. For the analysis of technical potential, Resource Innovations verified with FPUC's forecasting group that the baseline sales forecasts incorporated two known sources of naturally-occurring efficiency:

- Codes and Standards: The sales forecasts already incorporated the impacts of known Code & standards changes.
- Baseline Measure Adoption: The sales forecast excluded the projected impacts of future DSM efforts but included already implemented DSM penetration.

By properly accounting for these factors, the technical potential analysis estimated the additional EE opportunities beyond what is already included in the utility sales forecast.

### 5.1.2 DR Technical Potential

The concept of technical potential applies differently to DR than for EE. Technical potential for DR is effectively the magnitude of loads that can be curtailed during conditions when utilities need peak capacity reductions. In evaluating this potential at peak capacity, the following were considered: which customers are consuming electricity at those times? What end-uses are in play? Can those end-use loads be managed? Large C&I accounts generally do not provide the utility with direct control over particular end-uses. Instead, many of these customers will forego electric demand temporarily if the financial incentive is large enough. For residential and small C&I customers where DR generally takes the form of direct utility control, technical potential for DR is limited by the loads that can be controlled remotely at scale.

This framework makes end-use disaggregation an important element for understanding DR potential, particularly in the residential and small C&I sectors. When done properly, end-use disaggregation not only provides insights into which loads are on and off when specific grid services are needed, it also provides insight concerning how key loads and end-uses, such as air conditioning use, vary across customers. Resource Innovations' approach used for load disaggregation is more advanced than what is used for most potential studies. Instead of disaggregating annual consumption or peak demand, Resource Innovations produced end-use load disaggregation for all 8,760 hours. This was needed because the loads available at times when different grid applications are needed can vary substantially. Instead

of producing disaggregated loads for the average customer, the study was produced for several customer segments. Because customer-level load data was not available for FPUC, this process relied on interval load data from FPL's load research samples for each customer segment as best proxy. Using FPL's load data, Resource Innovations examined three residential segments based on customer housing type, four different small C&I segments based on customer size, and four different large C&I segments based on customer size, for a total of 11 different customer segments.

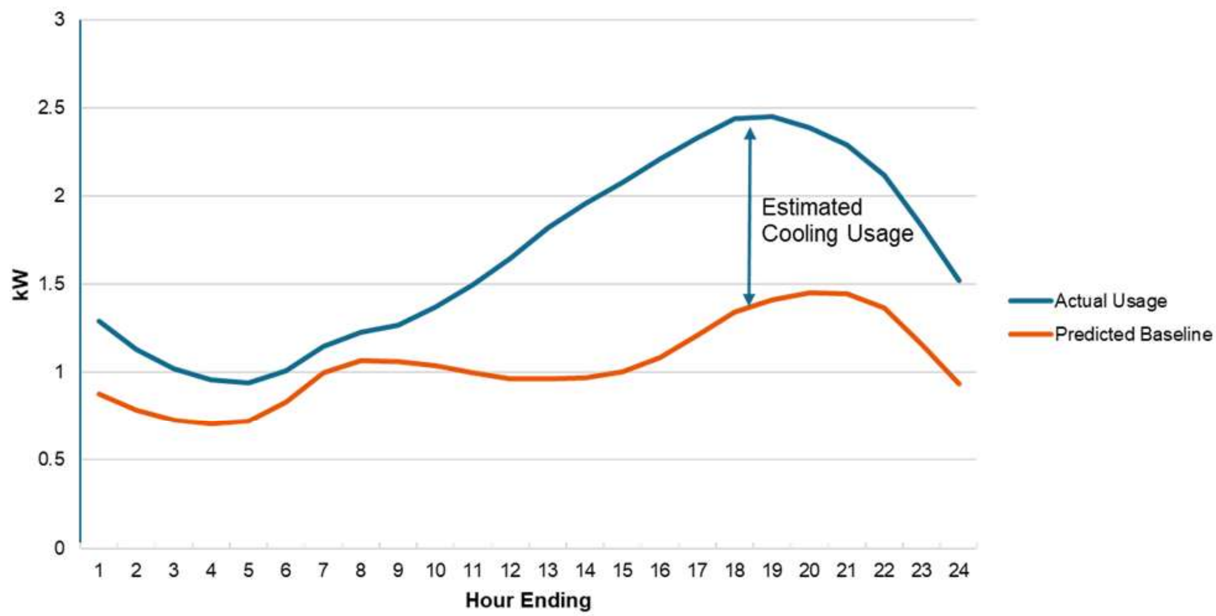
Technical potential, in the context of DR, is defined as the total amount of load available for reduction that is coincident with the period of interest; in this case, the system peak hour for the summer and winter seasons. Thus, two sets of capacity values are estimated: a summer capacity and a winter capacity.

As previously mentioned, for technical potential purposes, all coincident large C&I load is considered dispatchable, while residential and small C&I DR capacity is based on specific end-uses. Summer DR capacity for residential customers was comprised of air-conditioning (AC), pool pumps, water heaters, and managed electric vehicle charging. For small C&I customers, summer capacity was based on AC load. For winter DR capacity, residential was based on electric heating, pool pumps, and water heaters. For small C&I customers, winter capacity was based on electric heating.

AC and heating load profiles were generated for residential and small C&I customers using a sample customer interval data provided by FPL. This sample included a customer breakout based on housing type for residential customers and size for small C&I customers. Resource Innovations then used the interval data from these customers to create an average load profile for each customer segment.

The average load profile for each customer segment was combined with historical weather data, and used to estimate hourly load as a function of weather conditions. AC and heating loads were estimated by first calculating the baseline load on days when cooling degree days (CDD) and heating degree days (HDD) were equal to zero, and then subtracting this baseline load. This methodology is illustrated by Figure 9 (a similar methodology was used to predict heating loads).

Figure 9: Methodology for Estimating Cooling Loads




This method was able to produce estimates for average AC/heating load profiles for the seven different customer segments within the residential and small C&I sectors.

Profiles for residential water heater and pool pump loads were estimated by utilizing end-use load data from NREL's residential end-use load profile database.

For all eligible loads, the technical potential was defined as the amount that was coincident with system peak hours for each season, which are August from 4:00-5:00 PM for summer, and January from 7:00-8:00 AM for winter. As mentioned in Section 4, for technical potential there was also no measure breakout needed, because all measures will target the end-uses' estimated total loads.

### 5.1.3 DSRE Technical Potential

#### 5.1.3.1 PV Systems

To determine technical potential for PV systems, RI estimated the percentage of rooftop square footage in Florida that is suitable for hosting PV technology. Our estimate of technical potential for PV systems in this report is based in part on the available roof area and consisted of the following steps:

- Step 1: Outcomes from the forecast disaggregation analysis were used to characterize the existing and new residential, commercial, and industrial building stocks.
    - To calculate the total roof area for residential buildings, the average roof area per household is multiplied by the number of households.
    - For commercial and industrial buildings, RI calculated the total roof area by first dividing the load forecast by the energy usage intensity, which provides an estimate of the total building square footage. This result is then divided by the average number of floors to derive the total roof area.
- Step 2: The total available roof area feasible for installing PV systems was calculated. Relevant parameters included unusable area due to other rooftop equipment and setback requirements, in addition to possible shading from trees and limitations of roof orientation (factored into a "technical suitability" multiplier).
- Step 3: Estimated the expected power density (kW per square foot of roof area).
- Step 4: Estimated the hourly PV generation profile using NREL's PV Watts Calculator
- Step 5: Calculated total energy and coincident peak demand potential by applying RI's Spatial Penetration and Integration of Distributed Energy Resources (SPIDER) Model.

The methodology presented in this report uses the following formula to estimate overall technical potential of PVs:

**Equation 3: Core Equation for Solar DSRE Technical Energy Potential**

PV Technical Energy Potential = Suitable Rooftop PV Area (Sq Ft) × PV Power Density (kW-DC/Sq Ft) × Generation Factor (kWh/kW-DC)

Where:

- **Suitable Rooftop PV Area for Residential [Square Feet]:** Number of Residential Buildings x Average Roof Area Per Building x Technical Suitability Factor
- **Suitable Rooftop PV Area for Commercial [Square Feet] :** Energy Consumption [kWh] / Energy Intensity [kWh / Square Feet] / Average No. of Stories Per Building x Technical Suitability Factor
- **PV Power Density [kW-DC/Square Feet]:** Maximum power generated in Watts per square foot of solar panel.
- **Generation Factor:** Annual Energy Generation Factor for PV, from PV Watts (dependent on local solar irradiance)

#### 5.1.3.2 Battery Storage Systems Charged from PV Systems

Battery storage systems on their own do not generate power or create efficiency improvements, but store power for use at different times. Therefore, in analyzing the technical potential for battery storage systems, the source of the stored power and overlap with technical potential identified in other categories was considered.

Battery storage systems that are powered directly from the grid do not produce annual energy savings but may be used to shift or curtail load during particular time periods. As the DR technical potential analyzes curtailment opportunities for the summer and winter peak period, and battery storage systems can be used as a DR technology, the study concluded that no additional technical potential should be claimed for grid-powered battery systems beyond that already attributed to DR.

Battery storage systems that are connected to on-site PV systems also do not produce additional energy savings beyond the energy produced from the PV system[5]. However, PV-connected battery systems do create the opportunity to store energy during period when the PV system is generating more than the home or business is consuming and use that stored power during utility system peak periods.

To determine the additional technical potential peak demand savings for “solar plus storage” systems, our methodology consisted of the following steps:

- Assume that every PV system included in PV Technical Potential is installed with a paired storage system.
- Size the storage system assuming peak storage power is equal to peak PV generation and energy storage duration is three hours.
- Apply RI’s hourly dispatch optimization module in SPIDER to create an hourly storage dispatch profile that flattens the individual customer’s load profile to the greatest extent possible accounting for a) customer hourly load profile, b) hourly PV generation profile, and c) battery peak demand, energy capacity, and roundtrip charge/discharge efficiency.
- Calculate the effective hourly impact for the utility using the above storage dispatch profile, aligned with the utility’s peak hour (calculated separately for summer and winter)
- Report the output storage kW impact on utility coincident peak demand in summer and winter.

[5] PV-connected battery systems experience some efficiency loss due to storage, charging, and discharging. However, for this study, these losses were not quantified.

### 5.1.3.3 CHP Systems

The CHP analysis created a series of unique distributed generation potential models for each primary market sector (commercial and industrial).

Only non-residential customer segments whose electric and thermal load profiles allow for the application of CHP were considered. The technical potential analysis followed a three-step process. First, minimum facilities size thresholds were determined for each non-residential customer segment. Next, the full population of non-residential customers were segmented and screened based on the size threshold established for that segment. Finally, the facilities that were of sufficient size were matched with the appropriately sized CHP technology.

To determine the minimum threshold for CHP suitability, a thermal factor was applied to potential candidate customer loads to reflect thermal load considerations in CHP sizing. In most cases, on-site thermal energy demand is smaller than electrical demand. Thus, CHP size is usually dictated by the thermal load in order to achieve improved efficiencies.

The study collected electric and thermal intensity data from other recent CHP studies. For industrial customers, Resource Innovations assumed that the thermal load would primarily be used for process operations and was not modified from the secondary data sources for Florida climate conditions. For commercial customers, the thermal load is more commonly made up of water heating, space heating, and space cooling (through the use of an absorption chiller). Therefore, to account for the hot and humid climate in Florida, which traditionally limits weather-dependent internal heating loads, commercial customers' thermal loads were adjusted to incorporate a higher proportion of space cooling to space heating as available opportunities for waste heat recovery.

Resource Innovations worked with the utility-provided customer data, focusing on annual consumption due to the absence of NAICS or SIC codes for this utility data. Non-residential customers were subsequently classified based on annual consumption and size. Since NAICS or SIC codes were unavailable, no formal segmentation occurred. Instead, the analysis focused exclusively on annual utility usage. Facilities with annual loads below the kWh thresholds were deemed unlikely to possess the consistent electric and thermal loads necessary to support CHP and were consequently excluded from consideration. Conversely, those meeting the size criteria were aligned with the corresponding CHP technology.

In general, internal combustion engines are the prime mover for systems under 500kW with gas turbines becoming progressively more popular as system size increases above that. Based on the available load by customer, adjusted by the estimated thermal factor for each

segment, CHP technologies were assigned to utility customers in a top-down fashion (i.e., starting with the largest CHP generators).

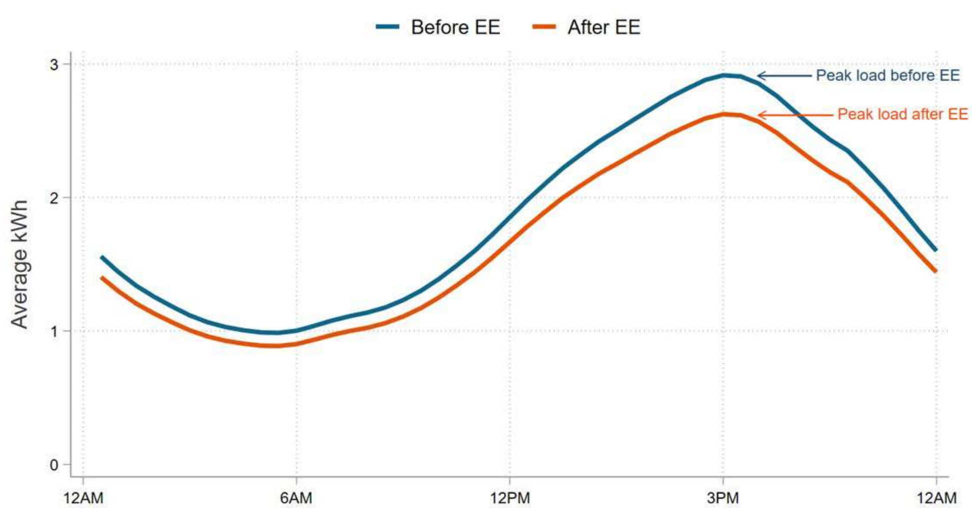
**Measure Interaction**

PV systems and battery storage charged from PV systems were analyzed collectively due to their common power generation source; and therefore, the identified technical potential for these systems is additive. However, CHP systems were independently analyzed for technical potential without consideration of the competition between DSRE technologies or customer preference for a particular DSRE system. Therefore, results for CHP technical potential should not be combined with PV systems or battery storage systems for overall DSRE potential but used as independent estimates.

### 5.1.4 Interaction of Technical Potential Impacts

As described above, the technical potential was estimated using separate models for EE, DR, and DSRE systems. However, there is interaction between these technologies; for example, a more efficient HVAC system would result in a reduced peak demand available for DR curtailment, as illustrated in Figure 10.

Figure 10: Illustration of EE Impacts on HVAC System Load Shape




Therefore, after development of the independent models, the interaction between EE, DR, and DSRE was incorporated as follows:

- The EE technical potential was assumed to be implemented first, followed by DR technical potential and DSRE technical potential.

- To account for the impact of EE technical potential on DR, the baseline load forecast for the applicable end-uses was adjusted by the EE technical potential, resulting in a reduction in baseline load available for curtailment.
- For DSRE systems, the EE and DR technical potential was incorporated in a similar fashion, adjusting the baseline load used to estimate DSRE potential.
  - For the PV analysis, this did not impact the results as the EE and DR technical potential did not affect the amount of PV that could be installed on available rooftops.
  - For the battery storage charged from PV systems, the reduced baseline load from EE resulted in additional PV-generated energy being available for the battery systems and for use during peak periods. The impact of DR events during the assumed curtailment hours was incorporated into the modeling of available battery storage and discharge loads.
- For CHP systems, the reduced baseline load from EE resulted in a reduction in the number of facilities that met the annual energy threshold needed for CHP installations. Installed DR capacity was assumed to not impact CHP potential as the CHP system feasibility was determined based on energy and thermal consumption at the facility. It should be noted that CHP systems not connected to the grid could impact the amount of load available for curtailment with utility-sponsored DR. Therefore, CHP technical potential should not be combined with DR potential but used as independent estimates.

## 5.2 EE Technical Potential

### 5.2.1 Summary

Table 9 summarizes the EE technical potential by sector:

**Table 9. EE Technical Potential**

| | Savings Potential | | |
|---|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) | Energy (GWh) |
| **Residential** | 26 | 15 | 97 |
| **Non-Residential**[6] | 14 | 12 | 71 |
| **Total** | 40 | 27 | 168 |

[6] Non-Residential results include all commercial and industrial customer segments.

### 5.2.2 Residential

Figure 11, Figure 12, and Figure 13 summarize the residential sector EE technical potential by end-use.

Figure 11: Residential EE Technical Potential by End-Use (Summer Peak Savings)

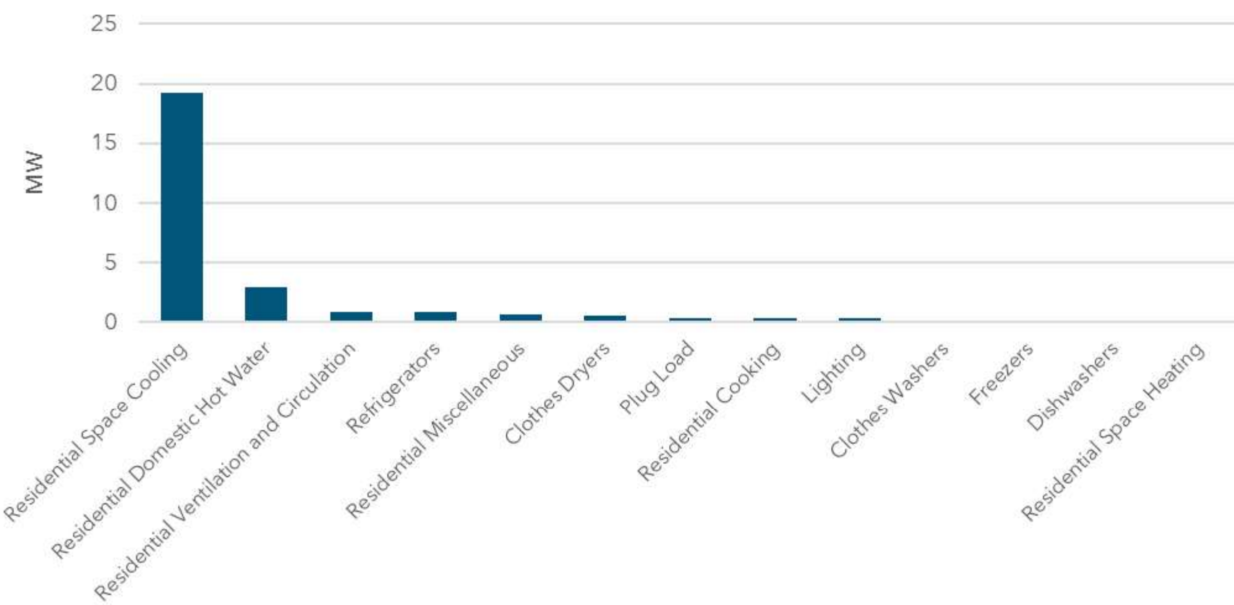


Figure 12: Residential EE Technical Potential by End-Use (Winter Peak Savings)

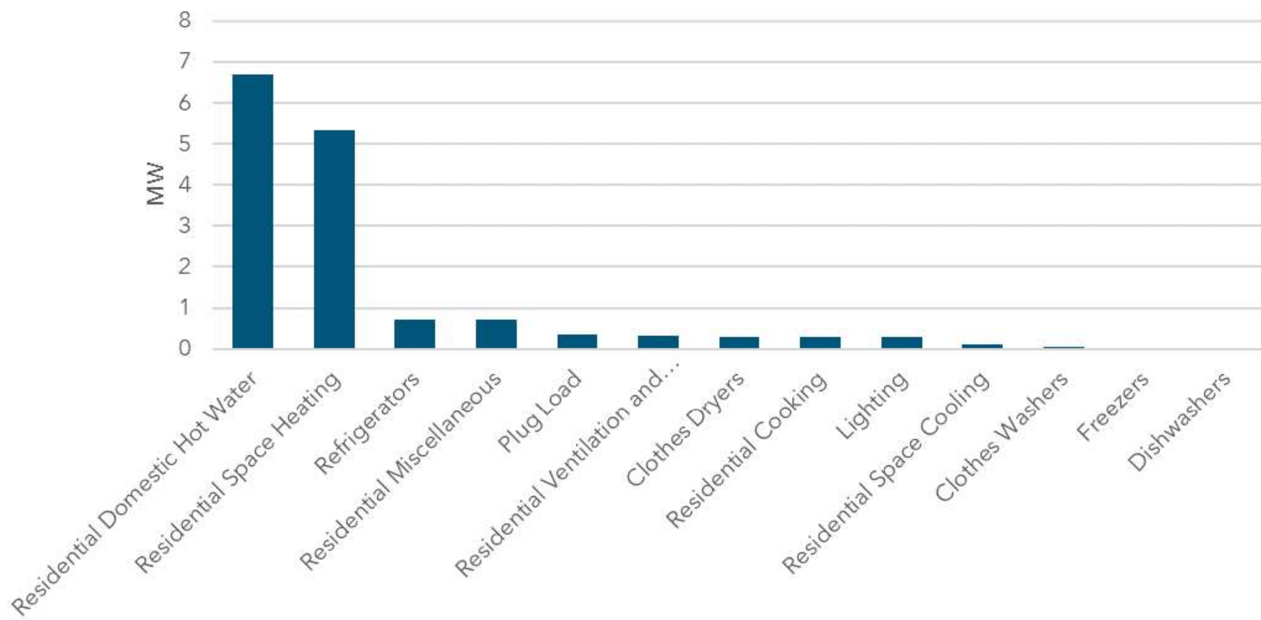
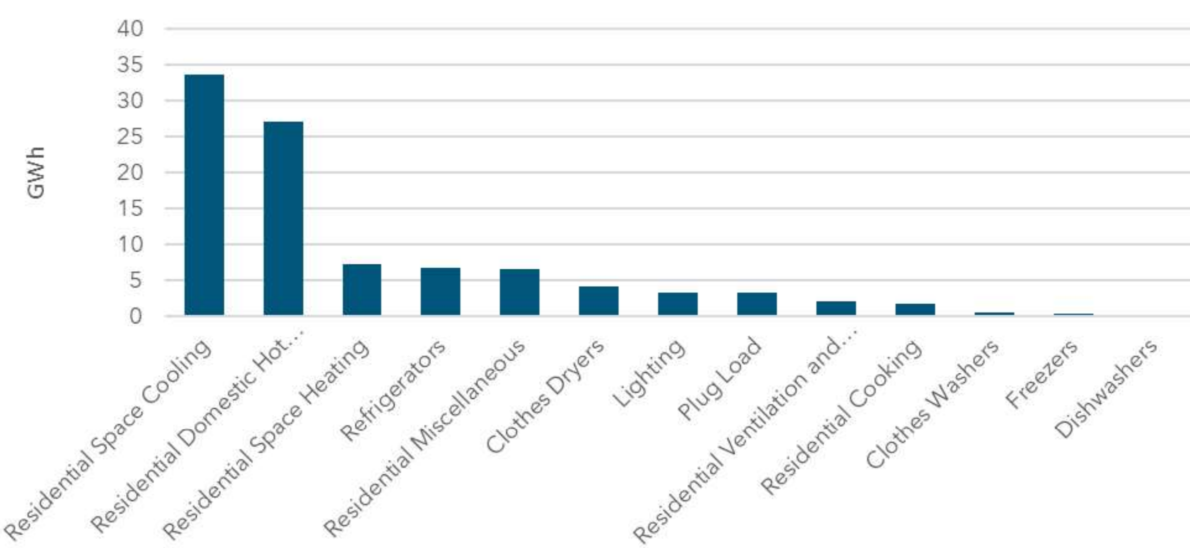



Figure 13: Residential EE Technical Potential by End-Use (Energy Savings)



### 5.2.3 Non-Residential

#### 5.2.3.1 Commercial Segments

Figure 14, Figure 15, and Figure 16 summarize the commercial sector EE technical potential by end-use.

Figure 14: Commercial EE Technical Potential by End-Use (Summer Peak Savings)

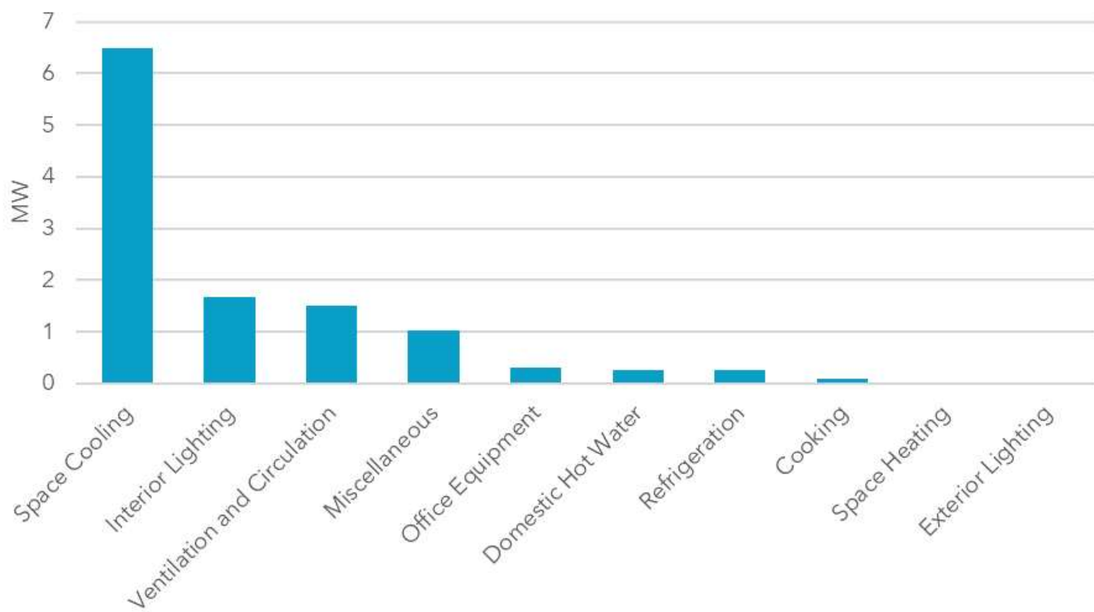


**Figure 15: Commercial EE Technical Potential by End-Use (Winter Peak Savings)**

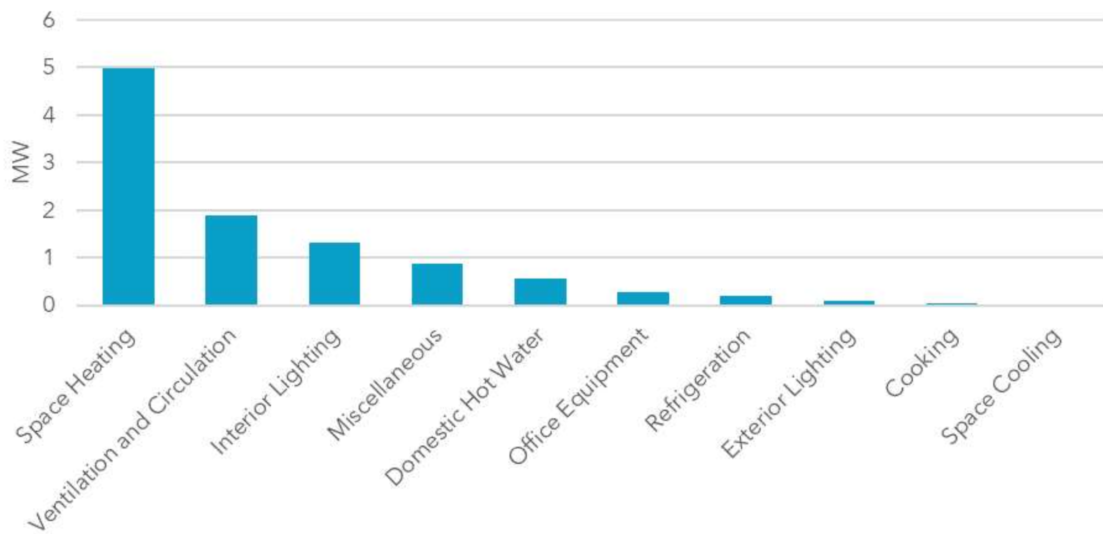
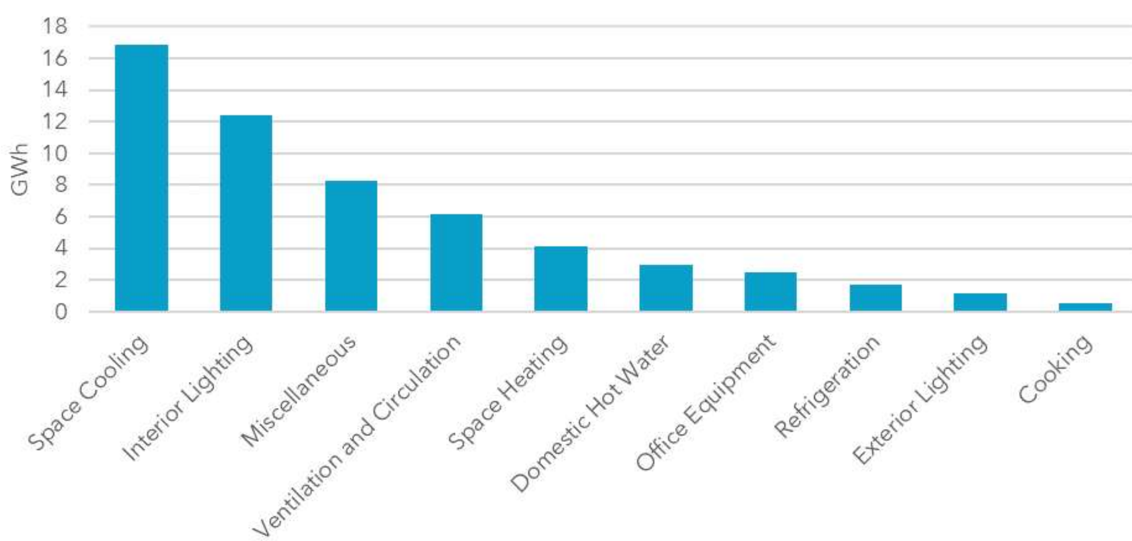



**Figure 16: Commercial EE Technical Potential by End-Use (Energy Savings)**




### 5.2.3.2 Industrial Segments

Figure 17, Figure 18, and Figure 19 summarize the industrial sector EE technical potential by end-use.

**Figure 17: Industrial EE Technical Potential by End-Use (Summer Peak Savings)**

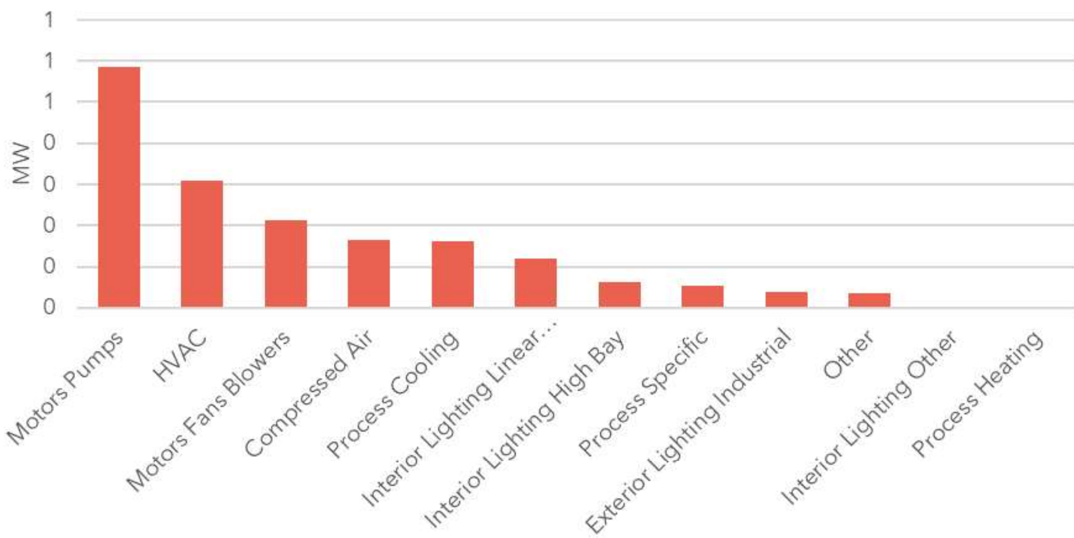



**Figure 18: Industrial EE Technical Potential by End-Use (Winter Peak Savings)**

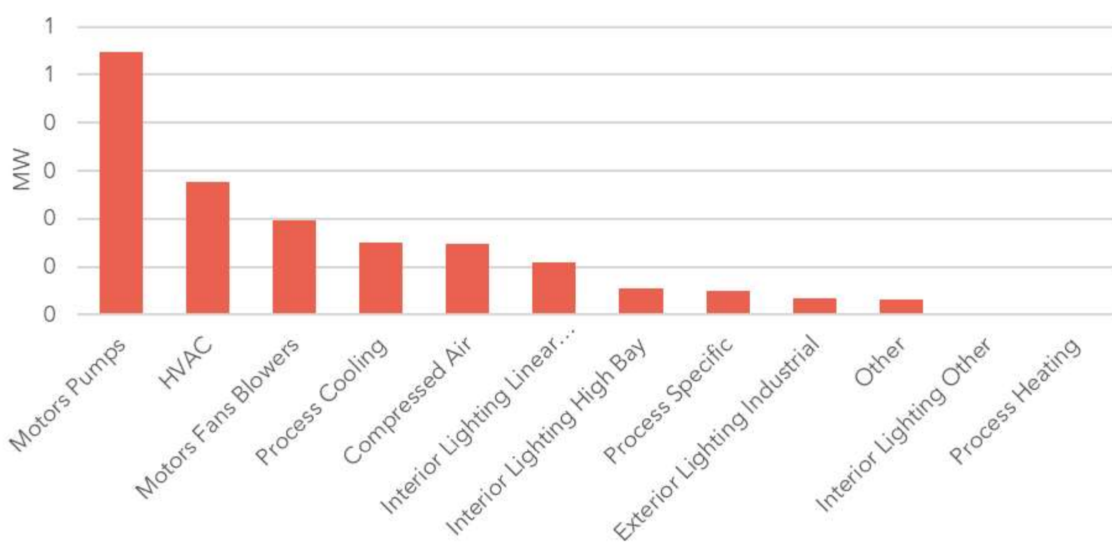
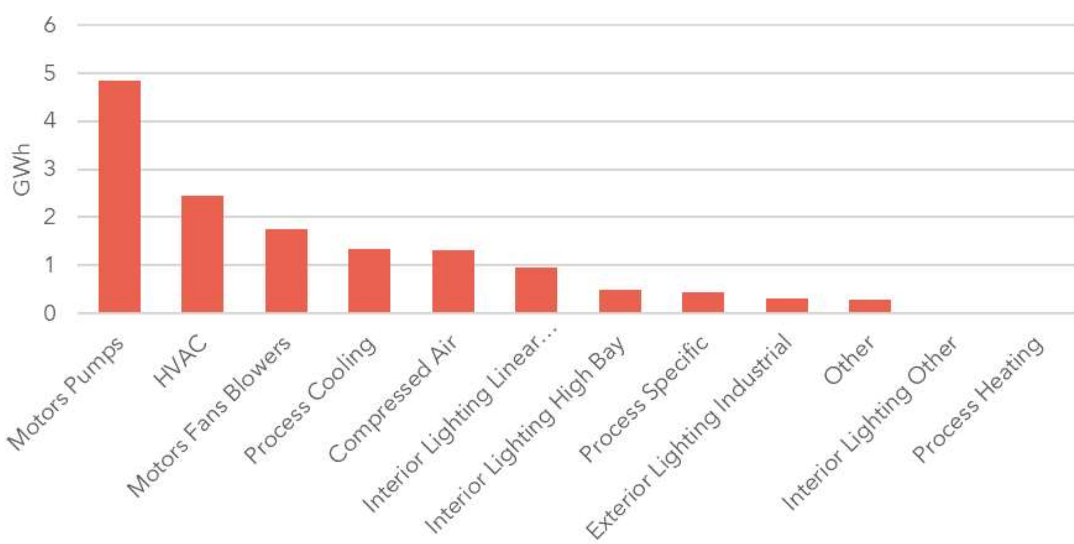


Figure 19: Industrial EE Technical Potential by End-Use (Energy Savings)




## 5.3 DR Technical Potential

Technical potential for DR is defined for each class of customers as follows:

- Residential & Small C&I customers – Technical potential is equal to the aggregate load for all end-uses that can participate in FPUC's current programs plus DR measures not currently offered in which the utility uses specialized devices to control loads (i.e., direct load control programs). This includes cooling and heating loads for residential and small C&I customers and water heater and pool pump loads for residential customers. Not all demand reductions are delivered via direct load control of end-uses. The magnitude of demand reductions from non-direct load control such as time varying pricing, peak time rebates and targeted notifications is linked to cooling and heating loads.
- Large C&I customers – Technical potential is equal to the total amount of load for each customer segment (i.e., that customers reduce their total load to zero when called upon).

Table 10 summarizes the seasonal DR technical potential by sector:

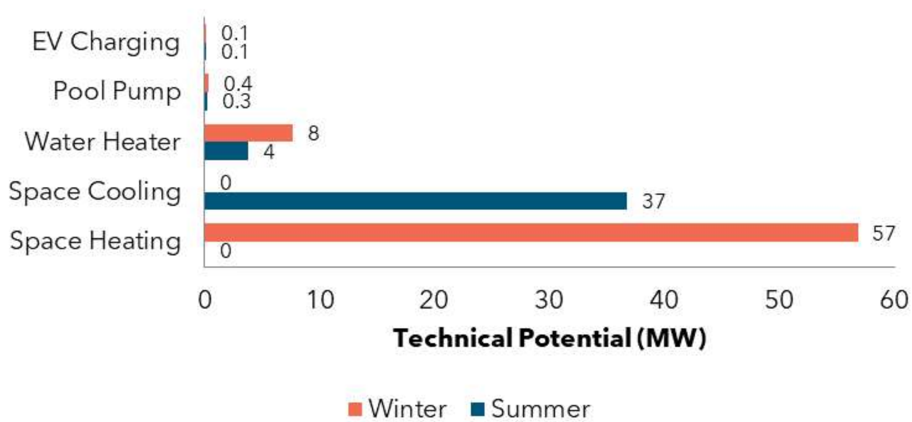
Table 10. DR Technical Potential

| | Savings Potential | |
|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) |
| **Residential** | 41 | 65 |
| **Non-Residential** | 27 | 24 |
| **Total** | 68 | 89 |

## 5.3.1 Residential

Residential technical potential is summarized in Figure 20.

Figure 20: Residential DR Technical Potential by End-Use

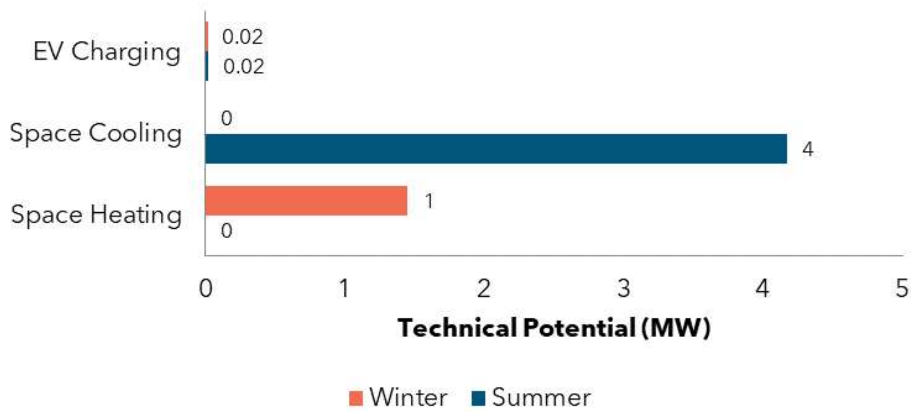



## 5.3.2 Non-Residential

### 5.3.2.1 Small C&I Customers

For small C&I technical potential, Resource Innovations looked at cooling and heating loads only. Small C&I technical potential is provided in Figure 21.

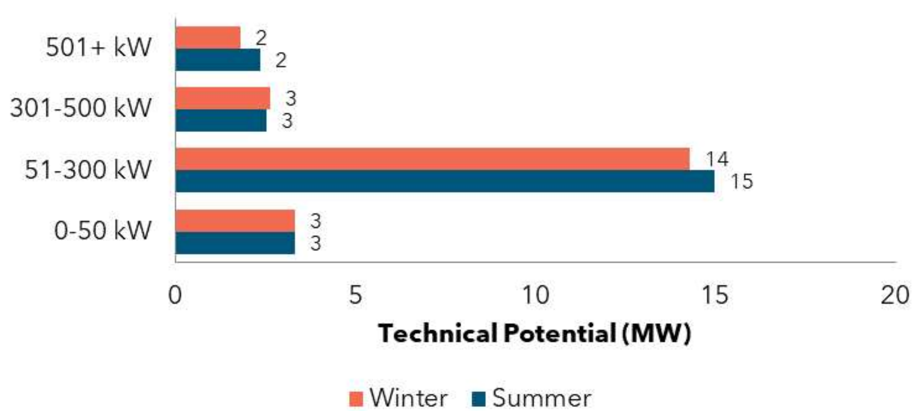
Figure 21: Small C&I DR Technical Potential by End-Use




### 5.3.2.2 Large C&I Customers

Figure 22 provides the technical potential for large C&I customers, broken down by customer size.

Figure 22: Large C&I DR Technical Potential by Segment




## 5.4 DSRE Technical Potential

Table 11 provides the results of the DSRE technical potential for each customer segment:

**Table 11. DSRE Technical Potential[7]**

| | Savings Potential | | |
|---|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) | Energy (GWh) |
| **PV Systems** | | | |
| **Residential** | 17 | 10 | 152 |
| **Non-Residential** | 9 | 3 | 70 |
| **Total** | 26 | 13 | 222 |
| **Battery Storage charged from PV Systems** | | | |
| **Residential** | 5 | 2 | 0 |
| **Non-Residential** | 0 | 1 | 0 |
| **Total** | 5 | 3 | 0 |
| **CHP Systems** | | | |
| **Total** | 23 | 13 | 108 |

[7] PV systems and CHP systems were independently analyzed for technical potential without consideration of the competition between technologies or customer preference for DSRE system.

# Appendix A EE Measure List

For information on how Resource Innovations developed this list, please see Section 4.

Table 12: Residential EE Measures

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| 120v Heat Pump Water Heater 50 Gallons | Residential Domestic Hot Water | 120v Heat Pump Water Heater 50 Gallons | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Air Sealing-Infiltration Control | Residential Space Cooling, Residential Space Heating | Standard Heating and Cooling System with Improved Infiltration Control | Standard Heating and Cooling System with Standard Infiltration Control |
| Air-to-Water Heat Pump | Residential Space Cooling, Residential Space Heating | Energy Star Air-to-Water Heat Pump, 25 SEER, 13 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - 15 SEER/14.3 SEER2 from base electric resistance | Residential Space Cooling, Residential Space Heating | ASHP 15 SEER from base electric resistance | Base AC, 15 SEER, Electric resistance heating |
| ASHP - 24 SEER/22.9 SEER2 (from elec resistance) | Residential Space Cooling, Residential Space Heating | ASHP: 24/22.9 SEER/SEER2, 10.5 HSPF | Base AC, 15 SEER, Electric resistance heating |
| ASHP - 24 SEER/22.9 SEER2, 10.5 HSPF | Residential Space Cooling, Residential Space Heating | ASHP: 24/22.9 SEER/SEER2, 10.5 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - CEE Advanced Tier: 17.8 SEER/17 SEER2; 10.0 HSPF | Residential Space Cooling, Residential Space Heating | CEE Advanced Tier ASHP:17.8/17 SEER/SEER2; 10.0 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - CEE Advanced Tier: 17.8 SEER/17 SEER2; 10.0 HSPF (from elec resistance) | Residential Space Cooling, Residential Space Heating | CEE Advanced Tier ASHP:17.8/17 SEER/SEER2; 10.0 HSPF | Base AC, 15 SEER, Electric resistance heating |
| ASHP - CEE Tier 2: 16.8 SEER/16 SEER2; 9.0 HSPF | Residential Space Cooling, Residential Space Heating | CEE Tier 2 ASHP: 16.8/16 SEER/SEER2; 9.0 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - CEE Tier 2: 16.8 SEER/16 SEER2; 9.0 HSPF (from elec resistance) | Residential Space Cooling, Residential Space Heating | CEE Tier 2 ASHP: 16.8/16 SEER/SEER2; 9.0 HSPF | Base AC, 15 SEER, Electric resistance heating |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| ASHP - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 (from elect resistance) | Residential Space Cooling, Residential Space Heating | ENERGY STAR/CEE Tier 1 ASHP: 16/15.2 SEER/SEER2, 9.0 HSPF | Base AC, 15 SEER, Electric resistance heating |
| ASHP - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2, 9.0 HSPF | Residential Space Cooling, Residential Space Heating | ENERGY STAR/CEE Tier 1 ASHP: 16/15.2 SEER/SEER2, 9.0 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| Basement or Crawlspace Wall Insulation R-15 | Residential Space Cooling, Residential Space Heating | Increased Basement or Crawlspace Wall Insulation (R-15) | Code-Compliant Exterior Below-Grade Wall Insulation (R-10) |
| Bathroom Faucet Aerators | Residential Domestic Hot Water | Low-Flow Faucet Aerator with Flow Rate of 1.5 gpm | Faucet Aerator with Federal Standard Flow Rate of 2.2 gpm |
| CEE Advanced Tier Clothes Dryer | Clothes Dryers | CEE Advanced Tier Clothes Dryer | One Clothes Dryer meeting Federal Standard |
| CEE Advanced Tier Clothes Washer | Clothes Washers | Tier 3 CEE Clothes washer | One Clothes Washer meeting Federal Standard |
| CEE Tier 3 Refrigerator | Refrigerators | Residential Tier 3 Refrigerator | One Refrigerator meeting Federal Standard |
| Ceiling Insulation (R11 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-1985) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R11 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-1985) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R19 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-2020) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R19 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-2020) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R2 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, older (pre-1982) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R2 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, older (pre-1982) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R30 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1986-2020) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R30 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1986-2020) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Ceiling Insulation (R38 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1986-2020) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Central AC - CEE Tier 2: 16.8 SEER/16 SEER2 | Residential Space Cooling | Central AC - CEE Tier 2: 16.8 SEER/16 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC - 24 SEER/22.9 SEER2 | Residential Space Cooling | Central AC - 24 SEER/22.9 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC - CEE Advanced Tier: 17.8 SEER/17 SEER2 | Residential Space Cooling | Central AC - CEE Advanced Tier: 17.8 SEER/17 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 | Residential Space Cooling | Central AC - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC Tune Up | Residential Space Cooling | System tune-up, including coil cleaning, refrigerant charging, and other diagnostics | Existing Typical Central AC without Regular Maintenance/tune-up |
| Dehumidifier Recycling | Plug Load | No dehumidifier | One Dehumidifier meeting Federal Standard |
| Drain Water Heat Recovery | Residential Domestic Hot Water | 50 Gallon Electric Resistance Heater and Drain Water Heat Exchanger | 50 Gallon Electric Resistance Heater, No Drain Water Heat Recovery |
| Duct Insulation | Residential Space Cooling, Residential Space Heating | Standard Electric Heating and Central AC with Insulated Ductwork | Standard Electric Heating and Central AC with Uninsulated Ductwork |
| Duct Repair | Residential Space Cooling, Residential Space Heating | Duct Repair to eliminate/minimize leaks, includes testing and sealing | Standard Electric Heating and Central AC with typical duct leakage |
| ECM Circulator Pump | Residential Miscellaneous | Install ECM Circulator Pump | Install Standard Circulator Pump |
| Energy Star Air Purifier | Plug Load | One Air Purifier meeting ENERGY STAR 2.0 Standards | One Standard Conventional Air Purifier |
| Energy Star Audio-Video Equipment | Plug Load | One DVD/Blu-Ray Player meeting current ENERGY STAR Standards | One Market Average DVD/Blu-Ray Player |
| Energy Star Bathroom Ventilating Fan | Residential Ventilation and Circulation | Bathroom Exhaust Fan meeting current ENERGY STAR Standards | Bathroom Exhaust Fan meeting Federal Standard |
| Energy Star Ceiling Fan | Residential Miscellaneous | 60" Ceiling Fan Meeting ENERGY STAR 3.1 Standards | Standard 60" Ceiling Fan |
| Energy Star Clothes Dryer | Clothes Dryers | One Electric Resistance Clothes Dryer meeting ENERGY STAR 1.1 Standards | One Clothes Dryer meeting Federal Standard |
| Energy Star Clothes Washer | Clothes Washers | One Clothes Washer meeting ENERGY STAR 8.1 Standards | One Clothes Washer meeting Federal Standard |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Energy Star Dehumidifier | Plug Load | One Dehumidifier meeting ENERGY STAR 5.0 Standards | One Dehumidifier meeting Federal Standard |
| Energy Star Dishwasher | Dishwashers | One Dishwasher meeting ENERGY STAR 7.0 Requirements (effective on July 19, 2023), electric water heating | One Dishwasher meeting Federal Standard |
| Energy Star Dishwasher (Gas Water Heating) | Dishwashers | One Dishwasher meeting ENERGY STAR 7.0 Requirements, gas water heating | One Dishwasher meeting Federal Standard; gas water heating |
| Energy Star Door | Residential Space Cooling, Residential Space Heating | 100ft2 of Opaque Door meeting Energy Star Version 6.0 Requirements (U-Value: 0.17) | 100ft2 of Opaque Door meeting current FL Code Requirements |
| ENERGY STAR EV supply equipment (level 2 charger) | Residential Miscellaneous | Level 2 Electric Vehicle Supply Equipment (EVSE) | Level 1 Electric Vehicle Supply Equipment (EVSE) |
| Energy Star Freezer | Freezers | One Freezer meeting current ENERGY STAR 5.1 Standards | One Freezer meeting Federal Standard |
| Energy Star Ground Source Heat Pump | Residential Space Cooling, Residential Space Heating | Energy Star GSHP, 17.1 SEER, 12 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF |
| Energy Star Imaging Equipment | Plug Load | One imaging device meeting current ENERGY STAR Standards | One non-ENERGY STAR imaging device |
| Energy Star Monitor | Plug Load | One Monitor meeting ENERGY STAR 8.0 Standards | One Standard Monitor |
| Energy Star Personal Computer | Plug Load | One Personal Computer meeting ENERGY STAR 8.0 Standards | One Personal Computer meeting ENERGY STARÂ® 3.0 Standards |
| Energy Star Refrigerator | Refrigerators | One Refrigerator/Freezer meeting ENERGY STAR 5.1 Standards | One Refrigerator/Freezer meeting Federal Standard |
| Energy Star Room AC | Residential Space Cooling | Room AC meeting current ENERGY STAR standards | Code-Compliant Room AC |
| Energy Star Set-Top Receiver | Plug Load | One Set-top Box meeting ENERGY STAR 4.1 Standards | One Market Average Set-top Box |
| Energy Star TV | Plug Load | One Television meeting ENERGY STAR 9.0 Standards | One non-ENERGY STAR Television |
| Energy Star Windows | Residential Space Cooling, Residential Space Heating | 100ft2 of Window meeting Energy Star Version 6.0 Requirements (U-Value: 0.27, SHGC: 0.21) | 100ft2 of Window current FL energy code requirements |
| Exterior Wall Insulation | Residential Space Cooling, Residential Space Heating | Increased Exterior Above-Grade Wall Insulation (R-13) | Market Average Existing Exterior Above-Grade Wall Insulation |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Filter Whistle | Residential Ventilation and Circulation | Install the Furnace Filter Alarm | No Furnace Filter Alarm on a Central Forced-Air Furnace |
| Floor Insulation | Residential Space Heating | Increased Floor Insulation (R-30) | Code-Compliant Floor Insulation |
| Freezer Recycling | Freezers | No Freezer | Current Market Freezer |
| Green Roof | Residential Space Cooling | Vegetated Roof Surface on top of Standard Roof | Standard Black Roof |
| Heat Pump Clothes Dryer | Clothes Dryers | One Heat Pump Clothes Dryer | One Clothes Dryer meeting Federal Standard |
| Heat Pump Pool Heater | Residential Miscellaneous | Heat Pump Swimming Pool Heater | Electric Resistance Swimming Pool Heater |
| Heat Pump Tune Up | Residential Space Cooling, Residential Space Heating | System tune-up, including coil cleaning, refrigerant charging, and other diagnostics | Standard Heating and Cooling System without Regular Maintenance/tune-up |
| Heat Pump Water Heater 50 Gallons-CEE Advanced Tier | Residential Domestic Hot Water | CEE Advanced Tier Heat Pump Water Heater 50 Gallons | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Heat Pump Water Heater 50 Gallons-ENERGY STAR | Residential Domestic Hot Water | Heat Pump Water Heater 50 Gallons | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Heat Pump Water Heater 80 Gallons-ENERGY STAR | Residential Domestic Hot Water | Energy Star Heat Pump Water Heater 80 Gallons | Code-Compliant 80 Gallon Electric Resistance Water Heater |
| Heat Trap | Residential Domestic Hot Water | Heat Trap | Existing Water Heater without heat trap |
| High Efficiency Convection Oven | Residential Cooking | One Full-Size Convection Oven meeting ENERGY STAR 3.0 Standards | One Standard Economy-Grade Full-Size Oven |
| High Efficiency Induction Cooktop | Residential Cooking | One residential induction cooktop | One standard residential electric cooktop |
| Home Energy Management System | Lighting, Plug Load, Residential Space Cooling, Residential Space Heating | Typical HVAC by Building Type Controlled by Energy Management System | Typical HVAC by Building Type, Manually Controlled |
| Hot Water Pipe Insulation | Residential Domestic Hot Water | 1' of Insulated Pipe in Unconditioned Spaces, Insulation of R-5 | 1' of Pipe in Unconditioned Spaces with Code Minimum of 1"of Insulation |
| HVAC ECM Motor | Residential Ventilation and Circulation | A brushless permanent magnet (ECM) blower motor for electric furnace | Permanent Split Capacitor Motor for Electric Furnace |
| HVAC Economizer | Residential Space Cooling | Install residential economizer | No economizer |
| HVAC Zoning System | Residential Space Cooling, Residential Space Heating | Install dampers in the ducts, dividing home into multiple | Single zone HVAC system |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| | | zones, each controlled by its own thermostat | |
| Indoor Daylight Sensor | Lighting | Install Indoor Daylight Sensors, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Induction Range | Residential Cooking | Residential induction range | Electric range |
| Instantaneous Hot Water System | Residential Domestic Hot Water | Instantaneous Hot Water System | Standard Efficiency Storage Tank Water Heater |
| Kitchen Faucet Aerators | Residential Domestic Hot Water | Low-Flow Faucet Aerator with Flow Rate of 1.5 gpm | Faucet Aerator with Federal Standard Flow Rate of 2.2 gpm |
| LED - 9W_CFL Baseline | Lighting | LED (assume 9W) replacing CFL baseline lamp | 14W CFL (60W equivalent) |
| LED - 9W_Halogen Baseline | Lighting | LED (assume 9W) replacing EISA-2020 compliant baseline lamp | EISA-2020 compliant baseline lamp (60W equivalent) |
| LED Specialty Lamps-5W Chandelier | Lighting | 5 W Chandelier LED | Standard incandescent chandelier lamp |
| Linear LED | Lighting | Linear LED Lamps in Linear Fluorescent Fixture | Standard (32w) T8 lamps in Linear Fluorescent Fixture |
| Low Flow Showerhead | Residential Domestic Hot Water | Low-Flow Handheld Showerhead, Flow Rate: 1.60 gpm | Standard Handheld Showerhead, Flow Rate: 2.50 gpm |
| New Construction - Whole Home Improvements - Tier 1 | Whole Home | Performance-based improvements in new homes - 20% savings | Residential New Construction (Baseline Efficiency) |
| New Construction - Whole Home Improvements - Tier 2 | Whole Home | Performance-based improvements in new homes - 35% savings | Residential New Construction (Baseline Efficiency) |
| Occupancy Sensors Switch Mounted | Lighting | Switch Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor Lighting Timer | Lighting | Timer on Outdoor Lighting, Controlling 120 Watts | 120 Watts of Lighting, Manually Controlled |
| Outdoor Motion Sensor | Lighting | Motion Sensor on Outdoor Lighting, Controlling 120 Watts | 120 Watts of Lighting, Manually Controlled |
| Ozone Laundry | Clothes Washers | Add a New, Single-Unit Ozone Laundry System to the Clothes Washer | One Clothes Washer meeting Federal Standard |
| Programmable Thermostat | Residential Space Cooling, Residential Space Heating | Standard Heating and Cooling System with Programmable Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Properly Sized CAC | Residential Space Cooling | Properly Sized Central Air Conditioning | Standard Central Air Conditioning, Oversized |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Radiant Barrier | Residential Space Cooling | Radiant Barrier | No radiant barrier |
| Reflective Roof | Residential Space Cooling | Reflective Roof Treatment | Standard dark shingle |
| Refrigerator Coil Cleaning | Refrigerators | Refrigerator Coil Cleaning | |
| Refrigerator Recycling | Refrigerators | No Refrigerator | Current Market Average Refrigerator |
| Residential Whole House Fan | Residential Space Cooling | Standard Central Air Conditioning with Whole House Fan | Standard Central Air Conditioning, No Whole House Fan |
| Sealed crawlspace | Residential Space Cooling, Residential Space Heating | Encapsulated and semi-conditioned crawlspace | Naturally vented, unconditioned crawlspace |
| Smart Breaker | Whole Home | Smart Breaker | standard electric breakers |
| Smart Panel | Whole Home | Multi-channel device that attaches to customer's circuit breaker to enable monitoring and control of major end-use appliances by customer | standard electric panel |
| Smart Power Strip | Plug Load | Smart plug strips for entertainment centers and home office | Standard entertainment center or home office usage, no smart strip controls |
| Smart Thermostat | Residential Space Cooling, Residential Space Heating | Standard Heating and Cooling System with Smart Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Solar Attic Fan | Residential Space Cooling | Standard Central Air Conditioning with Solar Attic Fan | Standard Central Air Conditioning, No Solar Attic Fan |
| Solar Pool Heater | Residential Miscellaneous | Solar Swimming Pool Heater | Electric Resistance Swimming Pool Heater |
| Solar Powered Pool Pumps | Residential Miscellaneous | Solar Powered Pool Pump | Variable Speed Pool Pump Motor |
| Solar Thermal Water Heating System | Residential Domestic Hot Water | Solar Thermal System with Electric Backup | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Spray Foam Insulation(Base R11) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in existing (1982-1985) homes | Existing ceiling insulation based on building code at time of construction |
| Spray Foam Insulation(Base R19) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in existing (1982-1985) homes | Existing ceiling insulation based on building code at time of construction |
| Spray Foam Insulation(Base R2) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in older (pre-1982) homes | Existing ceiling insulation based on building code at time of construction |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Spray Foam Insulation(Base R30) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in existing (1986-2020) homes | Existing ceiling insulation based on building code at time of construction |
| Thermostatic Shower Restriction Valve | Residential Domestic Hot Water | 50 Gallon Electric Resistance Heater and Thermostatic Shower Valves | 50 Gallon Electric Resistance Heater and Standard Shower Valves |
| Variable Refrigerant Flow (VRF) HVAC Systems | Residential Space Cooling, Residential Space Heating | Variable Refrigerant Flow (VRF) HVAC Systems | Code-Compliant ASHP, 15 SEER, 8.8 HSPF |
| Water Heater Blanket | Residential Domestic Hot Water | 50 Gallon Electric Resistance Water Heater with Insulated Tank Wrap | Code-Compliant 50 Gallon Electric Resistance Water Heater, No Tank Wrap |
| Water Heater Thermostat Setback | Residential Domestic Hot Water | 50 Gallon Electric Resistance Water Heater with Temperature Setpoint of 119°F | Code-Compliant 50 Gallon Electric Resistance Water Heater (Temp. Setpoint = 130Â°F) |
| Water Heater Timeclock | Residential Domestic Hot Water | Water Heater Timeclock | Existing Water Heater without time clock |
| Weather stripping | Residential Space Cooling, Residential Space Heating | Specific quantity of weather stripping to seal | |
| Window Caulking | Residential Space Cooling, Residential Space Heating | Window caulking | |
| Window Sun Protection | Residential Space Cooling | Window Film Applied to Standard Window | Standard Window with below Code Required Minimum SHGC |

**Table 13: Commercial EE Measures**

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| 1.5HP Open Drip-Proof (ODP) Motor | Ventilation and Circulation | High Efficiency 1.5 HP Open-Drip Proof Motor | 1.5HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 10HP Open Drip-Proof (ODP) Motor | Ventilation and Circulation | High Efficiency 10 HP Open-Drip Proof Motor | 10HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 20HP Open Drip-Proof (ODP) Motor | Ventilation and Circulation | High Efficiency 20 HP Open-Drip Proof Motor | 20HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| Advanced Rooftop Controller | Ventilation and Circulation | Advanced Rooftop Controller | Without Advanced Rooftop Controller |
| Air Compressor Optimization | Miscellaneous | Performing Routine Maintenance on 20HP Inlet | 20 HP Inlet Modulation Fixed-Speed Compressor |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| | | Modulation Fixed-Speed Compressor | |
| Air Curtains | Space Cooling, Space Heating | Air Curtain across door opening | Door opening with no air curtain |
| Airside Economizer | Space Cooling | Airside Economizer | No economizer |
| Anti-Sweat Controls | Refrigeration | One Medium Temperature Reach-In Case with Anti-Sweat Heater Controls | One Medium Temperature Reach-In Case without Anti-Sweat Heater Controls |
| Auto Off Time Switch | Interior Lighting | Auto-Off Time Switch on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Automatic Door Closer for Walk-in Coolers and Freezers | Refrigeration | One Medium Temperature Walk-In Refrigerator Door with Auto-Closer | One Medium Temperature Walk-In Refrigerator Door without Auto-Closer |
| Beverage Vending Machine Controls | Refrigeration | One non-ENERGY STAR beverage vending machine equipped with infrared occupancy sensing controls | One non-ENERGY STAR beverage vending machine, no controls |
| Bi-Level Lighting Control (Exterior) | Exterior Lighting | Bi-Level Controls on Exterior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Bi-Level Lighting Control (Interior) | Interior Lighting | Bi-Level Controls on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Ceiling Insulation (R19 to R38) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation (R19 to R49) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic - Beyond Code | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation (R2 to R38) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation (R2 to R49) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic - Beyond Code | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Chilled Water Reset | Space Cooling | One Chiller with Reset of Chilled Water Temperature Setpoint | One Chiller with Fixed Chilled Water Temperature |
| Chiller maintenance | Space Cooling | O&M improvements to restore chiller performance | |
| CO Sensors for Parking Garage Exhaust | Miscellaneous | Enclosed Parking Garage Exhaust with CO Control | Constant Volume Enclosed Parking Garage Exhaust |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Commercial Duct Sealing | Space Cooling, Space Heating | Standard Electric Heating and Central AC with Improved Duct Sealing | Standard Electric Heating and Central AC, Standard Duct Sealing |
| Commercial Strategic Energy Management | Whole Building | Commercial Strategic Energy Management | No active energy management |
| Custom measure - Non-lighting | Space Cooling, Space Heating | Custom Improvement to Facility's Operations | Baseline Technology/Process |
| Data Center Hot Cold Aisle | Office Equipment | Equipment configuration that saves HVAC | No hot, cold aisle containment |
| Dedicated Outside Air System (DOAS) | Space Cooling, Space Heating | Install Dedicated Outside Air System (DOAS) | Typical HVAC by Building Type |
| Demand Controlled Circulating Systems | Domestic Hot Water | Recirculation Pump with Demand Control Mechanism | Uncontrolled Recirculation Pump |
| Demand Controlled Ventilation | Ventilation and Circulation | Return Air System with CO2 Sensors | Standard Return Air System, No Sensors |
| Demand Defrost | Refrigeration | Walk-In Freezer System with Demand-Controlled Electric Defrost Cycle | Walk-In Freezer System with Timer-Controlled Electric Defrost Cycle |
| Destratification Fans | Space Heating | Destratification Fans improve temperature distribution by circulating warmer air from the ceiling back down to the floor level | No destratification fan |
| Door Gasket (Cooler) | Refrigeration | New Door Gasket on One-Door Medium Temperature Reach-In Case | Worn or Damaged Door Gasket on One-Door Medium Temperature Reach-In Case |
| Door Gasket (Freezer) | Refrigeration | New Door Gasket on One-Door Medium Temperature Reach-In Case | Worn or Damaged Door Gasket on One-Door Medium Temperature Reach-In Case |
| Drain water heat recovery | Domestic Hot Water | Hot Water Loop with 50 Gallon Electric Resistance Heater and Drain Water Heat Exchanger | Standard Hot Water Loop with 50 Gallon Electric Resistance Heater, No Drain Water Heat Recovery |
| Dual Enthalpy Economizer | Ventilation and Circulation | Standard HVAC Unit with an economizer and dual enthalpy differential control | HVAC unit with no economizer or with a non-functional disabled economizer |
| Duct Insulation | Space Cooling, Space Heating | Standard Electric Heating and Central AC with Insulated Ductwork (R-8) | Standard Electric Heating and Central AC with Uninsulated Ductwork (R-4) |
| Ductless Mini-Split AC | Space Cooling | Ductless Mini-Split AC, 4 Ton, 16 SEER | Code-Compliant AC Unit, 4 Ton, 15 SEER |
| Ductless Mini-Split HP | Space Cooling, Space Heating | Ductless Mini-Split HP, 17 SEER, 9.5 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF |
| DX Coil Cleaning | Space Cooling | DX Coil Cleaning | DX Coil Not Cleaned |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| ECM Motors on Furnaces | Space Heating | Variable Speed Electronically Commutated Motor for an Electric Furnace | Permanent Split Capacitor Motor for Electric Furnace |
| Efficient Battery Charger | Miscellaneous | Efficient Battery Charger | FR or SCR charging stations with power conversion efficiency < 89% or > 10 W |
| Efficient Exhaust Hood | Cooking | Kitchen ventilation with automatically adjusting fan controls | Kitchen ventilation with constant speed ventilation motor |
| Efficient Motor Belts | Miscellaneous | Synchronous belt, 98% efficiency | Standard V-belt drive |
| Efficient New Construction Lighting | Interior Lighting | Efficient New Construction Lighting, 15% Better than Code | New Construction with Lighting Power Density meeting Code Minimum |
| Energy Recovery Ventilation System (ERV) | Space Cooling | Unitary Cooling Equipment that Incorporates Energy Recovery | Current Market Packaged or Split DX Unit |
| Energy Star Combination Oven | Cooking | Energy Star Combination Oven meeting ENERGY STAR Version 3.0 Standards | One Standard Economy-Grade 10-Pan Combination Oven |
| Energy Star Commercial Clothes Washer | Miscellaneous | One Commercial Clothes Washer meeting current ENERGY STAR Version 8.1 Standards | One Commercial Clothes Washer meeting Federal Standard |
| Energy Star Commercial Dishwasher | Domestic Hot Water | One Commercial Dishwasher meeting ENERGY STAR Version 3.0 Standards | One Dishwasher meeting Federal Standard |
| Energy Star Commercial Glass Door Freezer | Refrigeration | One Glass Door Freezer meeting ENERGY STAR Version 5.0 Standards | One Glass Door Freezer meeting Federal Standards |
| Energy Star Commercial Glass Door Refrigerator | Refrigeration | One Glass Door Refrigerator meeting ENERGY STAR Version 5.0 Standards | One Glass Door Refrigerator meeting Federal Standards |
| Energy Star Commercial Solid Door Freezer | Refrigeration | One Solid Door Freezer meeting ENERGY STAR Version 5.0 Standards | One Solid Door Freezer meeting Federal Standards |
| Energy Star Commercial Solid Door Refrigerator | Refrigeration | One Solid Door Refrigerator meeting ENERGY STAR Version 5.0 Standards | One Solid Door Refrigerator meeting Federal Standards |
| Energy Star convection oven | Cooking | Energy Star convection oven meeting ENERGY STAR Version 3.0 Standards | One Standard Economy-Grade Full-Size Convection Oven |
| Energy Star EV Chargers | Miscellaneous | Level 2 Electric Vehicle Supply Equipment (EVSE) | Level 1 Electric Vehicle Supply Equipment (EVSE) |
| Energy Star Fryer | Cooking | One Standard Vat Electric Fryer meeting ENERGY STAR Version 3.0 Standards | One Standard Economy-Grade Standard Vat Electric Fryer |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Energy Star Griddle | Cooking | One Griddle meeting current ENERGY STAR Version 1.2 Standards | One Conventional Griddle |
| Energy Star Hot Food Holding Cabinet | Cooking | One Hot Food Holding Cabinet meeting current ENERGY STAR Version 2.0 Standards | One Standard Hot Food Holding Cabinet |
| Energy Star Ice Maker | Refrigeration | One Continuous Self-Contained Ice Maker meeting ENERGY STAR Version 3.0 Standards | One Continuous Self-Contained Ice Maker meeting Federal Standard |
| ENERGY STAR Imaging Equipment | Office Equipment | One imaging device meeting current ENERGY STAR Standards | One non-ENERGY STAR imaging device |
| Energy Star LED Directional Lamp | Interior Lighting | Energy Star 7.6W Directional LED lamp | 50W Incandescent lamp |
| Energy Star Monitors | Office Equipment | One Monitor meeting ENERGY STAR 8.0 Standards | One Standard Monitor |
| Energy Star PCs | Office Equipment | One Personal Computer (desktop or laptop) meeting current ENERGY STARÂ® Standards | One non-ENERGY STARÂ® Personal Computer |
| Energy Star room AC | Space Cooling | Room AC meeting current ENERGY STAR standards | Code-Compliant Room AC, 1 Ton, 10.9 CEER |
| Energy Star Servers | Office Equipment | One Server meeting ENERGY STAR 2.0 Standards | One Standard Server |
| Energy Star Steamer | Cooking | One 4-Pan Electric Steamer meeting ENERGY STARÂ® 2.0 Standards | One Standard Economy-Grade 4-Pan Steamer |
| Energy Star Uninterruptable Power Supply | Office Equipment | Standard Desktop Plugged into Energy Star Uninterruptable Power Supply at 25% Load | Standard Desktop Plugged into Average Rotary Uninterruptable Power Supply at 25% Load |
| Energy Star Vending Machine | Refrigeration | One Refrigerated Vending Machine meeting ENERGY STAR Version 4.0 Standards | One Refrigerated Vending Machine meeting ENERGY STARÂ® 1.0 Standards |
| ENERGY STAR Water Cooler | Miscellaneous | One Storage Type Hot/Cold Water Cooler Unit meeting ENERGY STAR Version 3.0 Standards | One Standard Storage Type Hot/Cold Water Cooler Unit |
| Energy Star windows | Space Cooling, Space Heating | 100ft2 of Window meeting Energy Star Version 6.0 Requirements (U-Value: 0.27, SHGC: 0.21) | 100ft2 of Window meeting Energy Star Version 5.0 Requirements (U-Value: 0.3, SHGC: 0.3) |
| Engine Block Timer | Miscellaneous | Plug-in timer that activates engine block timer to reduce unnecessary run time | Engine block heater (typically used for backup generators) running continuously |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Escalator Motor Efficiency Controller | Miscellaneous | Install Escalator Motor Efficiency Controller | Escalator without Motor Efficiency Controller |
| Facility Commissioning | Space Cooling, Space Heating, Ventilation and Circulation | Perform facility commissioning to optimize building operations in new facilities | Standard new construction facility with no commissioning |
| Facility Energy Management System | Space Cooling, Space Heating, Ventilation and Circulation | Typical HVAC by Building Type Controlled by Energy Management System | Standard/manual facility equipment controls |
| Faucet Aerator | Domestic Hot Water | Low-flow lavatory faucet aerator, flow rate: 1.0 gpm | Federal lavatory flow rate standard, 1994, flow rate: 2.2 gpm |
| Floating Head Pressure Controls | Refrigeration | Medium-Temperature Refrigeration System with 5HP Compressor and Adjustable Condenser Head Pressure Control Valve | Medium-Temperature Refrigeration System with 5 HP Compressor without Adjustable Condenser Head Pressure Control Valve |
| Floor Insulation | Space Cooling, Space Heating | Increased Floor Insulation (R-19) | Market Average Existing Floor Insulation |
| Geothermal Heat Pump | Space Cooling, Space Heating | Geothermal Heat Pump | Code-Compliant Air Source Heat Pump |
| Green roof | Space Cooling, Space Heating | Vegetated Roof Surface on top of Standard Roof | Standard Black Roof |
| HE Air Cooled Chiller - All Compressor Types - 100 Tons | Space Cooling | HE Air Cooled Chiller - Air Compressor Types - 100 Tons | Code-Compliant Air Cooled Positive Displacement Chiller, 100 Tons |
| HE DX 11.25-20.0 Tons Elec Heat | Space Cooling, Space Heating | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 11.25-20.0 Tons Other Heat | Space Cooling | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Elect Heat | Space Cooling, Space Heating | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Other Heat | Space Cooling | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX Less than 5.4 Tons Elect Heat | Space Cooling, Space Heating | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE DX Less than 5.4 Tons Other Heat | Space Cooling | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| HE Water Cooled Chiller - Centrifugal Compressor - 200 Tons | Space Cooling | Water Cooled Centrifugal Chiller with Integral VFD, 200 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 200 Tons |
| HE Water Cooled Chiller - Centrifugal Compressor - 500 Tons | Space Cooling | Water Cooled Centrifugal Chiller with Integral VFD, 500 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 500 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 175 Tons | Space Cooling | Water Cooled Positive Displacement Chiller with Integral VFD, 175 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 175 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 50 Tons | Space Cooling | Water Cooled Positive Displacement Chiller with Integral VFD, 50 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 50 Tons |
| Heat Pump Pool Heater Commercial | Miscellaneous | High Efficiency Pool Heater Eff. >=84% | Standard Efficiency Pool Heater 78% Eff. |
| Heat Pump Water Heater | Domestic Hot Water | Efficient 50 Gallon Electric Heat Pump Water Heater | Code-Compliant 50 Gallon Electric Heat Pump Water Heater |
| High Efficiency Air Compressor | Miscellaneous | 20 HP VFD Air Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| High Efficiency Data Center Cooling | Space Cooling | High Efficiency CRAC (computer room air conditioner) | Standard Efficiency CRAC |
| High Efficiency PTAC | Space Cooling | High Efficiency PTAC | Code-Compliant PTAC |
| High Efficiency PTHP | Space Cooling, Space Heating | High Efficiency PTHP | Code-Compliant PTHP |
| High Efficiency Refrigeration Compressor_Discus | Refrigeration | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Efficiency Refrigeration Compressor_Scroll | Refrigeration | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Speed Fans | Ventilation and Circulation | High Speed Fan, 24" - 35" Blade Diameter | Standard Speed Fan, 24" - 35" Blade Diameter |
| Hot water pipe insulation | Domestic Hot Water | 1' of Insulated Pipe in Unconditioned Spaces, Insulation of R-4 | 1' of Pipe in Unconditioned Spaces with Code Minimum of 1"of Insulation |
| Hotel Card Energy Control Systems | Space Cooling, Space Heating | Guest Room HVAC Unit Controlled by Hotel-Key-Card Activated Energy Control System | Guest Room HVAC Unit, Manually Controlled by Guest |
| Indoor daylight sensor | Interior Lighting | Install Indoor Daylight Sensors, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Induction Cooktops | Cooking | Efficient Induction Cooktop | One Standard Electric Cooktop |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Infiltration Reduction - Air Sealing | Space Cooling, Space Heating | Reduced leakage through caulking, weather-stripping | Standard Heating and Cooling System with Moderate Infiltration |
| Instantaneous Hot Water System Commercial | Domestic Hot Water | Instantaneous Hot Water System | Code-Compliant Electric Storage Water Heater |
| LED - 14W_CFL Baseline | Interior Lighting | LED (assume 14W) replacing CFL | 100W equivalent CFL |
| LED - 9W Flood_CFL Baseline | Exterior Lighting | LED (assume 9W) replacing CFL | 14W CFL |
| LED Canopy Lighting (Exterior) | Exterior Lighting | One 67.2W LED Canopy Light | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED Display Lighting (Exterior) | Exterior Lighting | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED Display Lighting (Interior) | Interior Lighting | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED Exit Sign | Interior Lighting | One 5W Single-Sided LED Exit Sign | One 9W Single-Sided CFL Exit Sign |
| LED Exterior Wall Packs | Exterior Lighting | One 35W LED Wall Pack | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED High Bay_HID Baseline | Interior Lighting | One 140W High Bay LED Fixture | Lumen-Equivalent HID High Bay Fixture |
| LED High Bay_LF Baseline | Interior Lighting | One 140W High Bay LED Fixture | Lumen-Equivalent Linear Fluorescent High Bay Fixture |
| LED Linear - Fixture Replacement | Interior Lighting | 2x4 LED Troffer | Lumen-Equivalent 32-Watt T8 Lamp |
| LED Linear - Lamp Replacement | Interior Lighting | Linear LED (16W) | Lumen-Equivalent 32-Watt T8 Lamp |
| LED Parking Lighting | Exterior Lighting | One 160W LED Area Light | Average Lumen Equivalent Exterior HID Area Lighting |
| LEED New Construction Whole Building | Space Cooling, Space Heating | LEED New Construction Whole Building | Comparable facility, code-compliance construction |
| Light Tube | Interior Lighting | One 14" Light Tube, Delivering light to 250 S.F. of Commercial Space | 250 S.F. of Commercial Space Lit by Typical Lighting Strategies |
| Low Flow Shower Head | Domestic Hot Water | Low-Flow Handheld Showerhead, Flow Rate: 1.50 gpm | Standard Handheld Showerhead, Flow Rate: 2.50 gpm |
| Low-Flow Pre-Rinse Sprayers | Domestic Hot Water | Low-Flow Pre-Rinse Sprayer with Flow Rate of 1.6 gpm | Pre-Rinse Sprayer with Federal Standard Flow Rate of 2.25 gpm |
| Network PC Power Management | Office Equipment | One computer and monitor attached to centralized energy management system that controls when desktop | One computer and monitor, manually controlled |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| | | computers and monitors plugged into a n | |
| Networked Lighting Controls | Interior Lighting | Install Networked Lighting Controls System on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Controlled either Manually or by Sensor as Specified by Code |
| Night Covers for Display Cases | Refrigeration | One Open Vertical Case with Night Covers | One Existing Open Vertical Case, No Night Covers |
| Occupancy Sensors, Ceiling Mounted | Interior Lighting | Ceiling Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Occupancy Sensors, Switch Mounted | Interior Lighting | Switch Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor Lighting Controls | Exterior Lighting | Install Exterior Photocell Dimming Controls, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor motion sensor | Exterior Lighting | Install Exterior Motion Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Ozone Laundry Commercial | Miscellaneous | Add a new ozone laundry system onto a commercial clothes washer | One commercial clothes washer without ozone laundry system |
| Programmable thermostat | Space Cooling, Space Heating | Pre-set programmable thermostat that replaces manual thermostat | Standard Heating and Cooling System with Manual Thermostat |
| PSC to ECM Evaporator Fan Motor (Reach-In) | Refrigeration | Medium Temperature Reach-In Case with equivalent size Electronically Commutated Evaporator Fan Motor | Medium Temperature Reach-In Case with Permanent Split Capacitor Evaporator Fan Motor |
| PSC to ECM Evaporator Fan Motor (Walk-In, Refrigerator) | Refrigeration | Medium Temperature Walk-In Case with Electronically Commutated Evaporator Fan Motor | Medium Temperature Walk-In Case with Permanent Split Capacitor Evaporator Fan Motor |
| Q-Sync Evaporator Fan Motor | Refrigeration | Medium Temperature Reach-In Case with equivalent size Q-Sync Evaporator Fan Motor | Medium Temperature Reach-In Case with 20W Permanent Split Capacitor Fan Motor |
| Reflective Roof Treatment | Space Cooling | Reflective Roof Treatment | Standard Black Roof |
| Refrigerated Display Case LED Lighting | Refrigeration | 60" Refrigerated Case LED Strip | Lumen-Equivalent 32-Watt T8 Fixture |
| Refrigerated Display Case Lighting Controls | Refrigeration | Occupancy Sensors for Refrigerated Case Lighting to reduce run time | Market-Share Weighted Existing Linear Fluorescent Fixture |
| Refrigeration Commissioning | Refrigeration | Commissioned Refrigeration System | Non-Commissioned Refrigeration System |
| Refrigeration Economizer | Refrigeration | Walk-in refrigerator with economizer | Walk-in refrigerator without economizer |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Regenerative Drive Elevator Motor | Miscellaneous | Regenerative drive produced energy when motor in overhaul condition | Standard motor |
| Retro-Commissioning (Existing Construction) | Space Cooling, Space Heating, Ventilation and Circulation | Perform facility retro-commissioning, including assessment, process improvements, and optimization of energy-consuming equipment and systems | |
| Roof Insulation | Space Cooling, Space Heating | Roof Insulation (built-up roof applicable to flat/low slope roofs) | Code-Compliant Flat Roof |
| Server Virtualization | Office Equipment | 2 Virtual Host Server | 20 Single Application Servers |
| Smart Strip Plug Outlet | Office Equipment | One Smart Strip Plug Outlet | One Standard plug strip/outlet |
| Smart thermostat | Space Cooling, Space Heating | Thermostats that include "smart" features such as occupancy sensors, geo-fencing, multi-zone sensors | Standard Heating and Cooling System with Manual Thermostat |
| Solar Pool Heater Commercial | Miscellaneous | Solar Swimming Pool Heater | Electric Resistance Swimming Pool Heater |
| Solar Powered Pool Pump | Miscellaneous | Solar Powered Pool Pump Motor | Variable Speed Pool Pump Motor |
| Solar Thermal Water Heating System Commercial | Domestic Hot Water | Solar Thermal System with Electric Backup | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Strip Curtains - Freezers | Refrigeration | Walk-in freezer with strip curtains at least 0.06 inches thick covering the entire area of the doorway | Walk-in freezer without strip curtains |
| Strip Curtains - Refrigerators | Refrigeration | Walk-in cooler with strip curtains at least 0.06 inches thick covering the entire area of the doorway | Walk-in cooler without strip curtains |
| Suction Pipe Insulation - Freezers | Refrigeration | Suction Pipe Insulation - Freezers | Uninsulated freezer suction lines |
| Suction Pipe Insulation - Refrigerators | Refrigeration | Suction Pipe Insulation - Refrigerators | Uninsulated refrigeration suction lines |
| Thermal Energy Storage | Space Cooling | Deploy thermal energy storage technology (ice harvester, etc.) to shift load | Code compliant chiller |
| Thermostatic Shower Restriction Valve Commercial | Domestic Hot Water | Hot Water Loop with 50 Gallon Electric Resistance Heater and | Standard Hot Water Loop with 50 Gallon Electric Resistance Heater and Standard Shower Valves |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| | | Pressure Balance Shower Valves | |
| Time Clock Control | Interior Lighting | Time Clock Controlled Lighting, 500 Watts Controlled | 500 Watts of Lighting, Controlled either Manually or by Sensor as Specified by Code |
| Variable Refrigerant Flow (VRF) HVAC Systems | Space Cooling, Space Heating | Variable Refrigerant Flow (VRF) HVAC Systems | Code-Compliant PTHP |
| VAV System | Ventilation and Circulation | Variable Air Volume Distribution System | Constant Air Volume Distribution System |
| VFD on Cooling Tower Fans | Space Cooling | Cooling Tower Fans with VFD Control | Cooling Tower Fans without VFD Control |
| VFD on HVAC Pump | Space Cooling, Space Heating | VFD on HVAC Pump | 7.5 HP HVAC Pump Motor, no VFD Control |
| VSD Controlled Compressor | Refrigeration | Refrigeration System with VSD Control | Refrigeration System with Standard Slide-Valve Control System |
| Wall Insulation | Space Cooling, Space Heating | Increased Exterior Above-Grade Wall Insulation | Market Average Existing Exterior Above-Grade Wall Insulation |
| Warehouse Loading Dock Seals | Space Cooling, Space Heating | Seals to reduce infiltration losses at loading dock | Loading dock with no seals |
| Water Cooled Refrigeration Heat Recovery | Domestic Hot Water | The heat reclaim system transfers waste heat from refrigeration system to space heating or hot water | No heat recovery |
| Water Heater Setback | Domestic Hot Water | A 50 gallon electric hot water tank with a thermostat setting reduced to no lower than 120 degrees. | A 50 gallon electric hot water tank with a thermostat setting that is higher than 120 degrees, typically hot water tanks with settings of 130 degrees or higher. |
| Water source heat pump | Space Cooling, Space Heating | Water Source Heat Pump, 2.5 Tons, 17.4 EER, 4.4 COP | Code-Compliant ASHP |
| Waterside Economizer | Space Cooling | Waterside Economizer | No economizer |
| Window shade film | Space Cooling | Window Film with SHGC of 0.35 Applied to Standard Window | Standard Window with below Code Required Minimum SHGC |
| Zero Energy Doors | Refrigeration | Install zero energy doors for a reach-in refrigerated cooler or freezer | Standard vertical reach-in refrigerated cooler or freezer with anti-sweat heaters on the glass surface of the doors |

Table 14: Industrial EE Measures

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| 1.5HP Open Drip-Proof (ODP) Motor | Motors Pumps | High Efficiency 1.5 HP Open-Drip Proof Motor | 1.5HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 10HP Open Drip-Proof (ODP) Motor | Motors Pumps | High Efficiency 10 HP Open-Drip Proof Motor | 10HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 20HP Open Drip-Proof (ODP) Motor | Motors Pumps | High Efficiency 20 HP Open-Drip Proof Motor | 20HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 3-phase High Frequency Battery Charger - 1 shift | Other | 3-phase High Frequency Battery Charger | Standard Charger |
| Advanced Rooftop Controller | HVAC | Advanced Rooftop Controller | Without Advanced Rooftop Controller |
| Air Compressor Optimization | Compressed Air | Performing Routine Maintenance on 20HP Inlet Modulation Fixed-Speed Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| Air curtains | HVAC | Air Curtain across door opening | Door opening with no air curtain |
| Airside economizer | HVAC | Airside Economizer | No economizer |
| Auto Closer on Refrigerator Door | Process Cooling | One Medium Temperature Walk-In Refrigerator Door with Auto-Closer | One Medium Temperature Walk-In Refrigerator Door without Auto-Closer |
| Auto Off Time Switch | Interior Lighting High Bay | Auto-Off Time Switch on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Bi-Level Lighting Control (Exterior) | Exterior Lighting Industrial | Install Exterior Bi-Level Lighting Control, 500 Watts Controlled | 500 Watts of Lighting, No Dim Setting |
| Bi-Level Lighting Control (Interior) | Interior Lighting High Bay | Bi-Level Controls on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, No Dim Setting |
| Chilled Water Reset | HVAC | One Chiller with Reset of Chilled Water Temperature Setpoint | One Chiller with Fixed Chilled Water Temperature |
| Cogged Belt on 15hp ODP Motor | Motors Pumps | 15HP ODP Motor with Cogged Belts Installed on Supply and/or Return Air Fans | 15HP ODP Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Cogged Belt on 40hp ODP Motor | Motors Pumps | 40HP ODP Motor with Cogged Belts Installed on Supply and/or Return Air Fans | 40HP ODP Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Compressed Air Desiccant Dryer | Process Specific | heated regenerative desiccant dryer without dew point demand controls | heatless regenerative desiccant dryer without dew point demand controls |
| Compressed Air No-Loss Condensate Drains | Process Specific | Install no-loss condensate drains | Install standard condensate drains |
| Compressed Air Storage Tank | Compressed Air | 20 HP Inlet Modulation Fixed-Speed Compressor with Receiver Tank | 20 HP Inlet Modulation Fixed-Speed Compressor, No Receiver Tank |
| Custom Measure - Non-Lighting | HVAC | Custom Improvement to Facility's Operations | Baseline Technology/Process |
| Dairy Refrigeration Heat Recovery | Other | refrigeration equipment with refrigeration heat recovery tank installed | existing dairy farm with refrigeration equipment and a water heater unit without an RHR unit |
| Dedicated Outside Air System (DOAS) | HVAC | Install Dedicated Outside Air System (DOAS) | Typical HVAC by Building Type |
| Demand Controlled Ventilation | HVAC | Return Air System with CO2 Sensors | Standard Return Air System, No Sensors |
| Demand Defrost | Process Cooling | Walk-In Freezer System with Demand-Controlled Electric Defrost Cycle | Walk-In Freezer System with Timer-Controlled Electric Defrost Cycle |
| Dew Point Sensor Control for Dessicant CA Dryer | Compressed Air | 1000 CFM Heated Desicant Air Dryer with Dew Point Controls | 1000 CFM Modulating Heated Desicant Air Dryer |
| Drip Irrigation Nozzles | Other | Flow Control Nozzles | Standard Irrigation Nozzles |
| Dual Enthalpy Economizer | Process Cooling | Standard HVAC Unit with an economizer and dual enthalpy differential control | HVAC unit with no economizer or with a non-functional disabled economizer |
| DX Coil Cleaning | HVAC | DX Coil Cleaning | DX Coil Not Cleaned |
| Efficient Compressed Air Nozzles | Compressed Air | 1/4" Engineered Air Nozzle | 1/4" Open-End Air Nozzle |
| Efficient New Construction Lighting | Interior Lighting High Bay | Efficient New Construction Lighting, 15% Better than Code | New Construction with Lighting Power Density meeting Code Minimum |
| Electric Actuators | Other | Electric Actuator | Pneumatic Actuator |
| Energy Efficient Laboratory Fume Hood | HVAC | Variable Air Volume High Performance Fume Hood | Constant Volume Conventional Bypass Fume Hood |
| Energy Efficient Transformers | Other | Energy Efficient Dry Type Transformer (CSL-3) | Standard Transformer (TP-1) |

resource innovations

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Energy Recovery Ventilation System | HVAC | Unitary Cooling Equipment that Incorporates Energy Recovery | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11.2 EER |
| Energy Star LED Directional Lamp | Interior Lighting Other | Energy Star 7.6W Directional LED lamp | 50W Incandescent lamp |
| Energy Star room ac | HVAC | Room AC meeting current ENERGY STAR standards | Code-Compliant Room AC |
| Energy Star windows | HVAC | 100ft2 of Window meeting Energy Star Version 6.0 Requirements (U-Value: 0.27, SHGC: 0.21) | 100ft2 of Window meeting Energy Star Version 5.0 Requirements (U-Value: 0.3, SHGC: 0.3) |
| Engine Block Timer | Other | An engine block heater operated by an outdoor plug-in timer | An engine block heater that is manually plugged in |
| Facility Commissioning | HVAC | Perform facility commissioning | Comparable facility, no commissioning |
| Facility Energy Management System | HVAC | Typical HVAC by Building Type Controlled by Energy Management System | Typical HVAC by Building Type, Manually Controlled |
| Fan Thermostat Controller | HVAC | Typical HVAC by Building Type with Fan Thermostat Controller Installed | Typical HVAC by Building Type with Programmable Thermostat |
| Floating Head Pressure Controller | Process Cooling | Medium-Temperature Refrigeration System with 5HP Compressor and Adjustable Condenser Head Pressure Control Valve | Medium-Temperature Refrigeration System with 5 HP Compressor without Adjustable Condenser Head Pressure Control Valve |
| Grain Bin Aeration Control System | Process Specific | Grain Storage Fan System with Automatic Controls | Grain Storage Fan System with Manual Controls |
| HE Air Cooled Chiller - All Compressor Types - 100 Tons | HVAC | HE Air Cooled Chiller - All Compressor Types - 100 Tons | Code-Compliant Air Cooled Positive Displacement Chiller, 100 Tons |
| HE Air Cooled Chiller - All Compressor Types - 300 Tons | HVAC | Air Cooled Positive Displacement Chiller with Integral VFD, 300 Tons, 13.7 EER | Code-Compliant Air Cooled Positive Displacement Chiller, 300 Tons, 12.5 EER |
| HE DX 11.25-20.0 Tons Elec Heat | HVAC | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 11.25-20.0 Tons Other Heat | HVAC | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Elect Heat | HVAC | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| HE DX 5.4-11.25 Tons Other Heat | HVAC | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX Less than 5.4 Tons Elect Heat | HVAC | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE DX Less than 5.4 Tons Other Heat | HVAC | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE Water Cooled Chiller - Centrifugal Compressor - 200 Tons | HVAC | Water Cooled Centrifugal Chiller with Integral VFD, 200 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 200 Tons |
| HE Water Cooled Chiller - Centrifugal Compressor - 500 Tons | HVAC | Water Cooled Centrifugal Chiller with Integral VFD, 500 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 500 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 175 Tons | HVAC | Water Cooled Positive Displacement Chiller with Integral VFD, 175 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 175 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 50 Tons | HVAC | Water Cooled Positive Displacement Chiller with Integral VFD, 50 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 50 Tons |
| High Bay Occupancy Sensors, Ceiling Mounted | Interior Lighting High Bay | Ceiling Mounted Occupancy Sensor, 800 Watts Controlled | 800 Watts of Lighting, Manually Controlled |
| High Efficiency Air Compressor | Compressed Air | 20 HP VFD Air Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| High Efficiency Refrigeration Compressor - Discus | Process Cooling | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Efficiency Refrigeration Compressor - Scroll | Process Cooling | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Efficiency Welder | Process Specific | High Efficiency Welder | Standard Welding Practices |
| High Speed Fans | HVAC | High Speed Fan, 24" - 35" Blade Diameter | Standard Speed Fan, 24" - 35" Blade Diameter |
| High Volume Low Speed Fan (HVLS) | Motors Fans Blowers | 20' High Volume Low Speed Fan | Conventional Circulating Fan |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Indoor Agriculture - LED Grow Lights | Interior Lighting High Bay | LED grow light | 1000W High Pressure Sodium |
| Indoor daylight sensor | Interior Lighting High Bay | Install Indoor Daylight Sensors, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Industrial Duct Sealing | HVAC | Standard Electric Heating and Central AC with Improved Duct Sealing | Standard Electric Heating and Central AC, Standard Duct Sealing |
| Injection Mold and Extruder Barrel Wraps | Other | 2' Diameter, 20' Long Machine Barrel with 1" Insulation | 2' Diameter, 20' Long Machine Barrel with no Insulation |
| Insulated Pellet Dryer Tanks and Ducts | Process Heating | Insulation for Pellet Tank and Duct | Uninsulated Pellet Tank and Duct |
| LED - 14W_CFL Baseline | Interior Lighting Other | LED (assume 14W) replacing CFL | 100W equivalent CFL |
| LED Canopy Lighting (Exterior) | Exterior Lighting Industrial | One 67.2W LED Canopy Light | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED Display Lighting (Exterior) | Exterior Lighting Industrial | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED Display Lighting (Interior) | Interior Lighting Other | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED exit sign | Interior Lighting Other | One 5W Single-Sided LED Exit Sign | One 9W Single-Sided CFL Exit Sign |
| LED Exterior Wall Packs | Exterior Lighting Industrial | One 35W LED Wall Pack | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED High Bay_HID Baseline | Interior Lighting High Bay | One 140W High Bay LED Fixture | Lumen-Equivalent HID High Bay Fixture |
| LED High Bay_LF Baseline | Interior Lighting High Bay | One 140W High Bay LED Fixture | Lumen-Equivalent Linear Fluorescent High Bay Fixture |
| LED Linear - Fixture Replacement | Interior Lighting Linear Fluorescent | 2x4 LED Troffer Fixture | Lumen-Equivalent 32-Watt T8 Fixture |
| LED Linear - Lamp Replacement | Interior Lighting Linear Fluorescent | Linear LED | Lumen-Equivalent 32-Watt T8 Lamp |
| LED Parking Lighting | Exterior Lighting Industrial | One 160W LED Area Light | Average Lumen Equivalent Exterior HID Area Lighting |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| LEED New Construction Whole Building | HVAC | LEED Qualifying New Construction | Comparable facility, code-compliance construction |
| Light Tube | Interior Lighting Other | One 14" Light Tube, Delivering light to 250 S.F. of Industrial Space | 250 S.F. of Industrial Space Lit by Typical Lighting Strategies |
| Low Energy Livestock Waterer | Motors Pumps | Install Thermostatically Controlled Livestock Watering System | Standard Livestock Watering System |
| Low Pressure Sprinkler Nozzles | Motors Pumps | Low Pressure Irrigation Nozzles operate at 35 psi or lower | Standard high pressure irrigation nozzles that operate at 50 psi or greater |
| Low Pressure-drop Filters | Compressed Air | 20 HP Inlet Modulation Fixed-Speed Compressor with Low Pressure Drop Filter | 20 HP Inlet Modulation Fixed-Speed Compressor, No Particulate Removal |
| Milk Pre-Cooler | Other | Installed pre-cooler heat exchanger | no pre-cooler heat exchanger installed |
| Networked Lighting Controls | Interior Lighting Linear Fluorescent | Install Networked Lighting Controls System on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Controlled either Manually or by Sensor as Specified by Code |
| Occupancy Sensors, Ceiling Mounted | Interior Lighting High Bay | Ceiling Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Occupancy sensors, switch mounted | Interior Lighting Linear Fluorescent | Switch Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor Lighting Controls | Exterior Lighting Industrial | Install Exterior Photocell Dimming Controls, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor motion sensor | Exterior Lighting Industrial | Install Exterior Motion Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Packaged Terminal AC | HVAC | High Efficiency Packaged Terminal AC | Code-Compliant PTAC, 10.9 EER |
| Process Cooling Ventilation Reduction | Process Cooling | Standard Process Cooling with Reduced Ventilation | Standard Process Cooling |
| Programmable thermostat | HVAC | Standard Heating and Cooling System with Programmable Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Reflective Roof Treatment | HVAC | Reflective Roof Treatment | Standard Black Roof |
| Refrigeration Commissioning | Process Cooling | Commissioned Refrigeration System | Non-Commissioned Refrigeration System |
| Retro-Commissioning | HVAC | Perform Facility Retro-commissioning | |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| (Existing Construction) | | | |
| Roof insulation | HVAC | Roof Insulation (built-up roof applicable to flat/low slope roofs) | Code-Compliant Flat Roof |
| Smart thermostat | HVAC | Standard Heating and Cooling System with Smart Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Strategic Energy Management | HVAC | SEM goal setting and tracking | No active energy management |
| Synchronous Belt on 15hp ODP Motor | Motors Pumps | 15 HP Open-Drip Proof Motor with Synchronous Belts Installed on Supply and/or Return Air Fans | 15 HP Open-Drip Proof Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Synchronous Belt on 5hp ODP Motor | Motors Pumps | 5 HP Open-Drip Proof Motor with Synchronous Belts Installed on Supply and/or Return Air Fans | 5 HP Open-Drip Proof Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Synchronous Belt on 75hp ODP Motor | Motors Pumps | 75 HP Open-Drip Proof Motor with Synchronous Belts Installed on Supply and/or Return Air Fans | 75 HP Open-Drip Proof Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Thermal energy storage | HVAC | Deploy thermal energy storage technology (ice harvester, etc.) to shift load | Code compliant chiller |
| Time Clock Control | Interior Lighting High Bay | Time Clock Controlled Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| VAV System | HVAC | Variable Air Volume Distribution System | Constant Air Volume Distribution System |
| VFD on Air Compressor | Compressed Air | 20 HP VFD Air Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| VFD on Cooling Tower Fans | Process Cooling | Cooling Tower Fans with VFD Control | Cooling Tower Fans without VFD Control |
| VFD on HVAC Fan | Motors Fans Blowers | 5 HP HVAC Fan Motor, with VFD Control | 5 HP HVAC Fan Motor, no VFD Control |
| VFD on HVAC Pump | Motors Pumps | VFD on HVAC Pump | 7.5 HP HVAC Pump Motor, no VFD Control |
| VFD on process pump | Motors Pumps | 20 HP Process Pump Equipped with VFD Control | 20 HP Process Pump, Constant Speed |
| VSD Controlled Compressor | Process Cooling | Refrigeration System with VSD Control | Refrigeration System with Standard Slide-Valve Control System |
| Water source heat pump | HVAC | Water Source Heat Pump, 2.5 Tons, 17.4 EER, 4.4 COP | Code-Compliant ASHP |
| Waterside economizer | HVAC | Waterside Economizer | No economizer |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Window shade film | HVAC | Window Film with SHGC of 0.35 Applied to Standard Window | Standard Window with below Code Required Minimum SHGC |

The following EE measures from the 2019 Technical Potential Study were eliminated from the current study[8]:

**Table 15: 2019 EE Measures Eliminated from Current Study**

| Sector | Measure | End-Use | Reason for Removal |
|---|---|---|---|
| Residential | CFL – 15W Flood | Lighting | Better technology (LED) available |
| Residential | CFL – 15W Flood (Exterior) | Lighting | Better technology (LED) available |
| Residential | CFL – 13W | Lighting | Better technology (LED) available |
| Residential | CFL – 23W | Lighting | Better technology (LED) available |
| Residential | Low Wattage T8 Fixture | Lighting | Better technology (LED) available |
| Residential | 15 SEER Central AC | Space Cooling | Updated Federal Standard |
| Residential | 15 SEER Air Source Heat Pump | Space Cooling, Space Heating | Updated Federal Standard |
| Residential | 14 SEER ASHP from base electric resistance heating | Space Cooling, Space Heating | Updated Federal Standard |
| Residential | Two Speed Pool Pump | Miscellaneous | Updated Florida Energy Code |
| Residential | Variable Speed Pool Pump | Miscellaneous | Updated Florida Energy Code |
| Residential | Storm Door | Space Cooling, Space Heating | Minimal/uncertain energy savings |
| Commercial | CFL – 15W Flood | Exterior Lighting | Better technology (LED) available |
| Commercial | High Efficiency HID Lighting | Exterior Lighting | Better technology (LED) available |
| Commercial | LED Street Lights | Exterior Lighting | Market standard |
| Commercial | LED Traffic and Crosswalk Lighting | Exterior Lighting | Market standard |

[8] Additional measures from the 2019 study were updated to reflect current vintage/technology for the current study.

| Sector | Measure | End-Use | Reason for Removal |
|---|---|---|---|
| Commercial | CFL-23W | Interior Lighting | Better technology (LED) available |
| Commercial | High Bay Fluorescent (T5) | Interior Lighting | Better technology (LED) available |
| Commercial | Premium T8 - Fixture Replacement | Interior Lighting | Better technology (LED) available |
| Commercial | Premium T8 - Lamp Replacement | Interior Lighting | Better technology (LED) available |
| Commercial | Two Speed Pool Pump | Miscellaneous | Updated Florida Energy Code |
| Commercial | Variable Speed Pool Pump | Miscellaneous | Updated Florida Energy Code |
| Commercial | Tank Wrap on Water Heater | Domestic Hot Water | Limited applicability |
| Commercial | Ceiling Insulation (R12 to R38) | Space Cooling, Space Heating | Consolidated measure baseline assumptions |
| Commercial | Ceiling Insulation (R30 to R38) | Miscellaneous | Consolidated measure baseline assumptions |

# Appendix B DR Measure List

Table 16: Residential DR Measures

| Measure | Type | Season | Description |
|---|---|---|---|
| Central air conditioner - Load Shed | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central Heating - Load Shed | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central air conditioner - 50% cycling | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Central Heating - 50% cycling | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Smart thermostats - Utility Installation | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| Smart thermostats – BYOT | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| CPP + Tech | Pricing | Summer and Winter | Electricity rate that varies based on time of day. Can be same rate schedule for every day during a given season (time of use, or TOU) and with critical peak pricing (CPP) days when peak period rates are substantially higher for a limited number of days per year (customers receive advance notification of CPP event). Customers also receive technology that they can pre-program to curtail load when an event is called. |
| Water heater control | Direct load control | Summer and Winter | Load control installed on a water heater (integrated or external switch) |
| Pool pump switches | Direct load control | Summer and Winter | Load control program with switch installed on pool pump |
| Room AC | Direct load control | Summer | Load control program that is focused on room AC units rather than central AC |
| Managed EV Charging – switch | Direct load control | Summer and Winter | Load control switch that is installed on an EV charger |
| Managed EV Charging – telematics | Direct load control | Summer and Winter | Direct load control program leveraging EV smart charging software |
| Battery Storage with PV | Pricing/Direct load control | Summer and Winter | PV charges battery and battery discharges to grid |

Table 17: Small C&I DR Measures

| Measure | Type | Season | Description |
|---|---|---|---|
| Central air conditioner - Load Shed | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central Heating - Load Shed* | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central air conditioner - 50% cycling | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Central Heating - 50% cycling* | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Smart thermostats - Utility Installation* | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| Smart thermostats – BYOT* | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| CPP + Tech | Pricing | Summer and Winter | Electricity rate that varies based on time of day. Can be same rate schedule for every day during a given season (time of use, or TOU) and with critical peak pricing (CPP) days when peak period rates are substantially higher for a limited number of days per year (customers receive advance notification of CPP event). Customers also receive technology that they can pre-program to curtail load when an event is called. |
| Managed EV Charging – switch | Direct load control | Summer and Winter | Load control switch that is installed on an EV charger |
| Managed EV Charging – telematics | Direct load control | Summer and Winter | Direct load control program leveraging EV smart charging software |
| Battery Storage with PV | Pricing/Direct load control | Summer and Winter | PV charges battery and battery discharges to grid |

Table 18: Large C&I DR Measures

| Measure | Type | Season | Description |
|---|---|---|---|
| CPP + Tech | Pricing | Summer and Winter | Electricity rate that varies based on time of day. Can be same rate schedule for every day during a given season (time of use, or TOU) and with critical peak pricing (CPP) days when peak period rates are substantially higher for a limited number of days per year (customers receive advance notification of |

| Measure | Type | Season | Description |
|---|---|---|---|
| | | | CPP event). Customers also receive technology that they can pre-program to curtail load when an event is called. |
| Auto DR | Utility-controlled loads | Summer and Winter | Custom load control of specific end-uses/processes that is triggered by utility signal to building management system; customer can sometimes opt-out of specific events |
| Firm Service Level | Contractual | Summer and Winter | Customer commits to a maximum usage level during peak periods and, when notified by the utility, agrees to cut usage to that level. |
| Guaranteed Load Drop | Contractual | Summer and Winter | Customer agrees to reduce usage by an agreed upon amount when notified |

No DR measures from the 2019 Technical Potential Study were eliminated from the current study.

# Appendix C DSRE Measure List

**Table 19: Residential DSRE Measures**

| Measure | Description |
|---|---|
| PV System | Roof-mounted system, including multiple panels, AC/DC inverter, racking system, and electrical system interconnections |
| Battery Storage from PV System | Lithium-ion battery system designed to integrate with an on-site PV system to store and discharge excess energy from PV generation |

**Table 20: Non-Residential DSRE Measures**

| Measure | Description |
|---|---|
| PV System | Roof-mounted system, including multiple panels, AC/DC inverter, racking system, and electrical system interconnections |
| Battery Storage from PV System | Lithium-ion battery system designed to integrate with an on-site PV system to store and discharge excess energy from PV generation |
| CHP – Fuel Cell | An electrochemical cell-based generator that reacts hydrogen fuel with oxygen |
| CHP – Micro Turbine | Small combustion turbine that burns gaseous or liquid fuel to drive a generator |
| CHP – Gas Turbine | A combustion turbine that burns gaseous or liquid fuel to drive a generator |
| CHP – Reciprocating Engine | An engine that uses one or more pistons to convert pressure into rotational motion |
| CHP - Steam Turbine | A turbine that extracts thermal energy from pressured steam to drive a generator |

No DSRE measures from the 2019 Technical Potential Study were eliminated from the current study.

# Appendix D External Measure Suggestions

**Table 21: External Measure Suggestions and Actions**

| Measure Suggestion | Stakeholder Comments | Action taken for FEECA Study |
| --- | --- | --- |
| Efficient Electrification Measures | All measures that can produce substantial site energy savings by converting from natural gas or other fossil fuels should be included in the Florida electric utilities' next efficiency potential study. Key examples include efficient heat pumps to displace gas furnaces and efficient heat pump water heaters to displace gas water heaters. It is important to note that these electrification measures provide not only heating energy savings and water heating energy savings, but can also potentially provide cooling efficiency benefits as well. In the case of heat pumps, that can occur because efficient heat pumps can operate in cooling mode more efficiently than standard central air conditioners. In the case of heat pump water heaters, cooling and dehumidification benefits can occur when/if the water heater is in conditioned space because they transfer heat (particularly latent heat) from the air around them to the water they are heating. A growing number of jurisdictions – including Illinois, Minnesota and some northeastern states – have begun to include efficient electrification measures in their efficiency programs portfolios. | Fuel-switching and electrification are outside the scope of this study |
| Networked Lighting Controls | LED lighting technology has become increasingly accepted and installed in commercial buildings. The next big efficiency opportunity in commercial lighting efficiency is in sophisticated controls integrated into the light fixtures themselves – both luminaire level lighting controls and networked lighting controls. For example, a 2017 report for both the Northwest Energy Efficiency Alliance and the Design Lights Consortium, a non-profit that works with utilities and manufacturers of lighting products (and which many utilities across the country reference for determination of eligibility of lighting products for efficiency program rebates), found that networked lighting controls can provide on the order of 50% additional savings after LED conversion. Other studies have also found the national savings potential from such products to be enormous. Moreover, these products can be designed to provide not only lighting energy savings but also a number of other non-energy benefits (e.g., asset tracking, such as the ability of hospitals to know the location of all wheel chairs). Numerous utilities across the country now actively promote this technology through their efficiency programs. For example, Commonwealth Edison, the utility serving Chicago and other parts of northern Illinois, is currently getting a significant portion of its commercial lighting savings from promotion of networked lighting controls | Added to measure list for 2024 study |

| Measure Suggestion | Stakeholder Comments | Action taken for FEECA Study |
|---|---|---|
| Ductless mini-split heat pumps to displace inefficient electric baseboard heating | While most Florida residential buildings with electric heat provide that heat with heat pumps, at least some (perhaps most likely being older multi-family rental buildings) still use inefficient electric resistance heat. Ductless mini- split heat pump retrofits can very efficiently displace such inefficient electric heat and should be added to the residential measure list. | Added to measure list for 2024 study |
| Air Source Heat Pump baseline assumptions | There are seven air source heat pump (ASHP) measures included in the residential measure list. Two of them – one at SEER 14 and a second at SEER 21 – are listed as relative to an electric resistance baseline. Five of them – SEER 15, SEER 16, SEER 17, SEER 18 and SEER 21 – appear to be relative to a baseline of a standard new ASHP. Are we interpreting this correctly? If so, we have a couple of comments/questions/suggestions:<br>• The efficiency standards assessed need to be modified to be consistent with new federal<br>standards, including new testing procedures.<br>• For cases where the baseline is "electric resistance", why only assessing two efficiency tiers (i.e.,<br>fewer than for standard ASHP baselines)? The same number of efficiency tiers should be<br>assessed for both baselines. | Incorporated suggestions into 2024 study, including updated baseline standard and assessing same efficiency tiers for both baselines |
| Heat Pump Water Heater Efficiency | The Res EE tab of the utilities draft measure list suggests that the efficiency of a heat pump water heater is an EF of 2.50. That is unrealistically low. In fact, of the 222 products listed on the Energy Star website, none had UEFs less than 2.80 and only 29 (13%) had UEFs that were less than 3.4; the average was 3.57. Indeed, the first product listed on a search of heat pump water heaters on Home Depot's website is a 50 gallon, Rheem (Pro Terra) product with a UEF of 3.75 and a cost of $1699. | Incorporated suggestion into 2024 study |
| New Construction Measure Packages | The measures lists did not appear to include packages of measures for building new residential and/or new commercial buildings to levels of efficiency beyond those required by code. Utilities in many jurisdictions run new construction efficiency programs supporting such measure packages. In the residential sector, many base their programs on the long-standing Federal Energy Star standard. However, increasingly utility programs are promoting additional efficiency tiers – often as part of all-electric new construction program offerings – that go well beyond the Energy Star standard. For example, Consumers Energy (Michigan) offers $1000 rebates to builders who construct Energy Star single family homes | Incorporated suggestion into 2024 study with 2 tiers of residential new construction whole-home improvement measures. |

| Measure Suggestion | Stakeholder Comments | Action taken for FEECA Study |
|---|---|---|
| | with a Home Energy Rating (HERS) score of 57 or less, but offer higher rebates for more efficient buildings – up to $4000 for all electric homes with a HERS score of 40 or less. The Florida utilities potential study should assess savings potential for both the Energy Star level and a tier or two of additional efficiency beyond that level. Similar assessments of new commercial building savings potential should also be assessed. | |
| Custom Industrial Measures | The utilities' list of industrial efficiency measures addresses common industrial efficiency opportunities. However, it does not address efficiency opportunities that may be unique to individual industries or even to individual industrial facilities. That can include such things as changes in types of materials used in manufacturing, reductions in waste streams, improved use of water delivered by agricultural irrigation systems, and/or other things that are not directly related to energy using equipment or controls of such equipment. It is obviously not possible to list all such measures. However, a potential study will understate savings potential if it does not include a way of capturing such potential in its estimates. One potential way to get a sense of such potential is to review results of comprehensive industrial efficiency programs run by other utilities to identify the portion of actual program savings from such unique custom measures – and then assume that portion of custom savings could be added to the savings estimated in the study for named measures. | Added to measure list for 2024 study |
| Electric Vehicle measures | Some EV chargers are more efficient than others. The Federal Energy Star program has a standard for them. Savings potential may not be huge, but should be considered in the study. With a growing number of EV sales, the study should also consider the potential savings from promoting the most efficient EVs within different size/style categories | Added to measure list for 2024 study |
| Removing screw-based LEDs | The screw-based LEDs on both the Residential and Commercial measure lists should now be considered baseline due to federal efficiency standards adopted earlier this year. Utility load forecasts for IRPs should reflect resulting improvements in end use efficiency. | Screw-based LEDs were included in the study but with limited applicability to reflect current market |
| Removing Commercial fluorescent lighting | LED technology – for both fixtures and lamps – has advanced significantly in recent years, to the point where it should be the only technology considered for commercial lighting. Measures such as high performance T-8 fluorescent fixtures and high bay T-5 fluorescent fixtures should be replaced with LED alternatives in the study. | Updated measure list for 2024 study to only include LED-based lamps for linear fluorescent replacements |

| Measure Suggestion | Stakeholder Comments | Action taken for FEECA Study |
|---|---|---|
| Removing fossil-gas fueled CHP | Fossil-fuel fired CHP systems should not be considered "renewable" and have questionable benefits if electric generation is expected to get increasingly more renewable and clean. Biogas-fueled CHP – such as systems installed in wastewater treatment facilities that use methane byproducts of processing waste – should be included in the study. | 2024 study will continue to assess all CHP options |
| Adding livestock methane power generation to renewables list | For example, see the "cow power" program currently being run by Green Mountain Power, Vermont's largest electric utility | 2024 study will continue to assess DSRE options consistent with prior study, including customer-sited solar, solar plus storage, and CHP |
| Adding EV managed charging to DR list | With national market shares for EVs growing, it is important that utilities consider programs for managing when charging occurs. Numerous utilities are currently running managed charging programs. This does not currently appear to be on the measure list and should be added to the Florida utilities' potential study. | Added to measure list for 2024 study |
| Residential "smart thermostat" measure can provide both efficiency savings and demand response potential | This is recognized in the inclusion of smart thermostats in both the Res EE and DR tabs of the measure list spreadsheet. We simply want to flag that it is important when assessing cost-effectiveness of this measure that these two potential benefits are considered together. In other words, the cost should be considered compared to the combined efficiency and DR potential rather than separately considered relative to just EE savings and then separately again compared to just DR potential | 2024 study will include interactive impacts of EE and DR opportunities |
| Emerging Technologies | The efficiency potential study measure list appears to be somewhat outdated. It does not include a number of new and emerging technologies. The potential list of such technologies is long. We suggest reviewing the attached list of emerging technologies developed almost two years ago by Consumers Energy (Michigan) and including them in the study. | Consumers Energy study was reviewed and commercially available measures were added to measure list for 2024 study, including heat pump water heaters - CEE advanced tier, heat pump clothes dryers, ozone laundry systems, and 21+ SEER HVAC units |

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resource innovations

# Technical Potential Study of Demand Side Management

JEA

Date: 03.07.2024

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# Executive Summary

In October 2022, the six electric utilities subject to the Florida Energy Efficiency and Conservation Act (FEECA Utilities) retained Resource Innovations, Inc. for the purpose of identifying and characterizing the market for demand-side management (DSM) opportunities, including energy efficiency (EE) improvement and building retrofits, peak load reductions from demand response (DR), and demand-side renewable energy (DSRE) systems.

The main objective of the study was to assess the technical potential of demand-side resources for reducing customer electric energy consumption and seasonal peak capacity demands.

This report provides the detailed methodology and results for the technical potential analysis of JEA's service territory.

## 1.1 Methodology

Resource Innovations estimates DSM savings potential by applying an analytical framework that aligns baseline market conditions for energy consumption and demand with DSM opportunities. After describing the baseline condition, Resource Innovations applies estimated measure savings to disaggregated consumption and demand data. The approach varies slightly according to the type of DSM resources and available data; the specific approaches used for each type of DSM are described below.

### 1.1.1 EE Potential

This study utilized Resource Innovations' proprietary EE modeling tool, TEA-POT (Technical / Economic / Achievable POTential). This modeling tool was built on a platform that provides the ability to create and analyze multiple scenarios and recalculate potential savings based on variable inputs such as sales/load forecasts, electricity prices, discount rates, and actual program savings. The methodology for the EE potential assessment was based on a hybrid "top-down/bottom-up" approach, which started with the current utility load forecast, then disaggregated it into its constituent customer-class and end-use components. Our assessment examined the effect of the range of EE measures and practices on each end-use, taking into account current market saturations, and technical feasibility. These unique impacts were aggregated to produce estimates of potential at the end-use, customer class, and system levels for JEA.

### 1.1.2 DR Potential

The assessment of DR potential in JEA's service territory was an analysis of mass market direct load control programs for residential and small commercial and industrial (C&I) customers, and an analysis of DR programs for large C&I customers. The direct load control program assessment focused on the potential for demand reduction through heating, ventilation, and air conditioning (HVAC), water heater, managed electric vehicle charging, and pool pump load control. These end-uses were of particular interest because of their large contribution to peak period system load. For this analysis, a range of direct load control measures were examined for each customer segment to highlight the range of potential. The assessment further accounted for existing DR programs for JEA when calculating the total DR potential.

### 1.1.3 DSRE Potential

The DSRE technologies included in this study are rooftop solar photovoltaic (PV) systems, battery storage systems charged from customers' PV systems, and combined heat and power (CHP) systems. The study leveraged the customer segmentation and load disaggregation data assembled for the EE and DR analyses, and applied our DSRE model, SPIDER™ (Spatial Penetration and Integration of Distributed Energy Resources), for economic and adoption analysis of solar and battery storage. This model dynamically responds to rapidly changing technologies and accounts for all key time-varying elements such as technology costs, incentives, tax credits, and electric rates. To estimate technical potential for CHP, the study utilized a series of unique distributed generation potential models for each primary market sector (commercial and industrial), calculating the average building consumption, assigning minimum facility size thresholds, and estimating building energy savings share percentage for each CHP technology based on its generation capacity.

## 1.2 Savings Potential

Technical potential for EE, DR, and DSRE are as follows:

### 1.2.1 EE Potential

EE technical potential describes the savings potential when all technically feasible EE measures are fully implemented, ignoring all non-technical constraints on electricity savings, such as cost-effectiveness and customer willingness to adopt EE.

The estimated EE technical potential results are summarized in Table 1.

Table 1. EE Technical Potential

| | Savings Potential | | |
|---|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) | Energy (GWh) |
| **Residential** | 517 | 297 | 1,887 |
| **Non-Residential**[1] | 280 | 251 | 1,690 |
| **Total** | 797 | 548 | 3,577 |

### 1.2.2 DR Potential

DR technical potential describes the magnitude of loads that can be managed during conditions when grid operators need peak capacity. For residential and small C&I customers where DR generally takes the form of direct utility control, technical potential for DR is limited by the loads that can be controlled remotely at scale such as heating, cooling, water heaters, managed electric vehicle charging, and pool pumps. For large C&I customers, this included their entire electric demand during a utility's system peak, as many of these types of customers will forego virtually all electric demand temporarily if the financial incentive is large enough.

The estimated DR technical potential results are summarized in Table 2.

Table 2. DR Technical Potential

| | Savings Potential | |
|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) |
| **Residential** | 443 | 1,451 |
| **Non-Residential** | 673 | 578 |
| **Total** | 1,116 | 2,029 |

[1] Non-Residential results include all commercial and industrial customer segments.

### 1.2.3 DSRE Potential

DSRE technical potential estimates quantify all technically feasible distributed generation opportunities from PV systems, battery storage systems charged from PV, and CHP technologies based on the customer characteristics of JEA's customer base.

The estimated DSRE technical potential results are summarized in Table 3.

Table 3. DSRE Technical Potential[2]

| | Savings Potential | | |
|---|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) | Energy (GWh) |
| PV Systems | | | |
| **Residential** | 493 | 19 | 4,146 |
| **Non-Residential** | 214 | 3 | 1,617 |
| **Total** | 707 | 22 | 5,763 |
| Battery Storage charged from PV Systems | | | |
| **Residential** | 304 | 557 | 0 |
| **Non-Residential** | 0 | 158 | 0 |
| **Total** | 304 | 715 | 0 |
| CHP Systems | | | |
| **Total** | 397 | 359 | 1,811 |

[2] PV systems and CHP systems were independently analyzed for technical potential without consideration of the competition between technologies or customer preference for DSRE system.

# 2 Introduction

In October, 2022, the six electric utilities subject to the Florida Energy Efficiency and Conservation Act (FEECA Utilities) retained Resource Innovations, Inc. for the purpose of identifying and characterizing the market for demand-side management (DSM) opportunities, including energy efficiency (EE) improvement and building retrofits, peak load reductions from demand response (DR), and demand-side renewable energy (DSRE) systems. The main objective of the study was:

- Assessing the technical potential of demand-side resources for reducing customer electric energy consumption and seasonal peak capacity demands.

This report provides the detailed methodology and results for the technical potential analysis of JEA's service territory.

The following deliverables were developed by Resource Innovations as part of the project and are addressed in this report:

- DSM measure list and detailed assumption workbooks
- Disaggregated baseline demand and energy use by year, sector, and end-use
- Baseline technology saturations, energy consumption, and demand
- Technical potential demand and energy savings
- Supporting calculation spreadsheets

## 2.1 Technical Potential Study Approach

Resource Innovations estimates technical potential according to the industry standard categorization, as follows:

> Technical Potential is the theoretical maximum amount of energy and capacity that could be displaced by DSM, regardless of cost and other barriers that may prevent the installation or adoption of a DSM measure.

For this study, technical potential included full application of commercially available DSM technologies to all residential, commercial, and industrial customers in the utility's service territory.

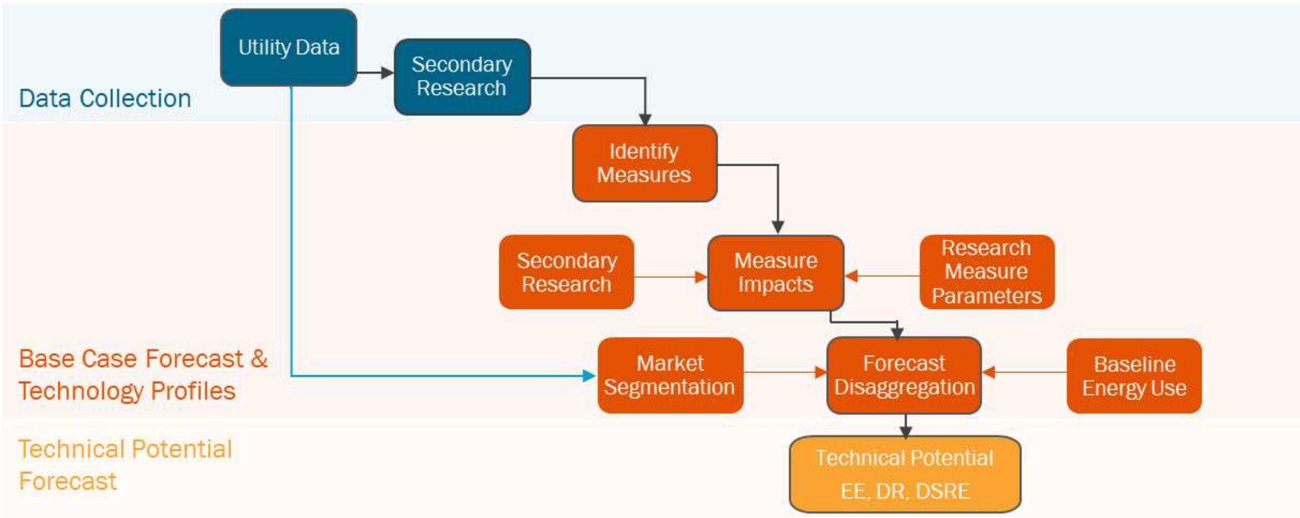
Quantifying DSM technical potential is the result of an analytical process that refines DSM opportunities that align with JEA's customers' electric consumption patterns. Resource Innovations' general methodology for estimating technical potential is a hybrid "top-

down/bottom-up" approach, which is described in detail in Sections 3 through 5 of this report and includes the following steps:

- Develop a baseline forecast: the study began with a disaggregation of the utility's official electric energy forecast to create a baseline electric energy forecast. This forecast does not include any utility-specific assumptions around DSM performance. Resource Innovations applied customer segmentation and consumption data from each utility and data from secondary sources to describe baseline customer-class and end-use components. Additional details on the forecast disaggregation are included in Section 3.
- Identify DSM opportunities: A comprehensive set of DSM opportunities applicable to JEA's climate and customers were analyzed to best depict DSM technical potential. Effects for a range of DSM technologies for each end-use could then be examined while accounting for current market saturations, technical feasibility, and impacts.
- Collect cost and impact data for measures: For those measures applicable to JEA's customers, Resource Innovations conducted primary and secondary research and estimated costs, energy savings, measure life, and demand savings. We differentiated between the type of cost (capital, installation labor, maintenance, etc.) to separately evaluate different implementation modes: retrofit (capital plus installation labor plus incremental maintenance); new construction (incremental capital and incremental maintenance); and burnout costs (incremental capital and incremental maintenance costs for replacement of appliances and equipment that has reached the end of its useful life). Additional details on measure development are included in Section 4.

Figure 1 provides an illustration of the technical potential modeling process conducted for JEA, with the assessment starting with the current utility load forecast, disaggregated into its constituent customer-class and end-use components, and calibrated to ensure consistency with the overall forecast.  Resource Innovations considered the range of DSM measures and practices application to each end-use, accounting for current market saturations, and technical feasibility. These unique impacts were aggregated to produce estimates of potential at the technology, end-use, customer class, and system levels.

Figure 1. Approach to Technical Potential Modeling




Resource Innovations estimated DSM technical potential based on a combination of market research, utility load forecasts and customer data, and measure impact analysis, all in coordination with JEA. Resource Innovations examined the technical potential for EE, DR, and DSRE opportunities; this report is organized to offer detail on each DSM category, with additional details on technical potential methodology presented in Section 5.

## 2.2 EE Potential Overview

To estimate EE potential, this study utilized Resource Innovations' modeling tool, TEA-POT (Technical / Economic / Achievable POTential). This modeling tool was built on a platform that provides the ability to create and analyze multiple scenarios and recalculate potential savings based on variable inputs such as sales/load forecasts, electricity prices, discount rates, and actual utility program savings, as described in Section 5.1.1 below. While the analysis estimates the impacts of individual EE measures, the model accounts for interactions and overlap of individual measure impacts within an end-use or equipment type. The model provides transparency into the assumptions and calculations for estimating EE potential.

## 2.3 DR Potential Overview

To estimate DR market potential, Resource Innovations considered customer demand during utility peaking conditions and projected customer response to DR measures. Customer demand was determined by looking at segment-level interval data for each customer segment. For each segment, Resource Innovations determined the portion of a customer's load that could be curtailed during the system peak.

## 2.4 DSRE Potential Overview

The DSRE technologies included in this study are rooftop solar photovoltaic (PV) systems, battery storage systems charged from PV, and combined heat and power (CHP) systems. The study leveraged the customer segmentation and load disaggregation data assembled for the EE and DR analyses, and applied our DSRE model, SPIDER™ (Spatial Penetration and Integration of Distributed Energy Resources), for economic and adoption analysis of solar and battery storage. This model dynamically responds to rapidly changing technologies and accounts for all key time-varying elements such as technology costs, incentives, tax credits, and electric rates. To estimate technical potential for CHP, the study utilized a series of unique distributed generation potential models for each primary market sector (commercial and industrial), calculating the average building consumption, assigning minimum facility size thresholds, and estimating building energy savings share percentage for each CHP technology based on its generation capacity.

# 3 Baseline Forecast Development

## 3.1 Market Characterization

The JEA base year energy use and sales forecast provided the reference point to determine potential savings. The end-use market characterization of the base year energy use and reference case forecast included customer segmentation and load forecast disaggregation. The characterization is described in this section, while the subsequent section addresses the measures and market potential energy and demand savings scenarios.

### 3.1.1 Customer Segmentation

In order to estimate EE, DR, and DSRE potential, the sales forecast and peak load forecasts were segmented by customer characteristics. As electricity consumption patterns vary by customer type, Resource Innovations segmented customers into homogenous groups to identify which customer groups are eligible to adopt specific DSM technologies, have similar building characteristics and load profiles, or are able to provide DSM grid services.

Resource Innovations segmented customers according to the following:

1) By Sector – how much of JEA's energy sales, summer and winter peak demand forecast is attributable to the residential, commercial, and industrial sectors?
2) By Customer – how much electricity does each customer typically consume annually and during system peaking conditions?
3) By End-Use – within a home or business, what equipment is using electricity during the system peak? How much energy does this end-use consume over the course of a year?

Table 4 summarizes the segmentation within each sector. In addition to the segmentation described here for the EE and DSRE analyses, the residential customer segments were further segmented by heating type (electric heat, gas heat, or unknown) and by annual consumption bins within each sub-segment for the DR analysis.

Table 4. Customer Segmentation

| Residential | Commercial | | Industrial | |
|---|---|---|---|---|
| Single Family | Assembly | Miscellaneous | Agriculture and Assembly | Primary Resources Industries |
| Multi-Family | College and University | Offices | Chemicals and Plastics | Stone/Glass/ Clay/Concrete |
| Manufactured Homes | Grocery | Restaurant | Construction | Textiles and Leather |
| | Healthcare | Retail | Electrical and Electronic Equipment | Transportation Equipment |
| | Hospitals | Schools K-12 | Lumber/Furniture/ Pulp/Paper | Water and Wastewater |
| | Institutional | Warehouse | Metal Products and Machinery | Other |
| | Lodging/ Hospitality | | Miscellaneous Manufacturing | |

From an equipment and energy use perspective, each segment has variation within each building type or sub-sector. For example, the energy consuming equipment in a convenience store will vary significantly from the equipment found in a supermarket. To account for this variation, the selected end-uses describe energy consumption patterns that are consistent with those typically studied in national or regional surveys, such as the U.S. Energy Information Administration's (EIA) Residential Energy Consumption Survey (RECS), Commercial Building Energy Consumption Survey (CBECS) and Manufacturing Energy Consumption Survey (MECS), among others. The end-uses selected for this study are listed in Table 5.

Table 5. End-Uses

| Residential End-Uses | Commercial End-Uses | Industrial End-Uses |
|---|---|---|
| Space heating[3] | Space heating[3] | Process heating |
| Space cooling[3] | Space cooling[3] | Process cooling |
| Domestic hot water | Domestic hot water | Compressed air |
| Ventilation and circulation | Ventilation and circulation | Motors/pumps |

[3] Includes the contribution of building envelope measures and efficiencies.

| Residential End-Uses | Commercial End-Uses | Industrial End-Uses |
|---|---|---|
| Lighting | Interior lighting | Fan, blower motors |
| Cooking | Exterior lighting | Process-specific |
| Appliances | Cooking | Industrial lighting |
| Electronics | Refrigeration | Exterior lighting |
| Miscellaneous | Office equipment | HVAC[3] |
| | Miscellaneous | Other |

For DR, the end-uses targeted were those with controllable load for residential customers (i.e., HVAC, water heaters, pool pumps, and electric vehicles) and small C&I customers (HVAC and electric vehicles).  For large C&I customers, all load during peak hours was included assuming these customers would potentially be willing to reduce electricity consumption for a limited time if offered a large enough incentive during temporary system peak demand conditions.

### 3.1.2 Forecast Disaggregation

A common understanding of the assumptions and granularity in the baseline load forecast was developed with input from JEA. Key discussion topics reviewed included:

- How current DSM offerings are reflected in the energy and demand forecast.
- Assumed weather conditions and hour(s) of the day when the system is projected to peak.
- Are there portions of the load forecast attributable to customers or equipment not eligible for DSM programs?
- How are projections of population increase, changes in appliance efficiency, and evolving distribution of end-use load shares accounted for in the peak demand forecast?

#### 3.1.2.1 Electricity Consumption (kWh) Forecast

Resource Innovations segmented JEA's electricity consumption forecast into electricity consumption load shares by customer class and end-use. The baseline customer segmentation represents the electricity market by describing how electricity was consumed within the service territory. Resource Innovations developed the forecast for the year 2025, and based it on data provided by JEA, primarily their 2023 Ten-Year Site Plan, which was the most recent plan available at the time the studies were initiated. The data addressed current baseline consumption, system load, and sales forecasts.

#### 3.1.2.2 Peak Demand (kW) Forecast

A fundamental component of DR potential was establishing a baseline forecast of what loads or operational requirements would be absent due to existing dispatchable DR or time varying rates. This baseline was necessary to assess how DR can assist in meeting specific planning and operational requirements. We utilized JEA's summer and winter peak demand forecast, which was developed for system planning purposes.

#### 3.1.2.3 Estimating Consumption by End-Use Technology

As part of the forecast disaggregation, Resource Innovations developed a list of electricity end-uses by sector (Table 5). To develop this list, Resource Innovations began with JEA's estimates of average end-use consumption by customer and sector. Resource Innovations combined these data with other information, such as utility residential appliance saturation surveys, as available, to develop estimates of customers' baseline consumption. Resource Innovations calibrated the utility-provided data with data available from public sources, such as the EIA's recurring data-collection efforts that describe energy end-use consumption for the residential, commercial, and manufacturing sectors.

To develop estimates of end-use electricity consumption by customer segment and end-use, Resource Innovations applied estimates of end-use and equipment-type saturation to the average energy consumption for each sector. The following data sources and adjustments were used in developing the base year 2025 sales by end-use:

**Residential Sector:**

- The disaggregation was based on JEA's rate class load shares and intensities.
- Baseline intensity was calibrated to account for differences in end-use saturation, fuel source, and equipment saturation as follows:
    - JEA rate class load share is based on average per customer.
    - Resource Innovations made conversions to usage estimates generated by applying JEA's 2020 Appliance Saturation Study (APSS) report, EIA RECS data, residential end-use study data from other FEECA utilities, and EIA's Annual Energy Outlook (AEO) 2023.

**Commercial Sector:**

- The disaggregation was based on JEA's rate class load shares, intensities, and EIA CBECS data.
- Segment data from EIA and JEA.

- Baseline intensity was calibrated to account for differences in end-use saturation, fuel source, and equipment saturation as follows:
    - Rate class load share based on EIA CBECS and end-use forecasts from JEA.

**Industrial Sector:**

- The disaggregation was based on rate class load shares, intensities, and EIA MECS data.
- Segment data from EIA and JEA.
- Baseline intensity was calibrated to account for differences in end-use saturation, fuel source, and equipment saturation as follows:
    - Rate class load share based on EIA MECS and end-use forecasts from JEA.

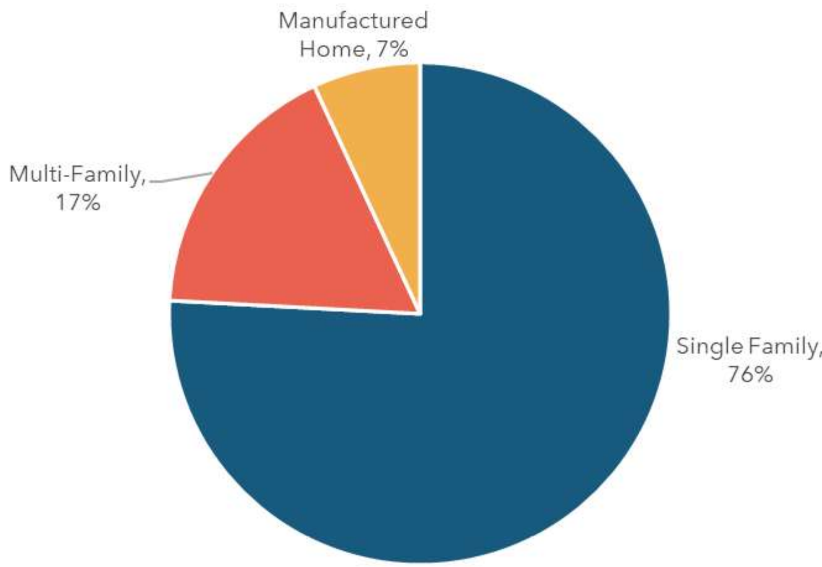
## 3.2 Analysis of Customer Segmentation

Customer segmentation is important to ensuring that a MPS examines DSM measure savings potential in a manner that reflects the diversity of energy savings opportunities existing across the utility's customer base. JEA provided Resource Innovations with data concerning the premise type and loads characteristics for all customers for the MPS analysis. Resource Innovations examined the provided data from multiple perspectives to identify customer segments. Resource Innovations' approach to segmentation varied slightly for non-residential and residential accounts, but the overall logic was consistent with the concept of expressing the accounts in terms that were relevant to DSM opportunities.

### 3.2.1 Residential Customers (EE, DR, and DSRE Analysis)

Segmentation of residential customer accounts enabled Resource Innovations to align DSM opportunities with appropriate DSM measures. Resource Innovations used utility customer data, supplemented with EIA data, to segment the residential sector by customer dwelling type (single family, multi-family, or manufactured home). The resulting distribution of customers according to dwelling unit type is presented in Figure 2.

**Figure 2. Residential Customer Segmentation**




### 3.2.2 Non-Residential (Commercial and Industrial) Customers (EE and DSRE Analysis)

For the EE and DSRE analysis, Resource Innovations segmented C&I accounts using the utility's North American Industry Classification System (NAICS) or Standard Industrial Classification (SIC) codes, supplemented by data produced by the EIA's CBECS and MECS. Resource Innovations classified the customers in this group as either commercial or industrial, on the basis of DSM measure information available and applicable to each. For example, agriculture and forestry DSM measures are commonly considered industrial savings opportunities. Resource Innovations based this classification on the types of DSM measures applicable by segment, rather than on the annual energy consumption or maximum instantaneous demand from the segment as a whole. The estimated energy sales distributions Resource Innovations applied are shown below in Figure 3 and Figure 4.

Figure 3. Commercial Customer Segmentation

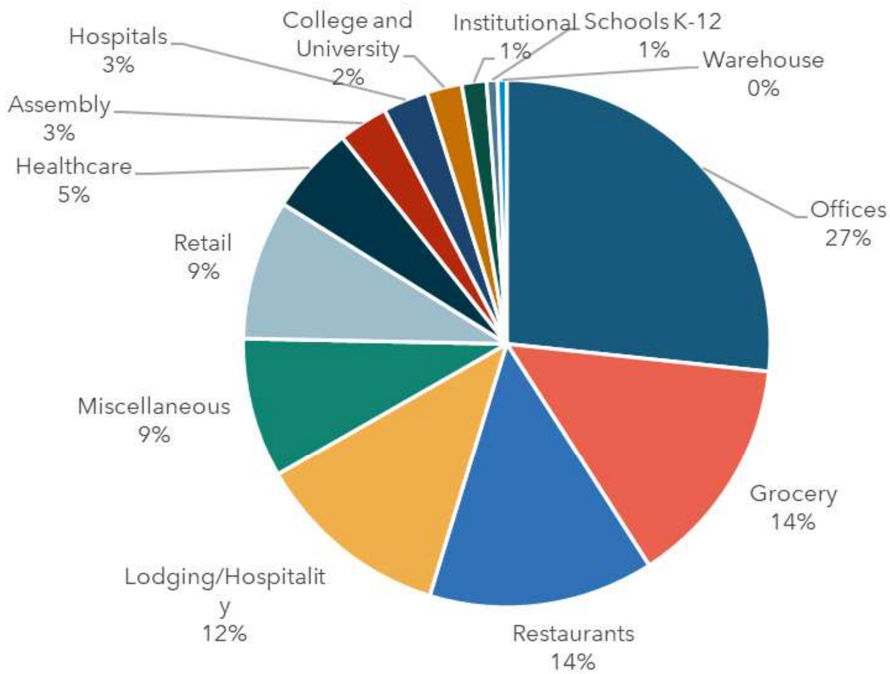
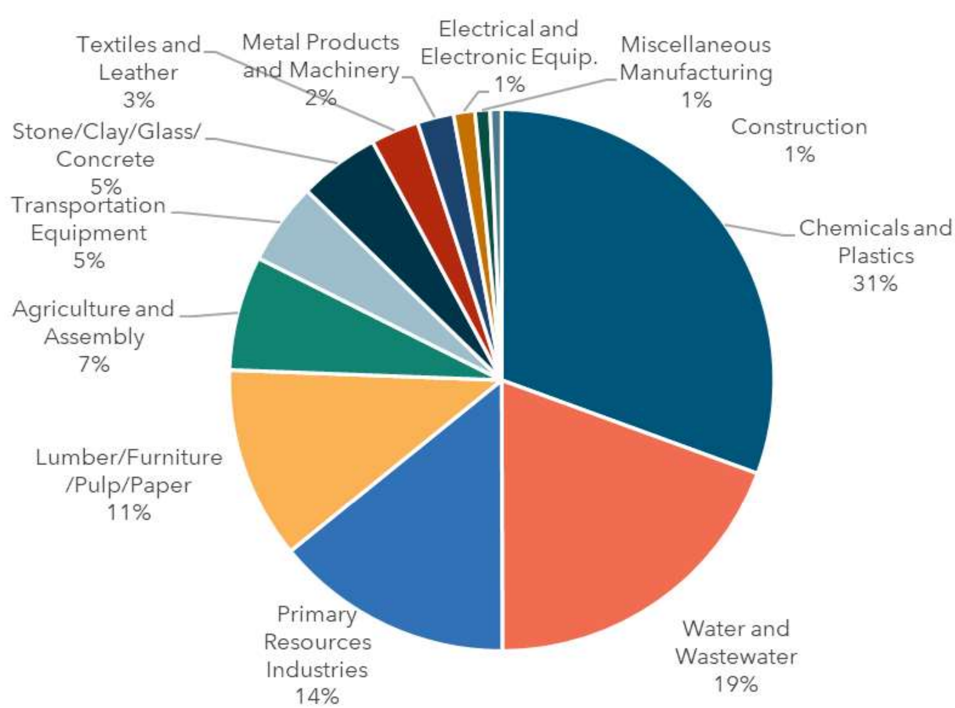



Figure 4. Industrial Customer Segmentation



### 3.2.3 Commercial and Industrial Accounts (DR Analysis)

For the DR analysis, Resource Innovations divided the non-residential customers into the two customer classes of small C&I and large C&I using rate class and annual consumption. For the purposes of this analysis, small C&I customers are those on the General Service (GS) tariff. Large C&I customers are all customers on the General Service Demand (GSD) tariff or on the General Service Large Demand (GSLD) tariff. Resource Innovations further segmented these two groups based on customer size. For small C&I, segmentation was determined using annual customer consumption and for large C&I the customer's maximum demand was used. Both customer maximum demand and customer annual consumption were calculated using billing data provided by JEA.

Table 6 shows the account breakout between small C&I and large C&I.

Table 6. Summary of Customer Classes for DR Analysis

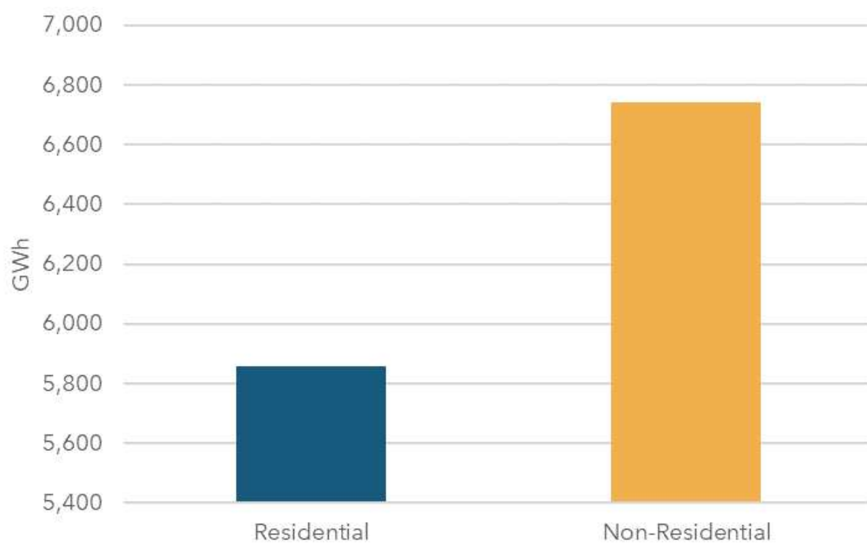
| Customer Class | Annual kWh | Estimated Number of Accounts |
|---|---|---|
| **Small C&I** | 0-15,000 kWh | 32,188 |
| | 15,001-25,000 kWh | 6,347 |
| | 25,001-50,000 kWh | 1,131 |
| | 50,001 kWh + | 13,802 |
| | Total | 53,468 |
| **Large C&I** | 0-50 kW | 331 |
| | 51-300 kW | 3,842 |
| | 301-500 kW | 8 |
| | 501 kW + | 153 |
| | Total | 4,334 |

## 3.3 Analysis of System Load

### 3.3.1 System Energy Sales

Technical potential is based on JEA's load forecast for the year 2025 from their 2023 Ten Year Site Plan, which is illustrated in Figure 5.

Figure 5. 2025 Electricity Sales Forecast by Sector



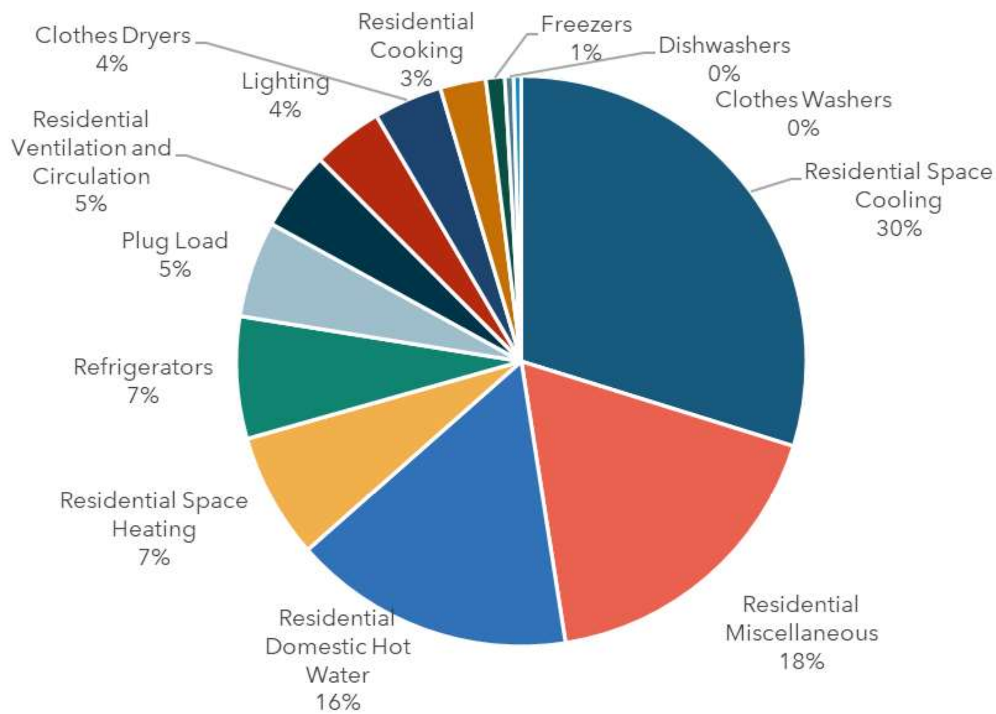

### 3.3.2 System Demand

To determine the technical potential for DR, Resource Innovations first established peaking conditions for each utility by looking at when each utility historically experienced its maximum demand. The primary data source used to determine when maximum DR impact was the historical system load for JEA. The data provided contained the system loads for all 8,760 hours of the most recent five years leading up to the study (2016-2021). The utility summer and winter peaks were then identified within the utility-defined peaking conditions. For JEA the summer peaking conditions were defined as August from 4:00-5:00 PM and the winter peaking conditions were defined as January from 7:00-8:00 AM. The seasonal peaks were then selected as the maximum demand during utility peaking conditions.

### 3.3.3 Load Disaggregation

The disaggregated annual electric loads[4] for the base year 2025 by sector and end-use are summarized in Figure 6, Figure 7, and Figure 8.

Figure 6. Residential Baseline (2025) Energy Sales by End-Use




[4] Full disaggregation of system demand by end-use was not conducted, as DR potential for residential and small C&I customers focused on specific end-uses of particular interest because of their large contribution to peak period system load, and was not end-use specific for large C&I customers. A description of the end-use analysis for residential and small C&I customers is included in Section 5.1.2

Figure 7. Commercial Baseline (2025) Energy Sales by End-Use

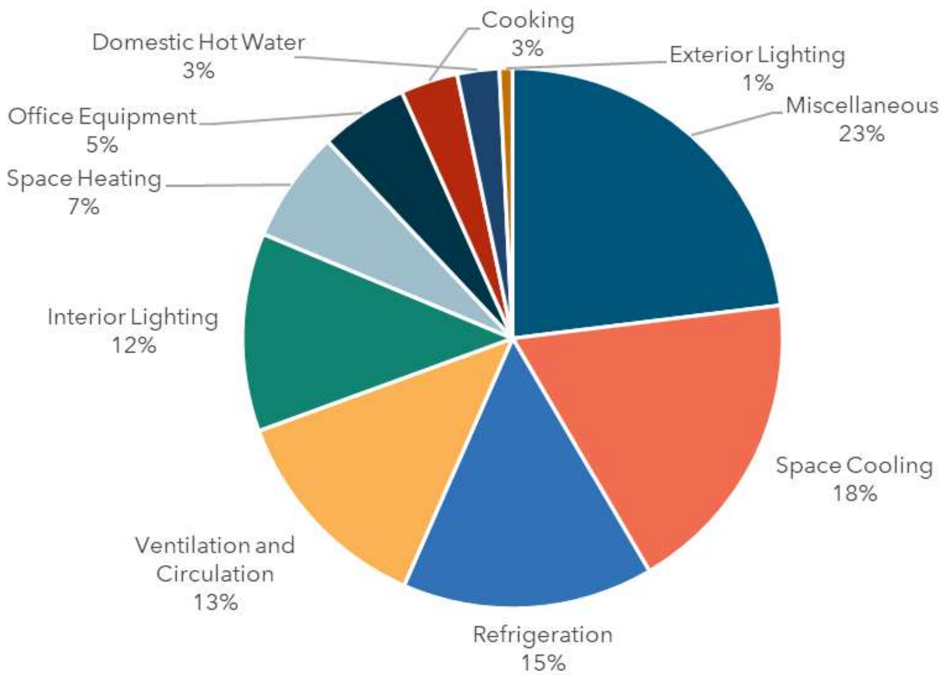
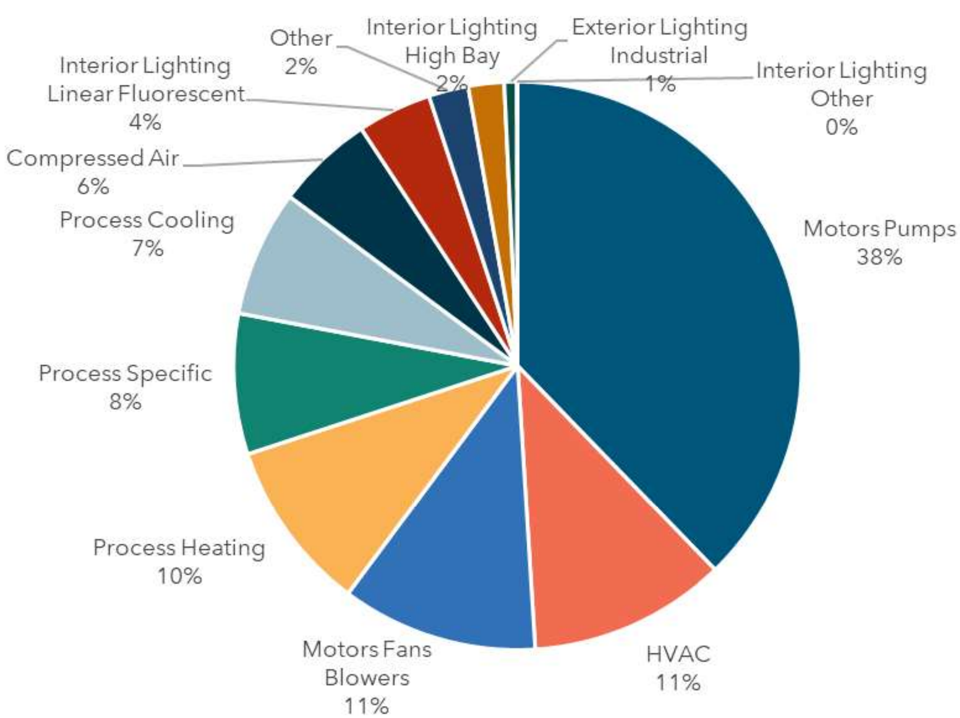



Figure 8. Industrial Baseline (2025) Energy Sales by End-Use



# 4 DSM Measure Development

DSM potential is described by comparing baseline market consumption with opportunities for savings. Describing these individual savings opportunities results in a list of DSM measures to analyze. This section presents the methodology to develop the EE, DR, and DSRE measure lists.

## 4.1 Methodology

Resource Innovations identified a comprehensive catalog of DSM measures for the study. The measure list is the same for all FEECA Utilities. The iterative vetting process with the utilities to develop the measure list began by initially examining the list of measures included in the 2019 Goals docket. This list was then adjusted based on proposed measure additions and revisions provided by the FEECA Utilities. Resource Innovations further refined the measure list based on reviews of Resource Innovations' DSM measure library, compiled from similar market potential studies conducted in recent years throughout the United States, as well as measures included in other utility programs where Resource Innovations is involved with program design, implementation, or evaluation. The FEECA Utilities also reached out to interested parties and received input with recommendations on measure additions to the 2019 measure list. Their measure suggestions were reviewed and incorporated into the study as appropriate. External measure suggestions and actions are summarized in Appendix D. The extensive, iterative review process involving multiple parties has ensured that the study included a robust and comprehensive set of DSM measures.

See Appendix A for the list of EE measures, Appendix B for the list of DR measures, and Appendix C for the list of DSRE measures analyzed in the study.

## 4.2 EE Measures

EE measures represent technologies applicable to the residential, commercial, and industrial customers in the FEECA Utilities' service territories. The development of EE measures included consideration of:

- EE technologies that are applicable to Florida and commercially available: Measures that are not applicable due to climate or customer characteristics were excluded, as were "emerging" technologies that are not currently commercially available to FEECA utility customers.
- Current and planned Florida Building Codes and Federal equipment standards (Codes & Standards) for baseline equipment: Measures included from prior studies

were adjusted to reflect current Codes & Standards as well as updated efficiency tiers, as appropriate.

- Eligibility for utility DSM offerings in Florida: For example, behavioral measures were excluded from consideration, as they historically have not been allowed to count towards utility DSM goals. Behavioral measures are intended to motivate customers to operate in a more energy-efficient manner (e.g., setting an air-conditioner thermostat to a higher temperature) without accompanying: a) physical changes to more efficient end-use equipment or to their building envelope, b) utility-provided products and tools to facilitate the efficiency improvements, or c) permanent operational changes that improve efficiency which are not easily revertible to prior conditions. These types of behavioral measures were excluded because of the variability in forecasting the magnitude and persistence of energy and demand savings from the utility's perspective. Additionally, decoupling behavioral measure savings from the installation of certain EE technologies like smart thermostats can be challenging and could result in overlapping potential with other EE measures included in the study.

Upon development of the final EE measure list, utility-specific measure details were developed. RI maintains a proprietary online database of energy efficiency measures for MPS studies, which was used as a starting point for measure development for this study. Measures are added or updated at the request of project stakeholders or because of changes to the EE marketplace (for example, new codes and standards, or current practice in the market). Measure data are refined as new data or algorithms are developed for estimating measure impacts, and updated for each study to incorporate inputs parameters specific to the service territory being analyzed. The database contains the following information for each of the measures:

- Measure description: measure classification by type, end-use, and subsector, and description of the base-case and the efficient-case scenarios.
- kWh savings: Energy savings associated with each measure were developed through engineering algorithms or building simulation modeling, taking climate data and customer segments into consideration as appropriate. Reference sources used for developing residential, commercial, and industrial measure savings included a variety of Florida-specific, as well as regional and national sources, such as utility-specific measurement & verification (M&V) data, technical reference manuals (TRM) from other jurisdictions, ENERGY STAR calculators, and manufacturer or retailer specifications for particular products.
- Energy savings were applied in RI's TEA-POT model as a percentage of total baseline consumption. Peak demand savings were determined using utility-specific load shapes or coincidence factors.

- Measure Expected Useful Lifetime: Sources included the Database for Energy Efficient Resources (DEER), the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Handbook, TRMs, and other regional and national measure databases and EE program evaluations.
- Measure Costs: Per-unit costs (full or incremental, depending on the application) associated with measure installations. Sources included: TRMs, ENERGY STAR calculator, online market research, FEECA utility program data, and other secondary sources.

The measure details from the online measure library are exported for use in RI's TEA-POT model, accompanied by utility-specific estimates of measure applicability. Measure applicability is a general term encompassing an array of factors, including technical feasibility of installation, and the measure's current saturation as well as factors to allocate savings associated with competing measures. Information used was primarily derived from data in current regional and national databases, as well as JEA's program tracking data. These factors are described in Table 7.

**Table 7. Measure Applicability Factors**

| Measure Impact | Explanation | Sources |
|---|---|---|
| Technical Feasibility | The percentage of buildings that can have the measure physically installed. Various factors may affect this, including, but not limited to, whether the building already has the baseline measure (e.g., dishwasher), and limitations on installation (e.g., size of unit and space available to install the unit). | Various secondary sources and engineering experience. |
| Measure Incomplete Factor | The percentage of buildings without the specific measure currently installed. | Utility RASS; EIA RECS, CBECS; MECS; ENERGY STAR sales figures; and engineering experience. |
| Measure Share | Used to distribute the percentage of market shares for competing measures (e.g., only blown-in ceiling insulation or spray foam insulation, not both would be installed in an attic). | Utility customer data, Various secondary sources and engineering experience. |

As shown in Table 8, the measure list includes 395 unique energy-efficiency measures. Expanding the measures to account for all appropriate installation scenarios resulted in

9,535 measure permutations, which are the application of individual measures to various customer segments, construction types, and end-uses (i.e., a single air-source heat pump "measure" can be installed in single family, multi-family, and manufactured homes, as well as new and existing vintages of each home type, and impacts both space cooling and space heating end-uses, resulting in twelve separate measure "permutations" analyzed).

Table 8. EE Measure Counts by Sector

| Sector | Unique Measures | Permutations |
|---|---|---|
| **Residential** | 119 | 1,173 |
| **Commercial** | 164 | 5,798 |
| **Industrial** | 112 | 2,564 |

## 4.3 DR Measures

The DR measures included in the measure list utilize the following DR strategies:

- **Direct Load Control.** Utility control of selected equipment at the customer's home or business, such as HVAC or water heaters.
- **Critical Peak Pricing (CPP) with Technology.** Electricity rate structures that vary based on time of day. Includes CPP when the rate is substantially higher for a limited number of hours or days per year (customers receive advance notification of CPP event) coupled with technology that enables customer to lower their usage in a specific end-use in response to the event (e.g., HVAC via smart thermostat).
- **Contractual DR.** Customers receive incentive payments or a rate discount for committing to reduce load by a pre-determined amount or to a pre-determined firm service level upon utility request.
- **Automated DR.** Utility dispatched control of specific end-uses at a customer facility.

DR initiatives that do not rely on the installation of a specific device or technology to implement (such as a voluntary curtailment program or time of use rates) were not included.

A workbook was developed for each measure which included the same measure inputs as previously described for the EE measures. In addition, the DR workbook included expected load reduction from the measure, based on utility technical potential, existing utility DR programs, and other nationwide DR programs if needed.

For technical potential, Resource Innovations did not break out results by specific measure or control technology because all of the developed measures target the end-uses estimated

for technical potential (i.e., potential is reported for space cooling end-use and not allocated to switches, smart thermostats, etc.).

## 4.4 DSRE Measures

The DSRE measure list includes rooftop PV systems, battery storage systems charged from PV systems, and CHP systems.

**PV Systems**

PV systems utilize solar panels (a packaged collection of PV cells) to convert sunlight into electricity. A system is constructed with multiple solar panels, a DC/AC inverter, a racking system to hold the panels, and electrical system interconnections. These systems are often roof-mounted systems that face south-west, south, and/or, south-east. The potential associated with roof-mounted systems installed on residential and commercial buildings was analyzed.

**Battery Storage Systems Charged from PV Systems**

Distributed battery storage systems included in this study consist of behind-the-meter battery systems installed in conjunction with an appropriately-sized PV system at residential and commercial customer facilities. These battery systems typically consist of a DC-charged battery, a DC/AC inverter, and electrical system interconnections to a PV system. On their own battery storage systems do not generate or conserve energy, but can collect and store excess PV generation to provide power during particular time periods, which for DSM purposes would be to offset customer demand during the utility's system peak.

**CHP Systems**

In most CHP applications, a heat engine creates shaft power that drives an electrical generator (fuel cells can produce electrical power directly from electrochemical reactions). The waste heat from the engine is then recovered to provide other on-site needs. Common prime mover technologies used in CHP applications and explored in this study include:

- Steam turbines
- Gas turbines
- Micro turbines
- Fuel Cells
- Internal combustion engines

A workbook was developed for each measure which included the inputs previously described for EE measures and prime mover operating parameters.

# 5 Technical Potential

In the previous sections, the approach for DSM measure development was summarized, and the 2025 base year load shares and reference-case load forecast were described. The outputs from these tasks provided the input for estimating the technical potential scenario, which is discussed in this section.

The technical potential scenario estimates the potential energy and demand savings when all technically feasible and commercially available DSM measures are implemented without regard for cost-effectiveness and customer willingness to adopt the most impactful EE, DR, or DSRE technologies. Since the technical potential does not consider the costs or time required to achieve these savings, the estimates provide a theoretical upper limit on electricity savings potential. Technical potential is only constrained by factors such as technical feasibility and applicability of measures. For this study, technical potential included full application of the commercially available DSM measures to all residential, commercial, and industrial customers in the utility's service territory.

## 5.1 Methodology

### 5.1.1 EE Technical Potential

EE technical potential refers to delivering less electricity to the same end-uses. In other words, technical potential might be summarized as "doing the same thing with less energy, regardless of the cost."

DSM measures were applied to the disaggregated utility electricity sales forecasts to estimate technical potential. This involved applying estimated energy savings from equipment and non-equipment measures to all electricity end-uses and customers. Technical potential consists of the total energy and demand that can be saved in the market which Resource Innovations reported as single numerical values for each utility's service territory.

The core equation used in the residential sector EE technical potential analysis for each individual efficiency measure is shown in Equation 1 below, while the core equation used in the nonresidential sector technical potential analysis for each individual efficiency measure is shown in Equation 2.

**Equation 1: Core Equation for Residential Sector EE Technical Potential**

Technical Potential of Efficient Measures = Total Number of Households × Base Case Equipment Energy Use Intensity (kWh/unit) × Saturation Shares × Percent Incomplete × Feasibility Factor × Savings Factor

Where:

- **Baseline Equipment Energy Use Intensity** = the electricity used per customer per year by each baseline technology in each market segment. In other words, the baseline equipment energy-use intensity is the consumption of the electrical energy using equipment that the efficient technology replaces or affects.
- **Saturation Share** = the fraction of the end-use electrical energy that is applicable for the efficient technology in a given market segment. For example, for residential cooling, the saturation share would be the fraction of all residential electric customers that have central air conditioners in their household.
- **Percent Incomplete** = the fraction of equipment that is not considered to already be energy efficient. To extend the example above, the fraction of central air conditioners that is not already energy efficient.
- **Feasibility Factor** = the fraction of units that is technically feasible for conversion to the most efficient available technology from an engineering perspective (i.e., it may not be possible to install LEDs in all light sockets in a home because the available styles may not fit in every socket).
- **Savings Factor** = the percentage reduction in electricity consumption resulting from the application of the efficient technology.

**Equation 2: Core Equation for Non-Residential Sector EE Technical Potential**

Technical Potential of Efficient Measures = Total Stock Sq. Footage by Building Type by EDC × Base Case Equipment Energy Use Intensity (kWh/unit) × Saturation Shares × Percent Incomplete × Feasibility Factor × Savings Factor

Where:

- **Total Stock Square Footage by Segment** = the forecasted square footage level for a given building type (e.g., square feet of office buildings).
- **Baseline Equipment Energy Use Intensity** = the electricity used per square foot per year by each baseline equipment type in each market segment.

- **Saturation Shares** = the fraction of total end-use energy consumption associated with the efficient technology in a given market segment. For example, for packaged terminal air-conditioner (PTAC), the saturation share would be the fraction of all space cooling kWh in a given market segment that is associated with PTAC equipment.
- **Percent Incomplete** = the fraction of equipment that is not considered to already be energy efficient.
- **Feasibility Factor** = the fraction of the equipment or practice that is technically feasible for conversion to the efficient technology from an engineering perspective (i.e., it may not be possible to install Variable Frequency Drives (VFD) on all motors in a given market segment).
- **Savings Factor** = the percentage reduction in electricity consumption resulting from the application of the efficient technology.

It is important to note that the technical potential estimate represents electricity savings potential at a specific point in time. In other words, the technical potential estimate is based on data describing status quo customer electricity use and technologies known to exist today. As technology and electricity consumption patterns evolve over time, the baseline electricity consumption will also change accordingly. For this reason, technical potential is a discrete estimate of a dynamic market. Resource Innovations reported the technical potential for 2025, based on currently known DSM measures and observed electricity consumption patterns.

### Measure Interaction and Competition (Overlap)

While the technical potential equations listed above focus on the technical potential of a single measure or technology, Resource Innovations' modeling approach does recognize the overlap of individual measure impacts within an end-use or equipment type, and accounts for the following interactive effects:

- Measure interaction: Installing high-efficiency equipment could reduce energy savings in absolute terms (kWh) associated with non-equipment measures that impact the same end-use. For example, installing a high-efficiency heat pump will reduce heating and cooling consumption which will reduce the baseline against which attic insulation would be applied, thus reducing savings associated with installing insulation. To account for this interaction, Resource Innovations' TEA-POT model ranks measures that interact with one another and reduces the baseline consumption for the subsequent measure based on the savings achieved by the preceding measure. For technical potential, interactive measures are ranked based on total end-use energy savings percentage.
- Measure competition (overlap): The "measure share"—as defined above—accounted for competing measures, ensuring savings were not double-counted. This interaction

occurred when two or more measures "competed" for the same end-use. For example, a T-12 lamp could be replaced with a T-8 or linear LED lamp.

**Addressing Naturally-Occurring EE**

Naturally occurring energy efficiency includes actions taken by customers to improve the efficiency of their homes and businesses in the absence of utility program intervention. For the analysis of technical potential, Resource Innovations verified with JEA's forecasting group that the baseline sales forecasts incorporated two known sources of naturally-occurring efficiency:

- Codes and Standards: The sales forecasts already incorporated the impacts of known Code & standards changes.
- Baseline Measure Adoption: The sales forecast excluded the projected impacts of future DSM efforts but included already implemented DSM penetration.

By properly accounting for these factors, the technical potential analysis estimated the additional EE opportunities beyond what is already included in the utility sales forecast.

### 5.1.2 DR Technical Potential

The concept of technical potential applies differently to DR than for EE. Technical potential for DR is effectively the magnitude of loads that can be curtailed during conditions when utilities need peak capacity reductions. In evaluating this potential at peak capacity, the following were considered: which customers are consuming electricity at those times? What end-uses are in play? Can those end-use loads be managed? Large C&I accounts generally do not provide the utility with direct control over particular end-uses. Instead, many of these customers will forego electric demand temporarily if the financial incentive is large enough. For residential and small C&I customers where DR generally takes the form of direct utility control, technical potential for DR is limited by the loads that can be controlled remotely at scale.

This framework makes end-use disaggregation an important element for understanding DR potential, particularly in the residential and small C&I sectors. When done properly, end-use disaggregation not only provides insights into which loads are on and off when specific grid services are needed, it also provides insight concerning how key loads and end-uses, such as air conditioning use, vary across customers. Resource Innovations' approach used for load disaggregation is more advanced than what is used for most potential studies. Instead of disaggregating annual consumption or peak demand, Resource Innovations produced end-use load disaggregation for all 8,760 hours. This was needed because the loads available at times when different grid applications are needed can vary substantially. Instead

of producing disaggregated loads for the average customer, the study was produced for several customer segments. For JEA, Resource Innovations examined three residential segments based on customer housing type, four different small C&I segments based on customer size, and four different large C&I segments based on customer size, for a total of 11 different customer segments.

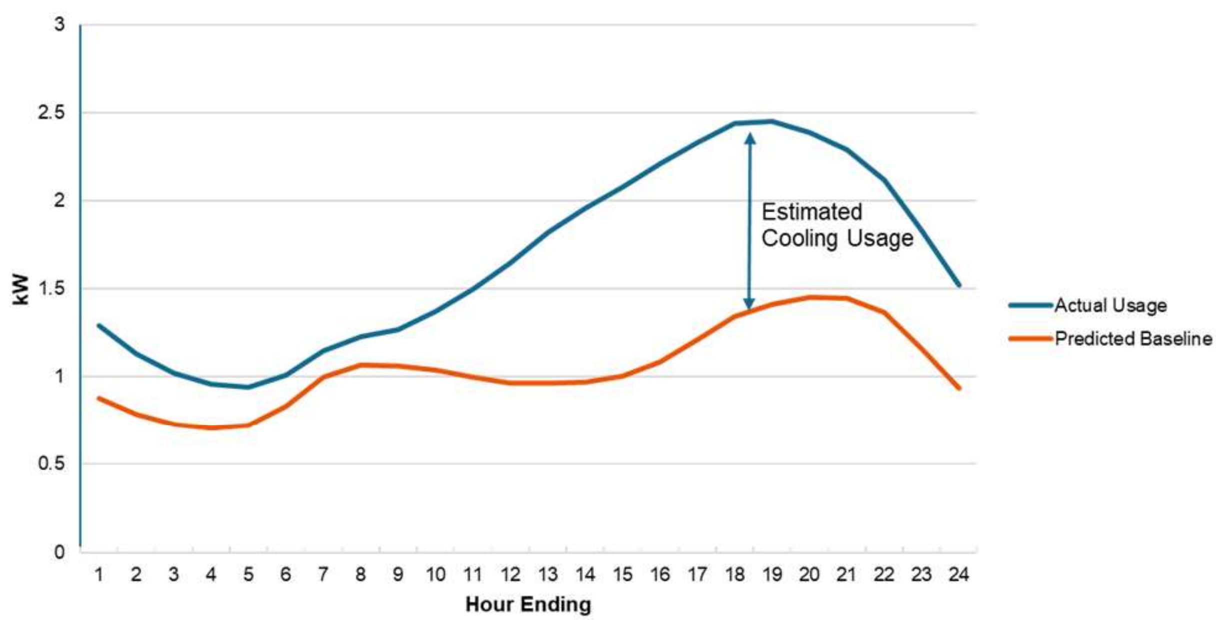
Technical potential, in the context of DR, is defined as the total amount of load available for reduction that is coincident with the period of interest; in this case, the system peak hour for the summer and winter seasons. Thus, two sets of capacity values are estimated: a summer capacity and a winter capacity.

As previously mentioned, for technical potential purposes, all coincident large C&I load is considered dispatchable, while residential and small C&I DR capacity is based on specific end-uses. Summer DR capacity for residential customers was comprised of air-conditioning (AC), pool pumps, water heaters, and managed electric vehicle charging. For small C&I customers, summer capacity was based on AC load. For winter DR capacity, residential was based on electric heating, pool pumps, and water heaters. For small C&I customers, winter capacity was based on electric heating.

AC and heating load profiles were generated for residential and small C&I customers using a segment-level interval data provided by JEA. Resource Innovations then used the interval data to create an average load profile for each customer segment.

The average load profile for each customer segment was combined with historical weather data, and used to estimate hourly load as a function of weather conditions. AC and heating loads were estimated by first calculating the baseline load on days when cooling degree days (CDD) and heating degree days (HDD) were equal to zero, and then subtracting this baseline load. This methodology is illustrated by Figure 9 (a similar methodology was used to predict heating loads).

Figure 9: Methodology for Estimating Cooling Loads




This method was able to produce estimates for average AC/heating load profiles for the different customer segments within the residential and small C&I sectors.

Profiles for residential water heater and pool pump loads were estimated by utilizing end-use load data from NREL's residential end-use load profile database.

For all eligible loads, the technical potential was defined as the amount that was coincident with system peak hours for each season, which are August from 4:00-5:00 PM for summer, and January from 7:00-8:00 AM for winter. As mentioned in Section 4, for technical potential there was also no measure breakout needed, because all measures will target the end-uses' estimated total loads.

### 5.1.3 DSRE Technical Potential

#### 5.1.3.1 PV Systems

To determine technical potential for PV systems, RI estimated the percentage of rooftop square footage in Florida that is suitable for hosting PV technology. Our estimate of technical potential for PV systems in this report is based in part on the available roof area and consisted of the following steps:

- Step 1: Outcomes from the forecast disaggregation analysis were used to characterize the existing and new residential, commercial and industrial building stocks.
    - To calculate the total roof area for residential buildings, the average roof area per household is multiplied by the number of households.
    - For commercial and industrial buildings, RI calculated the total roof area by first dividing the load forecast by the energy usage intensity, which provides an estimate of the total building square footage. This result is then divided by the average number of floors to derive the total roof area.
- Step 2: The total available roof area feasible for installing PV systems was calculated. Relevant parameters included unusable area due to other rooftop equipment and setback requirements, in addition to possible shading from trees and limitations of roof orientation (factored into a "technical suitability" multiplier).
- Step 3: Estimated the expected power density (kW per square foot of roof area).
- Step 4: Estimated the hourly PV generation profile using NREL's PV Watts Calculator
- Step 5: Calculated total energy and coincident peak demand potential by applying RI's Spatial Penetration and Integration of Distributed Energy Resources (SPIDER) Model.

The methodology presented in this report uses the following formula to estimate overall technical potential of PVs:

**Equation 3: Core Equation for Solar DSRE Technical Energy Potential**

$$\text{PV Technical Energy Potential} = \text{Suitable Rooftop PV Area (Sq Ft)} \times \text{PV Power Density (kW-DC/Sq Ft)} \times \text{Generation Factor (kWh/kW-DC)}$$

Where:

- **Suitable Rooftop PV Area for Residential [Square Feet]:** Number of Residential Buildings x Average Roof Area Per Building x Technical Suitability Factor
- **Suitable Rooftop PV Area for Commercial [Square Feet] :** Energy Consumption [kWh] / Energy Intensity [kWh / Square Feet] / Average No. of Stories Per Building x Technical Suitability Factor
- **PV Power Density [kW-DC/Square Feet]:** Maximum power generated in Watts per square foot of solar panel.
- **Generation Factor:** Annual Energy Generation Factor for PV, from PV Watts (dependent on local solar irradiance)

#### 5.1.3.2 Battery Storage Systems Charged from PV Systems

Battery storage systems on their own do not generate power or create efficiency improvements, but store power for use at different times. Therefore, in analyzing the technical potential for battery storage systems, the source of the stored power and overlap with technical potential identified in other categories was considered.

Battery storage systems that are powered directly from the grid do not produce annual energy savings but may be used to shift or curtail load during particular time periods. As the DR technical potential analyzes curtailment opportunities for the summer and winter peak period, and battery storage systems can be used as a DR technology, the study concluded that no additional technical potential should be claimed for grid-powered battery systems beyond that already attributed to DR.

Battery storage systems that are connected to on-site PV systems also do not produce additional energy savings beyond the energy produced from the PV system[5]. However, PV-connected battery systems do create the opportunity to store energy during period when the PV system is generating more than the home or business is consuming and use that stored power during utility system peak periods.

To determine the additional technical potential peak demand savings for "solar plus storage" systems, our methodology consisted of the following steps:

- Assume that every PV system included in PV Technical Potential is installed with a paired storage system.
- Size the storage system assuming peak storage power is equal to peak PV generation and energy storage duration is three hours.
- Apply RI's hourly dispatch optimization module in SPIDER to create an hourly storage dispatch profile that flattens the individual customer's load profile to the greatest extent possible accounting for a) customer hourly load profile, b) hourly PV generation profile, and c) battery peak demand, energy capacity, and roundtrip charge/discharge efficiency.
- Calculate the effective hourly impact for the utility using the above storage dispatch profile, aligned with the utility's peak hour (calculated separately for summer and winter)
- Report the output storage kW impact on utility coincident peak demand in summer and winter.

[5] PV-connected battery systems experience some efficiency loss due to storage, charging, and discharging. However, for this study, these losses were not quantified.

#### 5.1.3.3 CHP Systems

The CHP analysis created a series of unique distributed generation potential models for each primary market sector (commercial and industrial).

Only non-residential customer segments whose electric and thermal load profiles allow for the application of CHP were considered. The technical potential analysis followed a three-step process. First, minimum facilities size thresholds were determined for each non-residential customer segment. Next, the full population of non-residential customers were segmented and screened based on the size threshold established for that segment. Finally, the facilities that were of sufficient size were matched with the appropriately sized CHP technology.

To determine the minimum threshold for CHP suitability, a thermal factor was applied to potential candidate customer loads to reflect thermal load considerations in CHP sizing. In most cases, on-site thermal energy demand is smaller than electrical demand. Thus, CHP size is usually dictated by the thermal load in order to achieve improved efficiencies.

The study collected electric and thermal intensity data from other recent CHP studies. For industrial customers, Resource Innovations assumed that the thermal load would primarily be used for process operations and was not modified from the secondary data sources for Florida climate conditions. For commercial customers, the thermal load is more commonly made up of water heating, space heating, and space cooling (through the use of an absorption chiller). Therefore, to account for the hot and humid climate in Florida, which traditionally limits weather-dependent internal heating loads, commercial customers' thermal loads were adjusted to incorporate a higher proportion of space cooling to space heating as available opportunities for waste heat recovery.

Resource Innovations worked with the utility-provided customer data, focusing on annual consumption due to the absence of NAICS or SIC codes for this utility data. Non-residential customers were subsequently classified based on annual consumption and size. Since NAICS or SIC codes were unavailable, no formal segmentation occurred. Instead, the analysis focused exclusively on annual utility usage. Facilities with annual loads below the kWh thresholds were deemed unlikely to possess the consistent electric and thermal loads necessary to support CHP and were consequently excluded from consideration. Conversely, those meeting the size criteria were aligned with the corresponding CHP technology.

In general, internal combustion engines are the prime mover for systems under 500kW with gas turbines becoming progressively more popular as system size increases above that. Based on the available load by customer, adjusted by the estimated thermal factor for each

segment, CHP technologies were assigned to utility customers in a top-down fashion (i.e., starting with the largest CHP generators).

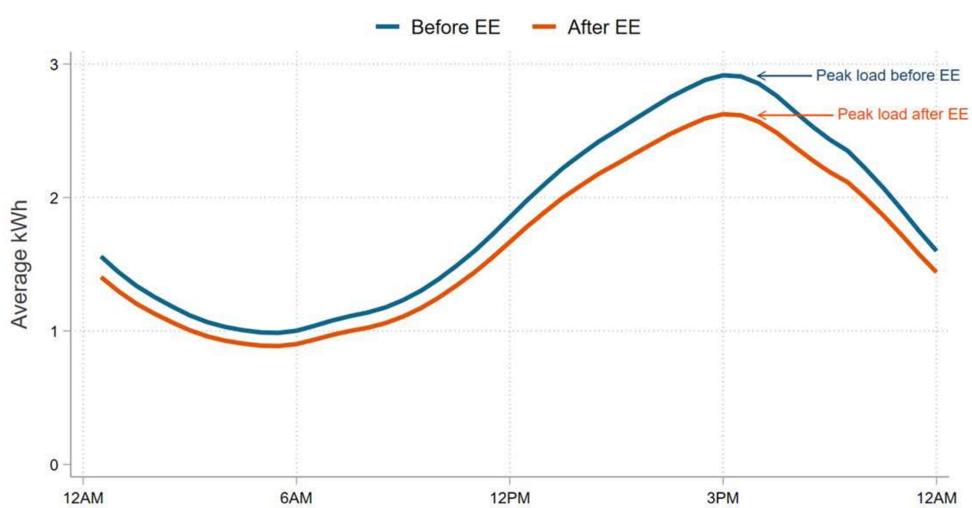
**Measure Interaction**

PV systems and battery storage charged from PV systems were analyzed collectively due to their common power generation source; and therefore, the identified technical potential for these systems is additive. However, CHP systems were independently analyzed for technical potential without consideration of the competition between DSRE technologies or customer preference for a particular DSRE system. Therefore, results for CHP technical potential should not be combined with PV systems or battery storage systems for overall DSRE potential but used as independent estimates.

### 5.1.4 Interaction of Technical Potential Impacts

As described above, the technical potential was estimated using separate models for EE, DR, and DSRE systems. However, there is interaction between these technologies; for example, a more efficient HVAC system would result in a reduced peak demand available for DR curtailment, as illustrated in Figure 10.

Figure 10: Illustration of EE Impacts on HVAC System Load Shape




Therefore, after development of the independent models, the interaction between EE, DR, and DSRE was incorporated as follows:

- The EE technical potential was assumed to be implemented first, followed by DR technical potential and DSRE technical potential.

- To account for the impact of EE technical potential on DR, the baseline load forecast for the applicable end-uses was adjusted by the EE technical potential, resulting in a reduction in baseline load available for curtailment.
- For DSRE systems, the EE and DR technical potential was incorporated in a similar fashion, adjusting the baseline load used to estimate DSRE potential.
  - For the PV analysis, this did not impact the results as the EE and DR technical potential did not affect the amount of PV that could be installed on available rooftops.
  - For the battery storage charged from PV systems, the reduced baseline load from EE resulted in additional PV-generated energy being available for the battery systems and for use during peak periods. The impact of DR events during the assumed curtailment hours was incorporated into the modeling of available battery storage and discharge loads.
- For CHP systems, the reduced baseline load from EE resulted in a reduction in the number of facilities that met the annual energy threshold needed for CHP installations. Installed DR capacity was assumed to not impact CHP potential as the CHP system feasibility was determined based on energy and thermal consumption at the facility. It should be noted that CHP systems not connected to the grid could impact the amount of load available for curtailment with utility-sponsored DR. Therefore, CHP technical potential should not be combined with DR potential but used as independent estimates.

## 5.2 EE Technical Potential

### 5.2.1 Summary

Table 9 summarizes the EE technical potential by sector:

Table 9. EE Technical Potential

| | Savings Potential | | |
|---|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) | Energy (GWh) |
| **Residential** | 517 | 297 | 1,887 |
| **Non-Residential**[6] | 280 | 251 | 1,690 |
| **Total** | 797 | 548 | 3,577 |

[6] Non-Residential results include all commercial and industrial customer segments.

### 5.2.2 Residential

Figure 11, Figure 12, and Figure 13 summarize the residential sector EE technical potential by end-use.

Figure 11: Residential EE Technical Potential by End-Use (Summer Peak Savings)

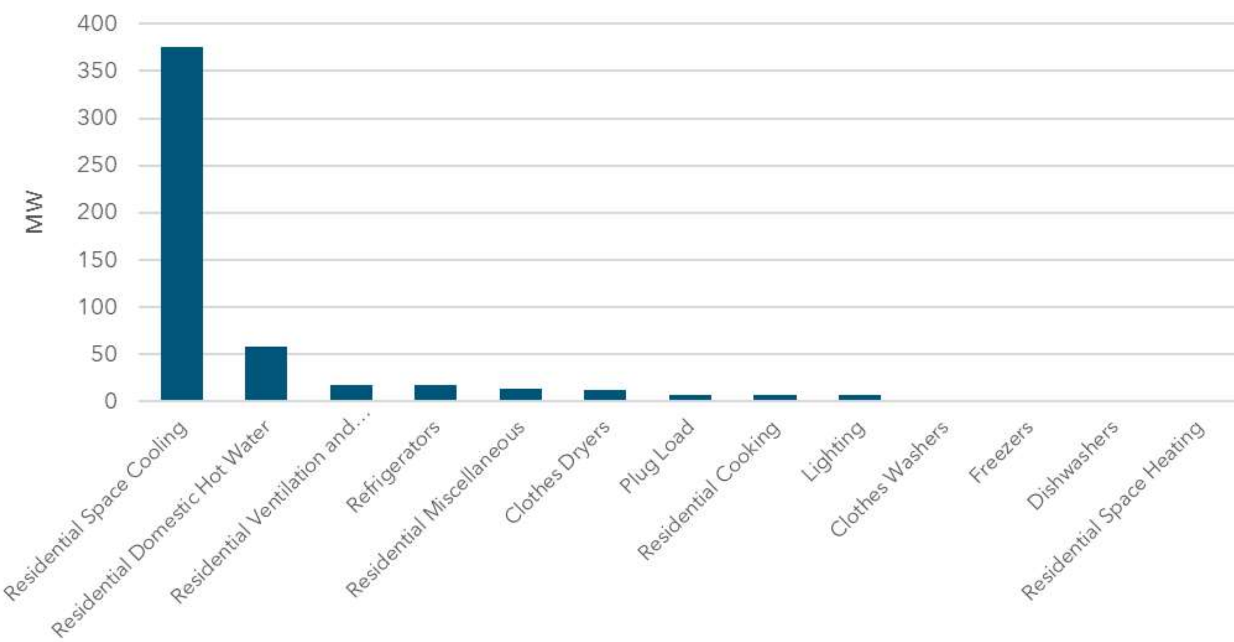


Figure 12: Residential EE Technical Potential by End-Use (Winter Peak Savings)

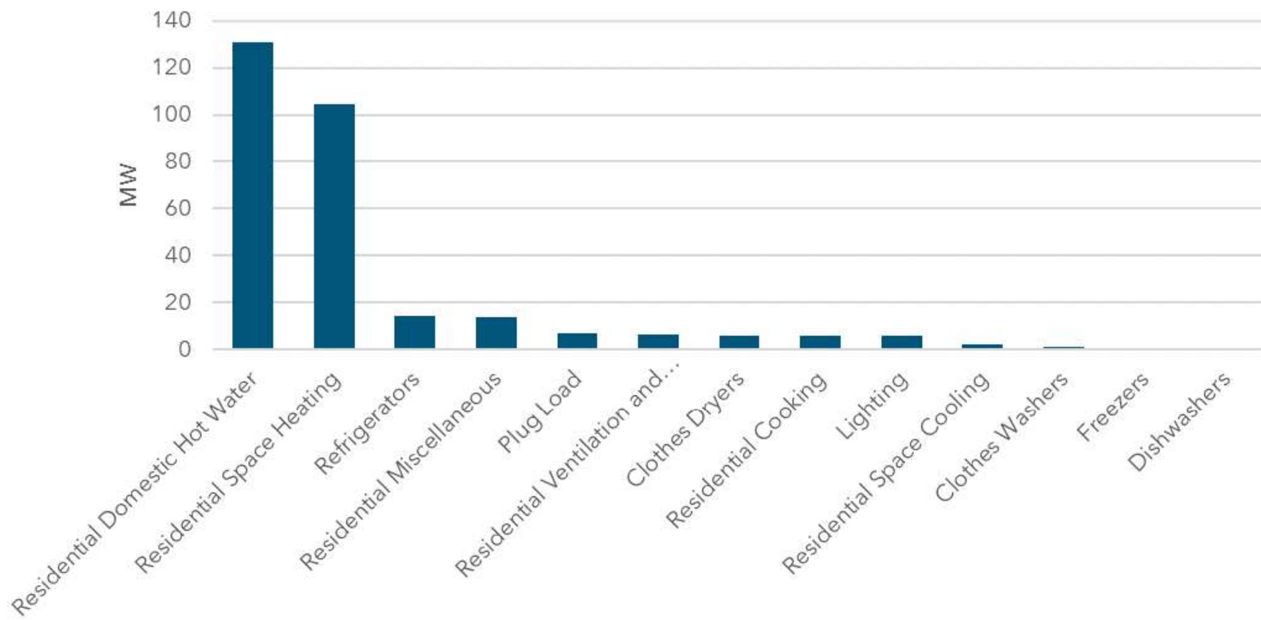
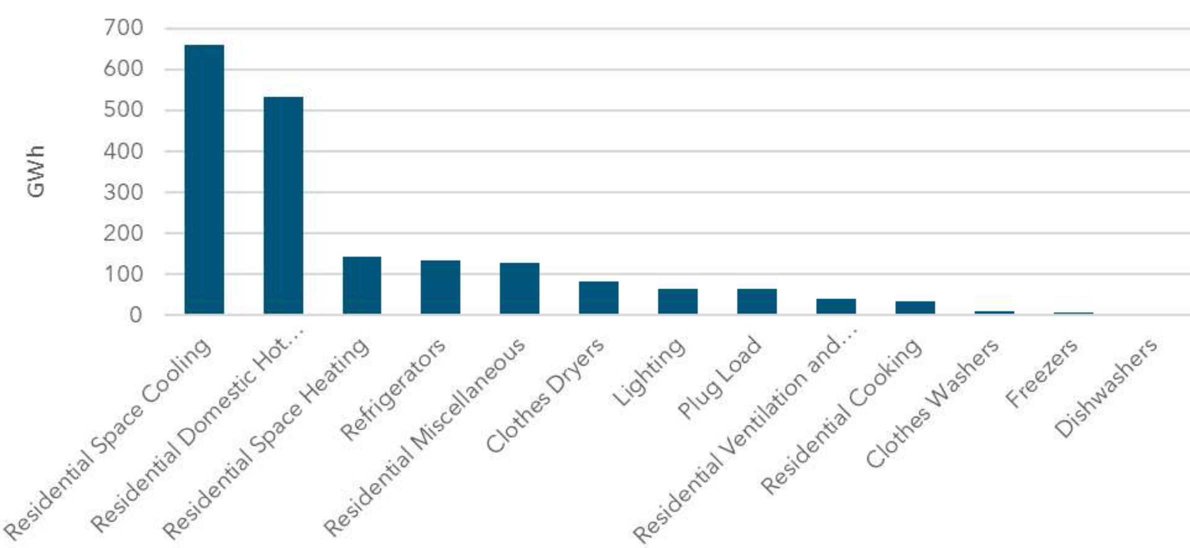



Figure 13: Residential EE Technical Potential by End-Use (Energy Savings)



### 5.2.3 Non-Residential

#### 5.2.3.1 Commercial Segments

Figure 14, Figure 15, and Figure 16 summarize the commercial sector EE technical potential by end-use.

Figure 14: Commercial EE Technical Potential by End-Use (Summer Peak Savings)

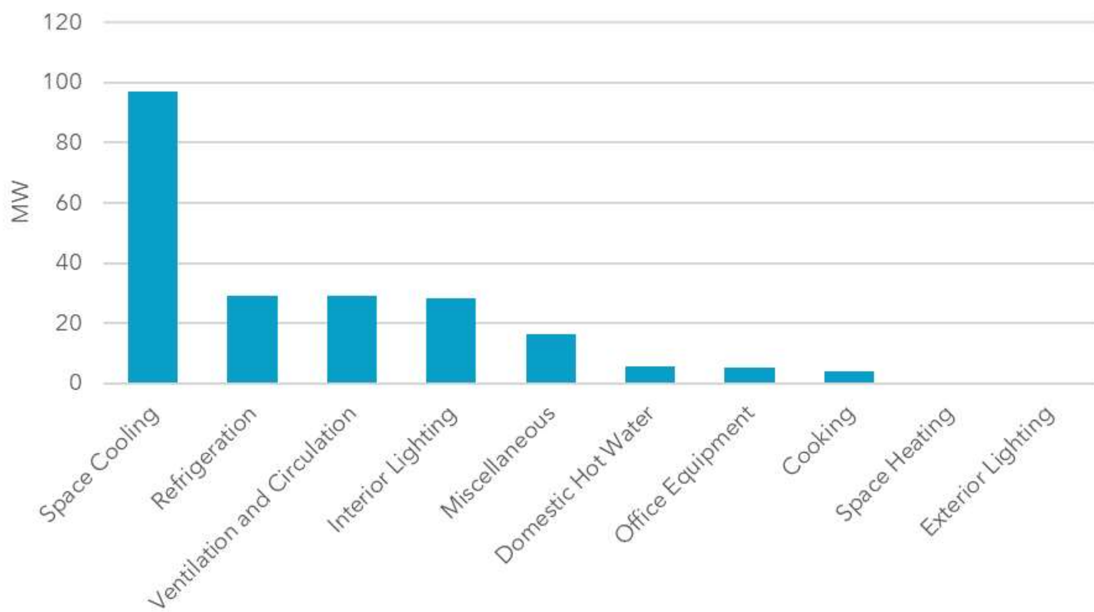


Figure 15: Commercial EE Technical Potential by End-Use (Winter Peak Savings)

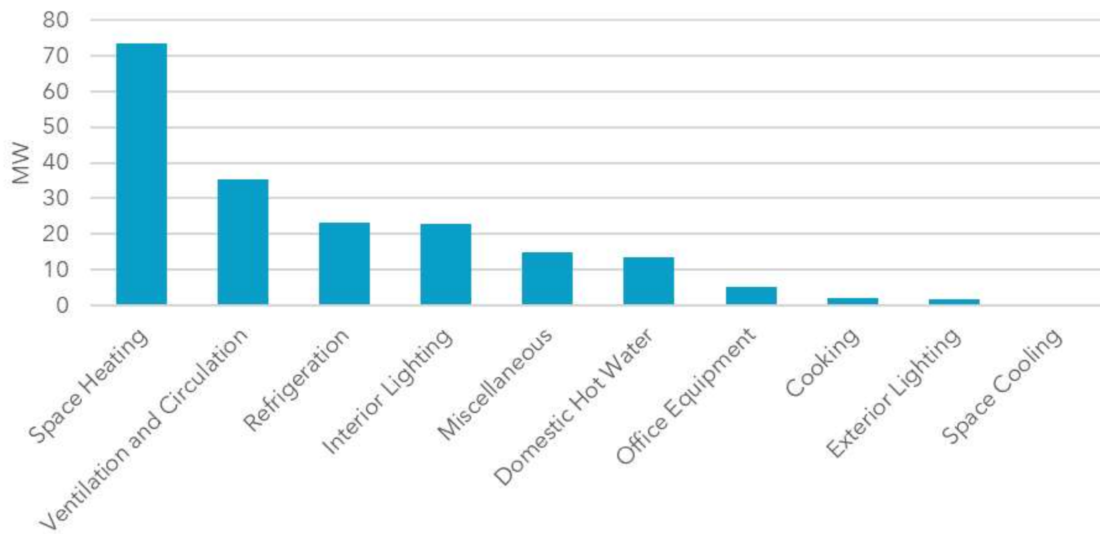
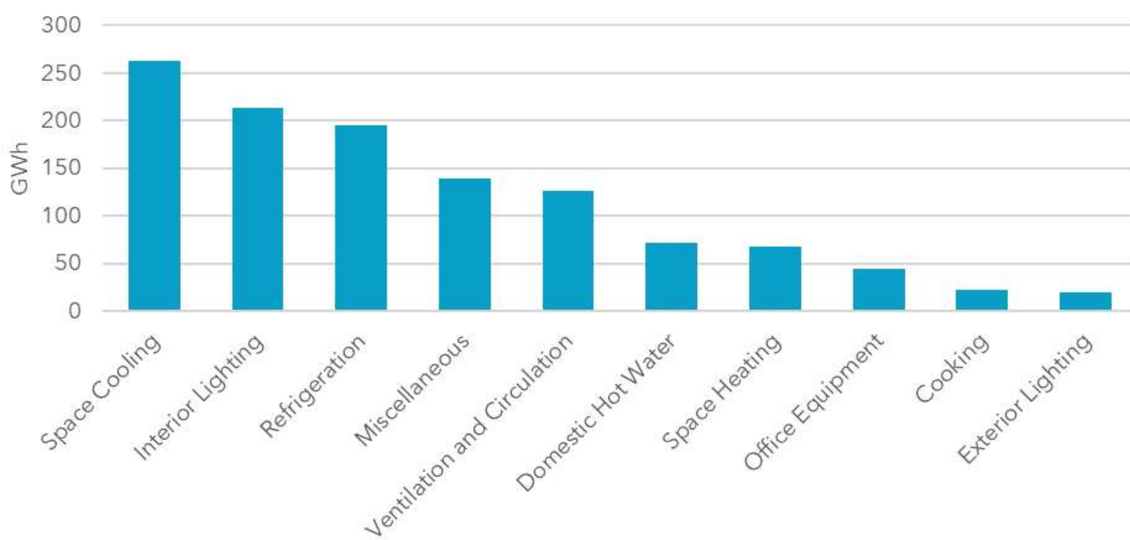



Figure 16: Commercial EE Technical Potential by End-Use (Energy Savings)




### 5.2.3.2 Industrial Segments

Figure 17, Figure 18, and Figure 19 summarize the industrial sector EE technical potential by end-use.

Figure 17: Industrial EE Technical Potential by End-Use (Summer Peak Savings)

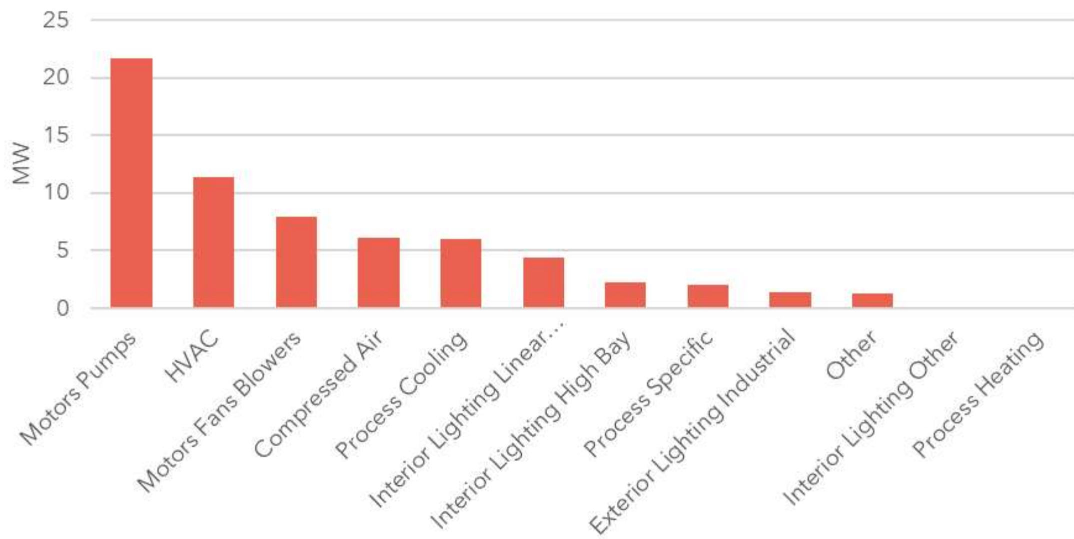



Figure 18: Industrial EE Technical Potential by End-Use (Winter Peak Savings)

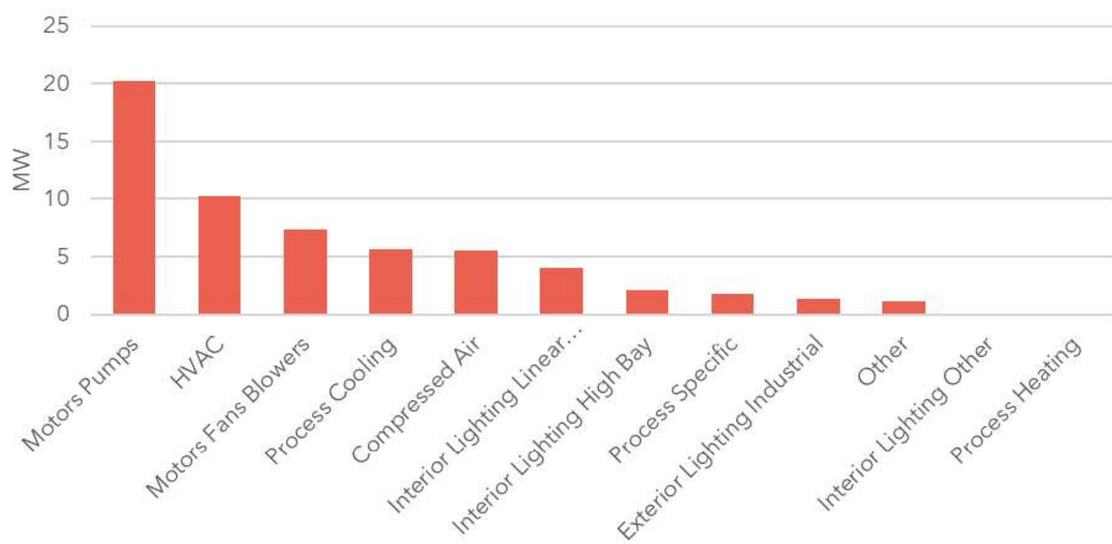
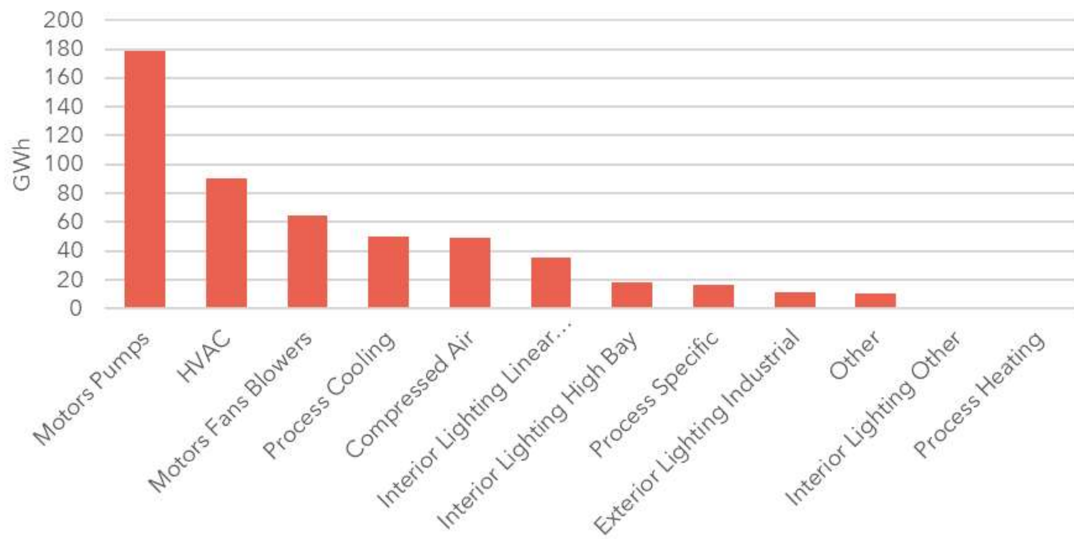


Figure 19: Industrial EE Technical Potential by End-Use (Energy Savings)




## 5.3 DR Technical Potential

Technical potential for DR is defined for each class of customers as follows:

- Residential & Small C&I customers – Technical potential is equal to the aggregate load for all end-uses that can participate in JEA's current programs plus DR measures not currently offered in which the utility uses specialized devices to control loads (i.e., direct load control programs). This includes cooling and heating loads for residential and small C&I customers and water heater and pool pump loads for residential customers. Not all demand reductions are delivered via direct load control of end-uses. The magnitude of demand reductions from non-direct load control such as time varying pricing, peak time rebates and targeted notifications is linked to cooling and heating loads.
- Large C&I customers – Technical potential is equal to the total amount of load for each customer segment (i.e., that customers reduce their total load to zero when called upon).

Table 10 summarizes the seasonal DR technical potential by sector:

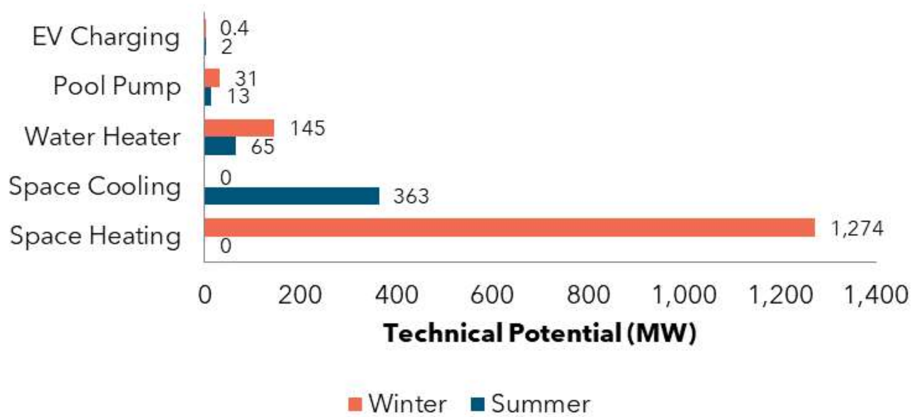
Table 10. DR Technical Potential

| | Savings Potential | |
|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) |
| **Residential** | 443 | 1,451 |
| **Non-Residential** | 673 | 578 |
| **Total** | 1,116 | 2,029 |

## 5.3.1 Residential

Residential technical potential is summarized in Figure 20.

Figure 20: Residential DR Technical Potential by End-Use

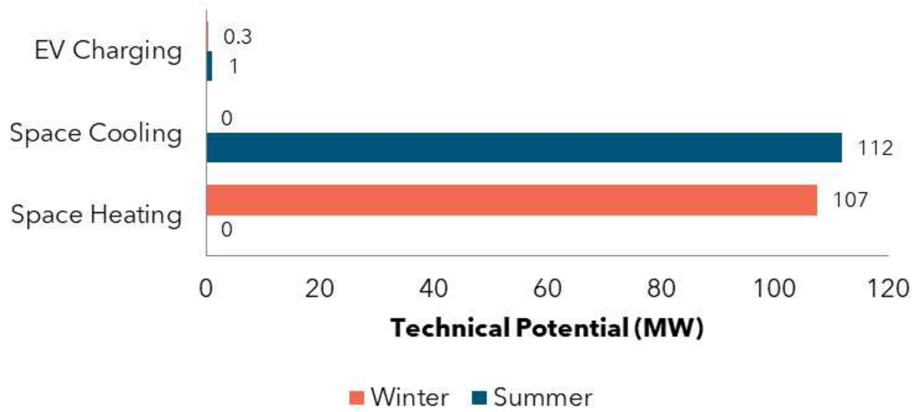



## 5.3.2 Non-Residential

### 5.3.2.1 Small C&I Customers

For small C&I technical potential, Resource Innovations looked at cooling and heating loads only. Small C&I technical potential is provided in Figure 21.

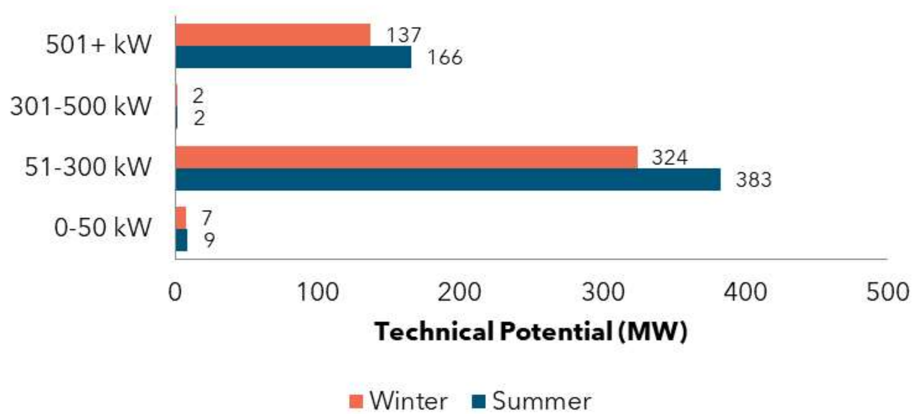
Figure 21: Small C&I DR Technical Potential by End-Use




### 5.3.2.2 Large C&I Customers

Figure 22 provides the technical potential for large C&I customers, broken down by customer size.

Figure 22: Large C&I DR Technical Potential by Segment




## 5.4 DSRE Technical Potential

Table 11 provides the results of the DSRE technical potential for each customer segment:

Table 11. DSRE Technical Potential[7]

| | Savings Potential | | |
|---|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) | Energy (GWh) |
| **PV Systems** | | | |
| **Residential** | 493 | 19 | 4,146 |
| **Non-Residential** | 214 | 3 | 1,617 |
| **Total** | 707 | 22 | 5,763 |
| **Battery Storage charged from PV Systems** | | | |
| **Residential** | 304 | 557 | 0 |
| **Non-Residential** | 0 | 158 | 0 |
| **Total** | 304 | 715 | 0 |
| **CHP Systems** | | | |
| **Total** | 397 | 359 | 1,811 |

[7] PV systems and CHP systems were independently analyzed for technical potential without consideration of the competition between technologies or customer preference for DSRE system.

# Appendix A EE Measure List

For information on how Resource Innovations developed this list, please see Section 4.

Table 12: Residential EE Measures

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| 120v Heat Pump Water Heater 50 Gallons | Residential Domestic Hot Water | 120v Heat Pump Water Heater 50 Gallons | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Air Sealing-Infiltration Control | Residential Space Cooling, Residential Space Heating | Standard Heating and Cooling System with Improved Infiltration Control | Standard Heating and Cooling System with Standard Infiltration Control |
| Air-to-Water Heat Pump | Residential Space Cooling, Residential Space Heating | Energy Star Air-to-Water Heat Pump, 25 SEER, 13 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - 15 SEER/14.3 SEER2 from base electric resistance | Residential Space Cooling, Residential Space Heating | ASHP 15 SEER from base electric resistance | Base AC, 15 SEER, Electric resistance heating |
| ASHP - 24 SEER/22.9 SEER2 (from elec resistance) | Residential Space Cooling, Residential Space Heating | ASHP: 24/22.9 SEER/SEER2, 10.5 HSPF | Base AC, 15 SEER, Electric resistance heating |
| ASHP - 24 SEER/22.9 SEER2, 10.5 HSPF | Residential Space Cooling, Residential Space Heating | ASHP: 24/22.9 SEER/SEER2, 10.5 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - CEE Advanced Tier: 17.8 SEER/17 SEER2; 10.0 HSPF | Residential Space Cooling, Residential Space Heating | CEE Advanced Tier ASHP:17.8/17 SEER/SEER2; 10.0 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - CEE Advanced Tier: 17.8 SEER/17 SEER2; 10.0 HSPF (from elec resistance) | Residential Space Cooling, Residential Space Heating | CEE Advanced Tier ASHP:17.8/17 SEER/SEER2; 10.0 HSPF | Base AC, 15 SEER, Electric resistance heating |
| ASHP - CEE Tier 2: 16.8 SEER/16 SEER2; 9.0 HSPF | Residential Space Cooling, Residential Space Heating | CEE Tier 2 ASHP: 16.8/16 SEER/SEER2; 9.0 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - CEE Tier 2: 16.8 SEER/16 SEER2; 9.0 HSPF (from elec resistance) | Residential Space Cooling, Residential Space Heating | CEE Tier 2 ASHP: 16.8/16 SEER/SEER2; 9.0 HSPF | Base AC, 15 SEER, Electric resistance heating |

| Measure | End-Use | Description | Baseline |
| --- | --- | --- | --- |
| ASHP - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 (from elect resistance) | Residential Space Cooling, Residential Space Heating | ENERGY STAR/CEE Tier 1 ASHP: 16/15.2 SEER/SEER2, 9.0 HSPF | Base AC, 15 SEER, Electric resistance heating |
| ASHP - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2, 9.0 HSPF | Residential Space Cooling, Residential Space Heating | ENERGY STAR/CEE Tier 1 ASHP: 16/15.2 SEER/SEER2, 9.0 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| Basement or Crawlspace Wall Insulation R-15 | Residential Space Cooling, Residential Space Heating | Increased Basement or Crawlspace Wall Insulation (R-15) | Code-Compliant Exterior Below-Grade Wall Insulation (R-10) |
| Bathroom Faucet Aerators | Residential Domestic Hot Water | Low-Flow Faucet Aerator with Flow Rate of 1.5 gpm | Faucet Aerator with Federal Standard Flow Rate of 2.2 gpm |
| CEE Advanced Tier Clothes Dryer | Clothes Dryers | CEE Advanced Tier Clothes Dryer | One Clothes Dryer meeting Federal Standard |
| CEE Advanced Tier Clothes Washer | Clothes Washers | Tier 3 CEE Clothes washer | One Clothes Washer meeting Federal Standard |
| CEE Tier 3 Refrigerator | Refrigerators | Residential Tier 3 Refrigerator | One Refrigerator meeting Federal Standard |
| Ceiling Insulation (R11 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-1985) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R11 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-1985) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R19 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-2020) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R19 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-2020) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R2 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, older (pre-1982) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R2 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, older (pre-1982) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R30 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1986-2020) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R30 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1986-2020) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R38 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1986-2020) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Central AC - CEE Tier 2: 16.8 SEER/16 SEER2 | Residential Space Cooling | Central AC - CEE Tier 2: 16.8 SEER/16 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC - 24 SEER/22.9 SEER2 | Residential Space Cooling | Central AC - 24 SEER/22.9 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC - CEE Advanced Tier: 17.8 SEER/17 SEER2 | Residential Space Cooling | Central AC - CEE Advanced Tier: 17.8 SEER/17 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 | Residential Space Cooling | Central AC - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC Tune Up | Residential Space Cooling | System tune-up, including coil cleaning, refrigerant charging, and other diagnostics | Existing Typical Central AC without Regular Maintenance/tune-up |
| Dehumidifier Recycling | Plug Load | No dehumidifier | One Dehumidifier meeting Federal Standard |
| Drain Water Heat Recovery | Residential Domestic Hot Water | 50 Gallon Electric Resistance Heater and Drain Water Heat Exchanger | 50 Gallon Electric Resistance Heater, No Drain Water Heat Recovery |
| Duct Insulation | Residential Space Cooling, Residential Space Heating | Standard Electric Heating and Central AC with Insulated Ductwork | Standard Electric Heating and Central AC with Uninsulated Ductwork |
| Duct Repair | Residential Space Cooling, Residential Space Heating | Duct Repair to eliminate/minimize leaks, includes testing and sealing | Standard Electric Heating and Central AC with typical duct leakage |
| ECM Circulator Pump | Residential Miscellaneous | Install ECM Circulator Pump | Install Standard Circulator Pump |
| Energy Star Air Purifier | Plug Load | One Air Purifier meeting ENERGY STAR 2.0 Standards | One Standard Conventional Air Purifier |
| Energy Star Audio-Video Equipment | Plug Load | One DVD/Blu-Ray Player meeting current ENERGY STAR Standards | One Market Average DVD/Blu-Ray Player |
| Energy Star Bathroom Ventilating Fan | Residential Ventilation and Circulation | Bathroom Exhaust Fan meeting current ENERGY STAR Standards | Bathroom Exhaust Fan meeting Federal Standard |
| Energy Star Ceiling Fan | Residential Miscellaneous | 60" Ceiling Fan Meeting ENERGY STAR 3.1 Standards | Standard 60" Ceiling Fan |
| Energy Star Clothes Dryer | Clothes Dryers | One Electric Resistance Clothes Dryer meeting ENERGY STAR 1.1 Standards | One Clothes Dryer meeting Federal Standard |
| Energy Star Clothes Washer | Clothes Washers | One Clothes Washer meeting ENERGY STAR 8.1 Standards | One Clothes Washer meeting Federal Standard |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Energy Star Dehumidifier | Plug Load | One Dehumidifier meeting ENERGY STAR 5.0 Standards | One Dehumidifier meeting Federal Standard |
| Energy Star Dishwasher | Dishwashers | One Dishwasher meeting ENERGY STAR 7.0 Requirements (effective on July 19, 2023), electric water heating | One Dishwasher meeting Federal Standard |
| Energy Star Dishwasher (Gas Water Heating) | Dishwashers | One Dishwasher meeting ENERGY STAR 7.0 Requirements, gas water heating | One Dishwasher meeting Federal Standard; gas water heating |
| Energy Star Door | Residential Space Cooling, Residential Space Heating | 100ft2 of Opaque Door meeting Energy Star Version 6.0 Requirements (U-Value: 0.17) | 100ft2 of Opaque Door meeting current FL Code Requirements |
| ENERGY STAR EV supply equipment (level 2 charger) | Residential Miscellaneous | Level 2 Electric Vehicle Supply Equipment (EVSE) | Level 1 Electric Vehicle Supply Equipment (EVSE) |
| Energy Star Freezer | Freezers | One Freezer meeting current ENERGY STAR 5.1 Standards | One Freezer meeting Federal Standard |
| Energy Star Ground Source Heat Pump | Residential Space Cooling, Residential Space Heating | Energy Star GSHP, 17.1 SEER, 12 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF |
| Energy Star Imaging Equipment | Plug Load | One imaging device meeting current ENERGY STAR Standards | One non-ENERGY STAR imaging device |
| Energy Star Monitor | Plug Load | One Monitor meeting ENERGY STAR 8.0 Standards | One Standard Monitor |
| Energy Star Personal Computer | Plug Load | One Personal Computer meeting ENERGY STAR 8.0 Standards | One Personal Computer meeting ENERGY STARÂ® 3.0 Standards |
| Energy Star Refrigerator | Refrigerators | One Refrigerator/Freezer meeting ENERGY STAR 5.1 Standards | One Refrigerator/Freezer meeting Federal Standard |
| Energy Star Room AC | Residential Space Cooling | Room AC meeting current ENERGY STAR standards | Code-Compliant Room AC |
| Energy Star Set-Top Receiver | Plug Load | One Set-top Box meeting ENERGY STAR 4.1 Standards | One Market Average Set-top Box |
| Energy Star TV | Plug Load | One Television meeting ENERGY STAR 9.0 Standards | One non-ENERGY STAR Television |
| Energy Star Windows | Residential Space Cooling, Residential Space Heating | 100ft2 of Window meeting Energy Star Version 6.0 Requirements (U-Value: 0.27, SHGC: 0.21) | 100ft2 of Window current FL energy code requirements |
| Exterior Wall Insulation | Residential Space Cooling, Residential Space Heating | Increased Exterior Above-Grade Wall Insulation (R-13) | Market Average Existing Exterior Above-Grade Wall Insulation |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Filter Whistle | Residential Ventilation and Circulation | Install the Furnace Filter Alarm | No Furnace Filter Alarm on a Central Forced-Air Furnace |
| Floor Insulation | Residential Space Heating | Increased Floor Insulation (R-30) | Code-Compliant Floor Insulation |
| Freezer Recycling | Freezers | No Freezer | Current Market Freezer |
| Green Roof | Residential Space Cooling | Vegetated Roof Surface on top of Standard Roof | Standard Black Roof |
| Heat Pump Clothes Dryer | Clothes Dryers | One Heat Pump Clothes Dryer | One Clothes Dryer meeting Federal Standard |
| Heat Pump Pool Heater | Residential Miscellaneous | Heat Pump Swimming Pool Heater | Electric Resistance Swimming Pool Heater |
| Heat Pump Tune Up | Residential Space Cooling, Residential Space Heating | System tune-up, including coil cleaning, refrigerant charging, and other diagnostics | Standard Heating and Cooling System without Regular Maintenance/tune-up |
| Heat Pump Water Heater 50 Gallons-CEE Advanced Tier | Residential Domestic Hot Water | CEE Advanced Tier Heat Pump Water Heater 50 Gallons | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Heat Pump Water Heater 50 Gallons-ENERGY STAR | Residential Domestic Hot Water | Heat Pump Water Heater 50 Gallons | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Heat Pump Water Heater 80 Gallons-ENERGY STAR | Residential Domestic Hot Water | Energy Star Heat Pump Water Heater 80 Gallons | Code-Compliant 80 Gallon Electric Resistance Water Heater |
| Heat Trap | Residential Domestic Hot Water | Heat Trap | Existing Water Heater without heat trap |
| High Efficiency Convection Oven | Residential Cooking | One Full-Size Convection Oven meeting ENERGY STAR 3.0 Standards | One Standard Economy-Grade Full-Size Oven |
| High Efficiency Induction Cooktop | Residential Cooking | One residential induction cooktop | One standard residential electric cooktop |
| Home Energy Management System | Lighting, Plug Load, Residential Space Cooling, Residential Space Heating | Typical HVAC by Building Type Controlled by Energy Management System | Typical HVAC by Building Type, Manually Controlled |
| Hot Water Pipe Insulation | Residential Domestic Hot Water | 1' of Insulated Pipe in Unconditioned Spaces, Insulation of R-5 | 1' of Pipe in Unconditioned Spaces with Code Minimum of 1"of Insulation |
| HVAC ECM Motor | Residential Ventilation and Circulation | A brushless permanent magnet (ECM) blower motor for electric furnace | Permanent Split Capacitor Motor for Electric Furnace |
| HVAC Economizer | Residential Space Cooling | Install residential economizer | No economizer |
| HVAC Zoning System | Residential Space Cooling, Residential Space Heating | Install dampers in the ducts, dividing home into multiple | Single zone HVAC system |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| | | zones, each controlled by its own thermostat | |
| Indoor Daylight Sensor | Lighting | Install Indoor Daylight Sensors, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Induction Range | Residential Cooking | Residential induction range | Electric range |
| Instantaneous Hot Water System | Residential Domestic Hot Water | Instantaneous Hot Water System | Standard Efficiency Storage Tank Water Heater |
| Kitchen Faucet Aerators | Residential Domestic Hot Water | Low-Flow Faucet Aerator with Flow Rate of 1.5 gpm | Faucet Aerator with Federal Standard Flow Rate of 2.2 gpm |
| LED - 9W_CFL Baseline | Lighting | LED (assume 9W) replacing CFL baseline lamp | 14W CFL (60W equivalent) |
| LED - 9W_Halogen Baseline | Lighting | LED (assume 9W) replacing EISA-2020 compliant baseline lamp | EISA-2020 compliant baseline lamp (60W equivalent) |
| LED Specialty Lamps-5W Chandelier | Lighting | 5 W Chandelier LED | Standard incandescent chandelier lamp |
| Linear LED | Lighting | Linear LED Lamps in Linear Fluorescent Fixture | Standard (32w) T8 lamps in Linear Fluorescent Fixture |
| Low Flow Showerhead | Residential Domestic Hot Water | Low-Flow Handheld Showerhead, Flow Rate: 1.60 gpm | Standard Handheld Showerhead, Flow Rate: 2.50 gpm |
| New Construction - Whole Home Improvements - Tier 1 | Whole Home | Performance-based improvements in new homes - 20% savings | Residential New Construction (Baseline Efficiency) |
| New Construction - Whole Home Improvements - Tier 2 | Whole Home | Performance-based improvements in new homes - 35% savings | Residential New Construction (Baseline Efficiency) |
| Occupancy Sensors Switch Mounted | Lighting | Switch Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor Lighting Timer | Lighting | Timer on Outdoor Lighting, Controlling 120 Watts | 120 Watts of Lighting, Manually Controlled |
| Outdoor Motion Sensor | Lighting | Motion Sensor on Outdoor Lighting, Controlling 120 Watts | 120 Watts of Lighting, Manually Controlled |
| Ozone Laundry | Clothes Washers | Add a New, Single-Unit Ozone Laundry System to the Clothes Washer | One Clothes Washer meeting Federal Standard |
| Programmable Thermostat | Residential Space Cooling, Residential Space Heating | Standard Heating and Cooling System with Programmable Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Properly Sized CAC | Residential Space Cooling | Properly Sized Central Air Conditioning | Standard Central Air Conditioning, Oversized |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Radiant Barrier | Residential Space Cooling | Radiant Barrier | No radiant barrier |
| Reflective Roof | Residential Space Cooling | Reflective Roof Treatment | Standard dark shingle |
| Refrigerator Coil Cleaning | Refrigerators | Refrigerator Coil Cleaning | |
| Refrigerator Recycling | Refrigerators | No Refrigerator | Current Market Average Refrigerator |
| Residential Whole House Fan | Residential Space Cooling | Standard Central Air Conditioning with Whole House Fan | Standard Central Air Conditioning, No Whole House Fan |
| Sealed crawlspace | Residential Space Cooling, Residential Space Heating | Encapsulated and semi-conditioned crawlspace | Naturally vented, unconditioned crawlspace |
| Smart Breaker | Whole Home | Smart Breaker | standard electric breakers |
| Smart Panel | Whole Home | Multi-channel device that attaches to customer's circuit breaker to enable monitoring and control of major end-use appliances by customer | standard electric panel |
| Smart Power Strip | Plug Load | Smart plug strips for entertainment centers and home office | Standard entertainment center or home office usage, no smart strip controls |
| Smart Thermostat | Residential Space Cooling, Residential Space Heating | Standard Heating and Cooling System with Smart Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Solar Attic Fan | Residential Space Cooling | Standard Central Air Conditioning with Solar Attic Fan | Standard Central Air Conditioning, No Solar Attic Fan |
| Solar Pool Heater | Residential Miscellaneous | Solar Swimming Pool Heater | Electric Resistance Swimming Pool Heater |
| Solar Powered Pool Pumps | Residential Miscellaneous | Solar Powered Pool Pump | Variable Speed Pool Pump Motor |
| Solar Thermal Water Heating System | Residential Domestic Hot Water | Solar Thermal System with Electric Backup | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Spray Foam Insulation(Base R11) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in existing (1982-1985) homes | Existing ceiling insulation based on building code at time of construction |
| Spray Foam Insulation(Base R19) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in existing (1982-1985) homes | Existing ceiling insulation based on building code at time of construction |
| Spray Foam Insulation(Base R2) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in older (pre-1982) homes | Existing ceiling insulation based on building code at time of construction |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Spray Foam Insulation(Base R30) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in existing (1986-2020) homes | Existing ceiling insulation based on building code at time of construction |
| Thermostatic Shower Restriction Valve | Residential Domestic Hot Water | 50 Gallon Electric Resistance Heater and Thermostatic Shower Valves | 50 Gallon Electric Resistance Heater and Standard Shower Valves |
| Variable Refrigerant Flow (VRF) HVAC Systems | Residential Space Cooling, Residential Space Heating | Variable Refrigerant Flow (VRF) HVAC Systems | Code-Compliant ASHP, 15 SEER, 8.8 HSPF |
| Water Heater Blanket | Residential Domestic Hot Water | 50 Gallon Electric Resistance Water Heater with Insulated Tank Wrap | Code-Compliant 50 Gallon Electric Resistance Water Heater, No Tank Wrap |
| Water Heater Thermostat Setback | Residential Domestic Hot Water | 50 Gallon Electric Resistance Water Heater with Temperature Setpoint of 119°F | Code-Compliant 50 Gallon Electric Resistance Water Heater (Temp. Setpoint = 130Â°F) |
| Water Heater Timeclock | Residential Domestic Hot Water | Water Heater Timeclock | Existing Water Heater without time clock |
| Weather stripping | Residential Space Cooling, Residential Space Heating | Specific quantity of weather stripping to seal | |
| Window Caulking | Residential Space Cooling, Residential Space Heating | Window caulking | |
| Window Sun Protection | Residential Space Cooling | Window Film Applied to Standard Window | Standard Window with below Code Required Minimum SHGC |

**Table 13: Commercial EE Measures**

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| 1.5HP Open Drip-Proof (ODP) Motor | Ventilation and Circulation | High Efficiency 1.5 HP Open-Drip Proof Motor | 1.5HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 10HP Open Drip-Proof (ODP) Motor | Ventilation and Circulation | High Efficiency 10 HP Open-Drip Proof Motor | 10HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 20HP Open Drip-Proof (ODP) Motor | Ventilation and Circulation | High Efficiency 20 HP Open-Drip Proof Motor | 20HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| Advanced Rooftop Controller | Ventilation and Circulation | Advanced Rooftop Controller | Without Advanced Rooftop Controller |
| Air Compressor Optimization | Miscellaneous | Performing Routine Maintenance on 20HP Inlet | 20 HP Inlet Modulation Fixed-Speed Compressor |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| | | Modulation Fixed-Speed Compressor | |
| Air Curtains | Space Cooling, Space Heating | Air Curtain across door opening | Door opening with no air curtain |
| Airside Economizer | Space Cooling | Airside Economizer | No economizer |
| Anti-Sweat Controls | Refrigeration | One Medium Temperature Reach-In Case with Anti-Sweat Heater Controls | One Medium Temperature Reach-In Case without Anti-Sweat Heater Controls |
| Auto Off Time Switch | Interior Lighting | Auto-Off Time Switch on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Automatic Door Closer for Walk-in Coolers and Freezers | Refrigeration | One Medium Temperature Walk-In Refrigerator Door with Auto-Closer | One Medium Temperature Walk-In Refrigerator Door without Auto-Closer |
| Beverage Vending Machine Controls | Refrigeration | One non-ENERGY STAR beverage vending machine equipped with infrared occupancy sensing controls | One non-ENERGY STAR beverage vending machine, no controls |
| Bi-Level Lighting Control (Exterior) | Exterior Lighting | Bi-Level Controls on Exterior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Bi-Level Lighting Control (Interior) | Interior Lighting | Bi-Level Controls on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Ceiling Insulation (R19 to R38) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation (R19 to R49) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic - Beyond Code | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation (R2 to R38) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation (R2 to R49) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic - Beyond Code | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Chilled Water Reset | Space Cooling | One Chiller with Reset of Chilled Water Temperature Setpoint | One Chiller with Fixed Chilled Water Temperature |
| Chiller maintenance | Space Cooling | O&M improvements to restore chiller performance | |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| CO Sensors for Parking Garage Exhaust | Miscellaneous | Enclosed Parking Garage Exhaust with CO Control | Constant Volume Enclosed Parking Garage Exhaust |
| Commercial Duct Sealing | Space Cooling, Space Heating | Standard Electric Heating and Central AC with Improved Duct Sealing | Standard Electric Heating and Central AC, Standard Duct Sealing |
| Commercial Strategic Energy Management | Whole Building | Commercial Strategic Energy Management | No active energy management |
| Custom measure - Non-lighting | Space Cooling, Space Heating | Custom Improvement to Facility's Operations | Baseline Technology/Process |
| Data Center Hot Cold Aisle | Office Equipment | Equipment configuration that saves HVAC | No hot, cold aisle containment |
| Dedicated Outside Air System (DOAS) | Space Cooling, Space Heating | Install Dedicated Outside Air System (DOAS) | Typical HVAC by Building Type |
| Demand Controlled Circulating Systems | Domestic Hot Water | Recirculation Pump with Demand Control Mechanism | Uncontrolled Recirculation Pump |
| Demand Controlled Ventilation | Ventilation and Circulation | Return Air System with CO2 Sensors | Standard Return Air System, No Sensors |
| Demand Defrost | Refrigeration | Walk-In Freezer System with Demand-Controlled Electric Defrost Cycle | Walk-In Freezer System with Timer-Controlled Electric Defrost Cycle |
| Destratification Fans | Space Heating | Destratification Fans improve temperature distribution by circulating warmer air from the ceiling back down to the floor level | No destratification fan |
| Door Gasket (Cooler) | Refrigeration | New Door Gasket on One-Door Medium Temperature Reach-In Case | Worn or Damaged Door Gasket on One-Door Medium Temperature Reach-In Case |
| Door Gasket (Freezer) | Refrigeration | New Door Gasket on One-Door Medium Temperature Reach-In Case | Worn or Damaged Door Gasket on One-Door Medium Temperature Reach-In Case |
| Drain water heat recovery | Domestic Hot Water | Hot Water Loop with 50 Gallon Electric Resistance Heater and Drain Water Heat Exchanger | Standard Hot Water Loop with 50 Gallon Electric Resistance Heater, No Drain Water Heat Recovery |
| Dual Enthalpy Economizer | Ventilation and Circulation | Standard HVAC Unit with an economizer and dual enthalpy differential control | HVAC unit with no economizer or with a non-functional disabled economizer |
| Duct Insulation | Space Cooling, Space Heating | Standard Electric Heating and Central AC with Insulated Ductwork (R-8) | Standard Electric Heating and Central AC with Uninsulated Ductwork (R-4) |
| Ductless Mini-Split AC | Space Cooling | Ductless Mini-Split AC, 4 Ton, 16 SEER | Code-Compliant AC Unit, 4 Ton, 15 SEER |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Ductless Mini-Split HP | Space Cooling, Space Heating | Ductless Mini-Split HP, 17 SEER, 9.5 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF |
| DX Coil Cleaning | Space Cooling | DX Coil Cleaning | DX Coil Not Cleaned |
| ECM Motors on Furnaces | Space Heating | Variable Speed Electronically Commutated Motor for an Electric Furnace | Permanent Split Capacitor Motor for Electric Furnace |
| Efficient Battery Charger | Miscellaneous | Efficient Battery Charger | FR or SCR charging stations with power conversion efficiency < 89% or > 10 W |
| Efficient Exhaust Hood | Cooking | Kitchen ventilation with automatically adjusting fan controls | Kitchen ventilation with constant speed ventilation motor |
| Efficient Motor Belts | Miscellaneous | Synchronous belt, 98% efficiency | Standard V-belt drive |
| Efficient New Construction Lighting | Interior Lighting | Efficient New Construction Lighting, 15% Better than Code | New Construction with Lighting Power Density meeting Code Minimum |
| Energy Recovery Ventilation System (ERV) | Space Cooling | Unitary Cooling Equipment that Incorporates Energy Recovery | Current Market Packaged or Split DX Unit |
| Energy Star Combination Oven | Cooking | Energy Star Combination Oven meeting ENERGY STAR Version 3.0 Standards | One Standard Economy-Grade 10-Pan Combination Oven |
| Energy Star Commercial Clothes Washer | Miscellaneous | One Commercial Clothes Washer meeting current ENERGY STAR Version 8.1 Standards | One Commercial Clothes Washer meeting Federal Standard |
| Energy Star Commercial Dishwasher | Domestic Hot Water | One Commercial Dishwasher meeting ENERGY STAR Version 3.0 Standards | One Dishwasher meeting Federal Standard |
| Energy Star Commercial Glass Door Freezer | Refrigeration | One Glass Door Freezer meeting ENERGY STAR Version 5.0 Standards | One Glass Door Freezer meeting Federal Standards |
| Energy Star Commercial Glass Door Refrigerator | Refrigeration | One Glass Door Refrigerator meeting ENERGY STAR Version 5.0 Standards | One Glass Door Refrigerator meeting Federal Standards |
| Energy Star Commercial Solid Door Freezer | Refrigeration | One Solid Door Freezer meeting ENERGY STAR Version 5.0 Standards | One Solid Door Freezer meeting Federal Standards |
| Energy Star Commercial Solid Door Refrigerator | Refrigeration | One Solid Door Refrigerator meeting ENERGY STAR Version 5.0 Standards | One Solid Door Refrigerator meeting Federal Standards |
| Energy Star convection oven | Cooking | Energy Star convection oven meeting ENERGY STAR Version 3.0 Standards | One Standard Economy-Grade Full-Size Convection Oven |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Energy Star EV Chargers | Miscellaneous | Level 2 Electric Vehicle Supply Equipment (EVSE) | Level 1 Electric Vehicle Supply Equipment (EVSE) |
| Energy Star Fryer | Cooking | One Standard Vat Electric Fryer meeting ENERGY STAR Version 3.0 Standards | One Standard Economy-Grade Standard Vat Electric Fryer |
| Energy Star Griddle | Cooking | One Griddle meeting current ENERGY STAR Version 1.2 Standards | One Conventional Griddle |
| Energy Star Hot Food Holding Cabinet | Cooking | One Hot Food Holding Cabinet meeting current ENERGY STAR Version 2.0 Standards | One Standard Hot Food Holding Cabinet |
| Energy Star Ice Maker | Refrigeration | One Continuous Self-Contained Ice Maker meeting ENERGY STAR Version 3.0 Standards | One Continuous Self-Contained Ice Maker meeting Federal Standard |
| ENERGY STAR Imaging Equipment | Office Equipment | One imaging device meeting current ENERGY STAR Standards | One non-ENERGY STAR imaging device |
| Energy Star LED Directional Lamp | Interior Lighting | Energy Star 7.6W Directional LED lamp | 50W Incandescent lamp |
| Energy Star Monitors | Office Equipment | One Monitor meeting ENERGY STAR 8.0 Standards | One Standard Monitor |
| Energy Star PCs | Office Equipment | One Personal Computer (desktop or laptop) meeting current ENERGY STARÂ® Standards | One non-ENERGY STARÂ® Personal Computer |
| Energy Star room AC | Space Cooling | Room AC meeting current ENERGY STAR standards | Code-Compliant Room AC, 1 Ton, 10.9 CEER |
| Energy Star Servers | Office Equipment | One Server meeting ENERGY STAR 2.0 Standards | One Standard Server |
| Energy Star Steamer | Cooking | One 4-Pan Electric Steamer meeting ENERGY STARÂ® 2.0 Standards | One Standard Economy-Grade 4-Pan Steamer |
| Energy Star Uninterruptable Power Supply | Office Equipment | Standard Desktop Plugged into Energy Star Uninterruptable Power Supply at 25% Load | Standard Desktop Plugged into Average Rotary Uninterruptable Power Supply at 25% Load |
| Energy Star Vending Machine | Refrigeration | One Refrigerated Vending Machine meeting ENERGY STAR Version 4.0 Standards | One Refrigerated Vending Machine meeting ENERGY STARÂ® 1.0 Standards |
| ENERGY STAR Water Cooler | Miscellaneous | One Storage Type Hot/Cold Water Cooler Unit meeting ENERGY STAR Version 3.0 Standards | One Standard Storage Type Hot/Cold Water Cooler Unit |
| Energy Star windows | Space Cooling, Space Heating | 100ft2 of Window meeting Energy Star Version 6.0 | 100ft2 of Window meeting Energy Star Version 5.0 |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| | | Requirements (U-Value: 0.27, SHGC: 0.21) | Requirements (U-Value: 0.3, SHGC: 0.3) |
| Engine Block Timer | Miscellaneous | Plug-in timer that activates engine block timer to reduce unnecessary run time | Engine block heater (typically used for backup generators) running continuously |
| Escalator Motor Efficiency Controller | Miscellaneous | Install Escalator Motor Efficiency Controller | Escalator without Motor Efficiency Controller |
| Facility Commissioning | Space Cooling, Space Heating, Ventilation and Circulation | Perform facility commissioning to optimize building operations in new facilities | Standard new construction facility with no commissioning |
| Facility Energy Management System | Space Cooling, Space Heating, Ventilation and Circulation | Typical HVAC by Building Type Controlled by Energy Management System | Standard/manual facility equipment controls |
| Faucet Aerator | Domestic Hot Water | Low-flow lavatory faucet aerator, flow rate: 1.0 gpm | Federal lavatory flow rate standard, 1994, flow rate: 2.2 gpm |
| Floating Head Pressure Controls | Refrigeration | Medium-Temperature Refrigeration System with 5HP Compressor and Adjustable Condenser Head Pressure Control Valve | Medium-Temperature Refrigeration System with 5 HP Compressor without Adjustable Condenser Head Pressure Control Valve |
| Floor Insulation | Space Cooling, Space Heating | Increased Floor Insulation (R-19) | Market Average Existing Floor Insulation |
| Geothermal Heat Pump | Space Cooling, Space Heating | Geothermal Heat Pump | Code-Compliant Air Source Heat Pump |
| Green roof | Space Cooling, Space Heating | Vegetated Roof Surface on top of Standard Roof | Standard Black Roof |
| HE Air Cooled Chiller - All Compressor Types - 100 Tons | Space Cooling | HE Air Cooled Chiller - Air Compressor Types - 100 Tons | Code-Compliant Air Cooled Positive Displacement Chiller, 100 Tons |
| HE DX 11.25-20.0 Tons Elec Heat | Space Cooling, Space Heating | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 11.25-20.0 Tons Other Heat | Space Cooling | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Elect Heat | Space Cooling, Space Heating | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Other Heat | Space Cooling | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| HE DX Less than 5.4 Tons Elect Heat | Space Cooling, Space Heating | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE DX Less than 5.4 Tons Other Heat | Space Cooling | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE Water Cooled Chiller - Centrifugal Compressor - 200 Tons | Space Cooling | Water Cooled Centrifugal Chiller with Integral VFD, 200 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 200 Tons |
| HE Water Cooled Chiller - Centrifugal Compressor - 500 Tons | Space Cooling | Water Cooled Centrifugal Chiller with Integral VFD, 500 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 500 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 175 Tons | Space Cooling | Water Cooled Positive Displacement Chiller with Integral VFD, 175 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 175 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 50 Tons | Space Cooling | Water Cooled Positive Displacement Chiller with Integral VFD, 50 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 50 Tons |
| Heat Pump Pool Heater Commercial | Miscellaneous | High Efficiency Pool Heater Eff. >=84% | Standard Efficiency Pool Heater 78% Eff. |
| Heat Pump Water Heater | Domestic Hot Water | Efficient 50 Gallon Electric Heat Pump Water Heater | Code-Compliant 50 Gallon Electric Heat Pump Water Heater |
| High Efficiency Air Compressor | Miscellaneous | 20 HP VFD Air Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| High Efficiency Data Center Cooling | Space Cooling | High Efficiency CRAC (computer room air conditioner) | Standard Efficiency CRAC |
| High Efficiency PTAC | Space Cooling | High Efficiency PTAC | Code-Compliant PTAC |
| High Efficiency PTHP | Space Cooling, Space Heating | High Efficiency PTHP | Code-Compliant PTHP |
| High Efficiency Refrigeration Compressor_Discus | Refrigeration | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Efficiency Refrigeration Compressor_Scroll | Refrigeration | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Speed Fans | Ventilation and Circulation | High Speed Fan, 24" - 35" Blade Diameter | Standard Speed Fan, 24" - 35" Blade Diameter |
| Hot water pipe insulation | Domestic Hot Water | 1' of Insulated Pipe in Unconditioned Spaces, Insulation of R-4 | 1' of Pipe in Unconditioned Spaces with Code Minimum of 1"of Insulation |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Hotel Card Energy Control Systems | Space Cooling, Space Heating | Guest Room HVAC Unit Controlled by Hotel-Key-Card Activated Energy Control System | Guest Room HVAC Unit, Manually Controlled by Guest |
| Indoor daylight sensor | Interior Lighting | Install Indoor Daylight Sensors, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Induction Cooktops | Cooking | Efficient Induction Cooktop | One Standard Electric Cooktop |
| Infiltration Reduction - Air Sealing | Space Cooling, Space Heating | Reduced leakage through caulking, weather-stripping | Standard Heating and Cooling System with Moderate Infiltration |
| Instantaneous Hot Water System Commercial | Domestic Hot Water | Instantaneous Hot Water System | Code-Compliant Electric Storage Water Heater |
| LED - 14W_CFL Baseline | Interior Lighting | LED (assume 14W) replacing CFL | 100W equivalent CFL |
| LED - 9W Flood_CFL Baseline | Exterior Lighting | LED (assume 9W) replacing CFL | 14W CFL |
| LED Canopy Lighting (Exterior) | Exterior Lighting | One 67.2W LED Canopy Light | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED Display Lighting (Exterior) | Exterior Lighting | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED Display Lighting (Interior) | Interior Lighting | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED Exit Sign | Interior Lighting | One 5W Single-Sided LED Exit Sign | One 9W Single-Sided CFL Exit Sign |
| LED Exterior Wall Packs | Exterior Lighting | One 35W LED Wall Pack | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED High Bay_HID Baseline | Interior Lighting | One 140W High Bay LED Fixture | Lumen-Equivalent HID High Bay Fixture |
| LED High Bay_LF Baseline | Interior Lighting | One 140W High Bay LED Fixture | Lumen-Equivalent Linear Fluorescent High Bay Fixture |
| LED Linear - Fixture Replacement | Interior Lighting | 2x4 LED Troffer | Lumen-Equivalent 32-Watt T8 Lamp |
| LED Linear - Lamp Replacement | Interior Lighting | Linear LED (16W) | Lumen-Equivalent 32-Watt T8 Lamp |
| LED Parking Lighting | Exterior Lighting | One 160W LED Area Light | Average Lumen Equivalent Exterior HID Area Lighting |
| LEED New Construction Whole Building | Space Cooling, Space Heating | LEED New Construction Whole Building | Comparable facility, code-compliance construction |
| Light Tube | Interior Lighting | One 14" Light Tube, Delivering light to 250 S.F. of Commercial Space | 250 S.F. of Commercial Space Lit by Typical Lighting Strategies |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Low Flow Shower Head | Domestic Hot Water | Low-Flow Handheld Showerhead, Flow Rate: 1.50 gpm | Standard Handheld Showerhead, Flow Rate: 2.50 gpm |
| Low-Flow Pre-Rinse Sprayers | Domestic Hot Water | Low-Flow Pre-Rinse Sprayer with Flow Rate of 1.6 gpm | Pre-Rinse Sprayer with Federal Standard Flow Rate of 2.25 gpm |
| Network PC Power Management | Office Equipment | One computer and monitor attached to centralized energy management system that controls when desktop computers and monitors plugged into a n | One computer and monitor, manually controlled |
| Networked Lighting Controls | Interior Lighting | Install Networked Lighting Controls System on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Controlled either Manually or by Sensor as Specified by Code |
| Night Covers for Display Cases | Refrigeration | One Open Vertical Case with Night Covers | One Existing Open Vertical Case, No Night Covers |
| Occupancy Sensors, Ceiling Mounted | Interior Lighting | Ceiling Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Occupancy Sensors, Switch Mounted | Interior Lighting | Switch Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor Lighting Controls | Exterior Lighting | Install Exterior Photocell Dimming Controls, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor motion sensor | Exterior Lighting | Install Exterior Motion Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Ozone Laundry Commercial | Miscellaneous | Add a new ozone laundry system onto a commercial clothes washer | One commercial clothes washer without ozone laundry system |
| Programmable thermostat | Space Cooling, Space Heating | Pre-set programmable thermostat that replaces manual thermostat | Standard Heating and Cooling System with Manual Thermostat |
| PSC to ECM Evaporator Fan Motor (Reach-In) | Refrigeration | Medium Temperature Reach-In Case with equivalent size Electronically Commutated Evaporator Fan Motor | Medium Temperature Reach-In Case with Permanent Split Capacitor Evaporator Fan Motor |
| PSC to ECM Evaporator Fan Motor (Walk-In, Refrigerator) | Refrigeration | Medium Temperature Walk-In Case with Electronically Commutated Evaporator Fan Motor | Medium Temperature Walk-In Case with Permanent Split Capacitor Evaporator Fan Motor |
| Q-Sync Evaporator Fan Motor | Refrigeration | Medium Temperature Reach-In Case with | Medium Temperature Reach-In Case with 20W Permanent Split Capacitor Fan Motor |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| | | equivalent size Q-Sync Evaporator Fan Motor | |
| Reflective Roof Treatment | Space Cooling | Reflective Roof Treatment | Standard Black Roof |
| Refrigerated Display Case LED Lighting | Refrigeration | 60" Refrigerated Case LED Strip | Lumen-Equivalent 32-Watt T8 Fixture |
| Refrigerated Display Case Lighting Controls | Refrigeration | Occupancy Sensors for Refrigerated Case Lighting to reduce run time | Market-Share Weighted Existing Linear Fluorescent Fixture |
| Refrigeration Commissioning | Refrigeration | Commissioned Refrigeration System | Non-Commissioned Refrigeration System |
| Refrigeration Economizer | Refrigeration | Walk-in refrigerator with economizer | Walk-in refrigerator without economizer |
| Regenerative Drive Elevator Motor | Miscellaneous | Regenerative drive produced energy when motor in overhaul condition | Standard motor |
| Retro-Commissioning (Existing Construction) | Space Cooling, Space Heating, Ventilation and Circulation | Perform facility retro-commissioning, including assessment, process improvements, and optimization of energy-consuming equipment and systems | |
| Roof Insulation | Space Cooling, Space Heating | Roof Insulation (built-up roof applicable to flat/low slope roofs) | Code-Compliant Flat Roof |
| Server Virtualization | Office Equipment | 2 Virtual Host Server | 20 Single Application Servers |
| Smart Strip Plug Outlet | Office Equipment | One Smart Strip Plug Outlet | One Standard plug strip/outlet |
| Smart thermostat | Space Cooling, Space Heating | Thermostats that include "smart" features such as occupancy sensors, geo-fencing, multi-zone sensors | Standard Heating and Cooling System with Manual Thermostat |
| Solar Pool Heater Commercial | Miscellaneous | Solar Swimming Pool Heater | Electric Resistance Swimming Pool Heater |
| Solar Powered Pool Pump | Miscellaneous | Solar Powered Pool Pump Motor | Variable Speed Pool Pump Motor |
| Solar Thermal Water Heating System Commercial | Domestic Hot Water | Solar Thermal System with Electric Backup | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Strip Curtains - Freezers | Refrigeration | Walk-in freezer with strip curtains at least 0.06 inches thick covering the entire area of the doorway | Walk-in freezer without strip curtains |
| Strip Curtains - Refrigerators | Refrigeration | Walk-in cooler with strip curtains at least 0.06 inches | Walk-in cooler without strip curtains |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| | | thick covering the entire area of the doorway | |
| Suction Pipe Insulation - Freezers | Refrigeration | Suction Pipe Insulation - Freezers | Uninsulated freezer suction lines |
| Suction Pipe Insulation - Refrigerators | Refrigeration | Suction Pipe Insulation - Refrigerators | Uninsulated refrigeration suction lines |
| Thermal Energy Storage | Space Cooling | Deploy thermal energy storage technology (ice harvester, etc.) to shift load | Code compliant chiller |
| Thermostatic Shower Restriction Valve Commercial | Domestic Hot Water | Hot Water Loop with 50 Gallon Electric Resistance Heater and Pressure Balance Shower Valves | Standard Hot Water Loop with 50 Gallon Electric Resistance Heater and Standard Shower Valves |
| Time Clock Control | Interior Lighting | Time Clock Controlled Lighting, 500 Watts Controlled | 500 Watts of Lighting, Controlled either Manually or by Sensor as Specified by Code |
| Variable Refrigerant Flow (VRF) HVAC Systems | Space Cooling, Space Heating | Variable Refrigerant Flow (VRF) HVAC Systems | Code-Compliant PTHP |
| VAV System | Ventilation and Circulation | Variable Air Volume Distribution System | Constant Air Volume Distribution System |
| VFD on Cooling Tower Fans | Space Cooling | Cooling Tower Fans with VFD Control | Cooling Tower Fans without VFD Control |
| VFD on HVAC Pump | Space Cooling, Space Heating | VFD on HVAC Pump | 7.5 HP HVAC Pump Motor, no VFD Control |
| VSD Controlled Compressor | Refrigeration | Refrigeration System with VSD Control | Refrigeration System with Standard Slide-Valve Control System |
| Wall Insulation | Space Cooling, Space Heating | Increased Exterior Above-Grade Wall Insulation | Market Average Existing Exterior Above-Grade Wall Insulation |
| Warehouse Loading Dock Seals | Space Cooling, Space Heating | Seals to reduce infiltration losses at loading dock | Loading dock with no seals |
| Water Cooled Refrigeration Heat Recovery | Domestic Hot Water | The heat reclaim system transfers waste heat from refrigeration system to space heating or hot water | No heat recovery |
| Water Heater Setback | Domestic Hot Water | A 50 gallon electric hot water tank with a thermostat setting reduced to no lower than 120 degrees. | A 50 gallon electric hot water tank with a thermostat setting that is higher than 120 degrees, typically hot water tanks with settings of 130 degrees or higher. |
| Water source heat pump | Space Cooling, Space Heating | Water Source Heat Pump, 2.5 Tons, 17.4 EER, 4.4 COP | Code-Compliant ASHP |
| Waterside Economizer | Space Cooling | Waterside Economizer | No economizer |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Window shade film | Space Cooling | Window Film with SHGC of 0.35 Applied to Standard Window | Standard Window with below Code Required Minimum SHGC |
| Zero Energy Doors | Refrigeration | Install zero energy doors for a reach-in refrigerated cooler or freezer | Standard vertical reach-in refrigerated cooler or freezer with anti-sweat heaters on the glass surface of the doors |

**Table 14: Industrial EE Measures**

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| 1.5HP Open Drip-Proof (ODP) Motor | Motors Pumps | High Efficiency 1.5 HP Open-Drip Proof Motor | 1.5HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 10HP Open Drip-Proof (ODP) Motor | Motors Pumps | High Efficiency 10 HP Open-Drip Proof Motor | 10HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 20HP Open Drip-Proof (ODP) Motor | Motors Pumps | High Efficiency 20 HP Open-Drip Proof Motor | 20HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 3-phase High Frequency Battery Charger - 1 shift | Other | 3-phase High Frequency Battery Charger | Standard Charger |
| Advanced Rooftop Controller | HVAC | Advanced Rooftop Controller | Without Advanced Rooftop Controller |
| Air Compressor Optimization | Compressed Air | Performing Routine Maintenance on 20HP Inlet Modulation Fixed-Speed Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| Air curtains | HVAC | Air Curtain across door opening | Door opening with no air curtain |
| Airside economizer | HVAC | Airside Economizer | No economizer |
| Auto Closer on Refrigerator Door | Process Cooling | One Medium Temperature Walk-In Refrigerator Door with Auto-Closer | One Medium Temperature Walk-In Refrigerator Door without Auto-Closer |
| Auto Off Time Switch | Interior Lighting High Bay | Auto-Off Time Switch on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Bi-Level Lighting Control (Exterior) | Exterior Lighting Industrial | Install Exterior Bi-Level Lighting Control, 500 Watts Controlled | 500 Watts of Lighting, No Dim Setting |
| Bi-Level Lighting Control (Interior) | Interior Lighting High Bay | Bi-Level Controls on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, No Dim Setting |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Chilled Water Reset | HVAC | One Chiller with Reset of Chilled Water Temperature Setpoint | One Chiller with Fixed Chilled Water Temperature |
| Cogged Belt on 15hp ODP Motor | Motors Pumps | 15HP ODP Motor with Cogged Belts Installed on Supply and/or Return Air Fans | 15HP ODP Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Cogged Belt on 40hp ODP Motor | Motors Pumps | 40HP ODP Motor with Cogged Belts Installed on Supply and/or Return Air Fans | 40HP ODP Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Compressed Air Desiccant Dryer | Process Specific | heated regenerative desiccant dryer without dew point demand controls | heatless regenerative desiccant dryer without dew point demand controls |
| Compressed Air No-Loss Condensate Drains | Process Specific | Install no-loss condensate drains | Install standard condensate drains |
| Compressed Air Storage Tank | Compressed Air | 20 HP Inlet Modulation Fixed-Speed Compressor with Receiver Tank | 20 HP Inlet Modulation Fixed-Speed Compressor, No Receiver Tank |
| Custom Measure - Non-Lighting | HVAC | Custom Improvement to Facility's Operations | Baseline Technology/Process |
| Dairy Refrigeration Heat Recovery | Other | refrigeration equipment with refrigeration heat recovery tank installed | existing dairy farm with refrigeration equipment and a water heater unit without an RHR unit |
| Dedicated Outside Air System (DOAS) | HVAC | Install Dedicated Outside Air System (DOAS) | Typical HVAC by Building Type |
| Demand Controlled Ventilation | HVAC | Return Air System with CO2 Sensors | Standard Return Air System, No Sensors |
| Demand Defrost | Process Cooling | Walk-In Freezer System with Demand-Controlled Electric Defrost Cycle | Walk-In Freezer System with Timer-Controlled Electric Defrost Cycle |
| Dew Point Sensor Control for Dessicant CA Dryer | Compressed Air | 1000 CFM Heated Desicant Air Dryer with Dew Point Controls | 1000 CFM Modulating Heated Desicant Air Dryer |
| Drip Irrigation Nozzles | Other | Flow Control Nozzles | Standard Irrigation Nozzles |
| Dual Enthalpy Economizer | Process Cooling | Standard HVAC Unit with an economizer and dual enthalpy differential control | HVAC unit with no economizer or with a non-functional disabled economizer |
| DX Coil Cleaning | HVAC | DX Coil Cleaning | DX Coil Not Cleaned |
| Efficient Compressed Air Nozzles | Compressed Air | 1/4" Engineered Air Nozzle | 1/4" Open-End Air Nozzle |

resource innovations

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Efficient New Construction Lighting | Interior Lighting High Bay | Efficient New Construction Lighting, 15% Better than Code | New Construction with Lighting Power Density meeting Code Minimum |
| Electric Actuators | Other | Electric Actuator | Pneumatic Actuator |
| Energy Efficient Laboratory Fume Hood | HVAC | Variable Air Volume High Performance Fume Hood | Constant Volume Conventional Bypass Fume Hood |
| Energy Efficient Transformers | Other | Energy Efficient Dry Type Transformer (CSL-3) | Standard Transformer (TP-1) |
| Energy Recovery Ventilation System | HVAC | Unitary Cooling Equipment that Incorporates Energy Recovery | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11.2 EER |
| Energy Star LED Directional Lamp | Interior Lighting Other | Energy Star 7.6W Directional LED lamp | 50W Incandescent lamp |
| Energy Star room ac | HVAC | Room AC meeting current ENERGY STAR standards | Code-Compliant Room AC |
| Energy Star windows | HVAC | 100ft2 of Window meeting Energy Star Version 6.0 Requirements (U-Value: 0.27, SHGC: 0.21) | 100ft2 of Window meeting Energy Star Version 5.0 Requirements (U-Value: 0.3, SHGC: 0.3) |
| Engine Block Timer | Other | An engine block heater operated by an outdoor plug-in timer | An engine block heater that is manually plugged in |
| Facility Commissioning | HVAC | Perform facility commissioning | Comparable facility, no commissioning |
| Facility Energy Management System | HVAC | Typical HVAC by Building Type Controlled by Energy Management System | Typical HVAC by Building Type, Manually Controlled |
| Fan Thermostat Controller | HVAC | Typical HVAC by Building Type with Fan Thermostat Controller Installed | Typical HVAC by Building Type with Programmable Thermostat |
| Floating Head Pressure Controller | Process Cooling | Medium-Temperature Refrigeration System with 5HP Compressor and Adjustable Condenser Head Pressure Control Valve | Medium-Temperature Refrigeration System with 5 HP Compressor without Adjustable Condenser Head Pressure Control Valve |
| Grain Bin Aeration Control System | Process Specific | Grain Storage Fan System with Automatic Controls | Grain Storage Fan System with Manual Controls |
| HE Air Cooled Chiller - All Compressor Types - 100 Tons | HVAC | HE Air Cooled Chiller - All Compressor Types - 100 Tons | Code-Compliant Air Cooled Positive Displacement Chiller, 100 Tons |
| HE Air Cooled Chiller - All Compressor Types - 300 Tons | HVAC | Air Cooled Positive Displacement Chiller with Integral VFD, 300 Tons, 13.7 EER | Code-Compliant Air Cooled Positive Displacement Chiller, 300 Tons, 12.5 EER |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| HE DX 11.25-20.0 Tons Elec Heat | HVAC | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 11.25-20.0 Tons Other Heat | HVAC | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Elect Heat | HVAC | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Other Heat | HVAC | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX Less than 5.4 Tons Elect Heat | HVAC | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE DX Less than 5.4 Tons Other Heat | HVAC | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE Water Cooled Chiller - Centrifugal Compressor - 200 Tons | HVAC | Water Cooled Centrifugal Chiller with Integral VFD, 200 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 200 Tons |
| HE Water Cooled Chiller - Centrifugal Compressor - 500 Tons | HVAC | Water Cooled Centrifugal Chiller with Integral VFD, 500 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 500 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 175 Tons | HVAC | Water Cooled Positive Displacement Chiller with Integral VFD, 175 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 175 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 50 Tons | HVAC | Water Cooled Positive Displacement Chiller with Integral VFD, 50 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 50 Tons |
| High Bay Occupancy Sensors, Ceiling Mounted | Interior Lighting High Bay | Ceiling Mounted Occupancy Sensor, 800 Watts Controlled | 800 Watts of Lighting, Manually Controlled |
| High Efficiency Air Compressor | Compressed Air | 20 HP VFD Air Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| High Efficiency Refrigeration Compressor - Discus | Process Cooling | High Efficiency Refrigeration Compressors | Standard Compressor |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| High Efficiency Refrigeration Compressor - Scroll | Process Cooling | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Efficiency Welder | Process Specific | High Efficiency Welder | Standard Welding Practices |
| High Speed Fans | HVAC | High Speed Fan, 24" - 35" Blade Diameter | Standard Speed Fan, 24" - 35" Blade Diameter |
| High Volume Low Speed Fan (HVLS) | Motors Fans Blowers | 20' High Volume Low Speed Fan | Conventional Circulating Fan |
| Indoor Agriculture - LED Grow Lights | Interior Lighting High Bay | LED grow light | 1000W High Pressure Sodium |
| Indoor daylight sensor | Interior Lighting High Bay | Install Indoor Daylight Sensors, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Industrial Duct Sealing | HVAC | Standard Electric Heating and Central AC with Improved Duct Sealing | Standard Electric Heating and Central AC, Standard Duct Sealing |
| Injection Mold and Extruder Barrel Wraps | Other | 2' Diameter, 20' Long Machine Barrel with 1" Insulation | 2' Diameter, 20' Long Machine Barrel with no Insulation |
| Insulated Pellet Dryer Tanks and Ducts | Process Heating | Insulation for Pellet Tank and Duct | Uninsulated Pellet Tank and Duct |
| LED - 14W_CFL Baseline | Interior Lighting Other | LED (assume 14W) replacing CFL | 100W equivalent CFL |
| LED Canopy Lighting (Exterior) | Exterior Lighting Industrial | One 67.2W LED Canopy Light | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED Display Lighting (Exterior) | Exterior Lighting Industrial | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED Display Lighting (Interior) | Interior Lighting Other | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED exit sign | Interior Lighting Other | One 5W Single-Sided LED Exit Sign | One 9W Single-Sided CFL Exit Sign |
| LED Exterior Wall Packs | Exterior Lighting Industrial | One 35W LED Wall Pack | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED High Bay_HID Baseline | Interior Lighting High Bay | One 140W High Bay LED Fixture | Lumen-Equivalent HID High Bay Fixture |
| LED High Bay_LF Baseline | Interior Lighting High Bay | One 140W High Bay LED Fixture | Lumen-Equivalent Linear Fluorescent High Bay Fixture |
| LED Linear - Fixture Replacement | Interior Lighting Linear Fluorescent | 2x4 LED Troffer Fixture | Lumen-Equivalent 32-Watt T8 Fixture |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| LED Linear - Lamp Replacement | Interior Lighting Linear Fluorescent | Linear LED | Lumen-Equivalent 32-Watt T8 Lamp |
| LED Parking Lighting | Exterior Lighting Industrial | One 160W LED Area Light | Average Lumen Equivalent Exterior HID Area Lighting |
| LEED New Construction Whole Building | HVAC | LEED Qualifying New Construction | Comparable facility, code-compliance construction |
| Light Tube | Interior Lighting Other | One 14" Light Tube, Delivering light to 250 S.F. of Industrial Space | 250 S.F. of Industrial Space Lit by Typical Lighting Strategies |
| Low Energy Livestock Waterer | Motors Pumps | Install Thermostatically Controlled Livestock Watering System | Standard Livestock Watering System |
| Low Pressure Sprinkler Nozzles | Motors Pumps | Low Pressure Irrigation Nozzles operate at 35 psi or lower | Standard high pressure irrigation nozzles that operate at 50 psi or greater |
| Low Pressure-drop Filters | Compressed Air | 20 HP Inlet Modulation Fixed-Speed Compressor with Low Pressure Drop Filter | 20 HP Inlet Modulation Fixed-Speed Compressor, No Particulate Removal |
| Milk Pre-Cooler | Other | Installed pre-cooler heat exchanger | no pre-cooler heat exchanger installed |
| Networked Lighting Controls | Interior Lighting Linear Fluorescent | Install Networked Lighting Controls System on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Controlled either Manually or by Sensor as Specified by Code |
| Occupancy Sensors, Ceiling Mounted | Interior Lighting High Bay | Ceiling Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Occupancy sensors, switch mounted | Interior Lighting Linear Fluorescent | Switch Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor Lighting Controls | Exterior Lighting Industrial | Install Exterior Photocell Dimming Controls, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor motion sensor | Exterior Lighting Industrial | Install Exterior Motion Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Packaged Terminal AC | HVAC | High Efficiency Packaged Terminal AC | Code-Compliant PTAC, 10.9 EER |
| Process Cooling Ventilation Reduction | Process Cooling | Standard Process Cooling with Reduced Ventilation | Standard Process Cooling |
| Programmable thermostat | HVAC | Standard Heating and Cooling System with Programmable Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Reflective Roof Treatment | HVAC | Reflective Roof Treatment | Standard Black Roof |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Refrigeration Commissioning | Process Cooling | Commissioned Refrigeration System | Non-Commissioned Refrigeration System |
| Retro-Commissioning (Existing Construction) | HVAC | Perform Facility Retro-commissioning | |
| Roof insulation | HVAC | Roof Insulation (built-up roof applicable to flat/low slope roofs) | Code-Compliant Flat Roof |
| Smart thermostat | HVAC | Standard Heating and Cooling System with Smart Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Strategic Energy Management | HVAC | SEM goal setting and tracking | No active energy management |
| Synchronous Belt on 15hp ODP Motor | Motors Pumps | 15 HP Open-Drip Proof Motor with Synchronous Belts Installed on Supply and/or Return Air Fans | 15 HP Open-Drip Proof Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Synchronous Belt on 5hp ODP Motor | Motors Pumps | 5 HP Open-Drip Proof Motor with Synchronous Belts Installed on Supply and/or Return Air Fans | 5 HP Open-Drip Proof Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Synchronous Belt on 75hp ODP Motor | Motors Pumps | 75 HP Open-Drip Proof Motor with Synchronous Belts Installed on Supply and/or Return Air Fans | 75 HP Open-Drip Proof Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Thermal energy storage | HVAC | Deploy thermal energy storage technology (ice harvester, etc.) to shift load | Code compliant chiller |
| Time Clock Control | Interior Lighting High Bay | Time Clock Controlled Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| VAV System | HVAC | Variable Air Volume Distribution System | Constant Air Volume Distribution System |
| VFD on Air Compressor | Compressed Air | 20 HP VFD Air Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| VFD on Cooling Tower Fans | Process Cooling | Cooling Tower Fans with VFD Control | Cooling Tower Fans without VFD Control |
| VFD on HVAC Fan | Motors Fans Blowers | 5 HP HVAC Fan Motor, with VFD Control | 5 HP HVAC Fan Motor, no VFD Control |
| VFD on HVAC Pump | Motors Pumps | VFD on HVAC Pump | 7.5 HP HVAC Pump Motor, no VFD Control |
| VFD on process pump | Motors Pumps | 20 HP Process Pump Equipped with VFD Control | 20 HP Process Pump, Constant Speed |
| VSD Controlled Compressor | Process Cooling | Refrigeration System with VSD Control | Refrigeration System with Standard Slide-Valve Control System |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Water source heat pump | HVAC | Water Source Heat Pump, 2.5 Tons, 17.4 EER, 4.4 COP | Code-Compliant ASHP |
| Waterside economizer | HVAC | Waterside Economizer | No economizer |
| Window shade film | HVAC | Window Film with SHGC of 0.35 Applied to Standard Window | Standard Window with below Code Required Minimum SHGC |

The following EE measures from the 2019 Technical Potential Study were eliminated from the current study[8]:

**Table 15: 2019 EE Measures Eliminated from Current Study**

| Sector | Measure | End-Use | Reason for Removal |
|---|---|---|---|
| Residential | CFL – 15W Flood | Lighting | Better technology (LED) available |
| Residential | CFL – 15W Flood (Exterior) | Lighting | Better technology (LED) available |
| Residential | CFL – 13W | Lighting | Better technology (LED) available |
| Residential | CFL – 23W | Lighting | Better technology (LED) available |
| Residential | Low Wattage T8 Fixture | Lighting | Better technology (LED) available |
| Residential | 15 SEER Central AC | Space Cooling | Updated Federal Standard |
| Residential | 15 SEER Air Source Heat Pump | Space Cooling, Space Heating | Updated Federal Standard |
| Residential | 14 SEER ASHP from base electric resistance heating | Space Cooling, Space Heating | Updated Federal Standard |
| Residential | Two Speed Pool Pump | Miscellaneous | Updated Florida Energy Code |
| Residential | Variable Speed Pool Pump | Miscellaneous | Updated Florida Energy Code |
| Residential | Storm Door | Space Cooling, Space Heating | Minimal/uncertain energy savings |
| Commercial | CFL – 15W Flood | Exterior Lighting | Better technology (LED) available |
| Commercial | High Efficiency HID Lighting | Exterior Lighting | Better technology (LED) available |

[8] Additional measures from the 2019 study were updated to reflect current vintage/technology for the current study.

| Sector | Measure | End-Use | Reason for Removal |
|---|---|---|---|
| Commercial | LED Street Lights | Exterior Lighting | Market standard |
| Commercial | LED Traffic and Crosswalk Lighting | Exterior Lighting | Market standard |
| Commercial | CFL-23W | Interior Lighting | Better technology (LED) available |
| Commercial | High Bay Fluorescent (T5) | Interior Lighting | Better technology (LED) available |
| Commercial | Premium T8 - Fixture Replacement | Interior Lighting | Better technology (LED) available |
| Commercial | Premium T8 - Lamp Replacement | Interior Lighting | Better technology (LED) available |
| Commercial | Two Speed Pool Pump | Miscellaneous | Updated Florida Energy Code |
| Commercial | Variable Speed Pool Pump | Miscellaneous | Updated Florida Energy Code |
| Commercial | Tank Wrap on Water Heater | Domestic Hot Water | Limited applicability |
| Commercial | Ceiling Insulation (R12 to R38) | Space Cooling, Space Heating | Consolidated measure baseline assumptions |
| Commercial | Ceiling Insulation (R30 to R38) | Miscellaneous | Consolidated measure baseline assumptions |

# Appendix B DR Measure List

Table 16: Residential DR Measures

| Measure | Type | Season | Description |
|---|---|---|---|
| Central air conditioner - Load Shed | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central Heating - Load Shed | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central air conditioner - 50% cycling | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Central Heating - 50% cycling | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Smart thermostats - Utility Installation | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| Smart thermostats – BYOT | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| CPP + Tech | Pricing | Summer and Winter | Electricity rate that varies based on time of day. Can be same rate schedule for every day during a given season (time of use, or TOU) and with critical peak pricing (CPP) days when peak period rates are substantially higher for a limited number of days per year (customers receive advance notification of CPP event). Customers also receive technology that they can pre-program to curtail load when an event is called. |
| Water heater control | Direct load control | Summer and Winter | Load control installed on a water heater (integrated or external switch) |
| Pool pump switches | Direct load control | Summer and Winter | Load control program with switch installed on pool pump |
| Room AC | Direct load control | Summer | Load control program that is focused on room AC units rather than central AC |
| Managed EV Charging – switch | Direct load control | Summer and Winter | Load control switch that is installed on an EV charger |
| Managed EV Charging – telematics | Direct load control | Summer and Winter | Direct load control program leveraging EV smart charging software |
| Battery Storage with PV | Pricing/Direct load control | Summer and Winter | PV charges battery and battery discharges to grid |

Table 17: Small C&I DR Measures

| Measure | Type | Season | Description |
|---|---|---|---|
| Central air conditioner - Load Shed | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central Heating - Load Shed* | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central air conditioner - 50% cycling | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Central Heating - 50% cycling* | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Smart thermostats - Utility Installation* | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| Smart thermostats – BYOT* | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| CPP + Tech | Pricing | Summer and Winter | Electricity rate that varies based on time of day. Can be same rate schedule for every day during a given season (time of use, or TOU) and with critical peak pricing (CPP) days when peak period rates are substantially higher for a limited number of days per year (customers receive advance notification of CPP event). Customers also receive technology that they can pre-program to curtail load when an event is called. |
| Managed EV Charging – switch | Direct load control | Summer and Winter | Load control switch that is installed on an EV charger |
| Managed EV Charging – telematics | Direct load control | Summer and Winter | Direct load control program leveraging EV smart charging software |
| Battery Storage with PV | Pricing/Direct load control | Summer and Winter | PV charges battery and battery discharges to grid |

Table 18: Large C&I DR Measures

| Measure | Type | Season | Description |
|---|---|---|---|
| CPP + Tech | Pricing | Summer and Winter | Electricity rate that varies based on time of day. Can be same rate schedule for every day during a given season (time of use, or TOU) and with critical peak pricing (CPP) days when peak period rates are substantially higher for a limited number of days per year (customers receive advance notification of |

| Measure | Type | Season | Description |
|---|---|---|---|
| | | | CPP event). Customers also receive technology that they can pre-program to curtail load when an event is called. |
| Auto DR | Utility-controlled loads | Summer and Winter | Custom load control of specific end-uses/processes that is triggered by utility signal to building management system; customer can sometimes opt-out of specific events |
| Firm Service Level | Contractual | Summer and Winter | Customer commits to a maximum usage level during peak periods and, when notified by the utility, agrees to cut usage to that level. |
| Guaranteed Load Drop | Contractual | Summer and Winter | Customer agrees to reduce usage by an agreed upon amount when notified |

No DR measures from the 2019 Technical Potential Study were eliminated from the current study.

# Appendix C DSRE Measure List

Table 19: Residential DSRE Measures

| Measure | Description |
|---|---|
| PV System | Roof-mounted system, including multiple panels, AC/DC inverter, racking system, and electrical system interconnections |
| Battery Storage from PV System | Lithium-ion battery system designed to integrate with an on-site PV system to store and discharge excess energy from PV generation |

Table 20: Non-Residential DSRE Measures

| Measure | Description |
|---|---|
| PV System | Roof-mounted system, including multiple panels, AC/DC inverter, racking system, and electrical system interconnections |
| Battery Storage from PV System | Lithium-ion battery system designed to integrate with an on-site PV system to store and discharge excess energy from PV generation |
| CHP – Fuel Cell | An electrochemical cell-based generator that reacts hydrogen fuel with oxygen |
| CHP – Micro Turbine | Small combustion turbine that burns gaseous or liquid fuel to drive a generator |
| CHP – Gas Turbine | A combustion turbine that burns gaseous or liquid fuel to drive a generator |
| CHP – Reciprocating Engine | An engine that uses one or more pistons to convert pressure into rotational motion |
| CHP - Steam Turbine | A turbine that extracts thermal energy from pressured steam to drive a generator |

No DSRE measures from the 2019 Technical Potential Study were eliminated from the current study.

# Appendix D External Measure Suggestions

Table 21: External Measure Suggestions and Actions

| Measure Suggestion | Stakeholder Comments | Action taken for FEECA Study |
|---|---|---|
| Efficient Electrification Measures | All measures that can produce substantial site energy savings by converting from natural gas or other fossil fuels should be included in the Florida electric utilities' next efficiency potential study. Key examples include efficient heat pumps to displace gas furnaces and efficient heat pump water heaters to displace gas water heaters. It is important to note that these electrification measures provide not only heating energy savings and water heating energy savings, but can also potentially provide cooling efficiency benefits as well. In the case of heat pumps, that can occur because efficient heat pumps can operate in cooling mode more efficiently than standard central air conditioners. In the case of heat pump water heaters, cooling and dehumidification benefits can occur when/if the water heater is in conditioned space because they transfer heat (particularly latent heat) from the air around them to the water they are heating. A growing number of jurisdictions – including Illinois, Minnesota and some northeastern states – have begun to include efficient electrification measures in their efficiency programs portfolios. | Fuel-switching and electrification are outside the scope of this study |
| Networked Lighting Controls | LED lighting technology has become increasingly accepted and installed in commercial buildings. The next big efficiency opportunity in commercial lighting efficiency is in sophisticated controls integrated into the light fixtures themselves – both luminaire level lighting controls and networked lighting controls. For example, a 2017 report for both the Northwest Energy Efficiency Alliance and the Design Lights Consortium, a non-profit that works with utilities and manufacturers of lighting products (and which many utilities across the country reference for determination of eligibility of lighting products for efficiency program rebates), found that networked lighting controls can provide on the order of 50% additional savings after LED conversion. Other studies have also found the national savings potential from such products to be enormous. Moreover, these products can be designed to provide not only lighting energy savings but also a number of other non-energy benefits (e.g., asset tracking, such as the ability of hospitals to know the location of all wheel chairs). Numerous utilities across the country now actively promote this technology through their efficiency programs. For example, Commonwealth Edison, the utility serving Chicago and other parts of northern Illinois, is currently getting a significant portion of its commercial lighting savings from promotion of networked lighting controls | Added to measure list for 2024 study |

| Measure Suggestion | Stakeholder Comments | Action taken for FEECA Study |
| --- | --- | --- |
| Ductless mini-split heat pumps to displace inefficient electric baseboard heating | While most Florida residential buildings with electric heat provide that heat with heat pumps, at least some (perhaps most likely being older multi-family rental buildings) still use inefficient electric resistance heat. Ductless mini- split heat pump retrofits can very efficiently displace such inefficient electric heat and should be added to the residential measure list. | Added to measure list for 2024 study |
| Air Source Heat Pump baseline assumptions | There are seven air source heat pump (ASHP) measures included in the residential measure list. Two of them – one at SEER 14 and a second at SEER 21 – are listed as relative to an electric resistance baseline. Five of them – SEER 15, SEER 16, SEER 17, SEER 18 and SEER 21 – appear to be relative to a baseline of a standard new ASHP. Are we interpreting this correctly? If so, we have a couple of comments/questions/suggestions:<br>• The efficiency standards assessed need to be modified to be consistent with new federal<br>standards, including new testing procedures.<br>• For cases where the baseline is "electric resistance", why only assessing two efficiency tiers (i.e.,<br>fewer than for standard ASHP baselines)? The same number of efficiency tiers should be<br>assessed for both baselines. | Incorporated suggestions into 2024 study, including updated baseline standard and assessing same efficiency tiers for both baselines |
| Heat Pump Water Heater Efficiency | The Res EE tab of the utilities draft measure list suggests that the efficiency of a heat pump water heater is an EF of 2.50. That is unrealistically low. In fact, of the 222 products listed on the Energy Star website, none had UEFs less than 2.80 and only 29 (13%) had UEFs that were less than 3.4; the average was 3.57. Indeed, the first product listed on a search of heat pump water heaters on Home Depot's website is a 50 gallon, Rheem (Pro Terra) product with a UEF of 3.75 and a cost of $1699. | Incorporated suggestion into 2024 study |
| New Construction Measure Packages | The measures lists did not appear to include packages of measures for building new residential and/or new commercial buildings to levels of efficiency beyond those required by code. Utilities in many jurisdictions run new construction efficiency programs supporting such measure packages. In the residential sector, many base their programs on the long-standing Federal Energy Star standard. However, increasingly utility programs are promoting additional efficiency tiers – often as part of all-electric new construction program offerings – that go well beyond the Energy Star standard. For example, Consumers Energy (Michigan) offers $1000 rebates to builders who construct Energy Star single family homes | Incorporated suggestion into 2024 study with 2 tiers of residential new construction whole-home improvement measures. |

| Measure Suggestion | Stakeholder Comments | Action taken for FEECA Study |
|---|---|---|
| | with a Home Energy Rating (HERS) score of 57 or less, but offer higher rebates for more efficient buildings – up to $4000 for all electric homes with a HERS score of 40 or less. The Florida utilities potential study should assess savings potential for both the Energy Star level and a tier or two of additional efficiency beyond that level. Similar assessments of new commercial building savings potential should also be assessed. | |
| Custom Industrial Measures | The utilities' list of industrial efficiency measures addresses common industrial efficiency opportunities. However, it does not address efficiency opportunities that may be unique to individual industries or even to individual industrial facilities. That can include such things as changes in types of materials used in manufacturing, reductions in waste streams, improved use of water delivered by agricultural irrigation systems, and/or other things that are not directly related to energy using equipment or controls of such equipment. It is obviously not possible to list all such measures. However, a potential study will understate savings potential if it does not include a way of capturing such potential in its estimates. One potential way to get a sense of such potential is to review results of comprehensive industrial efficiency programs run by other utilities to identify the portion of actual program savings from such unique custom measures – and then assume that portion of custom savings could be added to the savings estimated in the study for named measures. | Added to measure list for 2024 study |
| Electric Vehicle measures | Some EV chargers are more efficient than others. The Federal Energy Star program has a standard for them. Savings potential may not be huge, but should be considered in the study. With a growing number of EV sales, the study should also consider the potential savings from promoting the most efficient EVs within different size/style categories | Added to measure list for 2024 study |
| Removing screw-based LEDs | The screw-based LEDs on both the Residential and Commercial measure lists should now be considered baseline due to federal efficiency standards adopted earlier this year. Utility load forecasts for IRPs should reflect resulting improvements in end use efficiency. | Screw-based LEDs were included in the study but with limited applicability to reflect current market |
| Removing Commercial fluorescent lighting | LED technology – for both fixtures and lamps – has advanced significantly in recent years, to the point where it should be the only technology considered for commercial lighting. Measures such as high performance T-8 fluorescent fixtures and high bay T-5 fluorescent fixtures should be replaced with LED alternatives in the study. | Updated measure list for 2024 study to only include LED-based lamps for linear fluorescent replacements |

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| Measure Suggestion | Stakeholder Comments | Action taken for FEECA Study |
| --- | --- | --- |
| Removing fossil-gas fueled CHP | Fossil-fuel fired CHP systems should not be considered "renewable" and have questionable benefits if electric generation is expected to get increasingly more renewable and clean. Biogas-fueled CHP – such as systems installed in wastewater treatment facilities that use methane byproducts of processing waste – should be included in the study. | 2024 study will continue to assess all CHP options |
| Adding livestock methane power generation to renewables list | For example, see the "cow power" program currently being run by Green Mountain Power, Vermont's largest electric utility | 2024 study will continue to assess DSRE options consistent with prior study, including customer-sited solar, solar plus storage, and CHP |
| Adding EV managed charging to DR list | With national market shares for EVs growing, it is important that utilities consider programs for managing when charging occurs. Numerous utilities are currently running managed charging programs. This does not currently appear to be on the measure list and should be added to the Florida utilities' potential study. | Added to measure list for 2024 study |
| Residential "smart thermostat" measure can provide both efficiency savings and demand response potential | This is recognized in the inclusion of smart thermostats in both the Res EE and DR tabs of the measure list spreadsheet. We simply want to flag that it is important when assessing cost-effectiveness of this measure that these two potential benefits are considered together. In other words, the cost should be considered compared to the combined efficiency and DR potential rather than separately considered relative to just EE savings and then separately again compared to just DR potential | 2024 study will include interactive impacts of EE and DR opportunities |
| Emerging Technologies | The efficiency potential study measure list appears to be somewhat outdated. It does not include a number of new and emerging technologies. The potential list of such technologies is long. We suggest reviewing the attached list of emerging technologies developed almost two years ago by Consumers Energy (Michigan) and including them in the study. | Consumers Energy study was reviewed and commercially available measures were added to measure list for 2024 study, including heat pump water heaters - CEE advanced tier, heat pump clothes dryers, ozone laundry systems, and 21+ SEER HVAC units |

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# Technical Potential Study of Demand Side Management

## Orlando Utilities Commission

Date: 03.07.2024

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# Executive Summary

In October, 2022, the six electric utilities subject to the Florida Energy Efficiency and Conservation Act (FEECA Utilities) retained Resource Innovations, Inc. for the purpose of identifying and characterizing the market for demand-side management (DSM) opportunities, including energy efficiency (EE) improvement and building retrofits, peak load reductions from demand response (DR), and demand-side renewable energy (DSRE) systems.

The main objective of the study was to assess the technical potential of demand-side resources for reducing customer electric energy consumption and seasonal peak capacity demands.

This report provides the detailed methodology and results for the technical potential analysis of Orlando Utilities Commission's (OUC) service territory.

## 1.1 Methodology

Resource Innovations estimates DSM savings potential by applying an analytical framework that aligns baseline market conditions for energy consumption and demand with DSM opportunities. After describing the baseline condition, Resource Innovations applies estimated measure savings to disaggregated consumption and demand data. The approach varies slightly according to the type of DSM resources and available data; the specific approaches used for each type of DSM are described below.

### 1.1.1 EE Potential

This study utilized Resource Innovations' proprietary EE modeling tool, TEA-POT (Technical / Economic / Achievable POTential). This modeling tool was built on a platform that provides the ability to create and analyze multiple scenarios and recalculate potential savings based on variable inputs such as sales/load forecasts, electricity prices, discount rates, and actual program savings. The methodology for the EE potential assessment was based on a hybrid "top-down/bottom-up" approach, which started with the current utility load forecast, then disaggregated it into its constituent customer-class and end-use components. Our assessment examined the effect of the range of EE measures and practices on each end-use, taking into account current market saturations, and technical feasibility. These unique impacts were aggregated to produce estimates of potential at the end-use, customer class, and system levels for OUC.

### 1.1.2 DR Potential

The assessment of DR potential in OUC's service territory was an analysis of mass market direct load control programs for residential and small commercial and industrial (C&I) customers, and an analysis of DR programs for large C&I customers. The direct load control program assessment focused on the potential for demand reduction through heating, ventilation, and air conditioning (HVAC), water heater, managed electric vehicle charging, and pool pump load control. These end-uses were of particular interest because of their large contribution to peak period system load. For this analysis, a range of direct load control measures were examined for each customer segment to highlight the range of potential. The assessment further accounted for existing DR programs for OUC when calculating the total DR potential.

### 1.1.3 DSRE Potential

The DSRE technologies included in this study are rooftop solar photovoltaic (PV) systems, battery storage systems charged from customers' PV systems, and combined heat and power (CHP) systems. The study leveraged the customer segmentation and load disaggregation data assembled for the EE and DR analyses, and applied our DSRE model, SPIDER™ (Spatial Penetration and Integration of Distributed Energy Resources), for economic and adoption analysis of solar and battery storage. This model dynamically responds to rapidly changing technologies and accounts for all key time-varying elements such as technology costs, incentives, tax credits, and electric rates. To estimate technical potential for CHP, the study utilized a series of unique distributed generation potential models for each primary market sector (commercial and industrial), calculating the average building consumption, assigning minimum facility size thresholds, and estimating building energy savings share percentage for each CHP technology based on its generation capacity.

## 1.2 Savings Potential

Technical potential for EE, DR, and DSRE are as follows:

### 1.2.1 EE Potential

EE technical potential describes the savings potential when all technically feasible EE measures are fully implemented, ignoring all non-technical constraints on electricity savings, such as cost-effectiveness and customer willingness to adopt EE.

The estimated EE technical potential results are summarized in Table 1.

Table 1. EE Technical Potential

| | Savings Potential | | |
|---|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) | Energy (GWh) |
| **Residential** | 249 | 98 | 935 |
| **Non-Residential**[1] | 201 | 99 | 1,044 |
| **Total** | 450 | 197 | 1,979 |

### 1.2.2 DR Potential

DR technical potential describes the magnitude of loads that can be managed during conditions when grid operators need peak capacity. For residential and small C&I customers where DR generally takes the form of direct utility control, technical potential for DR is limited by the loads that can be controlled remotely at scale such as heating, cooling, water heaters, managed electric vehicle charging, and pool pumps. For large C&I customers, this included their entire electric demand during a utility's system peak, as many of these types of customers will forego virtually all electric demand temporarily if the financial incentive is large enough.

The estimated DR technical potential results are summarized in Table 2.

Table 2. DR Technical Potential

| | Savings Potential | |
|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) |
| **Residential** | 235 | 223 |
| **Non-Residential** | 582 | 563 |
| **Total** | 817 | 786 |

[1] Non-Residential results include all commercial and industrial customer segments.

### 1.2.3 DSRE Potential

DSRE technical potential estimates quantify all technically feasible distributed generation opportunities from PV systems, battery storage systems charged from PV, and CHP technologies based on the customer characteristics of OUC's customer base.

The estimated DSRE technical potential results are summarized in Table 3.

Table 3. DSRE Technical Potential[2]

| | Savings Potential | | |
|---|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) | Energy (GWh) |
| PV Systems | | | |
| **Residential** | 339 | 0 | 2,731 |
| **Non-Residential** | 162 | 0 | 1,169 |
| **Total** | 501 | 0 | 3,900 |
| Battery Storage charged from PV Systems | | | |
| **Residential** | 171 | 166 | 0 |
| **Non-Residential** | 14 | 70 | 0 |
| **Total** | 185 | 236 | 0 |
| CHP Systems | | | |
| **Total** | 354 | 292 | 1,591 |

[2] PV systems and CHP systems were independently analyzed for technical potential without consideration of the competition between technologies or customer preference for DSRE system.

# 2 Introduction

In October, 2022, the six electric utilities subject to the Florida Energy Efficiency and Conservation Act (FEECA Utilities) retained Resource Innovations, Inc. for the purpose of identifying and characterizing the market for demand-side management (DSM) opportunities, including energy efficiency (EE) improvement and building retrofits, peak load reductions from demand response (DR), and demand-side renewable energy (DSRE) systems. The main objective of the study was:

- Assessing the technical potential of demand-side resources for reducing customer electric energy consumption and seasonal peak capacity demands.

This report provides the detailed methodology and results for the technical potential analysis of OUC's service territory.

The following deliverables were developed by Resource Innovations as part of the project and are addressed in this report:

- DSM measure list and detailed assumption workbooks
- Disaggregated baseline demand and energy use by year, sector, and end-use
- Baseline technology saturations, energy consumption, and demand
- Technical potential demand and energy savings
- Supporting calculation spreadsheets

## 2.1 Technical Potential Study Approach

Resource Innovations estimates technical potential according to the industry standard categorization, as follows:

> Technical Potential is the theoretical maximum amount of energy and capacity that could be displaced by DSM, regardless of cost and other barriers that may prevent the installation or adoption of a DSM measure.

For this study, technical potential included full application of commercially available DSM technologies to all residential, commercial, and industrial customers in the utility's service territory.

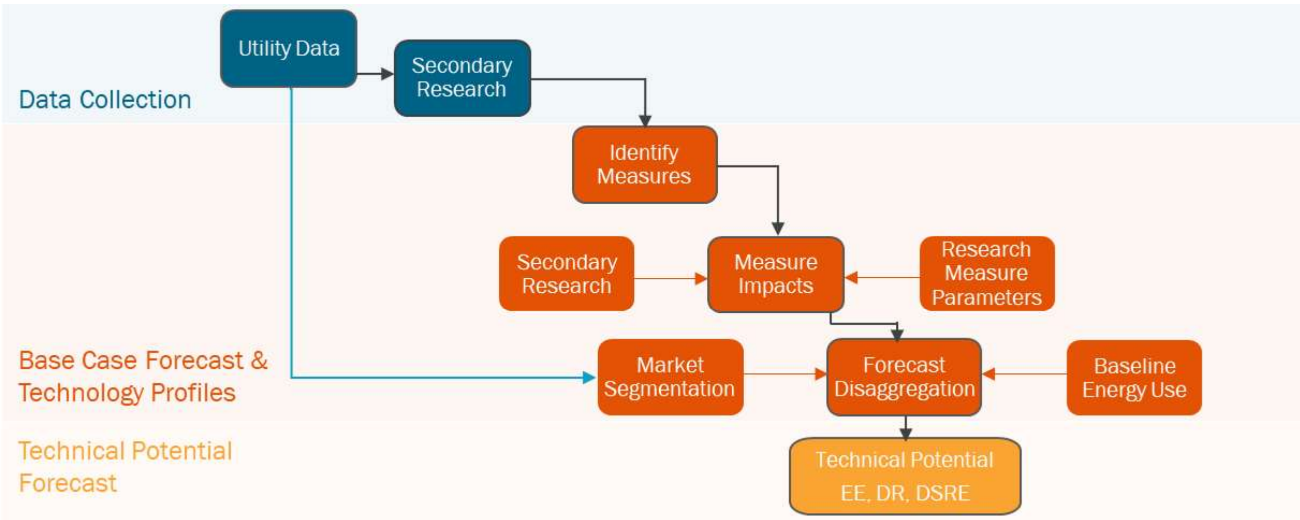
Quantifying DSM technical potential is the result of an analytical process that refines DSM opportunities that align with OUC's customers' electric consumption patterns. Resource Innovations' general methodology for estimating technical potential is a hybrid "top-

down/bottom-up" approach, which is described in detail in Sections 3 through 5 of this report and includes the following steps:

- Develop a baseline forecast: the study began with a disaggregation of the utility's official electric energy forecast to create a baseline electric energy forecast. This forecast does not include any utility-specific assumptions around DSM performance. Resource Innovations applied customer segmentation and consumption data from each utility and data from secondary sources to describe baseline customer-class and end-use components. Additional details on the forecast disaggregation are included in Section 3.
- Identify DSM opportunities: A comprehensive set of DSM opportunities applicable to OUC's climate and customers were analyzed to best depict DSM technical potential. Effects for a range of DSM technologies for each end-use could then be examined while accounting for current market saturations, technical feasibility, and impacts.
- Collect cost and impact data for measures: For those measures applicable to OUC's customers, Resource Innovations conducted primary and secondary research and estimated costs, energy savings, measure life, and demand savings. We differentiated between the type of cost (capital, installation labor, maintenance, etc.) to separately evaluate different implementation modes: retrofit (capital plus installation labor plus incremental maintenance); new construction (incremental capital and incremental maintenance); and burnout costs (incremental capital and incremental maintenance costs for replacement of appliances and equipment that has reached the end of its useful life). Additional details on measure development are included in Section 4.

Figure 1 provides an illustration of the technical potential modeling process conducted for OUC, with the assessment starting with the current utility load forecast, disaggregated into its constituent customer-class and end-use components, and calibrated to ensure consistency with the overall forecast.  Resource Innovations considered the range of DSM measures and practices application to each end-use, accounting for current market saturations, and technical feasibility. These unique impacts were aggregated to produce estimates of potential at the technology, end-use, customer class, and system levels.

Figure 1. Approach to Technical Potential Modeling




Resource Innovations estimated DSM technical potential based on a combination of market research, utility load forecasts and customer data, and measure impact analysis, all in coordination with OUC. Resource Innovations examined the technical potential for EE, DR, and DSRE opportunities; this report is organized to offer detail on each DSM category, with additional details on technical potential methodology presented in Section 5.

## 2.2 EE Potential Overview

To estimate EE potential, this study utilized Resource Innovations' modeling tool, TEA-POT (Technical / Economic / Achievable POTential). This modeling tool was built on a platform that provides the ability to create and analyze multiple scenarios and recalculate potential savings based on variable inputs such as sales/load forecasts, electricity prices, discount rates, and actual utility program savings, as described in Section 5.1.1 below. While the analysis estimates the impacts of individual EE measures, the model accounts for interactions and overlap of individual measure impacts within an end-use or equipment type. The model provides transparency into the assumptions and calculations for estimating EE potential.

## 2.3 DR Potential Overview

To estimate DR market potential, Resource Innovations considered customer demand during utility peaking conditions and projected customer response to DR measures. Customer demand was determined by looking at account-level interval data for all OUC customers within each customer segment. For each segment, Resource Innovations determined the portion of a customer's load that could be curtailed during the system peak.

## 2.4 DSRE Potential Overview

The DSRE technologies included in this study are rooftop solar photovoltaic (PV) systems, battery storage systems charged from PV, and combined heat and power (CHP) systems. The study leveraged the customer segmentation and load disaggregation data assembled for the EE and DR analyses, and applied our DSRE model, SPIDER™ (Spatial Penetration and Integration of Distributed Energy Resources), for economic and adoption analysis of solar and battery storage. This model dynamically responds to rapidly changing technologies and accounts for all key time-varying elements such as technology costs, incentives, tax credits, and electric rates. To estimate technical potential for CHP, the study utilized a series of unique distributed generation potential models for each primary market sector (commercial and industrial), calculating the average building consumption, assigning minimum facility size thresholds, and estimating building energy savings share percentage for each CHP technology based on its generation capacity.

# 3 Baseline Forecast Development

## 3.1 Market Characterization

The OUC base year energy use and sales forecast provided the reference point to determine potential savings. The end-use market characterization of the base year energy use and reference case forecast included customer segmentation and load forecast disaggregation. The characterization is described in this section, while the subsequent section addresses the measures and market potential energy and demand savings scenarios.

### 3.1.1 Customer Segmentation

In order to estimate EE, DR, and DSRE potential, the sales forecast and peak load forecasts were segmented by customer characteristics. As electricity consumption patterns vary by customer type, Resource Innovations segmented customers into homogenous groups to identify which customer groups are eligible to adopt specific DSM technologies, have similar building characteristics and load profiles, or are able to provide DSM grid services.

Resource Innovations segmented customers according to the following:

1) By Sector – how much of OUC's energy sales, summer and winter peak demand forecast is attributable to the residential, commercial, and industrial sectors?
2) By Customer – how much electricity does each customer typically consume annually and during system peaking conditions?
3) By End-Use – within a home or business, what equipment is using electricity during the system peak? How much energy does this end-use consume over the course of a year?

Table 4 summarizes the segmentation within each sector. In addition to the segmentation described here for the EE and DSRE analyses, the residential customer segments were further segmented by heating type (electric heat, gas heat, or unknown) and by annual consumption bins within each sub-segment for the DR analysis.

**Table 4. Customer Segmentation**

| Residential | Commercial | | Industrial | |
|---|---|---|---|---|
| Single Family | Assembly | Miscellaneous | Agriculture and Assembly | Primary Resources Industries |
| Multi-Family | College and University | Offices | Chemicals and Plastics | Stone/Glass/ Clay/Concrete |
| Manufactured Homes | Grocery | Restaurant | Construction | Textiles and Leather |
| | Healthcare | Retail | Electrical and Electronic Equipment | Transportation Equipment |
| | Hospitals | Schools K-12 | Lumber/Furniture/ Pulp/Paper | Water and Wastewater |
| | Institutional | Warehouse | Metal Products and Machinery | Other |
| | Lodging/ Hospitality | | Miscellaneous Manufacturing | |

From an equipment and energy use perspective, each segment has variation within each building type or sub-sector. For example, the energy consuming equipment in a convenience store will vary significantly from the equipment found in a supermarket. To account for this variation, the selected end-uses describe energy consumption patterns that are consistent with those typically studied in national or regional surveys, such as the U.S. Energy Information Administration's (EIA) Residential Energy Consumption Survey (RECS), Commercial Building Energy Consumption Survey (CBECS) and Manufacturing Energy Consumption Survey (MECS), among others. The end-uses selected for this study are listed in Table 5.

**Table 5. End-Uses**

| Residential End-Uses | Commercial End-Uses | Industrial End-Uses |
|---|---|---|
| Space heating[3] | Space heating[3] | Process heating |
| Space cooling[3] | Space cooling[3] | Process cooling |
| Domestic hot water | Domestic hot water | Compressed air |
| Ventilation and circulation | Ventilation and circulation | Motors/pumps |

[3] Includes the contribution of building envelope measures and efficiencies.

| Residential End-Uses | Commercial End-Uses | Industrial End-Uses |
|---|---|---|
| Lighting | Interior lighting | Fan, blower motors |
| Cooking | Exterior lighting | Process-specific |
| Appliances | Cooking | Industrial lighting |
| Electronics | Refrigeration | Exterior lighting |
| Miscellaneous | Office equipment | HVAC[3] |
| | Miscellaneous | Other |

For DR, the end-uses targeted were those with controllable load for residential customers (i.e., HVAC, water heaters, pool pumps, and electric vehicles) and small C&I customers (HVAC and electric vehicles). For large C&I customers, all load during peak hours was included assuming these customers would potentially be willing to reduce electricity consumption for a limited time if offered a large enough incentive during temporary system peak demand conditions.

### 3.1.2 Forecast Disaggregation

A common understanding of the assumptions and granularity in the baseline load forecast was developed with input from OUC. Key discussion topics reviewed included:

- How current DSM offerings are reflected in the energy and demand forecast.
- Assumed weather conditions and hour(s) of the day when the system is projected to peak.
- Are there portions of the load forecast attributable to customers or equipment not eligible for DSM programs?
- How are projections of population increase, changes in appliance efficiency, and evolving distribution of end-use load shares accounted for in the peak demand forecast?

#### 3.1.2.1 Electricity Consumption (kWh) Forecast

Resource Innovations segmented OUC's electricity consumption forecast into electricity consumption load shares by customer class and end-use. The baseline customer segmentation represents the electricity market by describing how electricity was consumed within the service territory. Resource Innovations developed the forecast for the year 2025, and based it on data provided by OUC, primarily their 2023 Ten-Year Site Plan, which was the most recent plan available at the time the studies were initiated. The data addressed current baseline consumption, system load, and sales forecasts.

### 3.1.2.2 Peak Demand (kW) Forecast

A fundamental component of DR potential was establishing a baseline forecast of what loads or operational requirements would be absent due to existing dispatchable DR or time varying rates. This baseline was necessary to assess how DR can assist in meeting specific planning and operational requirements. We utilized OUC's summer and winter peak demand forecast, which was developed for system planning purposes.

### 3.1.2.3 Estimating Consumption by End-Use Technology

As part of the forecast disaggregation, Resource Innovations developed a list of electricity end-uses by sector (Table 5). To develop this list, Resource Innovations began with OUC's estimates of average end-use consumption by customer and sector. Resource Innovations combined these data with other information, such as utility residential appliance saturation surveys, as available, to develop estimates of customers' baseline consumption. Resource Innovations calibrated the utility-provided data with data available from public sources, such as the EIA's recurring data-collection efforts that describe energy end-use consumption for the residential, commercial, and manufacturing sectors.

To develop estimates of end-use electricity consumption by customer segment and end-use, Resource Innovations applied estimates of end-use and equipment-type saturation to the average energy consumption for each sector. The following data sources and adjustments were used in developing the base year 2025 sales by end-use:

**Residential Sector:**

- The disaggregation was based on OUC's rate class load shares and intensities.
- Baseline intensity was calibrated to account for differences in end-use saturation, fuel source, and equipment saturation as follows:
    - OUC rate class load share is based on average per customer.
    - Resource Innovations made conversions to usage estimates generated by applying EIA RECS data, residential end-use study data from other FEECA utilities, and EIA's Annual Energy Outlook (AEO) 2023.

**Commercial Sector:**

- The disaggregation was based on OUC's rate class load shares, intensities, and EIA CBECS data.
- Segment data from EIA and OUC.
- Baseline intensity was calibrated to account for differences in end-use saturation, fuel source, and equipment saturation as follows:

  - Rate class load share based on EIA CBECS and end-use forecasts from OUC.

**Industrial Sector:**

- The disaggregation was based on rate class load shares, intensities, and EIA MECS data.
- Segment data from EIA and OUC.
- Baseline intensity was calibrated to account for differences in end-use saturation, fuel source, and equipment saturation as follows:
  - Rate class load share based on EIA MECS and end-use forecasts from OUC.

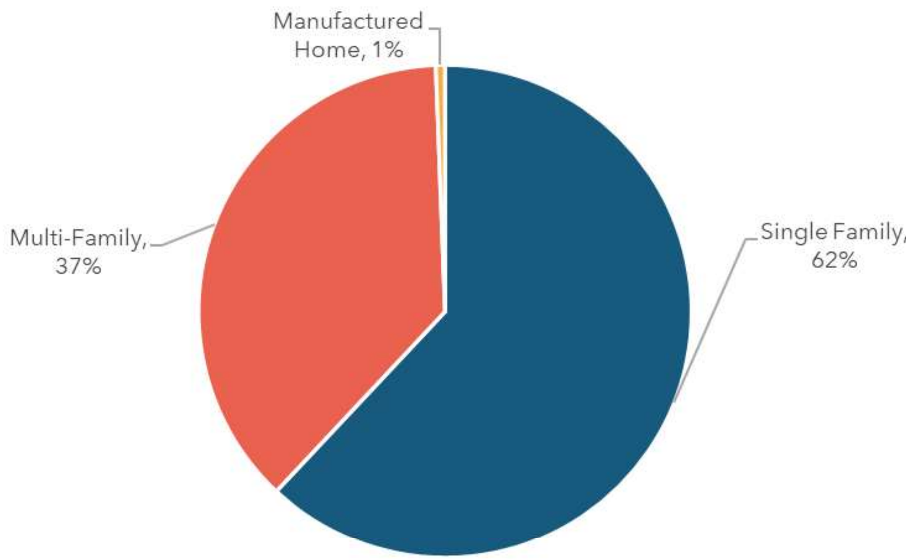
## 3.2 Analysis of Customer Segmentation

Customer segmentation is important to ensuring that a MPS examines DSM measure savings potential in a manner that reflects the diversity of energy savings opportunities existing across the utility's customer base. OUC provided Resource Innovations with data concerning the premise type and loads characteristics for all customers for the MPS analysis. Resource Innovations examined the provided data from multiple perspectives to identify customer segments. Resource Innovations' approach to segmentation varied slightly for non-residential and residential accounts, but the overall logic was consistent with the concept of expressing the accounts in terms that were relevant to DSM opportunities.

### 3.2.1 Residential Customers (EE, DR, and DSRE Analysis)

Segmentation of residential customer accounts enabled Resource Innovations to align DSM opportunities with appropriate DSM measures. Resource Innovations used utility customer data, supplemented with EIA data, to segment the residential sector by customer dwelling type (single family, multi-family, or manufactured home). The resulting distribution of customers according to dwelling unit type is presented in Figure 2.

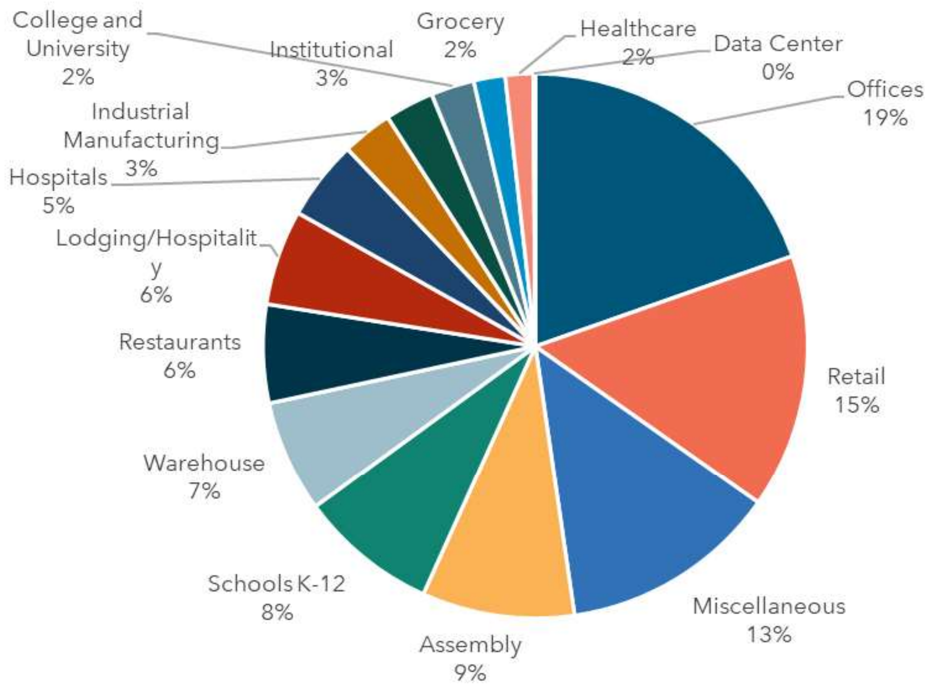
Figure 2. Residential Customer Segmentation




### 3.2.2 Non-Residential (Commercial and Industrial) Customers (EE and DSRE Analysis)

For the EE and DSRE analysis, Resource Innovations segmented C&I accounts using the utility's North American Industry Classification System (NAICS) or Standard Industrial Classification (SIC) codes, supplemented by data produced by the EIA's CBECS and MECS. Resource Innovations classified the customers in this group as either commercial or industrial, on the basis of DSM measure information available and applicable to each. For example, agriculture and forestry DSM measures are commonly considered industrial savings opportunities. Resource Innovations based this classification on the types of DSM measures applicable by segment, rather than on the annual energy consumption or maximum instantaneous demand from the segment as a whole. The estimated energy sales distributions Resource Innovations applied are shown below in Figure 3.

Figure 3. Business Customer Segmentation




### 3.2.3 Commercial and Industrial Accounts (DR Analysis)

For the DR analysis, Resource Innovations divided the non-residential customers into the two customer classes of small C&I and large C&I using rate class and annual consumption. For the purposes of this analysis, small C&I customers are those on the General Service (GS) tariff. Large C&I customers are all customers on the General Service Demand (GSD) tariff or on the General Service Large Demand (GSLD) tariff. Resource Innovations further segmented these two groups based on customer size. For small C&I, segmentation was determined using annual customer consumption and for large C&I the customer's maximum demand was used. Both customer maximum demand and customer annual consumption were calculated using billing data provided by OUC.

Table 6 shows the account breakout between small C&I and large C&I.

Table 6. Summary of Customer Classes for DR Analysis

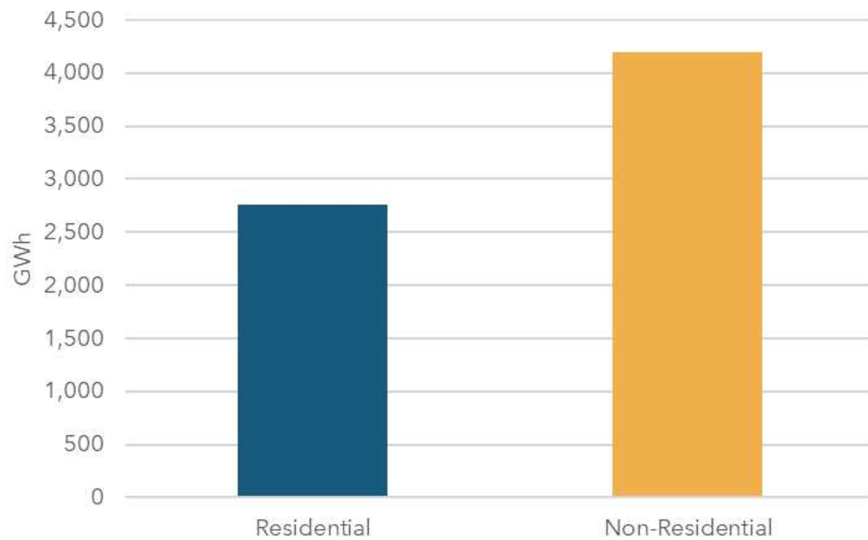
| Customer Class | Annual kWh | Estimated Number of Accounts |
|---|---|---|
| **Small C&I** | 0-15,000 kWh | 15,967 |
| | 15,001-25,000 kWh | 3,211 |
| | 25,001-50,000 kWh | 3,269 |
| | 50,001 kWh + | 2,096 |
| | Total | 24,543 |
| **Large C&I** | 0-50 kW | 1,764 |
| | 51-300 kW | 2,114 |
| | 301-500 kW | 267 |
| | 501 kW + | 373 |
| | Total | 4,518 |

## 3.3 Analysis of System Load

### 3.3.1 System Energy Sales

Technical potential is based on OUC's load forecast for the year 2025 from their 2023 Ten Year Site Plan, which is illustrated in **Error! Reference source not found.**.

Figure 4: 2025 Electricity Sales Forecast by Sector




### 3.3.2 System Demand

To determine the technical potential for DR, Resource Innovations first established peaking conditions for each utility by looking at when each utility historically experienced its maximum demand. The primary data source used to determine when maximum DR impact was the historical system load for OUC. The data provided contained the system loads for all 8,760 hours of the most recent five years leading up to the study (2016-2021). The OUV summer and winter peaks were then identified within the utility-defined peaking conditions. For OUC the summer peaking conditions were defined as August from 5:00-6:00 PM and the winter peaking conditions were defined as January from 6:00-7:00 PM. The seasonal peaks were then selected as the maximum demand during utility peaking conditions.

### 3.3.3 Load Disaggregation

The disaggregated annual electric loads[4] for the base year 2025 by sector and end-use are summarized in Figure 5 and Figure 6.

[4] Full disaggregation of system demand by end-use was not conducted, as DR potential for residential and small C&I customers focused on specific end-uses of particular interest because of their large contribution to peak period system load, and was not end-use specific for large C&I customers. A description of the end-use analysis for residential and small C&I customers is included in Section 5.1.2

**Figure 5: Residential Baseline (2025) Energy Sales by End-Use**

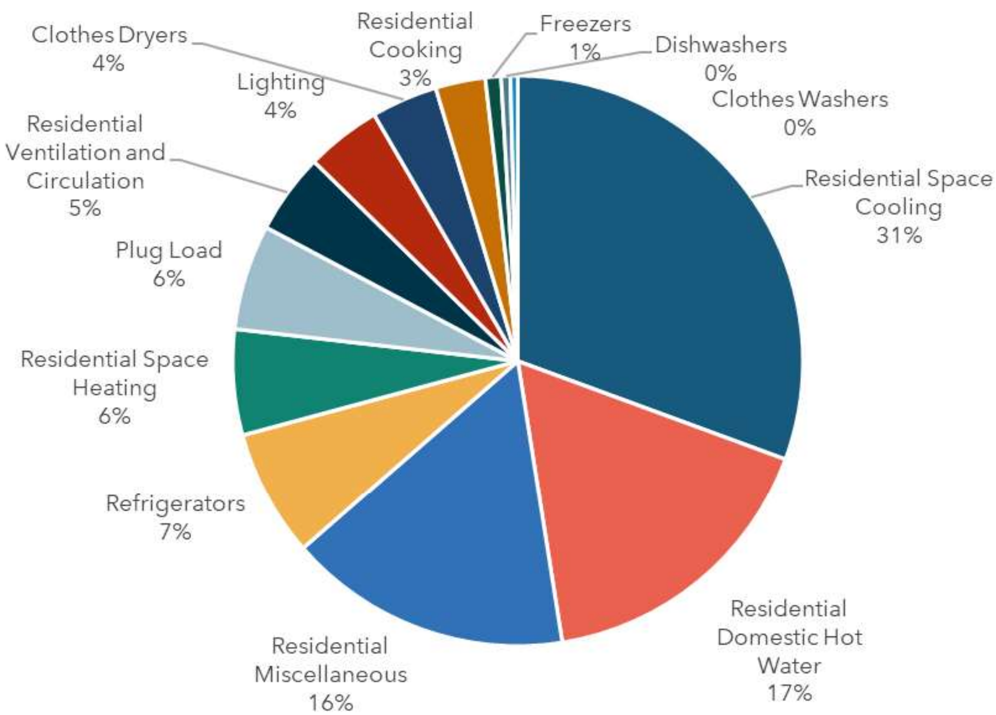
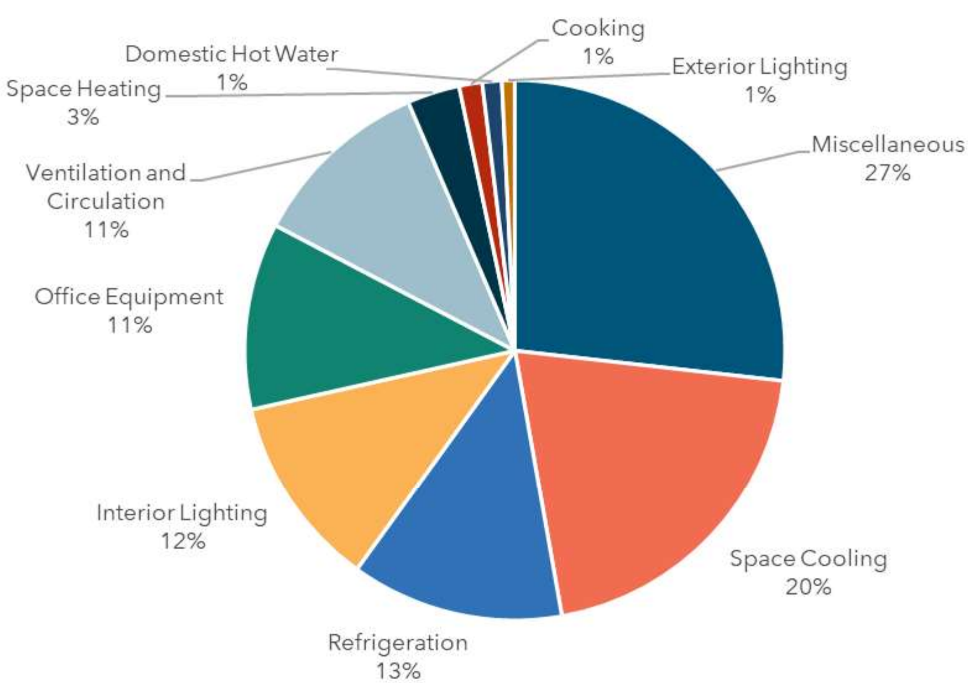



**Figure 6: Business Baseline (2025) Energy Sales by End-Use**

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# 4 DSM Measure Development

DSM potential is described by comparing baseline market consumption with opportunities for savings. Describing these individual savings opportunities results in a list of DSM measures to analyze. This section presents the methodology to develop the EE, DR, and DSRE measure lists.

## 4.1 Methodology

Resource Innovations identified a comprehensive catalog of DSM measures for the study. The measure list is the same for all FEECA Utilities. The iterative vetting process with the utilities to develop the measure list began by initially examining the list of measures included in the 2019 Goals docket. This list was then adjusted based on proposed measure additions and revisions provided by the FEECA Utilities. Resource Innovations further refined the measure list based on reviews of Resource Innovations' DSM measure library, compiled from similar market potential studies conducted in recent years throughout the United States, as well as measures included in other utility programs where Resource Innovations is involved with program design, implementation, or evaluation. The FEECA Utilities also reached out to interested parties and received input with recommendations on measure additions to the 2019 measure list. Their measure suggestions were reviewed and incorporated into the study as appropriate. External measure suggestions and actions are summarized in Appendix D. The extensive, iterative review process involving multiple parties has ensured that the study included a robust and comprehensive set of DSM measures.

See Appendix A for the list of EE measures, Appendix B for the list of DR measures, and Appendix C for the list of DSRE measures analyzed in the study.

## 4.2 EE Measures

EE measures represent technologies applicable to the residential, commercial, and industrial customers in the FEECA Utilities' service territories. The development of EE measures included consideration of:

- EE technologies that are applicable to Florida and commercially available: Measures that are not applicable due to climate or customer characteristics were excluded, as were "emerging" technologies that are not currently commercially available to FEECA utility customers.
- Current and planned Florida Building Codes and Federal equipment standards (Codes & Standards) for baseline equipment: Measures included from prior studies

were adjusted to reflect current Codes & Standards as well as updated efficiency tiers, as appropriate.

- Eligibility for utility DSM offerings in Florida: For example, behavioral measures were excluded from consideration, as they historically have not been allowed to count towards utility DSM goals. Behavioral measures are intended to motivate customers to operate in a more energy-efficient manner (e.g., setting an air-conditioner thermostat to a higher temperature) without accompanying: a) physical changes to more efficient end-use equipment or to their building envelope, b) utility-provided products and tools to facilitate the efficiency improvements, or c) permanent operational changes that improve efficiency which are not easily revertible to prior conditions. These types of behavioral measures were excluded because of the variability in forecasting the magnitude and persistence of energy and demand savings from the utility's perspective. Additionally, decoupling behavioral measure savings from the installation of certain EE technologies like smart thermostats can be challenging and could result in overlapping potential with other EE measures included in the study.

Upon development of the final EE measure list, utility-specific measure details were developed. RI maintains a proprietary online database of energy efficiency measures for MPS studies, which was used as a starting point for measure development for this study. Measures are added or updated at the request of project stakeholders or because of changes to the EE marketplace (for example, new codes and standards, or current practice in the market). Measure data are refined as new data or algorithms are developed for estimating measure impacts, and updated for each study to incorporate inputs parameters specific to the service territory being analyzed. The database contains the following information for each of the measures:

- Measure description: measure classification by type, end-use, and subsector, and description of the base-case and the efficient-case scenarios.
- kWh savings: Energy savings associated with each measure were developed through engineering algorithms or building simulation modeling, taking climate data and customer segments into consideration as appropriate. Reference sources used for developing residential, commercial, and industrial measure savings included a variety of Florida-specific, as well as regional and national sources, such as utility-specific measurement & verification (M&V) data, technical reference manuals (TRM) from other jurisdictions, ENERGY STAR calculators, and manufacturer or retailer specifications for particular products.
- Energy savings were applied in RI's TEA-POT model as a percentage of total baseline consumption. Peak demand savings were determined using utility-specific load shapes or coincidence factors.

- Measure Expected Useful Lifetime: Sources included the Database for Energy Efficient Resources (DEER), the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Handbook, TRMs, and other regional and national measure databases and EE program evaluations.
- Measure Costs: Per-unit costs (full or incremental, depending on the application) associated with measure installations. Sources included: TRMs, ENERGY STAR calculator, online market research, FEECA utility program data, and other secondary sources.

The measure details from the online measure library are exported for use in RI's TEA-POT model, accompanied by utility-specific estimates of measure applicability. Measure applicability is a general term encompassing an array of factors, including technical feasibility of installation, and the measure's current saturation as well as factors to allocate savings associated with competing measures. Information used was primarily derived from data in current regional and national databases, as well as OUC's program tracking data. These factors are described in Table 7.

**Table 7. Measure Applicability Factors**

| Measure Impact | Explanation | Sources |
|---|---|---|
| Technical Feasibility | The percentage of buildings that can have the measure physically installed. Various factors may affect this, including, but not limited to, whether the building already has the baseline measure (e.g., dishwasher), and limitations on installation (e.g., size of unit and space available to install the unit). | Various secondary sources and engineering experience. |
| Measure Incomplete Factor | The percentage of buildings without the specific measure currently installed. | OUC RASS; EIA RECS, CBECS; MECS; ENERGY STAR sales figures; and engineering experience. |
| Measure Share | Used to distribute the percentage of market shares for competing measures (e.g., only blown-in ceiling insulation or spray foam insulation, not both would be installed in an attic). | OUC customer data, Various secondary sources and engineering experience. |

As shown in Table 8, the measure list includes 395 unique energy-efficiency measures. Expanding the measures to account for all appropriate installation scenarios resulted in

9,535 measure permutations, which are the application of individual measures to various customer segments, construction types, and end-uses (i.e., a single air-source heat pump "measure" can be installed in single family, multi-family, and manufactured homes, as well as new and existing vintages of each home type, and impacts both space cooling and space heating end-uses, resulting in twelve separate measure "permutations" analyzed).

Table 8. EE Measure Counts by Sector

| Sector | Unique Measures | Permutations |
|---|---|---|
| **Residential** | 119 | 1,173 |
| **Commercial** | 164 | 5,798 |
| **Industrial** | 112 | 2,564 |

## 4.3 DR Measures

The DR measures included in the measure list utilize the following DR strategies:

- **Direct Load Control.** OUC control of selected equipment at the customer's home or business, such as HVAC or water heaters.
- **Critical Peak Pricing (CPP) with Technology.** Electricity rate structures that vary based on time of day. Includes CPP when the rate is substantially higher for a limited number of hours or days per year (customers receive advance notification of CPP event) coupled with technology that enables customer to lower their usage in a specific end-use in response to the event (e.g., HVAC via smart thermostat).
- **Contractual DR.** Customers receive incentive payments or a rate discount for committing to reduce load by a pre-determined amount or to a pre-determined firm service level upon utility request.
- **Automated DR.** OUC dispatched control of specific end-uses at a customer facility.

DR initiatives that do not rely on the installation of a specific device or technology to implement (such as a voluntary curtailment program or time of use rates) were not included.

A workbook was developed for each measure which included the same measure inputs as previously described for the EE measures. In addition, the DR workbook included expected load reduction from the measure, based on utility technical potential, existing utility DR programs, and other nationwide DR programs if needed.

For technical potential, Resource Innovations did not break out results by specific measure or control technology because all of the developed measures target the end-uses estimated

for technical potential (i.e., potential is reported for space cooling end-use and not allocated to switches, smart thermostats, etc.).

## 4.4 DSRE Measures

The DSRE measure list includes rooftop PV systems, battery storage systems charged from PV systems, and CHP systems.

**PV Systems**

PV systems utilize solar panels (a packaged collection of PV cells) to convert sunlight into electricity. A system is constructed with multiple solar panels, a DC/AC inverter, a racking system to hold the panels, and electrical system interconnections. These systems are often roof-mounted systems that face south-west, south, and/or, south-east. The potential associated with roof-mounted systems installed on residential and commercial buildings was analyzed.

**Battery Storage Systems Charged from PV Systems**

Distributed battery storage systems included in this study consist of behind-the-meter battery systems installed in conjunction with an appropriately-sized PV system at residential and commercial customer facilities. These battery systems typically consist of a DC-charged battery, a DC/AC inverter, and electrical system interconnections to a PV system. On their own battery storage systems do not generate or conserve energy, but can collect and store excess PV generation to provide power during particular time periods, which for DSM purposes would be to offset customer demand during the utility's system peak.

**CHP Systems**

In most CHP applications, a heat engine creates shaft power that drives an electrical generator (fuel cells can produce electrical power directly from electrochemical reactions). The waste heat from the engine is then recovered to provide other on-site needs. Common prime mover technologies used in CHP applications and explored in this study include:

- Steam turbines
- Gas turbines
- Micro turbines
- Fuel Cells
- Internal combustion engines

A workbook was developed for each measure which included the inputs previously described for EE measures and prime mover operating parameters.

# 5 Technical Potential

In the previous sections, the approach for DSM measure development was summarized, and the 2025 base year load shares and reference-case load forecast were described. The outputs from these tasks provided the input for estimating the technical potential scenario, which is discussed in this section.

The technical potential scenario estimates the potential energy and demand savings when all technically feasible and commercially available DSM measures are implemented without regard for cost-effectiveness and customer willingness to adopt the most impactful EE, DR, or DSRE technologies. Since the technical potential does not consider the costs or time required to achieve these savings, the estimates provide a theoretical upper limit on electricity savings potential. Technical potential is only constrained by factors such as technical feasibility and applicability of measures. For this study, technical potential included full application of the commercially available DSM measures to all residential, commercial, and industrial customers in the utility's service territory.

## 5.1 Methodology

### 5.1.1 EE Technical Potential

EE technical potential refers to delivering less electricity to the same end-uses. In other words, technical potential might be summarized as "doing the same thing with less energy, regardless of the cost."

DSM measures were applied to the disaggregated utility electricity sales forecasts to estimate technical potential. This involved applying estimated energy savings from equipment and non-equipment measures to all electricity end-uses and customers. Technical potential consists of the total energy and demand that can be saved in the market which Resource Innovations reported as single numerical values for each utility's service territory.

The core equation used in the residential sector EE technical potential analysis for each individual efficiency measure is shown in Equation 1 below, while the core equation used in the nonresidential sector technical potential analysis for each individual efficiency measure is shown in Equation 2.

**Equation 1: Core Equation for Residential Sector EE Technical Potential**

$$\text{Technical Potential of Efficient Measures} = \text{Total Number of Households} \times \text{Base Case Equipment Energy Use Intensity (kWh/unit)} \times \text{Saturation Shares} \times \text{Percent Incomplete} \times \text{Feasibility Factor} \times \text{Savings Factor}$$

Where:

- **Baseline Equipment Energy Use Intensity** = the electricity used per customer per year by each baseline technology in each market segment. In other words, the baseline equipment energy-use intensity is the consumption of the electrical energy using equipment that the efficient technology replaces or affects.
- **Saturation Share** = the fraction of the end-use electrical energy that is applicable for the efficient technology in a given market segment. For example, for residential cooling, the saturation share would be the fraction of all residential electric customers that have central air conditioners in their household.
- **Percent Incomplete** = the fraction of equipment that is not considered to already be energy efficient. To extend the example above, the fraction of central air conditioners that is not already energy efficient.
- **Feasibility Factor** = the fraction of units that is technically feasible for conversion to the most efficient available technology from an engineering perspective (i.e., it may not be possible to install LEDs in all light sockets in a home because the available styles may not fit in every socket).
- **Savings Factor** = the percentage reduction in electricity consumption resulting from the application of the efficient technology.

**Equation 2: Core Equation for Non-Residential Sector EE Technical Potential**

$$\text{Technical Potential of Efficient Measures} = \text{Total Stock Sq. Footage by Building Type by EDC} \times \text{Base Case Equipment Energy Use Intensity (kWh/unit)} \times \text{Saturation Shares} \times \text{Percent Incomplete} \times \text{Feasibility Factor} \times \text{Savings Factor}$$

Where:

- **Total Stock Square Footage by Segment** = the forecasted square footage level for a given building type (e.g., square feet of office buildings).
- **Baseline Equipment Energy Use Intensity** = the electricity used per square foot per year by each baseline equipment type in each market segment.

- **Saturation Shares** = the fraction of total end-use energy consumption associated with the efficient technology in a given market segment. For example, for packaged terminal air-conditioner (PTAC), the saturation share would be the fraction of all space cooling kWh in a given market segment that is associated with PTAC equipment.
- **Percent Incomplete** = the fraction of equipment that is not considered to already be energy efficient.
- **Feasibility Factor** = the fraction of the equipment or practice that is technically feasible for conversion to the efficient technology from an engineering perspective (i.e., it may not be possible to install Variable Frequency Drives (VFD) on all motors in a given market segment).
- **Savings Factor** = the percentage reduction in electricity consumption resulting from the application of the efficient technology.

It is important to note that the technical potential estimate represents electricity savings potential at a specific point in time. In other words, the technical potential estimate is based on data describing status quo customer electricity use and technologies known to exist today. As technology and electricity consumption patterns evolve over time, the baseline electricity consumption will also change accordingly. For this reason, technical potential is a discrete estimate of a dynamic market. Resource Innovations reported the technical potential for 2025, based on currently known DSM measures and observed electricity consumption patterns.

### Measure Interaction and Competition (Overlap)

While the technical potential equations listed above focus on the technical potential of a single measure or technology, Resource Innovations' modeling approach does recognize the overlap of individual measure impacts within an end-use or equipment type, and accounts for the following interactive effects:

- Measure interaction: Installing high-efficiency equipment could reduce energy savings in absolute terms (kWh) associated with non-equipment measures that impact the same end-use. For example, installing a high-efficiency heat pump will reduce heating and cooling consumption which will reduce the baseline against which attic insulation would be applied, thus reducing savings associated with installing insulation.  To account for this interaction, Resource Innovations' TEA-POT model ranks measures that interact with one another and reduces the baseline consumption for the subsequent measure based on the savings achieved by the preceding measure.  For technical potential, interactive measures are ranked based on total end-use energy savings percentage.
- Measure competition (overlap): The "measure share"—as defined above—accounted for competing measures, ensuring savings were not double-counted. This interaction

occurred when two or more measures "competed" for the same end-use. For example, a T-12 lamp could be replaced with a T-8 or linear LED lamp.

**Addressing Naturally-Occurring EE**

Naturally occurring energy efficiency includes actions taken by customers to improve the efficiency of their homes and businesses in the absence of utility program intervention. For the analysis of technical potential, Resource Innovations verified with OUC's forecasting group that the baseline sales forecasts incorporated two known sources of naturally-occurring efficiency:

- Codes and Standards: The sales forecasts already incorporated the impacts of known Code & standards changes.
- Baseline Measure Adoption: The sales forecast excluded the projected impacts of future DSM efforts but included already implemented DSM penetration.

By properly accounting for these factors, the technical potential analysis estimated the additional EE opportunities beyond what is already included in the utility sales forecast.

### 5.1.2 DR Technical Potential

The concept of technical potential applies differently to DR than for EE. Technical potential for DR is effectively the magnitude of loads that can be curtailed during conditions when utilities need peak capacity reductions. In evaluating this potential at peak capacity, the following were considered: which customers are consuming electricity at those times? What end-uses are in play? Can those end-use loads be managed? Large C&I accounts generally do not provide the utility with direct control over particular end-uses. Instead, many of these customers will forego electric demand temporarily if the financial incentive is large enough. For residential and small C&I customers where DR generally takes the form of direct utility control, technical potential for DR is limited by the loads that can be controlled remotely at scale.

This framework makes end-use disaggregation an important element for understanding DR potential, particularly in the residential and small C&I sectors. When done properly, end-use disaggregation not only provides insights into which loads are on and off when specific grid services are needed, it also provides insight concerning how key loads and end-uses, such as air conditioning use, vary across customers. Resource Innovations' approach used for load disaggregation is more advanced than what is used for most potential studies. Instead of disaggregating annual consumption or peak demand, Resource Innovations produced end-use load disaggregation for all 8,760 hours. This was needed because the loads available at times when different grid applications are needed can vary substantially. Instead

of producing disaggregated loads for the average customer, the study was produced for several customer segments. For OUC, Resource Innovations examined three residential segments based on customer housing type, four different small C&I segments based on customer size, and four different large C&I segments based on customer size, for a total of 11 different customer segments.

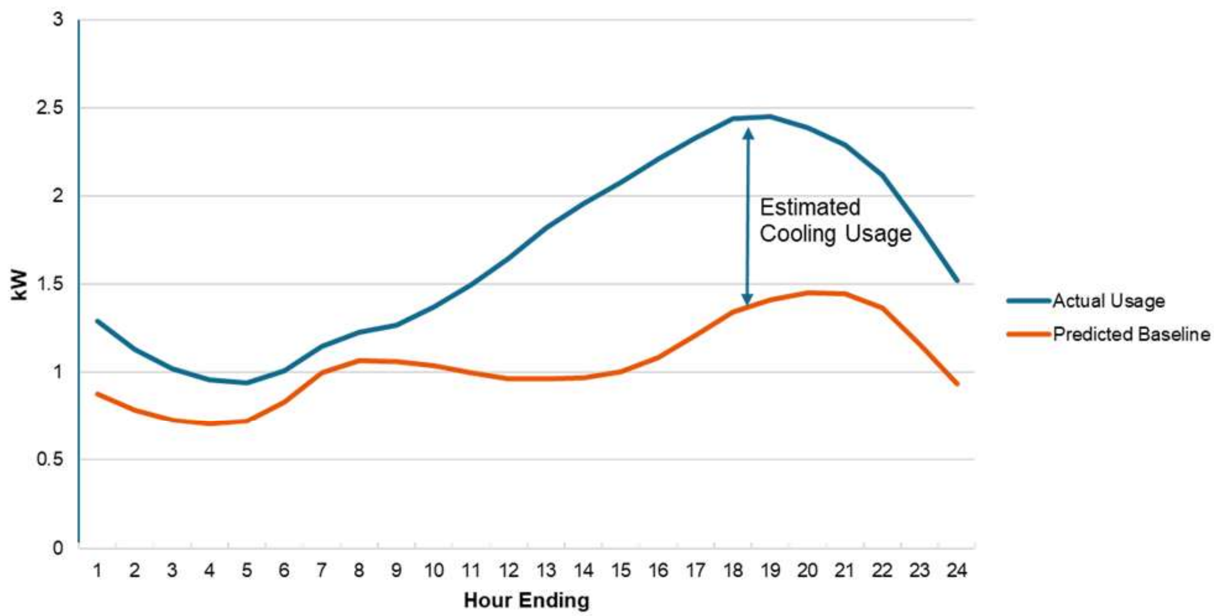
Technical potential, in the context of DR, is defined as the total amount of load available for reduction that is coincident with the period of interest; in this case, the system peak hour for the summer and winter seasons. Thus, two sets of capacity values are estimated: a summer capacity and a winter capacity.

As previously mentioned, for technical potential purposes, all coincident large C&I load is considered dispatchable, while residential and small C&I DR capacity is based on specific end-uses. Summer DR capacity for residential customers was comprised of air-conditioning (AC), pool pumps, water heaters, and managed electric vehicle charging. For small C&I customers, summer capacity was based on AC load. For winter DR capacity, residential was based on electric heating, pool pumps, and water heaters. For small C&I customers, winter capacity was based on electric heating.

AC and heating load profiles were generated for residential and small C&I customers using census-level customer interval data provided by OUC. This data included a customer breakout based on housing type for residential customers and size for small C&I customers. Resource Innovations then used the interval data from these customers to create an average load profile for each customer segment.

The average load profile for each customer segment was combined with historical weather data, and used to estimate hourly load as a function of weather conditions. AC and heating loads were estimated by first calculating the baseline load on days when cooling degree days (CDD) and heating degree days (HDD) were equal to zero, and then subtracting this baseline load. This methodology is illustrated by Figure 7 (a similar methodology was used to predict heating loads).

Figure 7: Methodology for Estimating Cooling Loads




This method was able to produce estimates for average AC/heating load profiles for the seven different customer segments within the residential and small C&I sectors.

Profiles for residential water heater and pool pump loads were estimated by utilizing end-use load data from NREL's residential end-use load profile database.

For all eligible loads, the technical potential was defined as the amount that was coincident with system peak hours for each season, which are August from 5:00-6:00 PM for summer, and January from 6:00-7:00 PM for winter. As mentioned in Section 4, for technical potential there was also no measure breakout needed, because all measures will target the end-uses' estimated total loads.

### 5.1.3 DSRE Technical Potential

#### 5.1.3.1 PV Systems

To determine technical potential for PV systems, RI estimated the percentage of rooftop square footage in Florida that is suitable for hosting PV technology. Our estimate of technical potential for PV systems in this report is based in part on the available roof area and consisted of the following steps:

- Step 1: Outcomes from the forecast disaggregation analysis were used to characterize the existing and new residential, commercial and industrial building stocks.
  - To calculate the total roof area for residential buildings, the average roof area per household is multiplied by the number of households.
  - For commercial and industrial buildings, RI calculated the total roof area by first dividing the load forecast by the energy usage intensity, which provides an estimate of the total building square footage. This result is then divided by the average number of floors to derive the total roof area.
- Step 2: The total available roof area feasible for installing PV systems was calculated. Relevant parameters included unusable area due to other rooftop equipment and setback requirements, in addition to possible shading from trees and limitations of roof orientation (factored into a "technical suitability" multiplier).
- Step 3: Estimated the expected power density (kW per square foot of roof area).
- Step 4: Estimated the hourly PV generation profile using NREL's PV Watts Calculator
- Step 5: Calculated total energy and coincident peak demand potential by applying RI's Spatial Penetration and Integration of Distributed Energy Resources (SPIDER) Model.

The methodology presented in this report uses the following formula to estimate overall technical potential of PVs:

**Equation 3: Core Equation for Solar DSRE Technical Energy Potential**

PV Technical Energy Potential = Suitable Rooftop PV Area (Sq Ft) × PV Power Density (kW-DC/Sq Ft) × Generation Factor (kWh/kW-DC)

Where:

- **Suitable Rooftop PV Area for Residential [Square Feet]:** Number of Residential Buildings x Average Roof Area Per Building x Technical Suitability Factor
- **Suitable Rooftop PV Area for Commercial [Square Feet] :** Energy Consumption [kWh] / Energy Intensity [kWh / Square Feet] / Average No. of Stories Per Building x Technical Suitability Factor
- **PV Power Density [kW-DC/Square Feet]:** Maximum power generated in Watts per square foot of solar panel.
- **Generation Factor:** Annual Energy Generation Factor for PV, from PV Watts (dependent on local solar irradiance)

#### 5.1.3.2 Battery Storage Systems Charged from PV Systems

Battery storage systems on their own do not generate power or create efficiency improvements, but store power for use at different times. Therefore, in analyzing the technical potential for battery storage systems, the source of the stored power and overlap with technical potential identified in other categories was considered.

Battery storage systems that are powered directly from the grid do not produce annual energy savings but may be used to shift or curtail load during particular time periods. As the DR technical potential analyzes curtailment opportunities for the summer and winter peak period, and battery storage systems can be used as a DR technology, the study concluded that no additional technical potential should be claimed for grid-powered battery systems beyond that already attributed to DR.

Battery storage systems that are connected to on-site PV systems also do not produce additional energy savings beyond the energy produced from the PV system[5]. However, PV-connected battery systems do create the opportunity to store energy during period when the PV system is generating more than the home or business is consuming and use that stored power during utility system peak periods.

To determine the additional technical potential peak demand savings for "solar plus storage" systems, our methodology consisted of the following steps:

- Assume that every PV system included in PV Technical Potential is installed with a paired storage system.
- Size the storage system assuming peak storage power is equal to peak PV generation and energy storage duration is three hours.
- Apply RI's hourly dispatch optimization module in SPIDER to create an hourly storage dispatch profile that flattens the individual customer's load profile to the greatest extent possible accounting for a) customer hourly load profile, b) hourly PV generation profile, and c) battery peak demand, energy capacity, and roundtrip charge/discharge efficiency.
- Calculate the effective hourly impact for the utility using the above storage dispatch profile, aligned with the utility's peak hour (calculated separately for summer and winter)
- Report the output storage kW impact on utility coincident peak demand in summer and winter.

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[5] PV-connected battery systems experience some efficiency loss due to storage, charging, and discharging. However, for this study, these losses were not quantified.

#### 5.1.3.3 CHP Systems

The CHP analysis created a series of unique distributed generation potential models for each primary market sector (commercial and industrial).

Only non-residential customer segments whose electric and thermal load profiles allow for the application of CHP were considered. The technical potential analysis followed a three-step process. First, minimum facilities size thresholds were determined for each non-residential customer segment. Next, the full population of non-residential customers were segmented and screened based on the size threshold established for that segment. Finally, the facilities that were of sufficient size were matched with the appropriately sized CHP technology.

To determine the minimum threshold for CHP suitability, a thermal factor was applied to potential candidate customer loads to reflect thermal load considerations in CHP sizing. In most cases, on-site thermal energy demand is smaller than electrical demand. Thus, CHP size is usually dictated by the thermal load in order to achieve improved efficiencies.

The study collected electric and thermal intensity data from other recent CHP studies. For industrial customers, Resource Innovations assumed that the thermal load would primarily be used for process operations and was not modified from the secondary data sources for Florida climate conditions. For commercial customers, the thermal load is more commonly made up of water heating, space heating, and space cooling (through the use of an absorption chiller). Therefore, to account for the hot and humid climate in Florida, which traditionally limits weather-dependent internal heating loads, commercial customers' thermal loads were adjusted to incorporate a higher proportion of space cooling to space heating as available opportunities for waste heat recovery.

Resource Innovations worked with the utility-provided customer data, focusing on annual consumption due to the absence of NAICS or SIC codes for this utility data. Non-residential customers were subsequently classified based on annual consumption and size. Since NAICS or SIC codes were unavailable, no formal segmentation occurred. Instead, the analysis focused exclusively on annual utility usage. Facilities with annual loads below the kWh thresholds were deemed unlikely to possess the consistent electric and thermal loads necessary to support CHP and were consequently excluded from consideration. Conversely, those meeting the size criteria were aligned with the corresponding CHP technology.

In general, internal combustion engines are the prime mover for systems under 500kW with gas turbines becoming progressively more popular as system size increases above that. Based on the available load by customer, adjusted by the estimated thermal factor for each

segment, CHP technologies were assigned to utility customers in a top-down fashion (i.e., starting with the largest CHP generators).

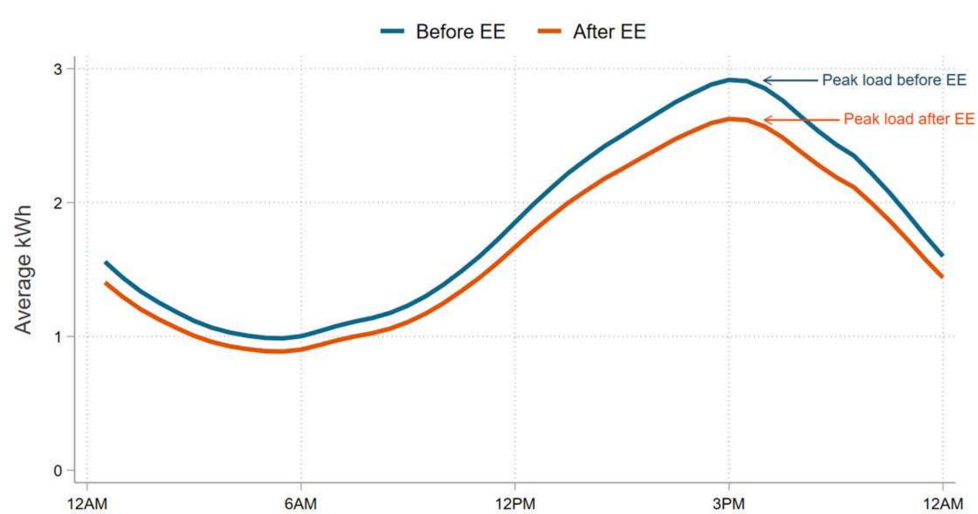
**Measure Interaction**

PV systems and battery storage charged from PV systems were analyzed collectively due to their common power generation source; and therefore, the identified technical potential for these systems is additive. However, CHP systems were independently analyzed for technical potential without consideration of the competition between DSRE technologies or customer preference for a particular DSRE system. Therefore, results for CHP technical potential should not be combined with PV systems or battery storage systems for overall DSRE potential but used as independent estimates.

### 5.1.4 Interaction of Technical Potential Impacts

As described above, the technical potential was estimated using separate models for EE, DR, and DSRE systems. However, there is interaction between these technologies; for example, a more efficient HVAC system would result in a reduced peak demand available for DR curtailment, as illustrated in Figure 8.

**Figure 8: Illustration of EE Impacts on HVAC System Load Shape**




Therefore, after development of the independent models, the interaction between EE, DR, and DSRE was incorporated as follows:

- The EE technical potential was assumed to be implemented first, followed by DR technical potential and DSRE technical potential.

- To account for the impact of EE technical potential on DR, the baseline load forecast for the applicable end-uses was adjusted by the EE technical potential, resulting in a reduction in baseline load available for curtailment.
- For DSRE systems, the EE and DR technical potential was incorporated in a similar fashion, adjusting the baseline load used to estimate DSRE potential.
    - For the PV analysis, this did not impact the results as the EE and DR technical potential did not affect the amount of PV that could be installed on available rooftops.
    - For the battery storage charged from PV systems, the reduced baseline load from EE resulted in additional PV-generated energy being available for the battery systems and for use during peak periods. The impact of DR events during the assumed curtailment hours was incorporated into the modeling of available battery storage and discharge loads.
- For CHP systems, the reduced baseline load from EE resulted in a reduction in the number of facilities that met the annual energy threshold needed for CHP installations. Installed DR capacity was assumed to not impact CHP potential as the CHP system feasibility was determined based on energy and thermal consumption at the facility. It should be noted that CHP systems not connected to the grid could impact the amount of load available for curtailment with utility-sponsored DR. Therefore, CHP technical potential should not be combined with DR potential but used as independent estimates.

## 5.2 EE Technical Potential

### 5.2.1 Summary

Table 9 summarizes the EE technical potential by sector:

**Table 9. EE Technical Potential**

| | Savings Potential | | |
|---|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) | Energy (GWh) |
| **Residential** | 249 | 98 | 935 |
| **Non-Residential**[6] | 201 | 99 | 1,044 |
| **Total** | 450 | 197 | 1,979 |

[6] Non-Residential results include all commercial and industrial customer segments.

### 5.2.2 Residential

Figure 10, Figure 10 and Figure 11 summarize the residential sector EE technical potential by end-use.

Figure 9: Residential EE Technical Potential by End-Use (Summer Peak Savings)

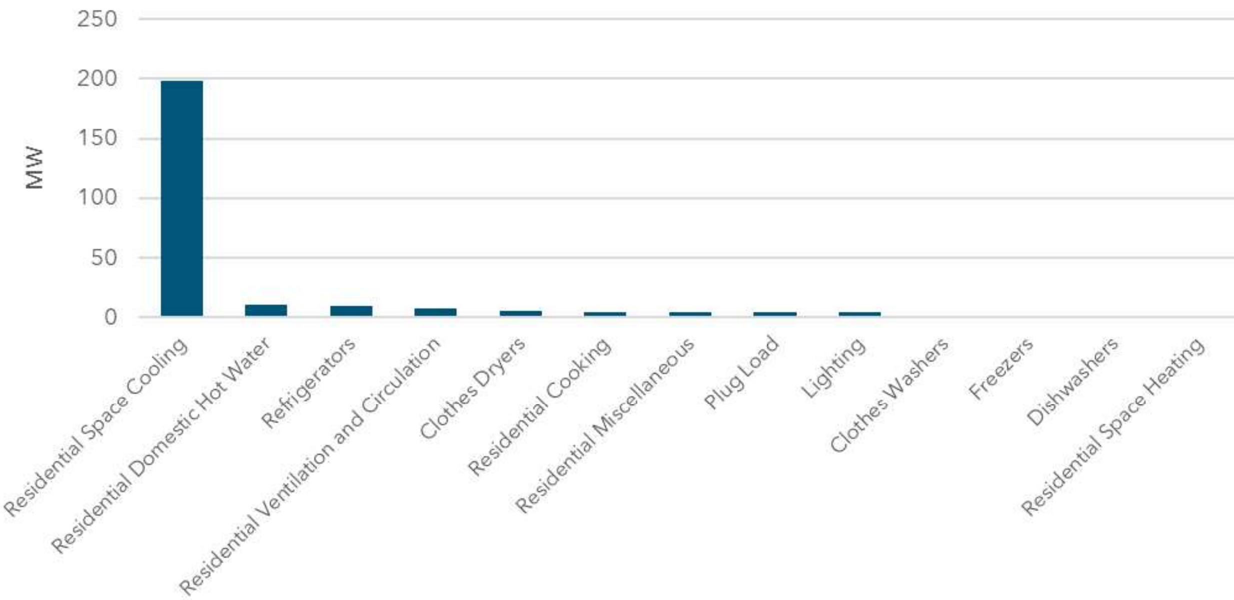


Figure 10: Residential EE Technical Potential by End-Use (Winter Peak Savings)

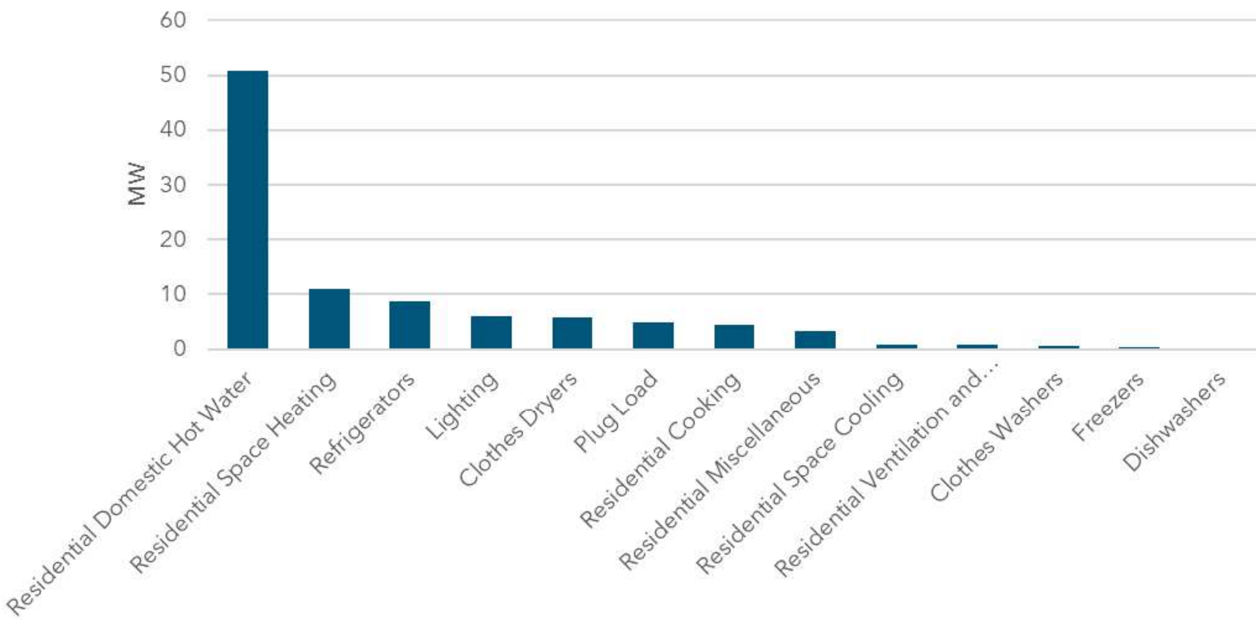
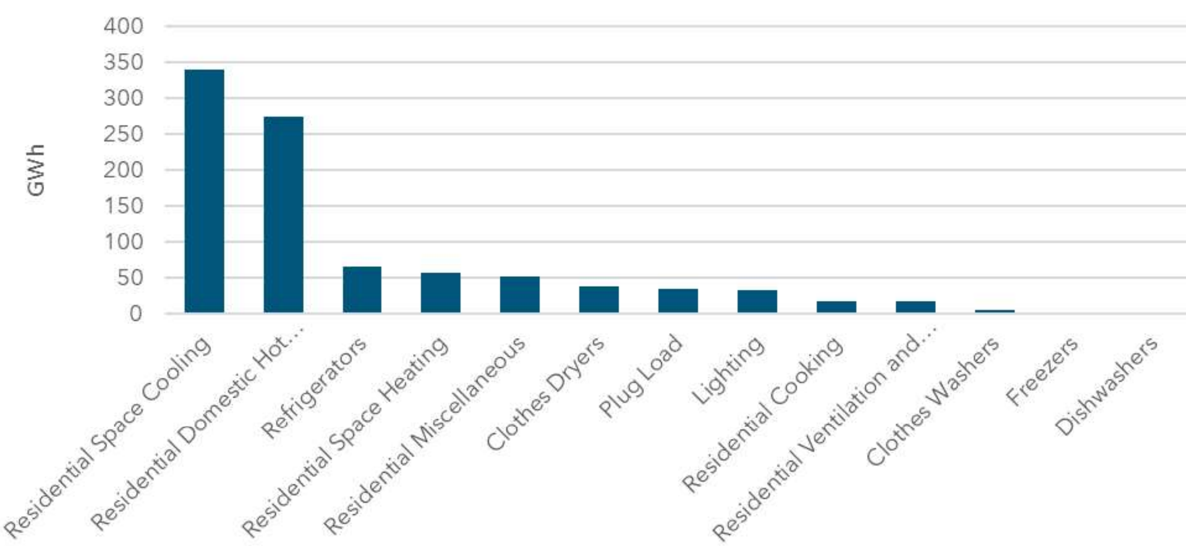



Figure 11: Residential EE Technical Potential by End-Use (Energy Savings)



## 5.2.3 Non-Residential

### 5.2.3.1 Business Segments

Figure 13, Figure 13 and Figure 14 summarize the business sector EE technical potential by end-use.

Figure 12: Business EE Technical Potential by End-Use (Summer Peak Savings)

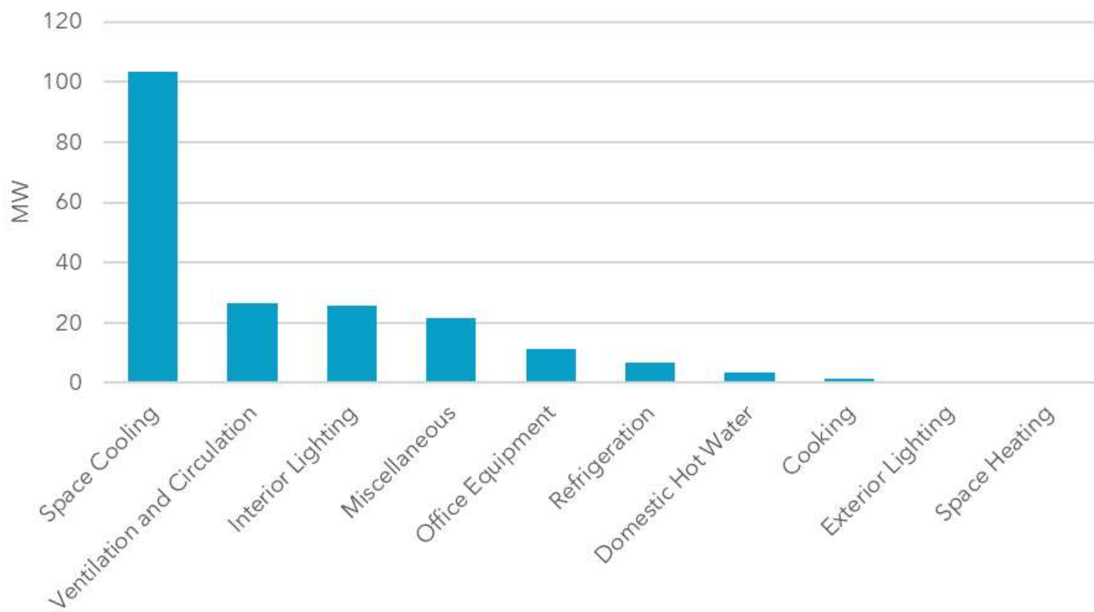


Figure 13: Business EE Technical Potential by End-Use (Winter Peak Savings)

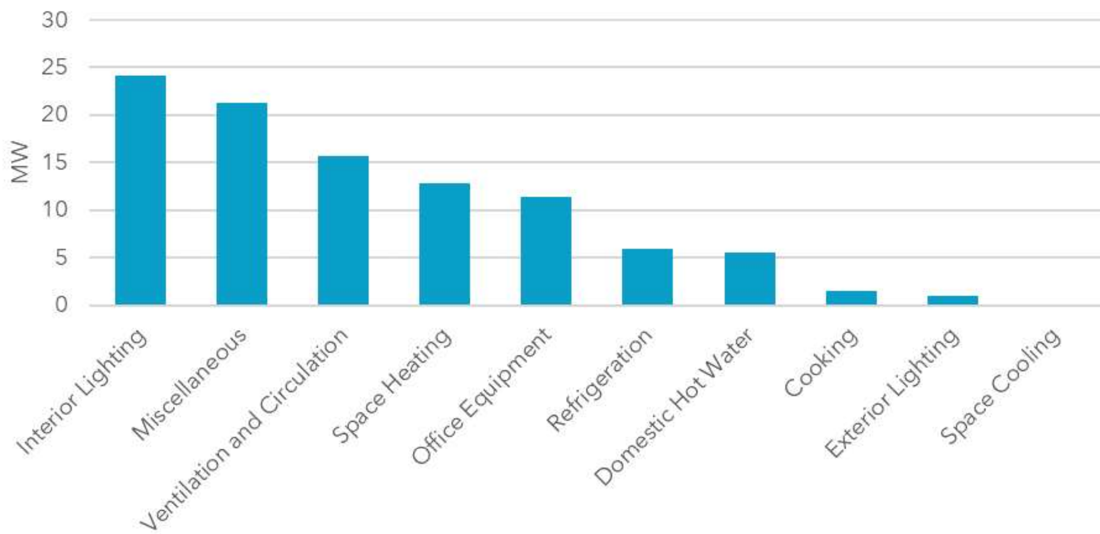
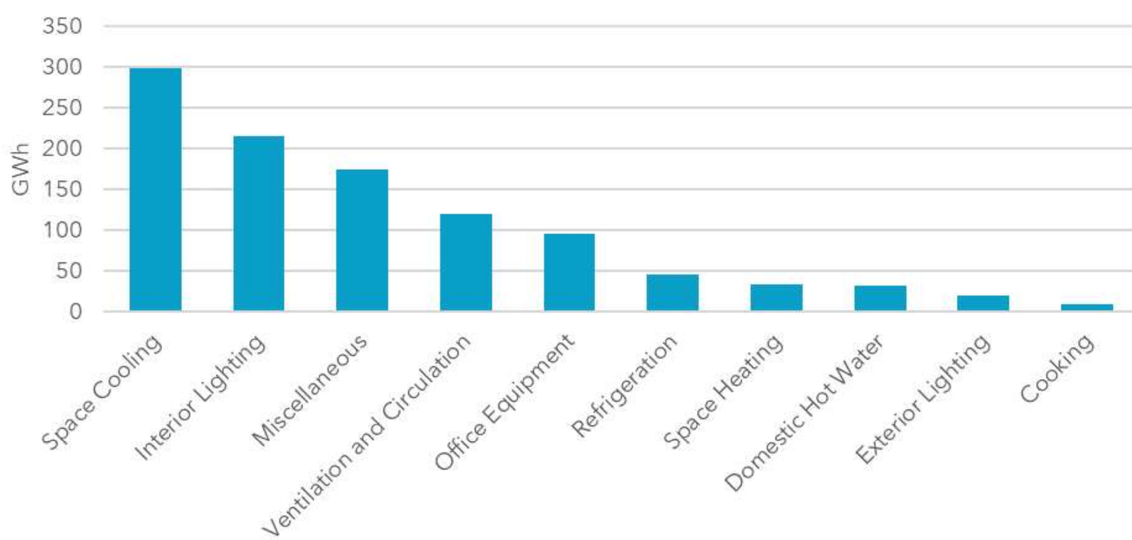



Figure 14: Business EE Technical Potential by End-Use (Energy Savings)




## 5.3 DR Technical Potential

Technical potential for DR is defined for each class of customers as follows:

- Residential & Small C&I customers – Technical potential is equal to the aggregate load for all end-uses that can participate in OUC's current programs plus DR measures not currently offered in which the utility uses specialized devices to control loads (i.e. direct load control programs). This includes cooling and heating loads for residential and small C&I customers and water heater and pool pump loads for residential customers. Not all demand reductions are delivered via direct load control of end-uses. The magnitude of demand reductions from non-direct load control such as time varying pricing, peak time rebates and targeted notifications is linked to cooling and heating loads.
- Large C&I customers – Technical potential is equal to the total amount of load for each customer segment (i.e., that customers reduce their total load to zero when called upon).

Table 10 summarizes the seasonal DR technical potential by sector:

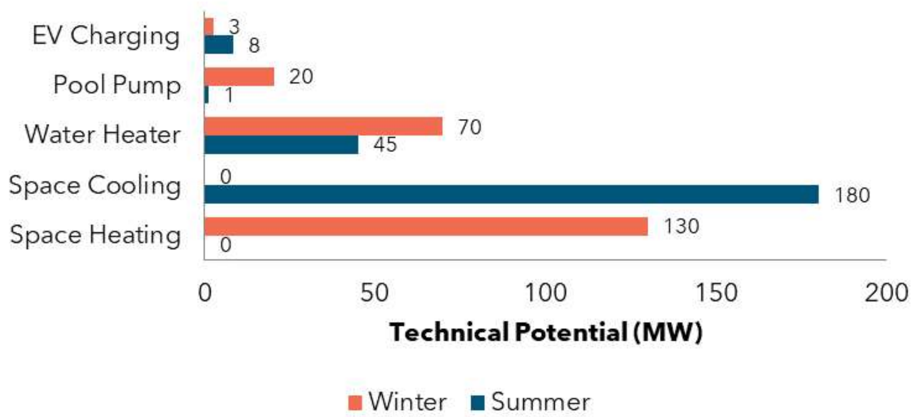
**Table 10. DR Technical Potential**

| | Savings Potential | |
|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) |
| **Residential** | 235 | 223 |
| **Non-Residential** | 582 | 563 |
| **Total** | 817 | 786 |

### 5.3.1 Residential

Residential technical potential is summarized in Figure 15.

Figure 15: Residential DR Technical Potential by End-Use

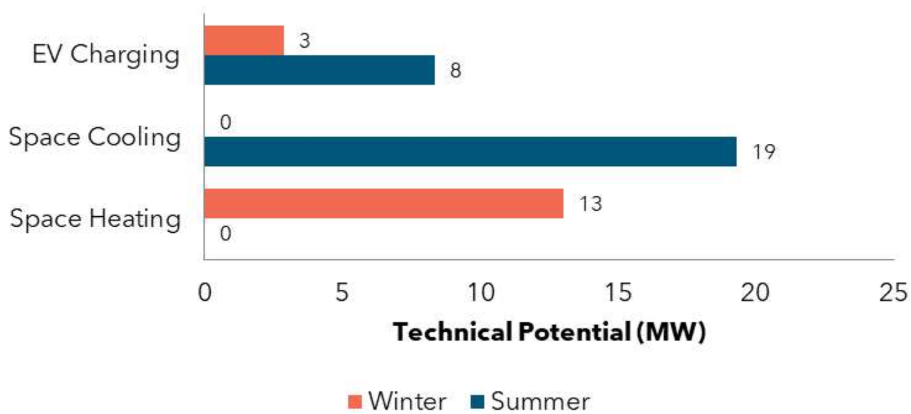



## 5.3.2 Non-Residential

### 5.3.2.1 Small C&I Customers

For small C&I technical potential, Resource Innovations looked at cooling and heating loads only. Small C&I technical potential is provided in Figure 16.

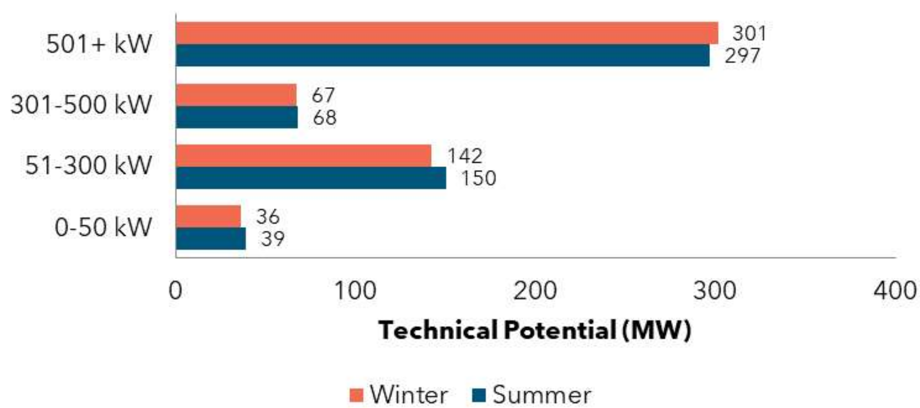
Figure 16: Small C&I DR Technical Potential by End-Use



#### 5.3.2.2 Large C&I Customers

Figure 17 provides the technical potential for large C&I customers, broken down by customer size.

Figure 17: Large C&I DR Technical Potential by Segment




## 5.4 DSRE Technical Potential

Table 11 provides the results of the DSRE technical potential for each customer segment:

Table 11. DSRE Technical Potential[7]

| | Savings Potential | | |
|---|---|---|---|
| | Summer Peak Demand (MW) | Winter Peak Demand (MW) | Energy (GWh) |
| **PV Systems** | | | |
| **Residential** | 339 | 0 | 2,731 |
| **Non-Residential** | 162 | 0 | 1,169 |
| **Total** | 501 | 0 | 3,900 |
| **Battery Storage charged from PV Systems** | | | |
| **Residential** | 171 | 166 | 0 |
| **Non-Residential** | 14 | 70 | 0 |
| **Total** | 185 | 236 | 0 |
| **CHP Systems** | | | |
| **Total** | 354 | 292 | 1,591 |

[7] PV systems and CHP systems were independently analyzed for technical potential without consideration of the competition between technologies or customer preference for DSRE system.

# Appendix A EE Measure List

For information on how Resource Innovations developed this list, please see Section 4.

Table 12: Residential EE Measures

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| 120v Heat Pump Water Heater 50 Gallons | Residential Domestic Hot Water | 120v Heat Pump Water Heater 50 Gallons | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Air Sealing-Infiltration Control | Residential Space Cooling, Residential Space Heating | Standard Heating and Cooling System with Improved Infiltration Control | Standard Heating and Cooling System with Standard Infiltration Control |
| Air-to-Water Heat Pump | Residential Space Cooling, Residential Space Heating | Energy Star Air-to-Water Heat Pump, 25 SEER, 13 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - 15 SEER/14.3 SEER2 from base electric resistance | Residential Space Cooling, Residential Space Heating | ASHP 15 SEER from base electric resistance | Base AC, 15 SEER, Electric resistance heating |
| ASHP - 24 SEER/22.9 SEER2 (from elec resistance) | Residential Space Cooling, Residential Space Heating | ASHP: 24/22.9 SEER/SEER2, 10.5 HSPF | Base AC, 15 SEER, Electric resistance heating |
| ASHP - 24 SEER/22.9 SEER2, 10.5 HSPF | Residential Space Cooling, Residential Space Heating | ASHP: 24/22.9 SEER/SEER2, 10.5 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - CEE Advanced Tier: 17.8 SEER/17 SEER2; 10.0 HSPF | Residential Space Cooling, Residential Space Heating | CEE Advanced Tier ASHP:17.8/17 SEER/SEER2; 10.0 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - CEE Advanced Tier: 17.8 SEER/17 SEER2; 10.0 HSPF (from elec resistance) | Residential Space Cooling, Residential Space Heating | CEE Advanced Tier ASHP:17.8/17 SEER/SEER2; 10.0 HSPF | Base AC, 15 SEER, Electric resistance heating |
| ASHP - CEE Tier 2: 16.8 SEER/16 SEER2; 9.0 HSPF | Residential Space Cooling, Residential Space Heating | CEE Tier 2 ASHP: 16.8/16 SEER/SEER2; 9.0 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - CEE Tier 2: 16.8 SEER/16 SEER2; 9.0 HSPF (from elec resistance) | Residential Space Cooling, Residential Space Heating | CEE Tier 2 ASHP: 16.8/16 SEER/SEER2; 9.0 HSPF | Base AC, 15 SEER, Electric resistance heating |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| ASHP - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 (from elect resistance) | Residential Space Cooling, Residential Space Heating | ENERGY STAR/CEE Tier 1 ASHP: 16/15.2 SEER/SEER2, 9.0 HSPF | Base AC, 15 SEER, Electric resistance heating |
| ASHP - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2, 9.0 HSPF | Residential Space Cooling, Residential Space Heating | ENERGY STAR/CEE Tier 1 ASHP: 16/15.2 SEER/SEER2, 9.0 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| Basement or Crawlspace Wall Insulation R-15 | Residential Space Cooling, Residential Space Heating | Increased Basement or Crawlspace Wall Insulation (R-15) | Code-Compliant Exterior Below-Grade Wall Insulation (R-10) |
| Bathroom Faucet Aerators | Residential Domestic Hot Water | Low-Flow Faucet Aerator with Flow Rate of 1.5 gpm | Faucet Aerator with Federal Standard Flow Rate of 2.2 gpm |
| CEE Advanced Tier Clothes Dryer | Clothes Dryers | CEE Advanced Tier Clothes Dryer | One Clothes Dryer meeting Federal Standard |
| CEE Advanced Tier Clothes Washer | Clothes Washers | Tier 3 CEE Clothes washer | One Clothes Washer meeting Federal Standard |
| CEE Tier 3 Refrigerator | Refrigerators | Residential Tier 3 Refrigerator | One Refrigerator meeting Federal Standard |
| Ceiling Insulation (R11 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-1985) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R11 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-1985) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R19 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-2020) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R19 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-2020) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R2 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, older (pre-1982) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R2 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, older (pre-1982) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R30 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1986-2020) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R30 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1986-2020) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Ceiling Insulation (R38 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1986-2020) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Central AC - CEE Tier 2: 16.8 SEER/16 SEER2 | Residential Space Cooling | Central AC - CEE Tier 2: 16.8 SEER/16 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC - 24 SEER/22.9 SEER2 | Residential Space Cooling | Central AC - 24 SEER/22.9 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC - CEE Advanced Tier: 17.8 SEER/17 SEER2 | Residential Space Cooling | Central AC - CEE Advanced Tier: 17.8 SEER/17 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 | Residential Space Cooling | Central AC - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC Tune Up | Residential Space Cooling | System tune-up, including coil cleaning, refrigerant charging, and other diagnostics | Existing Typical Central AC without Regular Maintenance/tune-up |
| Dehumidifier Recycling | Plug Load | No dehumidifier | One Dehumidifier meeting Federal Standard |
| Drain Water Heat Recovery | Residential Domestic Hot Water | 50 Gallon Electric Resistance Heater and Drain Water Heat Exchanger | 50 Gallon Electric Resistance Heater, No Drain Water Heat Recovery |
| Duct Insulation | Residential Space Cooling, Residential Space Heating | Standard Electric Heating and Central AC with Insulated Ductwork | Standard Electric Heating and Central AC with Uninsulated Ductwork |
| Duct Repair | Residential Space Cooling, Residential Space Heating | Duct Repair to eliminate/minimize leaks, includes testing and sealing | Standard Electric Heating and Central AC with typical duct leakage |
| ECM Circulator Pump | Residential Miscellaneous | Install ECM Circulator Pump | Install Standard Circulator Pump |
| Energy Star Air Purifier | Plug Load | One Air Purifier meeting ENERGY STAR 2.0 Standards | One Standard Conventional Air Purifier |
| Energy Star Audio-Video Equipment | Plug Load | One DVD/Blu-Ray Player meeting current ENERGY STAR Standards | One Market Average DVD/Blu-Ray Player |
| Energy Star Bathroom Ventilating Fan | Residential Ventilation and Circulation | Bathroom Exhaust Fan meeting current ENERGY STAR Standards | Bathroom Exhaust Fan meeting Federal Standard |
| Energy Star Ceiling Fan | Residential Miscellaneous | 60" Ceiling Fan Meeting ENERGY STAR 3.1 Standards | Standard 60" Ceiling Fan |
| Energy Star Clothes Dryer | Clothes Dryers | One Electric Resistance Clothes Dryer meeting ENERGY STAR 1.1 Standards | One Clothes Dryer meeting Federal Standard |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Energy Star Clothes Washer | Clothes Washers | One Clothes Washer meeting ENERGY STAR 8.1 Standards | One Clothes Washer meeting Federal Standard |
| Energy Star Dehumidifier | Plug Load | One Dehumidifier meeting ENERGY STAR 5.0 Standards | One Dehumidifier meeting Federal Standard |
| Energy Star Dishwasher | Dishwashers | One Dishwasher meeting ENERGY STAR 7.0 Requirements (effective on July 19, 2023), electric water heating | One Dishwasher meeting Federal Standard |
| Energy Star Dishwasher (Gas Water Heating) | Dishwashers | One Dishwasher meeting ENERGY STAR 7.0 Requirements, gas water heating | One Dishwasher meeting Federal Standard; gas water heating |
| Energy Star Door | Residential Space Cooling, Residential Space Heating | 100ft2 of Opaque Door meeting Energy Star Version 6.0 Requirements (U-Value: 0.17) | 100ft2 of Opaque Door meeting current FL Code Requirements |
| ENERGY STAR EV supply equipment (level 2 charger) | Residential Miscellaneous | Level 2 Electric Vehicle Supply Equipment (EVSE) | Level 1 Electric Vehicle Supply Equipment (EVSE) |
| Energy Star Freezer | Freezers | One Freezer meeting current ENERGY STAR 5.1 Standards | One Freezer meeting Federal Standard |
| Energy Star Ground Source Heat Pump | Residential Space Cooling, Residential Space Heating | Energy Star GSHP, 17.1 SEER, 12 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF |
| Energy Star Imaging Equipment | Plug Load | One imaging device meeting current ENERGY STAR Standards | One non-ENERGY STAR imaging device |
| Energy Star Monitor | Plug Load | One Monitor meeting ENERGY STAR 8.0 Standards | One Standard Monitor |
| Energy Star Personal Computer | Plug Load | One Personal Computer meeting ENERGY STAR 8.0 Standards | One Personal Computer meeting ENERGY STARÂ® 3.0 Standards |
| Energy Star Refrigerator | Refrigerators | One Refrigerator/Freezer meeting ENERGY STAR 5.1 Standards | One Refrigerator/Freezer meeting Federal Standard |
| Energy Star Room AC | Residential Space Cooling | Room AC meeting current ENERGY STAR standards | Code-Compliant Room AC |
| Energy Star Set-Top Receiver | Plug Load | One Set-top Box meeting ENERGY STAR 4.1 Standards | One Market Average Set-top Box |
| Energy Star TV | Plug Load | One Television meeting ENERGY STAR 9.0 Standards | One non-ENERGY STAR Television |
| Energy Star Windows | Residential Space Cooling, Residential Space Heating | 100ft2 of Window meeting Energy Star Version 6.0 Requirements (U-Value: 0.27, SHGC: 0.21) | 100ft2 of Window current FL energy code requirements |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Exterior Wall Insulation | Residential Space Cooling, Residential Space Heating | Increased Exterior Above-Grade Wall Insulation (R-13) | Market Average Existing Exterior Above-Grade Wall Insulation |
| Filter Whistle | Residential Ventilation and Circulation | Install the Furnace Filter Alarm | No Furnace Filter Alarm on a Central Forced-Air Furnace |
| Floor Insulation | Residential Space Heating | Increased Floor Insulation (R-30) | Code-Compliant Floor Insulation |
| Freezer Recycling | Freezers | No Freezer | Current Market Freezer |
| Green Roof | Residential Space Cooling | Vegetated Roof Surface on top of Standard Roof | Standard Black Roof |
| Heat Pump Clothes Dryer | Clothes Dryers | One Heat Pump Clothes Dryer | One Clothes Dryer meeting Federal Standard |
| Heat Pump Pool Heater | Residential Miscellaneous | Heat Pump Swimming Pool Heater | Electric Resistance Swimming Pool Heater |
| Heat Pump Tune Up | Residential Space Cooling, Residential Space Heating | System tune-up, including coil cleaning, refrigerant charging, and other diagnostics | Standard Heating and Cooling System without Regular Maintenance/tune-up |
| Heat Pump Water Heater 50 Gallons-CEE Advaned Tier | Residential Domestic Hot Water | CEE Advanced Tier Heat Pump Water Heater 50 Gallons | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Heat Pump Water Heater 50 Gallons-ENERGY STAR | Residential Domestic Hot Water | Heat Pump Water Heater 50 Gallons | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Heat Pump Water Heater 80 Gallons-ENERGY STAR | Residential Domestic Hot Water | Energy Star Heat Pump Water Heater 80 Gallons | Code-Compliant 80 Gallon Electric Resistance Water Heater |
| Heat Trap | Residential Domestic Hot Water | Heat Trap | Existing Water Heater without heat trap |
| High Efficiency Convection Oven | Residential Cooking | One Full-Size Convection Oven meeting ENERGY STAR 3.0 Standards | One Standard Economy-Grade Full-Size Oven |
| High Efficiency Induction Cooktop | Residential Cooking | One residential induction cooktop | One standard residential electric cooktop |
| Home Energy Management System | Lighting\|Plug Load\|Residential Space Cooling, Residential Space Heating | Typical HVAC by Building Type Controlled by Energy Management System | Typical HVAC by Building Type, Manually Controlled |
| Hot Water Pipe Insulation | Residential Domestic Hot Water | 1' of Insulated Pipe in Unconditioned Spaces, Insulation of R-5 | 1' of Pipe in Unconditioned Spaces with Code Minimum of 1"of Insulation |
| HVAC ECM Motor | Residential Ventilation and Circulation | A brushless permanent magnet (ECM) blower motor for electric furnace | Permanent Split Capacitor Motor for Electric Furnace |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| HVAC Economizer | Residential Space Cooling | Install residential economizer | No economizer |
| HVAC Zoning System | Residential Space Cooling, Residential Space Heating | Install dampers in the ducts, dividing home into multiple zones, each controlled by its own thermostat | Single zone HVAC system |
| Indoor Daylight Sensor | Lighting | Install Indoor Daylight Sensors, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Induction Range | Residential Cooking | Residential induction range | Electric range |
| Instantaneous Hot Water System | Residential Domestic Hot Water | Instantaneous Hot Water System | Standard Efficiency Storage Tank Water Heater |
| Kitchen Faucet Aerators | Residential Domestic Hot Water | Low-Flow Faucet Aerator with Flow Rate of 1.5 gpm | Faucet Aerator with Federal Standard Flow Rate of 2.2 gpm |
| LED - 9W_CFL Baseline | Lighting | LED (assume 9W) replacing CFL baseline lamp | 14W CFL (60W equivalent) |
| LED - 9W_Halogen Baseline | Lighting | LED (assume 9W) replacing EISA-2020 compliant baseline lamp | EISA-2020 compliant baseline lamp (60W equivalent) |
| LED Specialty Lamps-5W Chandelier | Lighting | 5 W Chandelier LED | Standard incandescent chandelier lamp |
| Linear LED | Lighting | Linear LED Lamps in Linear Fluorescent Fixture | Standard (32w) T8 lamps in Linear Fluorescent Fixture |
| Low Flow Showerhead | Residential Domestic Hot Water | Low-Flow Handheld Showerhead, Flow Rate: 1.60 gpm | Standard Handheld Showerhead, Flow Rate: 2.50 gpm |
| New Construction - Whole Home Improvements - Tier 1 | Whole Home | Performance-based improvements in new homes - 20% savings | Residential New Construction (Baseline Efficiency) |
| New Construction - Whole Home Improvements - Tier 2 | Whole Home | Performance-based improvements in new homes - 35% savings | Residential New Construction (Baseline Efficiency) |
| Occupancy Sensors Switch Mounted | Lighting | Switch Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor Lighting Timer | Lighting | Timer on Outdoor Lighting, Controlling 120 Watts | 120 Watts of Lighting, Manually Controlled |
| Outdoor Motion Sensor | Lighting | Motion Sensor on Outdoor Lighting, Controlling 120 Watts | 120 Watts of Lighting, Manually Controlled |
| Ozone Laundry | Clothes Washers | Add a New, Single-Unit Ozone Laundry System to the Clothes Washer | One Clothes Washer meeting Federal Standard |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Programmable Thermostat | Residential Space Cooling, Residential Space Heating | Standard Heating and Cooling System with Programmable Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Properly Sized CAC | Residential Space Cooling | Properly Sized Central Air Conditioning | Standard Central Air Conditioning, Oversized |
| Radiant Barrier | Residential Space Cooling | Radiant Barrier | No radiant barrier |
| Reflective Roof | Residential Space Cooling | Reflective Roof Treatment | Standard dark shingle |
| Refrigerator Coil Cleaning | Refrigerators | Refrigerator Coil Cleaning | |
| Refrigerator Recycling | Refrigerators | No Refrigerator | Current Market Average Refrigerator |
| Residential Whole House Fan | Residential Space Cooling | Standard Central Air Conditioning with Whole House Fan | Standard Central Air Conditioning, No Whole House Fan |
| Sealed crawlspace | Residential Space Cooling, Residential Space Heating | Encapsulated and semi-conditioned crawlspace | Naturally vented, unconditioned crawlspace |
| Smart Breaker | Whole Home | Smart Breaker | standard electric breakers |
| Smart Panel | Whole Home | Multi-channel device that attaches to customer's circuit breaker to enable monitoring and control of major end-use appliances by customer | standard electric panel |
| Smart Power Strip | Plug Load | Smart plug strips for entertainment centers and home office | Standard entertainment center or home office usage, no smart strip controls |
| Smart Thermostat | Residential Space Cooling, Residential Space Heating | Standard Heating and Cooling System with Smart Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Solar Attic Fan | Residential Space Cooling | Standard Central Air Conditioning with Solar Attic Fan | Standard Central Air Conditioning, No Solar Attic Fan |
| Solar Pool Heater | Residential Miscellaneous | Solar Swimming Pool Heater | Electric Resistance Swimming Pool Heater |
| Solar Powered Pool Pumps | Residential Miscellaneous | Solar Powered Pool Pump | Variable Speed Pool Pump Motor |
| Solar Thermal Water Heating System | Residential Domestic Hot Water | Solar Thermal System with Electric Backup | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Spray Foam Insulation(Base R11) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in existing (1982-1985) homes | Existing ceiling insulation based on building code at time of construction |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Spray Foam Insulation (Base R19) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in existing (1982-1985) homes | Existing ceiling insulation based on building code at time of construction |
| Spray Foam Insulation (Base R2) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in older (pre-1982) homes | Existing ceiling insulation based on building code at time of construction |
| Spray Foam Insulation (Base R30) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in existing (1986-2020) homes | Existing ceiling insulation based on building code at time of construction |
| Thermostatic Shower Restriction Valve | Residential Domestic Hot Water | 50 Gallon Electric Resistance Heater and Thermostatic Shower Valves | 50 Gallon Electric Resistance Heater and Standard Shower Valves |
| Variable Refrigerant Flow (VRF) HVAC Systems | Residential Space Cooling, Residential Space Heating | Variable Refrigerant Flow (VRF) HVAC Systems | Code-Compliant ASHP, 15 SEER, 8.8 HSPF |
| Water Heater Blanket | Residential Domestic Hot Water | 50 Gallon Electric Resistance Water Heater with Insulated Tank Wrap | Code-Compliant 50 Gallon Electric Resistance Water Heater, No Tank Wrap |
| Water Heater Thermostat Setback | Residential Domestic Hot Water | 50 Gallon Electric Resistance Water Heater with Temperature Setpoint of 119°F | Code-Compliant 50 Gallon Electric Resistance Water Heater (Temp. Setpoint = 130Â°F) |
| Water Heater Timeclock | Residential Domestic Hot Water | Water Heater Timeclock | Existing Water Heater without time clock |
| Weather stripping | Residential Space Cooling, Residential Space Heating | Specific quantity of weather stripping to seal | |
| Window Caulking | Residential Space Cooling, Residential Space Heating | Window caulking | |
| Window Sun Protection | Residential Space Cooling | Window Film Applied to Standard Window | Standard Window with below Code Required Minimum SHGC |

**Table 13: Commercial EE Measures**

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| 1.5HP Open Drip-Proof (ODP) Motor | Ventilation and Circulation | High Efficiency 1.5 HP Open-Drip Proof Motor | 1.5HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 10HP Open Drip-Proof (ODP) Motor | Ventilation and Circulation | High Efficiency 10 HP Open-Drip Proof Motor | 10HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| 20HP Open Drip-Proof (ODP) Motor | Ventilation and Circulation | High Efficiency 20 HP Open-Drip Proof Motor | 20HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| Advanced Rooftop Controller | Ventilation and Circulation | Advanced Rooftop Controller | Without Advanced Rooftop Controller |
| Air Compressor Optimization | Miscellaneous | Performing Routine Maintenance on 20HP Inlet Modulation Fixed-Speed Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| Air Curtains | Space Cooling, Space Heating | Air Curtain across door opening | Door opening with no air curtain |
| Airside Economizer | Space Cooling | Airside Economizer | No economizer |
| Anti-Sweat Controls | Refrigeration | One Medium Temperature Reach-In Case with Anti-Sweat Heater Controls | One Medium Temperature Reach-In Case without Anti-Sweat Heater Controls |
| Auto Off Time Switch | Interior Lighting | Auto-Off Time Switch on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Automatic Door Closer for Walk-in Coolers and Freezers | Refrigeration | One Medium Temperature Walk-In Refrigerator Door with Auto-Closer | One Medium Temperature Walk-In Refrigerator Door without Auto-Closer |
| Beverage Vending Machine Controls | Refrigeration | One non-ENERGY STAR beverage vending machine equipped with infrared occupancy sensing controls | One non-ENERGY STAR beverage vending machine, no controls |
| Bi-Level Lighting Control (Exterior) | Exterior Lighting | Bi-Level Controls on Exterior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Bi-Level Lighting Control (Interior) | Interior Lighting | Bi-Level Controls on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Ceiling Insulation (R19 to R38) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation (R19 to R49) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic - Beyond Code | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation (R2 to R38) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation (R2 to R49) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic - Beyond Code | Market Average Existing Ceiling Insulation in older steep slope, |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| | | | residential style commercial building |
| Chilled Water Reset | Space Cooling | One Chiller with Reset of Chilled Water Temperature Setpoint | One Chiller with Fixed Chilled Water Temperature |
| Chiller maintenance | Space Cooling | O&M improvements to restore chiller performance | |
| CO Sensors for Parking Garage Exhaust | Miscellaneous | Enclosed Parking Garage Exhaust with CO Control | Constant Volume Enclosed Parking Garage Exhaust |
| Commercial Duct Sealing | Space Cooling, Space Heating | Standard Electric Heating and Central AC with Improved Duct Sealing | Standard Electric Heating and Central AC, Standard Duct Sealing |
| Commercial Strategic Energy Management | Whole Building | Commercial Strategic Energy Management | No active energy management |
| Custom measure - Non-lighting | Space Cooling, Space Heating | Custom Improvement to Facility's Operations | Baseline Technology/Process |
| Data Center Hot Cold Aisle | Office Equipment | Equipment configuration that saves HVAC | No hot, cold aisle containment |
| Dedicated Outside Air System (DOAS) | Space Cooling, Space Heating | Install Dedicated Outside Air System (DOAS) | Typical HVAC by Building Type |
| Demand Controlled Circulating Systems | Domestic Hot Water | Recirculation Pump with Demand Control Mechanism | Uncontrolled Recirculation Pump |
| Demand Controlled Ventilation | Ventilation and Circulation | Return Air System with CO2 Sensors | Standard Return Air System, No Sensors |
| Demand Defrost | Refrigeration | Walk-In Freezer System with Demand-Controlled Electric Defrost Cycle | Walk-In Freezer System with Timer-Controlled Electric Defrost Cycle |
| Destratification Fans | Space Heating | Destratification Fans improve temperature distribution by circulating warmer air from the ceiling back down to the floor level | No destratification fan |
| Door Gasket (Cooler) | Refrigeration | New Door Gasket on One-Door Medium Temperature Reach-In Case | Worn or Damaged Door Gasket on One-Door Medium Temperature Reach-In Case |
| Door Gasket (Freezer) | Refrigeration | New Door Gasket on One-Door Medium Temperature Reach-In Case | Worn or Damaged Door Gasket on One-Door Medium Temperature Reach-In Case |
| Drain water heat recovery | Domestic Hot Water | Hot Water Loop with 50 Gallon Electric Resistance Heater and Drain Water Heat Exchanger | Standard Hot Water Loop with 50 Gallon Electric Resistance Heater, No Drain Water Heat Recovery |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Dual Enthalpy Economizer | Ventilation and Circulation | Standard HVAC Unit with an economizer and dual enthalpy differential control | HVAC unit with no economizer or with a non-functional disabled economizer |
| Duct Insulation | Space Cooling, Space Heating | Standard Electric Heating and Central AC with Insulated Ductwork (R-8) | Standard Electric Heating and Central AC with Uninsulated Ductwork (R-4) |
| Ductless Mini-Split AC | Space Cooling | Ductless Mini-Split AC, 4 Ton, 16 SEER | Code-Compliant AC Unit, 4 Ton, 15 SEER |
| Ductless Mini-Split HP | Space Cooling, Space Heating | Ductless Mini-Split HP, 17 SEER, 9.5 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF |
| DX Coil Cleaning | Space Cooling | DX Coil Cleaning | DX Coil Not Cleaned |
| ECM Motors on Furnaces | Space Heating | Variable Speed Electronically Commutated Motor for an Electric Furnace | Permanent Split Capacitor Motor for Electric Furnace |
| Efficient Battery Charger | Miscellaneous | Efficient Battery Charger | FR or SCR charging stations with power conversion efficiency < 89% or > 10 W |
| Efficient Exhaust Hood | Cooking | Kitchen ventilation with automatically adjusting fan controls | Kitchen ventilation with constant speed ventilation motor |
| Efficient Motor Belts | Miscellaneous | Synchronous belt, 98% efficiency | Standard V-belt drive |
| Efficient New Construction Lighting | Interior Lighting | Efficient New Construction Lighting, 15% Better than Code | New Construction with Lighting Power Density meeting Code Minimum |
| Energy Recovery Ventilation System (ERV) | Space Cooling | Unitary Cooling Equipment that Incorporates Energy Recovery | Current Market Packaged or Split DX Unit |
| Energy Star Combination Oven | Cooking | Energy Star Combination Oven meeting ENERGY STAR Version 3.0 Standards | One Standard Economy-Grade 10-Pan Combination Oven |
| Energy Star Commercial Clothes Washer | Miscellaneous | One Commercial Clothes Washer meeting current ENERGY STAR Version 8.1 Standards | One Commercial Clothes Washer meeting Federal Standard |
| Energy Star Commercial Dishwasher | Domestic Hot Water | One Commercial Dishwasher meeting ENERGY STAR Version 3.0 Standards | One Dishwasher meeting Federal Standard |
| Energy Star Commercial Glass Door Freezer | Refrigeration | One Glass Door Freezer meeting ENERGY STAR Version 5.0 Standards | One Glass Door Freezer meeting Federal Standards |
| Energy Star Commercial Glass Door Refrigerator | Refrigeration | One Glass Door Refrigerator meeting ENERGY STAR Version 5.0 Standards | One Glass Door Refrigerator meeting Federal Standards |
| Energy Star Commercial Solid Door Freezer | Refrigeration | One Solid Door Freezer meeting ENERGY STAR Version 5.0 Standards | One Solid Door Freezer meeting Federal Standards |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Energy Star Commercial Solid Door Refrigerator | Refrigeration | One Solid Door Refrigerator meeting ENERGY STAR Version 5.0 Standards | One Solid Door Refrigerator meeting Federal Standards |
| Energy Star convection oven | Cooking | Energy Star convection oven meeting ENERGY STAR Version 3.0 Standards | One Standard Economy-Grade Full-Size Convection Oven |
| Energy Star EV Chargers | Miscellaneous | Level 2 Electric Vehicle Supply Equipment (EVSE) | Level 1 Electric Vehicle Supply Equipment (EVSE) |
| Energy Star Fryer | Cooking | One Standard Vat Electric Fryer meeting ENERGY STAR Version 3.0 Standards | One Standard Economy-Grade Standard Vat Electric Fryer |
| Energy Star Griddle | Cooking | One Griddle meeting current ENERGY STAR Version 1.2 Standards | One Conventional Griddle |
| Energy Star Hot Food Holding Cabinet | Cooking | One Hot Food Holding Cabinet meeting current ENERGY STAR Version 2.0 Standards | One Standard Hot Food Holding Cabinet |
| Energy Star Ice Maker | Refrigeration | One Continuous Self-Contained Ice Maker meeting ENERGY STAR Version 3.0 Standards | One Continuous Self-Contained Ice Maker meeting Federal Standard |
| ENERGY STAR Imaging Equipment | Office Equipment | One imaging device meeting current ENERGY STAR Standards | One non-ENERGY STAR imaging device |
| Energy Star LED Directional Lamp | Interior Lighting | Energy Star 7.6W Directional LED lamp | 50W Incandescent lamp |
| Energy Star Monitors | Office Equipment | One Monitor meeting ENERGY STAR 8.0 Standards | One Standard Monitor |
| Energy Star PCs | Office Equipment | One Personal Computer (desktop or laptop) meeting current ENERGY STARÂ® Standards | One non-ENERGY STARÂ® Personal Computer |
| Energy Star room AC | Space Cooling | Room AC meeting current ENERGY STAR standards | Code-Compliant Room AC, 1 Ton, 10.9 CEER |
| Energy Star Servers | Office Equipment | One Server meeting ENERGY STAR 2.0 Standards | One Standard Server |
| Energy Star Steamer | Cooking | One 4-Pan Electric Steamer meeting ENERGY STARÂ® 2.0 Standards | One Standard Economy-Grade 4-Pan Steamer |
| Energy Star Uninterruptable Power Supply | Office Equipment | Standard Desktop Plugged into Energy Star Uninterruptable Power Supply at 25% Load | Standard Desktop Plugged into Average Rotary Uninterruptable Power Supply at 25% Load |
| Energy Star Vending Machine | Refrigeration | One Refrigerated Vending Machine meeting ENERGY STAR Version 4.0 Standards | One Refrigerated Vending Machine meeting ENERGY STARÂ® 1.0 Standards |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| ENERGY STAR Water Cooler | Miscellaneous | One Storage Type Hot/Cold Water Cooler Unit meeting ENERGY STAR Version 3.0 Standards | One Standard Storage Type Hot/Cold Water Cooler Unit |
| Energy Star windows | Space Cooling, Space Heating | 100ft2 of Window meeting Energy Star Version 6.0 Requirements (U-Value: 0.27, SHGC: 0.21) | 100ft2 of Window meeting Energy Star Version 5.0 Requirements (U-Value: 0.3, SHGC: 0.3) |
| Engine Block Timer | Miscellaneous | Plug-in timer that activates engine block timer to reduce unnecessary run time | Engine block heater (typically used for backup generators) running continuously |
| Escalator Motor Efficiency Controller | Miscellaneous | Install Escalator Motor Efficiency Controller | Escalator without Motor Efficiency Controller |
| Facility Commissioning | Space Cooling, Space Heating, Ventilation and Circulation | Perform facility commissioning to optimize building operations in new facilities | Standard new construction facility with no commissioning |
| Facility Energy Management System | Space Cooling, Space Heating, Ventilation and Circulation | Typical HVAC by Building Type Controlled by Energy Management System | Standard/manual facility equipment controls |
| Faucet Aerator | Domestic Hot Water | Low-flow lavatory faucet aerator, flow rate: 1.0 gpm | Federal lavatory flow rate standard, 1994, flow rate: 2.2 gpm |
| Floating Head Pressure Controls | Refrigeration | Medium-Temperature Refrigeration System with 5HP Compressor and Adjustable Condenser Head Pressure Control Valve | Medium-Temperature Refrigeration System with 5 HP Compressor without Adjustable Condenser Head Pressure Control Valve |
| Floor Insulation | Space Cooling, Space Heating | Increased Floor Insulation (R-19) | Market Average Existing Floor Insulation |
| Geothermal Heat Pump | Space Cooling, Space Heating | Geothermal Heat Pump | Code-Compliant Air Source Heat Pump |
| Green roof | Space Cooling, Space Heating | Vegetated Roof Surface on top of Standard Roof | Standard Black Roof |
| HE Air Cooled Chiller - All Compressor Types - 100 Tons | Space Cooling | HE Air Cooled Chiller - Air Compressor Types - 100 Tons | Code-Compliant Air Cooled Positive Displacement Chiller, 100 Tons |
| HE DX 11.25-20.0 Tons Elec Heat | Space Cooling, Space Heating | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 11.25-20.0 Tons Other Heat | Space Cooling | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| HE DX 5.4-11.25 Tons Elect Heat | Space Cooling, Space Heating | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Other Heat | Space Cooling | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX Less than 5.4 Tons Elect Heat | Space Cooling, Space Heating | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE DX Less than 5.4 Tons Other Heat | Space Cooling | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE Water Cooled Chiller - Centrifugal Compressor - 200 Tons | Space Cooling | Water Cooled Centrifugal Chiller with Integral VFD, 200 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 200 Tons |
| HE Water Cooled Chiller - Centrifugal Compressor - 500 Tons | Space Cooling | Water Cooled Centrifugal Chiller with Integral VFD, 500 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 500 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 175 Tons | Space Cooling | Water Cooled Positive Displacement Chiller with Integral VFD, 175 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 175 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 50 Tons | Space Cooling | Water Cooled Positive Displacement Chiller with Integral VFD, 50 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 50 Tons |
| Heat Pump Pool Heater Commercial | Miscellaneous | High Efficiency Pool Heater Eff. >=84% | Standard Efficiency Pool Heater 78% Eff. |
| Heat Pump Water Heater | Domestic Hot Water | Efficient 50 Gallon Electric Heat Pump Water Heater | Code-Compliant 50 Gallon Electric Heat Pump Water Heater |
| High Efficiency Air Compressor | Miscellaneous | 20 HP VFD Air Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| High Efficiency Data Center Cooling | Space Cooling | High Efficiency CRAC (computer room air conditioner) | Standard Efficiency CRAC |
| High Efficiency PTAC | Space Cooling | High Efficiency PTAC | Code-Compliant PTAC |
| High Efficiency PTHP | Space Cooling, Space Heating | High Efficiency PTHP | Code-Compliant PTHP |
| High Efficiency Refrigeration Compressor_Discus | Refrigeration | High Efficiency Refrigeration Compressors | Standard Compressor |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| High Efficiency Refrigeration Compressor_Scroll | Refrigeration | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Speed Fans | Ventilation and Circulation | High Speed Fan, 24" - 35" Blade Diameter | Standard Speed Fan, 24" - 35" Blade Diameter |
| Hot water pipe insulation | Domestic Hot Water | 1' of Insulated Pipe in Unconditioned Spaces, Insulation of R-4 | 1' of Pipe in Unconditioned Spaces with Code Minimum of 1"of Insulation |
| Hotel Card Energy Control Systems | Space Cooling, Space Heating | Guest Room HVAC Unit Controlled by Hotel-Key-Card Activated Energy Control System | Guest Room HVAC Unit, Manually Controlled by Guest |
| Indoor daylight sensor | Interior Lighting | Install Indoor Daylight Sensors, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Induction Cooktops | Cooking | Efficient Induction Cooktop | One Standard Electric Cooktop |
| Infiltration Reduction - Air Sealing | Space Cooling, Space Heating | Reduced leakage through caulking, weather-stripping | Standard Heating and Cooling System with Moderate Infiltration |
| Instantaneous Hot Water System Commercial | Domestic Hot Water | Instantaneous Hot Water System | Code-Compliant Electric Storage Water Heater |
| LED - 14W_CFL Baseline | Interior Lighting | LED (assume 14W) replacing CFL | 100W equivalent CFL |
| LED - 9W Flood_CFL Baseline | Exterior Lighting | LED (assume 9W) replacing CFL | 14W CFL |
| LED Canopy Lighting (Exterior) | Exterior Lighting | One 67.2W LED Canopy Light | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED Display Lighting (Exterior) | Exterior Lighting | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED Display Lighting (Interior) | Interior Lighting | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED Exit Sign | Interior Lighting | One 5W Single-Sided LED Exit Sign | One 9W Single-Sided CFL Exit Sign |
| LED Exterior Wall Packs | Exterior Lighting | One 35W LED Wall Pack | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED High Bay_HID Baseline | Interior Lighting | One 140W High Bay LED Fixture | Lumen-Equivalent HID High Bay Fixture |
| LED High Bay_LF Baseline | Interior Lighting | One 140W High Bay LED Fixture | Lumen-Equivalent Linear Fluorescent High Bay Fixture |
| LED Linear - Fixture Replacement | Interior Lighting | 2x4 LED Troffer | Lumen-Equivalent 32-Watt T8 Lamp |
| LED Linear - Lamp Replacement | Interior Lighting | Linear LED (16W) | Lumen-Equivalent 32-Watt T8 Lamp |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| LED Parking Lighting | Exterior Lighting | One 160W LED Area Light | Average Lumen Equivalent Exterior HID Area Lighting |
| LEED New Construction Whole Building | Space Cooling, Space Heating | LEED New Construction Whole Building | Comparable facility, code-compliance construction |
| Light Tube | Interior Lighting | One 14" Light Tube, Delivering light to 250 S.F. of Commercial Space | 250 S.F. of Commercial Space Lit by Typical Lighting Strategies |
| Low Flow Shower Head | Domestic Hot Water | Low-Flow Handheld Showerhead, Flow Rate: 1.50 gpm | Standard Handheld Showerhead, Flow Rate: 2.50 gpm |
| Low-Flow Pre-Rinse Sprayers | Domestic Hot Water | Low-Flow Pre-Rinse Sprayer with Flow Rate of 1.6 gpm | Pre-Rinse Sprayer with Federal Standard Flow Rate of 2.25 gpm |
| Network PC Power Management | Office Equipment | One computer and monitor attached to centralized energy management system that controls when desktop computers and monitors plugged into a n | One computer and monitor, manually controlled |
| Networked Lighting Controls | Interior Lighting | Install Networked Lighting Controls System on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Controlled either Manually or by Sensor as Specified by Code |
| Night Covers for Display Cases | Refrigeration | One Open Vertical Case with Night Covers | One Existing Open Vertical Case, No Night Covers |
| Occupancy Sensors, Ceiling Mounted | Interior Lighting | Ceiling Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Occupancy Sensors, Switch Mounted | Interior Lighting | Switch Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor Lighting Controls | Exterior Lighting | Install Exterior Photocell Dimming Controls, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor motion sensor | Exterior Lighting | Install Exterior Motion Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Ozone Laundry Commercial | Miscellaneous | Add a new ozone laundry system onto a commercial clothes washer | One commercial clothes washer without ozone laundry system |
| Programmable thermostat | Space Cooling, Space Heating | Pre-set programmable thermostat that replaces manual thermostat | Standard Heating and Cooling System with Manual Thermostat |
| PSC to ECM Evaporator Fan Motor (Reach-In) | Refrigeration | Medium Temperature Reach-In Case with equivalent size Electronically | Medium Temperature Reach-In Case with Permanent Split Capacitor Evaporator Fan Motor |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| | | Commutated Evaporator Fan Motor | |
| PSC to ECM Evaporator Fan Motor (Walk-In, Refrigerator) | Refrigeration | Medium Temperature Walk-In Case with Electronically Commutated Evaporator Fan Motor | Medium Temperature Walk-In Case with Permanent Split Capacitor Evaporator Fan Motor |
| Q-Sync Evaporator Fan Motor | Refrigeration | Medium Temperature Reach-In Case with equivalent size Q-Sync Evaporator Fan Motor | Medium Temperature Reach-In Case with 20W Permanent Split Capacitor Fan Motor |
| Reflective Roof Treatment | Space Cooling | Reflective Roof Treatment | Standard Black Roof |
| Refrigerated Display Case LED Lighting | Refrigeration | 60" Refrigerated Case LED Strip | Lumen-Equivalent 32-Watt T8 Fixture |
| Refrigerated Display Case Lighting Controls | Refrigeration | Occupancy Sensors for Refrigerated Case Lighting to reduce run time | Market-Share Weighted Existing Linear Fluorescent Fixture |
| Refrigeration Commissioning | Refrigeration | Commissioned Refrigeration System | Non-Commissioned Refrigeration System |
| Refrigeration Economizer | Refrigeration | Walk-in refrigerator with economizer | Walk-in refrigerator without economizer |
| Regenerative Drive Elevator Motor | Miscellaneous | Regenerative drive produced energy when motor in overhaul condition | Standard motor |
| Retro-Commissioning (Existing Construction) | Space Cooling, Space Heating, Ventilation and Circulation | Perform facility retro-commissioning, including assessment, process improvements, and optimization of energy-consuming equipment and systems | |
| Roof Insulation | Space Cooling, Space Heating | Roof Insulation (built-up roof applicable to flat/low slope roofs) | Code-Compliant Flat Roof |
| Server Virtualization | Office Equipment | 2 Virtual Host Server | 20 Single Application Servers |
| Smart Strip Plug Outlet | Office Equipment | One Smart Strip Plug Outlet | One Standard plug strip/outlet |
| Smart thermostat | Space Cooling, Space Heating | Thermostats that include "smart" features such as occupancy sensors, geo-fencing, multi-zone sensors | Standard Heating and Cooling System with Manual Thermostat |
| Solar Pool Heater Commercial | Miscellaneous | Solar Swimming Pool Heater | Electric Resistance Swimming Pool Heater |
| Solar Powered Pool Pump | Miscellaneous | Solar Powered Pool Pump Motor | Variable Speed Pool Pump Motor |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Solar Thermal Water Heating System Commercial | Domestic Hot Water | Solar Thermal System with Electric Backup | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Strip Curtains - Freezers | Refrigeration | Walk-in freezer with strip curtains at least 0.06 inches thick covering the entire area of the doorway | Walk-in freezer without strip curtains |
| Strip Curtains - Refrigerators | Refrigeration | Walk-in cooler with strip curtains at least 0.06 inches thick covering the entire area of the doorway | Walk-in cooler without strip curtains |
| Suction Pipe Insulation - Freezers | Refrigeration | Suction Pipe Insulation - Freezers | Uninsulated freezer suction lines |
| Suction Pipe Insulation - Refrigerators | Refrigeration | Suction Pipe Insulation - Refrigerators | Uninsulated refrigeration suction lines |
| Thermal Energy Storage | Space Cooling | Deploy thermal energy storage technology (ice harvester, etc.) to shift load | Code compliant chiller |
| Thermostatic Shower Restriction Valve Commercial | Domestic Hot Water | Hot Water Loop with 50 Gallon Electric Resistance Heater and Pressure Balance Shower Valves | Standard Hot Water Loop with 50 Gallon Electric Resistance Heater and Standard Shower Valves |
| Time Clock Control | Interior Lighting | Time Clock Controlled Lighting, 500 Watts Controlled | 500 Watts of Lighting, Controlled either Manually or by Sensor as Specified by Code |
| Variable Refrigerant Flow (VRF) HVAC Systems | Space Cooling, Space Heating | Variable Refrigerant Flow (VRF) HVAC Systems | Code-Compliant PTHP |
| VAV System | Ventilation and Circulation | Variable Air Volume Distribution System | Constant Air Volume Distribution System |
| VFD on Cooling Tower Fans | Space Cooling | Cooling Tower Fans with VFD Control | Cooling Tower Fans without VFD Control |
| VFD on HVAC Pump | Space Cooling, Space Heating | VFD on HVAC Pump | 7.5 HP HVAC Pump Motor, no VFD Control |
| VSD Controlled Compressor | Refrigeration | Refrigeration System with VSD Control | Refrigeration System with Standard Slide-Valve Control System |
| Wall Insulation | Space Cooling, Space Heating | Increased Exterior Above-Grade Wall Insulation | Market Average Existing Exterior Above-Grade Wall Insulation |
| Warehouse Loading Dock Seals | Space Cooling, Space Heating | Seals to reduce infiltration losses at loading dock | Loading dock with no seals |
| Water Cooled Refrigeration Heat Recovery | Domestic Hot Water | The heat reclaim system transfers waste heat from refrigeration system to space heating or hot water | No heat recovery |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Water Heater Setback | Domestic Hot Water | A 50 gallon electric hot water tank with a thermostat setting reduced to no lower than 120 degrees. | A 50 gallon electric hot water tank with a thermostat setting that is higher than 120 degrees, typically hot water tanks with settings of 130 degrees or higher. |
| Water source heat pump | Space Cooling, Space Heating | Water Source Heat Pump, 2.5 Tons, 17.4 EER, 4.4 COP | Code-Compliant ASHP |
| Waterside Economizer | Space Cooling | Waterside Economizer | No economizer |
| Window shade film | Space Cooling | Window Film with SHGC of 0.35 Applied to Standard Window | Standard Window with below Code Required Minimum SHGC |
| Zero Energy Doors | Refrigeration | Install zero energy doors for a reach-in refrigerated cooler or freezer | Standard vertical reach-in refrigerated cooler or freezer with anti-sweat heaters on the glass surface of the doors |

**Table 14: Industrial EE Measures**

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| 1.5HP Open Drip-Proof (ODP) Motor | Motors Pumps | High Efficiency 1.5 HP Open-Drip Proof Motor | 1.5HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 10HP Open Drip-Proof (ODP) Motor | Motors Pumps | High Efficiency 10 HP Open-Drip Proof Motor | 10HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 20HP Open Drip-Proof (ODP) Motor | Motors Pumps | High Efficiency 20 HP Open-Drip Proof Motor | 20HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 3-phase High Frequency Battery Charger - 1 shift | Other | 3-phase High Frequency Battery Charger | Standard Charger |
| Advanced Rooftop Controller | HVAC | Advanced Rooftop Controller | Without Advanced Rooftop Controller |
| Air Compressor Optimization | Compressed Air | Performing Routine Maintenance on 20HP Inlet Modulation Fixed-Speed Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| Air curtains | HVAC | Air Curtain across door opening | Door opening with no air curtain |
| Airside economizer | HVAC | Airside Economizer | No economizer |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Auto Closer on Refrigerator Door | Process Cooling | One Medium Temperature Walk-In Refrigerator Door with Auto-Closer | One Medium Temperature Walk-In Refrigerator Door without Auto-Closer |
| Auto Off Time Switch | Interior Lighting High Bay | Auto-Off Time Switch on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Bi-Level Lighting Control (Exterior) | Exterior Lighting Industrial | Install Exterior Bi-Level Lighting Control, 500 Watts Controlled | 500 Watts of Lighting, No Dim Setting |
| Bi-Level Lighting Control (Interior) | Interior Lighting High Bay | Bi-Level Controls on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, No Dim Setting |
| Chilled Water Reset | HVAC | One Chiller with Reset of Chilled Water Temperature Setpoint | One Chiller with Fixed Chilled Water Temperature |
| Cogged Belt on 15hp ODP Motor | Motors Pumps | 15HP ODP Motor with Cogged Belts Installed on Supply and/or Return Air Fans | 15HP ODP Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Cogged Belt on 40hp ODP Motor | Motors Pumps | 40HP ODP Motor with Cogged Belts Installed on Supply and/or Return Air Fans | 40HP ODP Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Compressed Air Desiccant Dryer | Process Specific | heated regenerative desiccant dryer without dew point demand controls | heatless regenerative desiccant dryer without dew point demand controls |
| Compressed Air No-Loss Condensate Drains | Process Specific | Install no-loss condensate drains | Install standard condensate drains |
| Compressed Air Storage Tank | Compressed Air | 20 HP Inlet Modulation Fixed-Speed Compressor with Receiver Tank | 20 HP Inlet Modulation Fixed-Speed Compressor, No Receiver Tank |
| Custom Measure - Non-Lighting | HVAC | Custom Improvement to Facility's Operations | Baseline Technology/Process |
| Dairy Refrigeration Heat Recovery | Other | refrigeration equipment with refrigeration heat recovery tank installed | existing dairy farm with refrigeration equipment and a water heater unit without an RHR unit |
| Dedicated Outside Air System (DOAS) | HVAC | Install Dedicated Outside Air System (DOAS) | Typical HVAC by Building Type |
| Demand Controlled Ventilation | HVAC | Return Air System with CO2 Sensors | Standard Return Air System, No Sensors |
| Demand Defrost | Process Cooling | Walk-In Freezer System with Demand-Controlled Electric Defrost Cycle | Walk-In Freezer System with Timer-Controlled Electric Defrost Cycle |
| Dew Point Sensor Control for Dessicant CA Dryer | Compressed Air | 1000 CFM Heated Desicant Air Dryer with Dew Point Controls | 1000 CFM Modulating Heated Desicant Air Dryer |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Drip Irrigation Nozzles | Other | Flow Control Nozzles | Standard Irrigation Nozzles |
| Dual Enthalpy Economizer | Process Cooling | Standard HVAC Unit with an economizer and dual enthalpy differential control | HVAC unit with no economizer or with a non-functional disabled economizer |
| DX Coil Cleaning | HVAC | DX Coil Cleaning | DX Coil Not Cleaned |
| Efficient Compressed Air Nozzles | Compressed Air | 1/4" Engineered Air Nozzle | 1/4" Open-End Air Nozzle |
| Efficient New Construction Lighting | Interior Lighting High Bay | Efficient New Construction Lighting, 15% Better than Code | New Construction with Lighting Power Density meeting Code Minimum |
| Electric Actuators | Other | Electric Actuator | Pneumatic Actuator |
| Energy Efficient Laboratory Fume Hood | HVAC | Variable Air Volume High Performance Fume Hood | Constant Volume Conventional Bypass Fume Hood |
| Energy Efficient Transformers | Other | Energy Efficient Dry Type Transformer (CSL-3) | Standard Transformer (TP-1) |
| Energy Recovery Ventilation System | HVAC | Unitary Cooling Equipment that Incorporates Energy Recovery | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11.2 EER |
| Energy Star LED Directional Lamp | Interior Lighting Other | Energy Star 7.6W Directional LED lamp | 50W Incandescent lamp |
| Energy Star room ac | HVAC | Room AC meeting current ENERGY STAR standards | Code-Compliant Room AC |
| Energy Star windows | HVAC | 100ft2 of Window meeting Energy Star Version 6.0 Requirements (U-Value: 0.27, SHGC: 0.21) | 100ft2 of Window meeting Energy Star Version 5.0 Requirements (U-Value: 0.3, SHGC: 0.3) |
| Engine Block Timer | Other | An engine block heater operated by an outdoor plug-in timer | An engine block heater that is manually plugged in |
| Facility Commissioning | HVAC | Perform facility commissioning | Comparable facility, no commissioning |
| Facility Energy Management System | HVAC | Typical HVAC by Building Type Controlled by Energy Management System | Typical HVAC by Building Type, Manually Controlled |
| Fan Thermostat Controller | HVAC | Typical HVAC by Building Type with Fan Thermostat Controller Installed | Typical HVAC by Building Type with Programmable Thermostat |
| Floating Head Pressure Controller | Process Cooling | Medium-Temperature Refrigeration System with 5HP Compressor and Adjustable Condenser Head Pressure Control Valve | Medium-Temperature Refrigeration System with 5 HP Compressor without Adjustable Condenser Head Pressure Control Valve |
| Grain Bin Aeration Control System | Process Specific | Grain Storage Fan System with Automatic Controls | Grain Storage Fan System with Manual Controls |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| HE Air Cooled Chiller - All Compressor Types - 100 Tons | HVAC | HE Air Cooled Chiller - All Compressor Types - 100 Tons | Code-Compliant Air Cooled Positive Displacement Chiller, 100 Tons |
| HE Air Cooled Chiller - All Compressor Types - 300 Tons | HVAC | Air Cooled Positive Displacement Chiller with Integral VFD, 300 Tons, 13.7 EER | Code-Compliant Air Cooled Positive Displacement Chiller, 300 Tons, 12.5 EER |
| HE DX 11.25-20.0 Tons Elec Heat | HVAC | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 11.25-20.0 Tons Other Heat | HVAC | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Elect Heat | HVAC | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Other Heat | HVAC | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX Less than 5.4 Tons Elect Heat | HVAC | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE DX Less than 5.4 Tons Other Heat | HVAC | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE Water Cooled Chiller - Centrifugal Compressor - 200 Tons | HVAC | Water Cooled Centrifugal Chiller with Integral VFD, 200 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 200 Tons |
| HE Water Cooled Chiller - Centrifugal Compressor - 500 Tons | HVAC | Water Cooled Centrifugal Chiller with Integral VFD, 500 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 500 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 175 Tons | HVAC | Water Cooled Positive Displacement Chiller with Integral VFD, 175 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 175 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 50 Tons | HVAC | Water Cooled Positive Displacement Chiller with Integral VFD, 50 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 50 Tons |
| High Bay Occupancy Sensors, Ceiling Mounted | Interior Lighting High Bay | Ceiling Mounted Occupancy Sensor, 800 Watts Controlled | 800 Watts of Lighting, Manually Controlled |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| High Efficiency Air Compressor | Compressed Air | 20 HP VFD Air Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| High Efficiency Refrigeration Compressor - Discus | Process Cooling | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Efficiency Refrigeration Compressor - Scroll | Process Cooling | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Efficiency Welder | Process Specific | High Efficiency Welder | Standard Welding Practices |
| High Speed Fans | HVAC | High Speed Fan, 24" - 35" Blade Diameter | Standard Speed Fan, 24" - 35" Blade Diameter |
| High Volume Low Speed Fan (HVLS) | Motors Fans Blowers | 20' High Volume Low Speed Fan | Conventional Circulating Fan |
| Indoor Agriculture - LED Grow Lights | Interior Lighting High Bay | LED grow light | 1000W High Pressure Sodium |
| Indoor daylight sensor | Interior Lighting High Bay | Install Indoor Daylight Sensors, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Industrial Duct Sealing | HVAC | Standard Electric Heating and Central AC with Improved Duct Sealing | Standard Electric Heating and Central AC, Standard Duct Sealing |
| Injection Mold and Extruder Barrel Wraps | Other | 2' Diameter, 20' Long Machine Barrel with 1" Insulation | 2' Diameter, 20' Long Machine Barrel with no Insulation |
| Insulated Pellet Dryer Tanks and Ducts | Process Heating | Insulation for Pellet Tank and Duct | Uninsulated Pellet Tank and Duct |
| LED - 14W_CFL Baseline | Interior Lighting Other | LED (assume 14W) replacing CFL | 100W equivalent CFL |
| LED Canopy Lighting (Exterior) | Exterior Lighting Industrial | One 67.2W LED Canopy Light | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED Display Lighting (Exterior) | Exterior Lighting Industrial | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED Display Lighting (Interior) | Interior Lighting Other | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED exit sign | Interior Lighting Other | One 5W Single-Sided LED Exit Sign | One 9W Single-Sided CFL Exit Sign |
| LED Exterior Wall Packs | Exterior Lighting Industrial | One 35W LED Wall Pack | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED High Bay_HID Baseline | Interior Lighting High Bay | One 140W High Bay LED Fixture | Lumen-Equivalent HID High Bay Fixture |
| LED High Bay_LF Baseline | Interior Lighting High Bay | One 140W High Bay LED Fixture | Lumen-Equivalent Linear Fluorescent High Bay Fixture |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| LED Linear - Fixture Replacement | Interior Lighting Linear Fluorescent | 2x4 LED Troffer Fixture | Lumen-Equivalent 32-Watt T8 Fixture |
| LED Linear - Lamp Replacement | Interior Lighting Linear Fluorescent | Linear LED | Lumen-Equivalent 32-Watt T8 Lamp |
| LED Parking Lighting | Exterior Lighting Industrial | One 160W LED Area Light | Average Lumen Equivalent Exterior HID Area Lighting |
| LEED New Construction Whole Building | HVAC | LEED Qualifying New Construction | Comparable facility, code-compliance construction |
| Light Tube | Interior Lighting Other | One 14" Light Tube, Delivering light to 250 S.F. of Industrial Space | 250 S.F. of Industrial Space Lit by Typical Lighting Strategies |
| Low Energy Livestock Waterer | Motors Pumps | Install Thermostatically Controlled Livestock Watering System | Standard Livestock Watering System |
| Low Pressure Sprinkler Nozzles | Motors Pumps | Low Pressure Irrigation Nozzles operate at 35 psi or lower | Standard high pressure irrigation nozzles that operate at 50 psi or greater |
| Low Pressure-drop Filters | Compressed Air | 20 HP Inlet Modulation Fixed-Speed Compressor with Low Pressure Drop Filter | 20 HP Inlet Modulation Fixed-Speed Compressor, No Particulate Removal |
| Milk Pre-Cooler | Other | Installed pre-cooler heat exchanger | no pre-cooler heat exchanger installed |
| Networked Lighting Controls | Interior Lighting Linear Fluorescent | Install Networked Lighting Controls System on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Controlled either Manually or by Sensor as Specified by Code |
| Occupancy Sensors, Ceiling Mounted | Interior Lighting High Bay | Ceiling Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Occupancy sensors, switch mounted | Interior Lighting Linear Fluorescent | Switch Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor Lighting Controls | Exterior Lighting Industrial | Install Exterior Photocell Dimming Controls, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor motion sensor | Exterior Lighting Industrial | Install Exterior Motion Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Packaged Terminal AC | HVAC | High Efficiency Packaged Terminal AC | Code-Compliant PTAC, 10.9 EER |
| Process Cooling Ventilation Reduction | Process Cooling | Standard Process Cooling with Reduced Ventilation | Standard Process Cooling |
| Programmable thermostat | HVAC | Standard Heating and Cooling System with Programmable Thermostat | Standard Heating and Cooling System with Manual Thermostat |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Reflective Roof Treatment | HVAC | Reflective Roof Treatment | Standard Black Roof |
| Refrigeration Commissioning | Process Cooling | Commissioned Refrigeration System | Non-Commissioned Refrigeration System |
| Retro-Commissioning (Existing Construction) | HVAC | Perform Facility Retro-commissioning | |
| Roof insulation | HVAC | Roof Insulation (built-up roof applicable to flat/low slope roofs) | Code-Compliant Flat Roof |
| Smart thermostat | HVAC | Standard Heating and Cooling System with Smart Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Strategic Energy Management | HVAC | SEM goal setting and tracking | No active energy management |
| Synchronous Belt on 15hp ODP Motor | Motors Pumps | 15 HP Open-Drip Proof Motor with Synchronous Belts Installed on Supply and/or Return Air Fans | 15 HP Open-Drip Proof Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Synchronous Belt on 5hp ODP Motor | Motors Pumps | 5 HP Open-Drip Proof Motor with Synchronous Belts Installed on Supply and/or Return Air Fans | 5 HP Open-Drip Proof Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Synchronous Belt on 75hp ODP Motor | Motors Pumps | 75 HP Open-Drip Proof Motor with Synchronous Belts Installed on Supply and/or Return Air Fans | 75 HP Open-Drip Proof Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Thermal energy storage | HVAC | Deploy thermal energy storage technology (ice harvester, etc.) to shift load | Code compliant chiller |
| Time Clock Control | Interior Lighting High Bay | Time Clock Controlled Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| VAV System | HVAC | Variable Air Volume Distribution System | Constant Air Volume Distribution System |
| VFD on Air Compressor | Compressed Air | 20 HP VFD Air Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| VFD on Cooling Tower Fans | Process Cooling | Cooling Tower Fans with VFD Control | Cooling Tower Fans without VFD Control |
| VFD on HVAC Fan | Motors Fans Blowers | 5 HP HVAC Fan Motor, with VFD Control | 5 HP HVAC Fan Motor, no VFD Control |
| VFD on HVAC Pump | Motors Pumps | VFD on HVAC Pump | 7.5 HP HVAC Pump Motor, no VFD Control |
| VFD on process pump | Motors Pumps | 20 HP Process Pump Equipped with VFD Control | 20 HP Process Pump, Constant Speed |
| VSD Controlled Compressor | Process Cooling | Refrigeration System with VSD Control | Refrigeration System with Standard Slide-Valve Control System |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Water source heat pump | HVAC | Water Source Heat Pump, 2.5 Tons, 17.4 EER, 4.4 COP | Code-Compliant ASHP |
| Waterside economizer | HVAC | Waterside Economizer | No economizer |
| Window shade film | HVAC | Window Film with SHGC of 0.35 Applied to Standard Window | Standard Window with below Code Required Minimum SHGC |

The following EE measures from the 2019 Technical Potential Study were eliminated from the current study[8]:

**Table 15: 2019 EE Measures Eliminated from Current Study**

| Sector | Measure | End-Use | Reason for Removal |
|---|---|---|---|
| Residential | CFL – 15W Flood | Lighting | Better technology (LED) available |
| Residential | CFL – 15W Flood (Exterior) | Lighting | Better technology (LED) available |
| Residential | CFL – 13W | Lighting | Better technology (LED) available |
| Residential | CFL – 23W | Lighting | Better technology (LED) available |
| Residential | Low Wattage T8 Fixture | Lighting | Better technology (LED) available |
| Residential | 15 SEER Central AC | Space Cooling | Updated Federal Standard |
| Residential | 15 SEER Air Source Heat Pump | Space Cooling, Space Heating | Updated Federal Standard |
| Residential | 14 SEER ASHP from base electric resistance heating | Space Cooling, Space Heating | Updated Federal Standard |
| Residential | Two Speed Pool Pump | Miscellaneous | Updated Florida Energy Code |
| Residential | Variable Speed Pool Pump | Miscellaneous | Updated Florida Energy Code |
| Residential | Storm Door | Space Cooling, Space Heating | Minimal/uncertain energy savings |
| Commercial | CFL – 15W Flood | Exterior Lighting | Better technology (LED) available |
| Commercial | High Efficiency HID Lighting | Exterior Lighting | Better technology (LED) available |

[8] Additional measures from the 2019 study were updated to reflect current vintage/technology for the current study.

| Sector | Measure | End-Use | Reason for Removal |
|---|---|---|---|
| Commercial | LED Street Lights | Exterior Lighting | Market standard |
| Commercial | LED Traffic and Crosswalk Lighting | Exterior Lighting | Market standard |
| Commercial | CFL-23W | Interior Lighting | Better technology (LED) available |
| Commercial | High Bay Fluorescent (T5) | Interior Lighting | Better technology (LED) available |
| Commercial | Premium T8 - Fixture Replacement | Interior Lighting | Better technology (LED) available |
| Commercial | Premium T8 - Lamp Replacement | Interior Lighting | Better technology (LED) available |
| Commercial | Two Speed Pool Pump | Miscellaneous | Updated Florida Energy Code |
| Commercial | Variable Speed Pool Pump | Miscellaneous | Updated Florida Energy Code |
| Commercial | Tank Wrap on Water Heater | Domestic Hot Water | Limited applicability |
| Commercial | Ceiling Insulation (R12 to R38) | Space Cooling, Space Heating | Consolidated measure baseline assumptions |
| Commercial | Ceiling Insulation (R30 to R38) | Miscellaneous | Consolidated measure baseline assumptions |

# Appendix B DR Measure List

Table 16: Residential DR Measures

| Measure | Type | Season | Description |
|---|---|---|---|
| Central air conditioner - Load Shed | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central Heating - Load Shed | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central air conditioner - 50% cycling | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Central Heating - 50% cycling | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Smart thermostats - Utility Installation | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| Smart thermostats – BYOT | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| CPP + Tech | Pricing | Summer and Winter | Electricity rate that varies based on time of day. Can be same rate schedule for every day during a given season (time of use, or TOU) and with critical peak pricing (CPP) days when peak period rates are substantially higher for a limited number of days per year (customers receive advance notification of CPP event). Customers also receive technology that they can pre-program to curtail load when an event is called. |
| Water heater control | Direct load control | Summer and Winter | Load control installed on a water heater (integrated or external switch) |
| Pool pump switches | Direct load control | Summer and Winter | Load control program with switch installed on pool pump |
| Room AC | Direct load control | Summer | Load control program that is focused on room AC units rather than central AC |
| Managed EV Charging – switch | Direct load control | Summer and Winter | Load control switch that is installed on an EV charger |
| Managed EV Charging – telematics | Direct load control | Summer and Winter | Direct load control program leveraging EV smart charging software |
| Battery Storage with PV | Pricing/Direct load control | Summer and Winter | PV charges battery and battery discharges to grid |

Table 17: Small C&I DR Measures

| Measure | Type | Season | Description |
|---|---|---|---|
| Central air conditioner - Load Shed | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central Heating - Load Shed* | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central air conditioner - 50% cycling | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Central Heating - 50% cycling* | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Smart thermostats - Utility Installation* | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| Smart thermostats – BYOT* | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| CPP + Tech | Pricing | Summer and Winter | Electricity rate that varies based on time of day. Can be same rate schedule for every day during a given season (time of use, or TOU) and with critical peak pricing (CPP) days when peak period rates are substantially higher for a limited number of days per year (customers receive advance notification of CPP event). Customers also receive technology that they can pre-program to curtail load when an event is called. |
| Managed EV Charging – switch | Direct load control | Summer and Winter | Load control switch that is installed on an EV charger |
| Managed EV Charging – telematics | Direct load control | Summer and Winter | Direct load control program leveraging EV smart charging software |
| Battery Storage with PV | Pricing/Direct load control | Summer and Winter | PV charges battery and battery discharges to grid |

Table 18: Large C&I DR Measures

| Measure | Type | Season | Description |
|---|---|---|---|
| CPP + Tech | Pricing | Summer and Winter | Electricity rate that varies based on time of day. Can be same rate schedule for every day during a given season (time of use, or TOU) and with critical peak pricing (CPP) days when peak period rates are substantially higher for a limited number of days per year (customers receive advance notification of |

| Measure | Type | Season | Description |
|---|---|---|---|
| | | | CPP event). Customers also receive technology that they can pre-program to curtail load when an event is called. |
| Auto DR | Utility-controlled loads | Summer and Winter | Custom load control of specific end-uses/processes that is triggered by utility signal to building management system; customer can sometimes opt-out of specific events |
| Firm Service Level | Contractual | Summer and Winter | Customer commits to a maximum usage level during peak periods and, when notified by the utility, agrees to cut usage to that level. |
| Guaranteed Load Drop | Contractual | Summer and Winter | Customer agrees to reduce usage by an agreed upon amount when notified |

No DR measures from the 2019 Technical Potential Study were eliminated from the current study.

# Appendix C DSRE Measure List

Table 19: Residential DSRE Measures

| Measure | Description |
|---|---|
| PV System | Roof-mounted system, including multiple panels, AC/DC inverter, racking system, and electrical system interconnections |
| Battery Storage from PV System | Lithium-ion battery system designed to integrate with an on-site PV system to store and discharge excess energy from PV generation |

Table 20: Non-Residential DSRE Measures

| Measure | Description |
|---|---|
| PV System | Roof-mounted system, including multiple panels, AC/DC inverter, racking system, and electrical system interconnections |
| Battery Storage from PV System | Lithium-ion battery system designed to integrate with an on-site PV system to store and discharge excess energy from PV generation |
| CHP – Fuel Cell | An electrochemical cell-based generator that reacts hydrogen fuel with oxygen |
| CHP – Micro Turbine | Small combustion turbine that burns gaseous or liquid fuel to drive a generator |
| CHP – Gas Turbine | A combustion turbine that burns gaseous or liquid fuel to drive a generator |
| CHP – Reciprocating Engine | An engine that uses one or more pistons to convert pressure into rotational motion |
| CHP - Steam Turbine | A turbine that extracts thermal energy from pressured steam to drive a generator |

No DSRE measures from the 2019 Technical Potential Study were eliminated from the current study.

# Appendix D External Measure Suggestions

Table 21: External Measure Suggestions and Actions

| Measure Suggestion | Stakeholder Comments | Action taken for FEECA Study |
|---|---|---|
| Efficient Electrification Measures | All measures that can produce substantial site energy savings by converting from natural gas or other fossil fuels should be included in the Florida electric utilities' next efficiency potential study. Key examples include efficient heat pumps to displace gas furnaces and efficient heat pump water heaters to displace gas water heaters. It is important to note that these electrification measures provide not only heating energy savings and water heating energy savings, but can also potentially provide cooling efficiency benefits as well. In the case of heat pumps, that can occur because efficient heat pumps can operate in cooling mode more efficiently than standard central air conditioners. In the case of heat pump water heaters, cooling and dehumidification benefits can occur when/if the water heater is in conditioned space because they transfer heat (particularly latent heat) from the air around them to the water they are heating. A growing number of jurisdictions – including Illinois, Minnesota and some northeastern states – have begun to include efficient electrification measures in their efficiency programs portfolios. | Fuel-switching and electrification are outside the scope of this study |
| Networked Lighting Controls | LED lighting technology has become increasingly accepted and installed in commercial buildings. The next big efficiency opportunity in commercial lighting efficiency is in sophisticated controls integrated into the light fixtures themselves – both luminaire level lighting controls and networked lighting controls. For example, a 2017 report for both the Northwest Energy Efficiency Alliance and the Design Lights Consortium, a non-profit that works with utilities and manufacturers of lighting products (and which many utilities across the country reference for determination of eligibility of lighting products for efficiency program rebates), found that networked lighting controls can provide on the order of 50% additional savings after LED conversion. Other studies have also found the national savings potential from such products to be enormous. Moreover, these products can be designed to provide not only lighting energy savings but also a number of other non-energy benefits (e.g., asset tracking, such as the ability of hospitals to know the location of all wheel chairs). Numerous utilities across the country now actively promote this technology through their efficiency programs. For example, Commonwealth Edison, the utility serving Chicago and other parts of northern Illinois, is currently getting a significant portion of its commercial lighting savings from promotion of networked lighting controls | Added to measure list for 2024 study |

| Measure Suggestion | Stakeholder Comments | Action taken for FEECA Study |
|---|---|---|
| Ductless mini-split heat pumps to displace inefficient electric baseboard heating | While most Florida residential buildings with electric heat provide that heat with heat pumps, at least some (perhaps most likely being older multi-family rental buildings) still use inefficient electric resistance heat. Ductless mini- split heat pump retrofits can very efficiently displace such inefficient electric heat and should be added to the residential measure list. | Added to measure list for 2024 study |
| Air Source Heat Pump baseline assumptions | There are seven air source heat pump (ASHP) measures included in the residential measure list. Two of them – one at SEER 14 and a second at SEER 21 – are listed as relative to an electric resistance baseline. Five of them – SEER 15, SEER 16, SEER 17, SEER 18 and SEER 21 – appear to be relative to a baseline of a standard new ASHP. Are we interpreting this correctly? If so, we have a couple of comments/questions/suggestions:<br>• The efficiency standards assessed need to be modified to be consistent with new federal<br>standards, including new testing procedures.<br>• For cases where the baseline is "electric resistance", why only assessing two efficiency tiers (i.e.,<br>fewer than for standard ASHP baselines)? The same number of efficiency tiers should be<br>assessed for both baselines. | Incorporated suggestions into 2024 study, including updated baseline standard and assessing same efficiency tiers for both baselines |
| Heat Pump Water Heater Efficiency | The Res EE tab of the utilities draft measure list suggests that the efficiency of a heat pump water heater is an EF of 2.50. That is unrealistically low. In fact, of the 222 products listed on the Energy Star website, none had UEFs less than 2.80 and only 29 (13%) had UEFs that were less than 3.4; the average was 3.57. Indeed, the first product listed on a search of heat pump water heaters on Home Depot's website is a 50 gallon, Rheem (Pro Terra) product with a UEF of 3.75 and a cost of $1699. | Incorporated suggestion into 2024 study |
| New Construction Measure Packages | The measures lists did not appear to include packages of measures for building new residential and/or new commercial buildings to levels of efficiency beyond those required by code. Utilities in many jurisdictions run new construction efficiency programs supporting such measure packages. In the residential sector, many base their programs on the long-standing Federal Energy Star standard. However, increasingly utility programs are promoting additional efficiency tiers – often as part of all-electric new construction program offerings – that go well beyond the Energy Star standard. For example, Consumers Energy (Michigan) offers $1000 rebates to builders who construct Energy Star single family homes | Incorporated suggestion into 2024 study with 2 tiers of residential new construction whole-home improvement measures. |



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| Measure Suggestion | Stakeholder Comments | Action taken for FEECA Study |
|---|---|---|
| | with a Home Energy Rating (HERS) score of 57 or less, but offer higher rebates for more efficient buildings – up to $4000 for all electric homes with a HERS score of 40 or less. The Florida utilities potential study should assess savings potential for both the Energy Star level and a tier or two of additional efficiency beyond that level. Similar assessments of new commercial building savings potential should also be assessed. | |
| Custom Industrial Measures | The utilities' list of industrial efficiency measures addresses common industrial efficiency opportunities. However, it does not address efficiency opportunities that may be unique to individual industries or even to individual industrial facilities. That can include such things as changes in types of materials used in manufacturing, reductions in waste streams, improved use of water delivered by agricultural irrigation systems, and/or other things that are not directly related to energy using equipment or controls of such equipment. It is obviously not possible to list all such measures. However, a potential study will understate savings potential if it does not include a way of capturing such potential in its estimates. One potential way to get a sense of such potential is to review results of comprehensive industrial efficiency programs run by other utilities to identify the portion of actual program savings from such unique custom measures – and then assume that portion of custom savings could be added to the savings estimated in the study for named measures. | Added to measure list for 2024 study |
| Electric Vehicle measures | Some EV chargers are more efficient than others. The Federal Energy Star program has a standard for them. Savings potential may not be huge, but should be considered in the study. With a growing number of EV sales, the study should also consider the potential savings from promoting the most efficient EVs within different size/style categories | Added to measure list for 2024 study |
| Removing screw-based LEDs | The screw-based LEDs on both the Residential and Commercial measure lists should now be considered baseline due to federal efficiency standards adopted earlier this year. Utility load forecasts for IRPs should reflect resulting improvements in end use efficiency. | Screw-based LEDs were included in the study but with limited applicability to reflect current market |
| Removing Commercial fluorescent lighting | LED technology – for both fixtures and lamps – has advanced significantly in recent years, to the point where it should be the only technology considered for commercial lighting. Measures such as high performance T-8 fluorescent fixtures and high bay T-5 fluorescent fixtures should be replaced with LED alternatives in the study. | Updated measure list for 2024 study to only include LED-based lamps for linear fluorescent replacements |

| Measure Suggestion | Stakeholder Comments | Action taken for FEECA Study |
|---|---|---|
| Removing fossil-gas fueled CHP | Fossil-fuel fired CHP systems should not be considered "renewable" and have questionable benefits if electric generation is expected to get increasingly more renewable and clean. Biogas-fueled CHP – such as systems installed in wastewater treatment facilities that use methane byproducts of processing waste – should be included in the study. | 2024 study will continue to assess all CHP options |
| Adding livestock methane power generation to renewables list | For example, see the "cow power" program currently being run by Green Mountain Power, Vermont's largest electric utility | 2024 study will continue to assess DSRE options consistent with prior study, including customer-sited solar, solar plus storage, and CHP |
| Adding EV managed charging to DR list | With national market shares for EVs growing, it is important that utilities consider programs for managing when charging occurs. Numerous utilities are currently running managed charging programs. This does not currently appear to be on the measure list and should be added to the Florida utilities' potential study. | Added to measure list for 2024 study |
| Residential "smart thermostat" measure can provide both efficiency savings and demand response potential | This is recognized in the inclusion of smart thermostats in both the Res EE and DR tabs of the measure list spreadsheet. We simply want to flag that it is important when assessing cost-effectiveness of this measure that these two potential benefits are considered together. In other words, the cost should be considered compared to the combined efficiency and DR potential rather than separately considered relative to just EE savings and then separately again compared to just DR potential | 2024 study will include interactive impacts of EE and DR opportunities |
| Emerging Technologies | The efficiency potential study measure list appears to be somewhat outdated. It does not include a number of new and emerging technologies. The potential list of such technologies is long. We suggest reviewing the attached list of emerging technologies developed almost two years ago by Consumers Energy (Michigan) and including them in the study. | Consumers Energy study was reviewed and commercially available measures were added to measure list for 2024 study, including heat pump water heaters - CEE advanced tier, heat pump clothes dryers, ozone laundry systems, and 21+ SEER HVAC units |

# Exhibit JH-8
# 2024 Measure Lists

## EE Measure Lists

Table 1: Residential EE Measures

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| 120v Heat Pump Water Heater 50 Gallons | Residential Domestic Hot Water | 120v Heat Pump Water Heater 50 Gallons | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Air Sealing-Infiltration Control | Residential Space Cooling, Residential Space Heating | Standard Heating and Cooling System with Improved Infiltration Control | Standard Heating and Cooling System with Standard Infiltration Control |
| Air-to-Water Heat Pump | Residential Space Cooling, Residential Space Heating | Energy Star Air-to-Water Heat Pump, 25 SEER, 13 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - 15 SEER/14.3 SEER2 from base electric resistance | Residential Space Cooling, Residential Space Heating | ASHP 15 SEER from base electric resistance | Base AC, 15 SEER, Electric resistance heating |
| ASHP - 24 SEER/22.9 SEER2 (from elec resistance) | Residential Space Cooling, Residential Space Heating | ASHP: 24/22.9 SEER/SEER2, 10.5 HSPF | Base AC, 15 SEER, Electric resistance heating |
| ASHP - 24 SEER/22.9 SEER2, 10.5 HSPF | Residential Space Cooling, Residential Space Heating | ASHP: 24/22.9 SEER/SEER2, 10.5 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - CEE Advanced Tier: 17.8 SEER/17 SEER2; 10.0 HSPF | Residential Space Cooling, Residential Space Heating | CEE Advanced Tier ASHP:17.8/17 SEER/SEER2; 10.0 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - CEE Advanced Tier: 17.8 SEER/17 SEER2; 10.0 HSPF (from elec resistance) | Residential Space Cooling, Residential Space Heating | CEE Advanced Tier ASHP:17.8/17 SEER/SEER2; 10.0 HSPF | Base AC, 15 SEER, Electric resistance heating |
| ASHP - CEE Tier 2: 16.8 SEER/16 SEER2; 9.0 HSPF | Residential Space Cooling, Residential Space Heating | CEE Tier 2 ASHP: 16.8/16 SEER/SEER2; 9.0 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| ASHP - CEE Tier 2: 16.8 SEER/16 SEER2; 9.0 HSPF (from elec resistance) | Residential Space Cooling, Residential Space Heating | CEE Tier 2 ASHP: 16.8/16 SEER/SEER2; 9.0 HSPF | Base AC, 15 SEER, Electric resistance heating |
| ASHP - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 | Residential Space Cooling, Residential Space Heating | ENERGY STAR/CEE Tier 1 ASHP: 16/15.2 SEER/SEER2, 9.0 HSPF | Base AC, 15 SEER, Electric resistance heating |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| (from elect resistance) | | | |
| ASHP - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2, 9.0 HSPF | Residential Space Cooling, Residential Space Heating | ENERGY STAR/CEE Tier 1 ASHP: 16/15.2 SEER/SEER2, 9.0 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF (updated) |
| Basement or Crawlspace Wall Insulation R-15 | Residential Space Cooling, Residential Space Heating | Increased Basement or Crawlspace Wall Insulation (R-15) | Code-Compliant Exterior Below-Grade Wall Insulation (R-10) |
| Bathroom Faucet Aerators | Residential Domestic Hot Water | Low-Flow Faucet Aerator with Flow Rate of 1.5 gpm | Faucet Aerator with Federal Standard Flow Rate of 2.2 gpm |
| CEE Advanced Tier Clothes Dryer | Clothes Dryers | CEE Advanced Tier Clothes Dryer | One Clothes Dryer meeting Federal Standard |
| CEE Advanced Tier Clothes Washer | Clothes Washers | Tier 3 CEE Clothes washer | One Clothes Washer meeting Federal Standard |
| CEE Tier 3 Refrigerator | Refrigerators | Residential Tier 3 Refrigerator | One Refrigerator meeting Federal Standard |
| Ceiling Insulation (R11 to R30) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-1985) homes, bring to current code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R11 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-1985) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R11 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-1985) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R19 to R30) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-2020) homes, bring to current code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R19 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-2020) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R19 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1982-2020) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R2 to R30) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, older (pre-1982) homes, bring to current code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R2 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, older (pre-1982) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R2 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, older (pre-1982) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R30 to R38) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1986-2020) homes | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R30 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1986-2020) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |
| Ceiling Insulation (R38 to R49) | Residential Space Cooling, Residential Space Heating | Blown-in insulation in ceiling cavity/attic, existing (1986-2020) homes - Beyond Code | Existing ceiling insulation based on building code at time of construction |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Central AC - CEE Tier 2: 16.8 SEER/16 SEER2 | Residential Space Cooling | Central AC - CEE Tier 2: 16.8 SEER/16 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC - 24 SEER/22.9 SEER2 | Residential Space Cooling | Central AC - 24 SEER/22.9 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC - CEE Advanced Tier: 17.8 SEER/17 SEER2 | Residential Space Cooling | Central AC - CEE Advanced Tier: 17.8 SEER/17 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 | Residential Space Cooling | Central AC - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 | Code-Compliant Central AC, 15 SEER (updated) |
| Central AC Tune Up | Residential Space Cooling | System tune-up, including coil cleaning, refrigerant charging, and other diagnostics | Existing Typical Central AC without Regular Maintenance/tune-up |
| Dehumidifier Recycling | Plug Load | No dehumidifier | One Dehumidifier meeting Federal Standard |
| Drain Water Heat Recovery | Residential Domestic Hot Water | 50 Gallon Electric Resistance Heater and Drain Water Heat Exchanger | 50 Gallon Electric Resistance Heater, No Drain Water Heat Recovery |
| Duct Insulation | Residential Space Cooling, Residential Space Heating | Standard Electric Heating and Central AC with Insulated Ductwork | Standard Electric Heating and Central AC with Uninsulated Ductwork |
| Duct Repair | Residential Space Cooling, Residential Space Heating | Duct Repair to eliminate/minimize leaks, includes testing and sealing | Standard Electric Heating and Central AC with typical duct leakage |
| ECM Circulator Pump | Residential Miscellaneous | Install ECM Circulator Pump | Install Standard Circulator Pump |
| Energy Star Air Purifier | Plug Load | One Air Purifier meeting ENERGY STAR 2.0 Standards | One Standard Conventional Air Purifier |
| Energy Star Audio-Video Equipment | Plug Load | One DVD/Blu-Ray Player meeting current ENERGY STAR Standards | One Market Average DVD/Blu-Ray Player |
| Energy Star Bathroom Ventilating Fan | Residential Ventilation and Circulation | Bathroom Exhaust Fan meeting current ENERGY STAR Standards | Bathroom Exhaust Fan meeting Federal Standard |
| Energy Star Ceiling Fan | Residential Miscellaneous | 60" Ceiling Fan Meeting ENERGY STAR 3.1 Standards | Standard 60" Ceiling Fan |
| Energy Star Clothes Dryer | Clothes Dryers | One Electric Resistance Clothes Dryer meeting ENERGY STAR 1.1 Standards | One Clothes Dryer meeting Federal Standard |
| Energy Star Clothes Washer | Clothes Washers | One Clothes Washer meeting ENERGY STAR 8.1 Standards | One Clothes Washer meeting Federal Standard |
| Energy Star Dehumidifier | Plug Load | One Dehumidifier meeting ENERGY STAR 5.0 Standards | One Dehumidifier meeting Federal Standard |
| Energy Star Dishwasher | Dishwashers | One Dishwasher meeting ENERGY STAR 7.0 Requirements (effective on July 19, 2023), electric water heating | One Dishwasher meeting Federal Standard |
| Energy Star Dishwasher (Gas Water Heating) | Dishwashers | One Dishwasher meeting ENERGY STAR 7.0 Requirements, gas water heating | One Dishwasher meeting Federal Standard; gas water heating |
| Energy Star Door | Residential Space Cooling, Residential Space Heating | 100ft2 of Opaque Door meeting Energy Star Version 6.0 Requirements (U-Value: 0.17) | 100ft2 of Opaque Door meeting current FL Code Requirements |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| ENERGY STAR EV supply equipment (level 2 charger) | Residential Miscellaneous | Level 2 Electric Vehicle Supply Equipment (EVSE) | Level 1 Electric Vehicle Supply Equipment (EVSE) |
| Energy Star Freezer | Freezers | One Freezer meeting current ENERGY STAR 5.1 Standards | One Freezer meeting Federal Standard |
| Energy Star Ground Source Heat Pump | Residential Space Cooling, Residential Space Heating | Energy Star GSHP, 17.1 SEER, 12 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF |
| Energy Star Imaging Equipment | Plug Load | One imaging device meeting current ENERGY STAR Standards | One non-ENERGY STAR imaging device |
| Energy Star Monitor | Plug Load | One Monitor meeting ENERGY STAR 8.0 Standards | One Standard Monitor |
| Energy Star Personal Computer | Plug Load | One Personal Computer meeting ENERGY STAR 8.0 Standards | One Personal Computer meeting ENERGY STARÂ® 3.0 Standards |
| Energy Star Refrigerator | Refrigerators | One Refrigerator/Freezer meeting ENERGY STAR 5.1 Standards | One Refrigerator/Freezer meeting Federal Standard |
| Energy Star Room AC | Residential Space Cooling | Room AC meeting current ENERGY STAR standards | Code-Compliant Room AC |
| Energy Star Set-Top Receiver | Plug Load | One Set-top Box meeting ENERGY STAR 4.1 Standards | One Market Average Set-top Box |
| Energy Star TV | Plug Load | One Television meeting ENERGY STAR 9.0 Standards | One non-ENERGY STAR Television |
| Energy Star Windows | Residential Space Cooling, Residential Space Heating | 100ft2 of Window meeting Energy Star Version 6.0 Requirements (U-Value: 0.27, SHGC: 0.21) | 100ft2 of Window current FL energy code requirements |
| Exterior Wall Insulation | Residential Space Cooling, Residential Space Heating | Increased Exterior Above-Grade Wall Insulation (R-13) | Market Average Existing Exterior Above-Grade Wall Insulation |
| Filter Whistle | Residential Ventilation and Circulation | Install the Furnace Filter Alarm | No Furnace Filter Alarm on a Central Forced-Air Furnace |
| Floor Insulation | Residential Space Heating | Increased Floor Insulation (R-30) | Code-Compliant Floor Insulation |
| Freezer Recycling | Freezers | No Freezer | Current Market Freezer |
| Green Roof | Residential Space Cooling | Vegetated Roof Surface on top of Standard Roof | Standard Black Roof |
| Heat Pump Clothes Dryer | Clothes Dryers | One Heat Pump Clothes Dryer | One Clothes Dryer meeting Federal Standard |
| Heat Pump Pool Heater | Residential Miscellaneous | Heat Pump Swimming Pool Heater | Electric Resistance Swimming Pool Heater |
| Heat Pump Tune Up | Residential Space Cooling, Residential Space Heating | System tune-up, including coil cleaning, refrigerant charging, and other diagnostics | Standard Heating and Cooling System without Regular Maintenance/tune-up |
| Heat Pump Water Heater 50 Gallons-CEE Advanced Tier | Residential Domestic Hot Water | CEE Advanced Tier Heat Pump Water Heater 50 Gallons | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Heat Pump Water Heater 50 Gallons-ENERGY STAR | Residential Domestic Hot Water | Heat Pump Water Heater 50 Gallons | Code-Compliant 50 Gallon Electric Resistance Water Heater |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Heat Pump Water Heater 80 Gallons-ENERGY STAR | Residential Domestic Hot Water | Energy Star Heat Pump Water Heater 80 Gallons | Code-Compliant 80 Gallon Electric Resistance Water Heater |
| Heat Trap | Residential Domestic Hot Water | Heat Trap | Existing Water Heater without heat trap |
| High Efficiency Convection Oven | Residential Cooking | One Full-Size Convection Oven meeting ENERGY STAR 3.0 Standards | One Standard Economy-Grade Full-Size Oven |
| High Efficiency Induction Cooktop | Residential Cooking | One residential induction cooktop | One standard residential electric cooktop |
| Home Energy Management System | Lighting, Plug Load, Residential Space Cooling, Residential Space Heating | Typical HVAC by Building Type Controlled by Energy Management System | Typical HVAC by Building Type, Manually Controlled |
| Hot Water Pipe Insulation | Residential Domestic Hot Water | 1' of Insulated Pipe in Unconditioned Spaces, Insulation of R-5 | 1' of Pipe in Unconditioned Spaces with Code Minimum of 1"of Insulation |
| HVAC ECM Motor | Residential Ventilation and Circulation | A brushless permanent magnet (ECM) blower motor for electric furnace | Permanent Split Capacitor Motor for Electric Furnace |
| HVAC Economizer | Residential Space Cooling | Install residential economizer | No economizer |
| HVAC Zoning System | Residential Space Cooling, Residential Space Heating | Install dampers in the ducts, dividing home into multiple zones, each controlled by its own thermostat | Single zone HVAC system |
| Indoor Daylight Sensor | Lighting | Install Indoor Daylight Sensors, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Induction Range | Residential Cooking | Residential induction range | Electric range |
| Instantaneous Hot Water System | Residential Domestic Hot Water | Instantaneous Hot Water System | Standard Efficiency Storage Tank Water Heater |
| Kitchen Faucet Aerators | Residential Domestic Hot Water | Low-Flow Faucet Aerator with Flow Rate of 1.5 gpm | Faucet Aerator with Federal Standard Flow Rate of 2.2 gpm |
| LED - 9W_CFL Baseline | Lighting | LED (assume 9W) replacing CFL baseline lamp | 14W CFL (60W equivalent) |
| LED - 9W_Halogen Baseline | Lighting | LED (assume 9W) replacing EISA-2020 compliant baseline lamp | EISA-2020 compliant baseline lamp (60W equivalent) |
| LED Specialty Lamps-5W Chandelier | Lighting | 5 W Chandelier LED | Standard incandescent chandelier lamp |
| Linear LED | Lighting | Linear LED Lamps in Linear Fluorescent Fixture | Standard (32w) T8 lamps in Linear Fluorescent Fixture |
| Low Flow Showerhead | Residential Domestic Hot Water | Low-Flow Handheld Showerhead, Flow Rate: 1.60 gpm | Standard Handheld Showerhead, Flow Rate: 2.50 gpm |
| New Construction - Whole Home Improvements - Tier 1 | Whole Home | Performance-based improvements in new homes - 20% savings | Residential New Construction (Baseline Efficiency) |
| New Construction - Whole Home Improvements - Tier 2 | Whole Home | Performance-based improvements in new homes - 35% savings | Residential New Construction (Baseline Efficiency) |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Occupancy Sensors Switch Mounted | Lighting | Switch Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor Lighting Timer | Lighting | Timer on Outdoor Lighting, Controlling 120 Watts | 120 Watts of Lighting, Manually Controlled |
| Outdoor Motion Sensor | Lighting | Motion Sensor on Outdoor Lighting, Controlling 120 Watts | 120 Watts of Lighting, Manually Controlled |
| Ozone Laundry | Clothes Washers | Add a New, Single-Unit Ozone Laundry System to the Clothes Washer | One Clothes Washer meeting Federal Standard |
| Programmable Thermostat | Residential Space Cooling, Residential Space Heating | Standard Heating and Cooling System with Programmable Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Properly Sized CAC | Residential Space Cooling | Properly Sized Central Air Conditioning | Standard Central Air Conditioning, Oversized |
| Radiant Barrier | Residential Space Cooling | Radiant Barrier | No radiant barrier |
| Reflective Roof | Residential Space Cooling | Reflective Roof Treatment | Standard dark shingle |
| Refrigerator Coil Cleaning | Refrigerators | Refrigerator Coil Cleaning | |
| Refrigerator Recycling | Refrigerators | No Refrigerator | Current Market Average Refrigerator |
| Residential Whole House Fan | Residential Space Cooling | Standard Central Air Conditioning with Whole House Fan | Standard Central Air Conditioning, No Whole House Fan |
| Sealed crawlspace | Residential Space Cooling, Residential Space Heating | Encapsulated and semi-conditioned crawlspace | Naturally vented, unconditioned crawlspace |
| Smart Breaker | Whole Home | Smart Breaker | standard electric breakers |
| Smart Panel | Whole Home | Multi-channel device that attaches to customer's circuit breaker to enable monitoring and control of major end-use appliances by customer | standard electric panel |
| Smart Power Strip | Plug Load | Smart plug strips for entertainment centers and home office | Standard entertainment center or home office usage, no smart strip controls |
| Smart Thermostat | Residential Space Cooling, Residential Space Heating | Standard Heating and Cooling System with Smart Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Solar Attic Fan | Residential Space Cooling | Standard Central Air Conditioning with Solar Attic Fan | Standard Central Air Conditioning, No Solar Attic Fan |
| Solar Pool Heater | Residential Miscellaneous | Solar Swimming Pool Heater | Electric Resistance Swimming Pool Heater |
| Solar Powered Pool Pumps | Residential Miscellaneous | Solar Powered Pool Pump | Variable Speed Pool Pump Motor |
| Solar Thermal Water Heating System | Residential Domestic Hot Water | Solar Thermal System with Electric Backup | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Spray Foam Insulation (Base R11) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in existing (1982-1985) homes | Existing ceiling insulation based on building code at time of construction |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Spray Foam Insulation (Base R19) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in existing (1982-1985) homes | Existing ceiling insulation based on building code at time of construction |
| Spray Foam Insulation (Base R2) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in older (pre-1982) homes | Existing ceiling insulation based on building code at time of construction |
| Spray Foam Insulation (Base R30) | Residential Space Cooling, Residential Space Heating | Open cell spray foam along roofline in existing (1986-2020) homes | Existing ceiling insulation based on building code at time of construction |
| Thermostatic Shower Restriction Valve | Residential Domestic Hot Water | 50 Gallon Electric Resistance Heater and Thermostatic Shower Valves | 50 Gallon Electric Resistance Heater and Standard Shower Valves |
| Variable Refrigerant Flow (VRF) HVAC Systems | Residential Space Cooling, Residential Space Heating | Variable Refrigerant Flow (VRF) HVAC Systems | Code-Compliant ASHP, 15 SEER, 8.8 HSPF |
| Water Heater Blanket | Residential Domestic Hot Water | 50 Gallon Electric Resistance Water Heater with Insulated Tank Wrap | Code-Compliant 50 Gallon Electric Resistance Water Heater, No Tank Wrap |
| Water Heater Thermostat Setback | Residential Domestic Hot Water | 50 Gallon Electric Resistance Water Heater with Temperature Setpoint of 119°F | Code-Compliant 50 Gallon Electric Resistance Water Heater (Temp. Setpoint = 130Â°F) |
| Water Heater Timeclock | Residential Domestic Hot Water | Water Heater Timeclock | Existing Water Heater without time clock |
| Weather stripping | Residential Space Cooling, Residential Space Heating | Specific quantity of weather stripping to seal | |
| Window Caulking | Residential Space Cooling, Residential Space Heating | Window caulking | |
| Window Sun Protection | Residential Space Cooling | Window Film Applied to Standard Window | Standard Window with below Code Required Minimum SHGC |

Table 2: Commercial EE Measures

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| 1.5HP Open Drip-Proof (ODP) Motor | Ventilation and Circulation | High Efficiency 1.5 HP Open-Drip Proof Motor | 1.5HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 10HP Open Drip-Proof (ODP) Motor | Ventilation and Circulation | High Efficiency 10 HP Open-Drip Proof Motor | 10HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 20HP Open Drip-Proof (ODP) Motor | Ventilation and Circulation | High Efficiency 20 HP Open-Drip Proof Motor | 20HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| Advanced Rooftop Controller | Ventilation and Circulation | Advanced Rooftop Controller | Without Advanced Rooftop Controller |
| Air Compressor Optimization | Miscellaneous | Performing Routine Maintenance on 20HP Inlet Modulation Fixed-Speed Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Air Curtains | Space Cooling, Space Heating | Air Curtain across door opening | Door opening with no air curtain |
| Airside Economizer | Space Cooling | Airside Economizer | No economizer |
| Anti-Sweat Controls | Refrigeration | One Medium Temperature Reach-In Case with Anti-Sweat Heater Controls | One Medium Temperature Reach-In Case without Anti-Sweat Heater Controls |
| Auto Off Time Switch | Interior Lighting | Auto-Off Time Switch on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Automatic Door Closer for Walk-in Coolers and Freezers | Refrigeration | One Medium Temperature Walk-In Refrigerator Door with Auto-Closer | One Medium Temperature Walk-In Refrigerator Door without Auto-Closer |
| Beverage Vending Machine Controls | Refrigeration | One non-ENERGY STAR beverage vending machine equipped with infrared occupancy sensing controls | One non-ENERGY STAR beverage vending machine, no controls |
| Bi-Level Lighting Control (Exterior) | Exterior Lighting | Bi-Level Controls on Exterior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Bi-Level Lighting Control (Interior) | Interior Lighting | Bi-Level Controls on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Ceiling Insulation (R19 to R30) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation (R19 to R38) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation (R19 to R49) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic - Beyond Code | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation (R2 to R30) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation (R2 to R38) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Ceiling Insulation (R2 to R49) | Space Cooling, Space Heating | Blown-in insulation in ceiling cavity/attic - Beyond Code | Market Average Existing Ceiling Insulation in older steep slope, residential style commercial building |
| Chilled Water Reset | Space Cooling | One Chiller with Reset of Chilled Water Temperature Setpoint | One Chiller with Fixed Chilled Water Temperature |
| Chiller maintenance | Space Cooling | O&M improvements to restore chiller performance | |
| CO Sensors for Parking Garage Exhaust | Miscellaneous | Enclosed Parking Garage Exhaust with CO Control | Constant Volume Enclosed Parking Garage Exhaust |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Commercial Duct Sealing | Space Cooling, Space Heating | Standard Electric Heating and Central AC with Improved Duct Sealing | Standard Electric Heating and Central AC, Standard Duct Sealing |
| Commercial Strategic Energy Management | Whole Building | Commercial Strategic Energy Management | No active energy management |
| Custom measure - Non-lighting | Space Cooling, Space Heating | Custom Improvement to Facility's Operations | Baseline Technology/Process |
| Data Center Hot Cold Aisle | Office Equipment | Equipment configuration that saves HVAC | No hot, cold aisle containment |
| Dedicated Outside Air System (DOAS) | Space Cooling, Space Heating | Install Dedicated Outside Air System (DOAS) | Typical HVAC by Building Type |
| Demand Controlled Circulating Systems | Domestic Hot Water | Recirculation Pump with Demand Control Mechanism | Uncontrolled Recirculation Pump |
| Demand Controlled Ventilation | Ventilation and Circulation | Return Air System with CO2 Sensors | Standard Return Air System, No Sensors |
| Demand Defrost | Refrigeration | Walk-In Freezer System with Demand-Controlled Electric Defrost Cycle | Walk-In Freezer System with Timer-Controlled Electric Defrost Cycle |
| Destratification Fans | Space Heating | Destratification Fans improve temperature distribution by circulating warmer air from the ceiling back down to the floor level | No destratification fan |
| Door Gasket (Cooler) | Refrigeration | New Door Gasket on One-Door Medium Temperature Reach-In Case | Worn or Damaged Door Gasket on One-Door Medium Temperature Reach-In Case |
| Door Gasket (Freezer) | Refrigeration | New Door Gasket on One-Door Medium Temperature Reach-In Case | Worn or Damaged Door Gasket on One-Door Medium Temperature Reach-In Case |
| Drain water heat recovery | Domestic Hot Water | Hot Water Loop with 50 Gallon Electric Resistance Heater and Drain Water Heat Exchanger | Standard Hot Water Loop with 50 Gallon Electric Resistance Heater, No Drain Water Heat Recovery |
| Dual Enthalpy Economizer | Ventilation and Circulation | Standard HVAC Unit with an economizer and dual enthalpy differential control | HVAC unit with no economizer or with a non-functional disabled economizer |
| Duct Insulation | Space Cooling, Space Heating | Standard Electric Heating and Central AC with Insulated Ductwork (R-8) | Standard Electric Heating and Central AC with Uninsulated Ductwork (R-4) |
| Ductless Mini-Split AC | Space Cooling | Ductless Mini-Split AC, 4 Ton, 16 SEER | Code-Compliant AC Unit, 4 Ton, 15 SEER |
| Ductless Mini-Split HP | Space Cooling, Space Heating | Ductless Mini-Split HP, 17 SEER, 9.5 HSPF | Code-Compliant ASHP, 15 SEER, 8.8 HSPF |
| DX Coil Cleaning | Space Cooling | DX Coil Cleaning | DX Coil Not Cleaned |
| ECM Motors on Furnaces | Space Heating | Variable Speed Electronically Commutated Motor for an Electric Furnace | Permanent Split Capacitor Motor for Electric Furnace |
| Efficient Battery Charger | Miscellaneous | Efficient Battery Charger | FR or SCR charging stations with power conversion efficiency < 89% or > 10 W |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Efficient Exhaust Hood | Cooking | Kitchen ventilation with automatically adjusting fan controls | Kitchen ventilation with constant speed ventilation motor |
| Efficient Motor Belts | Miscellaneous | Synchronous belt, 98% efficiency | Standard V-belt drive |
| Efficient New Construction Lighting | Interior Lighting | Efficient New Construction Lighting, 15% Better than Code | New Construction with Lighting Power Density meeting Code Minimum |
| Energy Recovery Ventilation System (ERV) | Space Cooling | Unitary Cooling Equipment that Incorporates Energy Recovery | Current Market Packaged or Split DX Unit |
| Energy Star Combination Oven | Cooking | Energy Star Combination Oven meeting ENERGY STAR Version 3.0 Standards | One Standard Economy-Grade 10-Pan Combination Oven |
| Energy Star Commercial Clothes Washer | Miscellaneous | One Commercial Clothes Washer meeting current ENERGY STAR Version 8.1 Standards | One Commercial Clothes Washer meeting Federal Standard |
| Energy Star Commercial Dishwasher | Domestic Hot Water | One Commercial Dishwasher meeting ENERGY STAR Version 3.0 Standards | One Dishwasher meeting Federal Standard |
| Energy Star Commercial Glass Door Freezer | Refrigeration | One Glass Door Freezer meeting ENERGY STAR Version 5.0 Standards | One Glass Door Freezer meeting Federal Standards |
| Energy Star Commercial Glass Door Refrigerator | Refrigeration | One Glass Door Refrigerator meeting ENERGY STAR Version 5.0 Standards | One Glass Door Refrigerator meeting Federal Standards |
| Energy Star Commercial Solid Door Freezer | Refrigeration | One Solid Door Freezer meeting ENERGY STAR Version 5.0 Standards | One Solid Door Freezer meeting Federal Standards |
| Energy Star Commercial Solid Door Refrigerator | Refrigeration | One Solid Door Refrigerator meeting ENERGY STAR Version 5.0 Standards | One Solid Door Refrigerator meeting Federal Standards |
| Energy Star convection oven | Cooking | Energy Star convection oven meeting ENERGY STAR Version 3.0 Standards | One Standard Economy-Grade Full-Size Convection Oven |
| Energy Star EV Chargers | Miscellaneous | Level 2 Electric Vehicle Supply Equipment (EVSE) | Level 1 Electric Vehicle Supply Equipment (EVSE) |
| Energy Star Fryer | Cooking | One Standard Vat Electric Fryer meeting ENERGY STAR Version 3.0 Standards | One Standard Economy-Grade Standard Vat Electric Fryer |
| Energy Star Griddle | Cooking | One Griddle meeting current ENERGY STAR Version 1.2 Standards | One Conventional Griddle |
| Energy Star Hot Food Holding Cabinet | Cooking | One Hot Food Holding Cabinet meeting current ENERGY STAR Version 2.0 Standards | One Standard Hot Food Holding Cabinet |
| Energy Star Ice Maker | Refrigeration | One Continuous Self-Contained Ice Maker meeting ENERGY STAR Version 3.0 Standards | One Continuous Self-Contained Ice Maker meeting Federal Standard |
| ENERGY STAR Imaging Equipment | Office Equipment | One imaging device meeting current ENERGY STAR Standards | One non-ENERGY STAR imaging device |
| Energy Star LED Directional Lamp | Interior Lighting | Energy Star 7.6W Directional LED lamp | 50W Incandescent lamp |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Energy Star Monitors | Office Equipment | One Monitor meeting ENERGY STAR 8.0 Standards | One Standard Monitor |
| Energy Star PCs | Office Equipment | One Personal Computer (desktop or laptop) meeting current ENERGY STARÂ® Standards | One non-ENERGY STARÂ® Personal Computer |
| Energy Star room AC | Space Cooling | Room AC meeting current ENERGY STAR standards | Code-Compliant Room AC, 1 Ton, 10.9 CEER |
| Energy Star Servers | Office Equipment | One Server meeting ENERGY STAR 2.0 Standards | One Standard Server |
| Energy Star Steamer | Cooking | One 4-Pan Electric Steamer meeting ENERGY STARÂ® 2.0 Standards | One Standard Economy-Grade 4-Pan Steamer |
| Energy Star Uninterruptable Power Supply | Office Equipment | Standard Desktop Plugged into Energy Star Uninterruptable Power Supply at 25% Load | Standard Desktop Plugged into Average Rotary Uninterruptable Power Supply at 25% Load |
| Energy Star Vending Machine | Refrigeration | One Refrigerated Vending Machine meeting ENERGY STAR Version 4.0 Standards | One Refrigerated Vending Machine meeting ENERGY STARÂ® 1.0 Standards |
| ENERGY STAR Water Cooler | Miscellaneous | One Storage Type Hot/Cold Water Cooler Unit meeting ENERGY STAR Version 3.0 Standards | One Standard Storage Type Hot/Cold Water Cooler Unit |
| Energy Star windows | Space Cooling, Space Heating | 100ft2 of Window meeting Energy Star Version 6.0 Requirements (U-Value: 0.27, SHGC: 0.21) | 100ft2 of Window meeting Energy Star Version 5.0 Requirements (U-Value: 0.3, SHGC: 0.3) |
| Engine Block Timer | Miscellaneous | Plug-in timer that activates engine block timer to reduce unnecessary run time | Engine block heater (typically used for backup generators) running continuously |
| Escalator Motor Efficiency Controller | Miscellaneous | Install Escalator Motor Efficiency Controller | Escalator without Motor Efficiency Controller |
| Facility Commissioning | Space Cooling, Space Heating, Ventilation and Circulation | Perform facility commissioning to optimize building operations in new facilities | Standard new construction facility with no commissioning |
| Facility Energy Management System | Space Cooling, Space Heating, Ventilation and Circulation | Typical HVAC by Building Type Controlled by Energy Management System | Standard/manual facility equipment controls |
| Faucet Aerator | Domestic Hot Water | Low-flow lavatory faucet aerator, flow rate: 1.0 gpm | Federal lavatory flow rate standard, 1994, flow rate: 2.2 gpm |
| Floating Head Pressure Controls | Refrigeration | Medium-Temperature Refrigeration System with 5HP Compressor and Adjustable Condenser Head Pressure Control Valve | Medium-Temperature Refrigeration System with 5 HP Compressor without Adjustable Condenser Head Pressure Control Valve |
| Floor Insulation | Space Cooling, Space Heating | Increased Floor Insulation (R-19) | Market Average Existing Floor Insulation |
| Geothermal Heat Pump | Space Cooling, Space Heating | Geothermal Heat Pump | Code-Compliant Air Source Heat Pump |
| Green roof | Space Cooling, Space Heating | Vegetated Roof Surface on top of Standard Roof | Standard Black Roof |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| HE Air Cooled Chiller - All Compressor Types - 100 Tons | Space Cooling | HE Air Cooled Chiller - Air Compressor Types - 100 Tons | Code-Compliant Air Cooled Positive Displacement Chiller, 100 Tons |
| HE DX 11.25-20.0 Tons Elec Heat | Space Cooling, Space Heating | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 11.25-20.0 Tons Other Heat | Space Cooling | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Elect Heat | Space Cooling, Space Heating | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Other Heat | Space Cooling | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX Less than 5.4 Tons Elect Heat | Space Cooling, Space Heating | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE DX Less than 5.4 Tons Other Heat | Space Cooling | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE Water Cooled Chiller - Centrifugal Compressor - 200 Tons | Space Cooling | Water Cooled Centrifugal Chiller with Integral VFD, 200 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 200 Tons |
| HE Water Cooled Chiller - Centrifugal Compressor - 500 Tons | Space Cooling | Water Cooled Centrifugal Chiller with Integral VFD, 500 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 500 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 175 Tons | Space Cooling | Water Cooled Positive Displacement Chiller with Integral VFD, 175 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 175 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 50 Tons | Space Cooling | Water Cooled Positive Displacement Chiller with Integral VFD, 50 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 50 Tons |
| Heat Pump Pool Heater Commercial | Miscellaneous | High Efficiency Pool Heater Eff. >=84% | Standard Efficiency Pool Heater 78% Eff. |
| Heat Pump Water Heater | Domestic Hot Water | Efficient 50 Gallon Electric Heat Pump Water Heater | Code-Compliant 50 Gallon Electric Heat Pump Water Heater |
| High Efficiency Air Compressor | Miscellaneous | 20 HP VFD Air Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| High Efficiency Data Center Cooling | Space Cooling | High Efficiency CRAC (computer room air conditioner) | Standard Efficiency CRAC |
| High Efficiency PTAC | Space Cooling | High Efficiency PTAC | Code-Compliant PTAC |
| High Efficiency PTHP | Space Cooling, Space Heating | High Efficiency PTHP | Code-Compliant PTHP |
| High Efficiency Refrigeration Compressor_Discus | Refrigeration | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Efficiency Refrigeration Compressor_Scroll | Refrigeration | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Speed Fans | Ventilation and Circulation | High Speed Fan, 24" - 35" Blade Diameter | Standard Speed Fan, 24" - 35" Blade Diameter |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Hot water pipe insulation | Domestic Hot Water | 1' of Insulated Pipe in Unconditioned Spaces, Insulation of R-4 | 1' of Pipe in Unconditioned Spaces with Code Minimum of 1"of Insulation |
| Hotel Card Energy Control Systems | Space Cooling, Space Heating | Guest Room HVAC Unit Controlled by Hotel-Key-Card Activated Energy Control System | Guest Room HVAC Unit, Manually Controlled by Guest |
| Indoor daylight sensor | Interior Lighting | Install Indoor Daylight Sensors, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Induction Cooktops | Cooking | Efficient Induction Cooktop | One Standard Electric Cooktop |
| Infiltration Reduction - Air Sealing | Space Cooling, Space Heating | Reduced leakage through caulking, weather-stripping | Standard Heating and Cooling System with Moderate Infiltration |
| Instantaneous Hot Water System Commercial | Domestic Hot Water | Instantaneous Hot Water System | Code-Compliant Electric Storage Water Heater |
| LED - 14W_CFL Baseline | Interior Lighting | LED (assume 14W) replacing CFL | 100W equivalent CFL |
| LED - 9W Flood_CFL Baseline | Exterior Lighting | LED (assume 9W) replacing CFL | 14W CFL |
| LED Canopy Lighting (Exterior) | Exterior Lighting | One 67.2W LED Canopy Light | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED Display Lighting (Exterior) | Exterior Lighting | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED Display Lighting (Interior) | Interior Lighting | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED Exit Sign | Interior Lighting | One 5W Single-Sided LED Exit Sign | One 9W Single-Sided CFL Exit Sign |
| LED Exterior Wall Packs | Exterior Lighting | One 35W LED Wall Pack | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED High Bay_HID Baseline | Interior Lighting | One 140W High Bay LED Fixture | Lumen-Equivalent HID High Bay Fixture |
| LED High Bay_LF Baseline | Interior Lighting | One 140W High Bay LED Fixture | Lumen-Equivalent Linear Fluorescent High Bay Fixture |
| LED Linear - Fixture Replacement | Interior Lighting | 2x4 LED Troffer | Lumen-Equivalent 32-Watt T8 Lamp |
| LED Linear - Lamp Replacement | Interior Lighting | Linear LED (16W) | Lumen-Equivalent 32-Watt T8 Lamp |
| LED Parking Lighting | Exterior Lighting | One 160W LED Area Light | Average Lumen Equivalent Exterior HID Area Lighting |
| LEED New Construction Whole Building | Space Cooling, Space Heating | LEED New Construction Whole Building | Comparable facility, code-compliance construction |
| Light Tube | Interior Lighting | One 14" Light Tube, Delivering light to 250 S.F. of Commercial Space | 250 S.F. of Commercial Space Lit by Typical Lighting Strategies |
| Low Flow Shower Head | Domestic Hot Water | Low-Flow Handheld Showerhead, Flow Rate: 1.50 gpm | Standard Handheld Showerhead, Flow Rate: 2.50 gpm |
| Low-Flow Pre-Rinse Sprayers | Domestic Hot Water | Low-Flow Pre-Rinse Sprayer with Flow Rate of 1.6 gpm | Pre-Rinse Sprayer with Federal Standard Flow Rate of 2.25 gpm |
| Network PC Power Management | Office Equipment | One computer and monitor attached to centralized energy | One computer and monitor, manually controlled |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| | | management system that controls when desktop computers and monitors plugged into a n | |
| Networked Lighting Controls | Interior Lighting | Install Networked Lighting Controls System on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Controlled either Manually or by Sensor as Specified by Code |
| Night Covers for Display Cases | Refrigeration | One Open Vertical Case with Night Covers | One Existing Open Vertical Case, No Night Covers |
| Occupancy Sensors, Ceiling Mounted | Interior Lighting | Ceiling Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Occupancy Sensors, Switch Mounted | Interior Lighting | Switch Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor Lighting Controls | Exterior Lighting | Install Exterior Photocell Dimming Controls, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor motion sensor | Exterior Lighting | Install Exterior Motion Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Ozone Laundry Commercial | Miscellaneous | Add a new ozone laundry system onto a commercial clothes washer | One commercial clothes washer without ozone laundry system |
| Programmable thermostat | Space Cooling, Space Heating | Pre-set programmable thermostat that replaces manual thermostat | Standard Heating and Cooling System with Manual Thermostat |
| PSC to ECM Evaporator Fan Motor (Reach-In) | Refrigeration | Medium Temperature Reach-In Case with equivalent size Electronically Commutated Evaporator Fan Motor | Medium Temperature Reach-In Case with Permanent Split Capacitor Evaporator Fan Motor |
| PSC to ECM Evaporator Fan Motor (Walk-In, Refrigerator) | Refrigeration | Medium Temperature Walk-In Case with Electronically Commutated Evaporator Fan Motor | Medium Temperature Walk-In Case with Permanent Split Capacitor Evaporator Fan Motor |
| Q-Sync Evaporator Fan Motor | Refrigeration | Medium Temperature Reach-In Case with equivalent size Q-Sync Evaporator Fan Motor | Medium Temperature Reach-In Case with 20W Permanent Split Capacitor Fan Motor |
| Reflective Roof Treatment | Space Cooling | Reflective Roof Treatment | Standard Black Roof |
| Refrigerated Display Case LED Lighting | Refrigeration | 60" Refrigerated Case LED Strip | Lumen-Equivalent 32-Watt T8 Fixture |
| Refrigerated Display Case Lighting Controls | Refrigeration | Occupancy Sensors for Refrigerated Case Lighting to reduce run time | Market-Share Weighted Existing Linear Fluorescent Fixture |
| Refrigeration Commissioning | Refrigeration | Commissioned Refrigeration System | Non-Commissioned Refrigeration System |
| Refrigeration Economizer | Refrigeration | Walk-in refrigerator with economizer | Walk-in refrigerator without economizer |
| Regenerative Drive Elevator Motor | Miscellaneous | Regenerative drive produced energy when motor in overhaul condition | Standard motor |
| Retro-Commissioning (Existing Construction) | Space Cooling, Space Heating, Ventilation and Circulation | Perform facility retro-commissioning, including assessment, process improvements, and optimization of energy-consuming equipment and systems | |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Roof Insulation | Space Cooling, Space Heating | Roof Insulation (built-up roof applicable to flat/low slope roofs) | Code-Compliant Flat Roof |
| Server Virtualization | Office Equipment | 2 Virtual Host Server | 20 Single Application Servers |
| Smart Strip Plug Outlet | Office Equipment | One Smart Strip Plug Outlet | One Standard plug strip/outlet |
| Smart thermostat | Space Cooling, Space Heating | Thermostats that include "smart" features such as occupancy sensors, geo-fencing, multi-zone sensors | Standard Heating and Cooling System with Manual Thermostat |
| Solar Pool Heater Commercial | Miscellaneous | Solar Swimming Pool Heater | Electric Resistance Swimming Pool Heater |
| Solar Powered Pool Pump | Miscellaneous | Solar Powered Pool Pump Motor | Variable Speed Pool Pump Motor |
| Solar Thermal Water Heating System Commercial | Domestic Hot Water | Solar Thermal System with Electric Backup | Code-Compliant 50 Gallon Electric Resistance Water Heater |
| Strip Curtains - Freezers | Refrigeration | Walk-in freezer with strip curtains at least 0.06 inches thick covering the entire area of the doorway | Walk-in freezer without strip curtains |
| Strip Curtains - Refrigerators | Refrigeration | Walk-in cooler with strip curtains at least 0.06 inches thick covering the entire area of the doorway | Walk-in cooler without strip curtains |
| Suction Pipe Insulation - Freezers | Refrigeration | Suction Pipe Insulation - Freezers | Uninsulated freezer suction lines |
| Suction Pipe Insulation - Refrigerators | Refrigeration | Suction Pipe Insulation - Refrigerators | Uninsulated refrigeration suction lines |
| Thermal Energy Storage | Space Cooling | Deploy thermal energy storage technology (ice harvester, etc.) to shift load | Code compliant chiller |
| Thermostatic Shower Restriction Valve Commercial | Domestic Hot Water | Hot Water Loop with 50 Gallon Electric Resistance Heater and Pressure Balance Shower Valves | Standard Hot Water Loop with 50 Gallon Electric Resistance Heater and Standard Shower Valves |
| Time Clock Control | Interior Lighting | Time Clock Controlled Lighting, 500 Watts Controlled | 500 Watts of Lighting, Controlled either Manually or by Sensor as Specified by Code |
| Variable Refrigerant Flow (VRF) HVAC Systems | Space Cooling, Space Heating | Variable Refrigerant Flow (VRF) HVAC Systems | Code-Compliant PTHP |
| VAV System | Ventilation and Circulation | Variable Air Volume Distribution System | Constant Air Volume Distribution System |
| VFD on Cooling Tower Fans | Space Cooling | Cooling Tower Fans with VFD Control | Cooling Tower Fans without VFD Control |
| VFD on HVAC Pump | Space Cooling, Space Heating | VFD on HVAC Pump | 7.5 HP HVAC Pump Motor, no VFD Control |
| VSD Controlled Compressor | Refrigeration | Refrigeration System with VSD Control | Refrigeration System with Standard Slide-Valve Control System |
| Wall Insulation | Space Cooling, Space Heating | Increased Exterior Above-Grade Wall Insulation | Market Average Existing Exterior Above-Grade Wall Insulation |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Warehouse Loading Dock Seals | Space Cooling, Space Heating | Seals to reduce infiltration losses at loading dock | Loading dock with no seals |
| Water Cooled Refrigeration Heat Recovery | Domestic Hot Water | The heat reclaim system transfers waste heat from refrigeration system to space heating or hot water | No heat recovery |
| Water Heater Setback | Domestic Hot Water | A 50 gallon electric hot water tank with a thermostat setting reduced to no lower than 120 degrees. | A 50 gallon electric hot water tank with a thermostat setting that is higher than 120 degrees, typically hot water tanks with settings of 130 degrees or higher. |
| Water source heat pump | Space Cooling, Space Heating | Water Source Heat Pump, 2.5 Tons, 17.4 EER, 4.4 COP | Code-Compliant ASHP |
| Waterside Economizer | Space Cooling | Waterside Economizer | No economizer |
| Window shade film | Space Cooling | Window Film with SHGC of 0.35 Applied to Standard Window | Standard Window with below Code Required Minimum SHGC |
| Zero Energy Doors | Refrigeration | Install zero energy doors for a reach-in refrigerated cooler or freezer | Standard vertical reach-in refrigerated cooler or freezer with anti-sweat heaters on the glass surface of the doors |

Table 3: Industrial EE Measures

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| 1.5HP Open Drip-Proof (ODP) Motor | Motors Pumps | High Efficiency 1.5 HP Open-Drip Proof Motor | 1.5HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 10HP Open Drip-Proof (ODP) Motor | Motors Pumps | High Efficiency 10 HP Open-Drip Proof Motor | 10HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 20HP Open Drip-Proof (ODP) Motor | Motors Pumps | High Efficiency 20 HP Open-Drip Proof Motor | 20HP Open-Drip Proof Motor with Current Minimum EPACT Efficiency |
| 3-phase High Frequency Battery Charger - 1 shift | Other | 3-phase High Frequency Battery Charger | Standard Charger |
| Advanced Rooftop Controller | HVAC | Advanced Rooftop Controller | Without Advanced Rooftop Controller |
| Air Compressor Optimization | Compressed Air | Performing Routine Maintenance on 20HP Inlet Modulation Fixed-Speed Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| Air curtains | HVAC | Air Curtain across door opening | Door opening with no air curtain |
| Airside economizer | HVAC | Airside Economizer | No economizer |
| Auto Closer on Refrigerator Door | Process Cooling | One Medium Temperature Walk-In Refrigerator Door with Auto-Closer | One Medium Temperature Walk-In Refrigerator Door without Auto-Closer |
| Auto Off Time Switch | Interior Lighting High Bay | Auto-Off Time Switch on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Bi-Level Lighting Control (Exterior) | Exterior Lighting Industrial | Install Exterior Bi-Level Lighting Control, 500 Watts Controlled | 500 Watts of Lighting, No Dim Setting |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Bi-Level Lighting Control (Interior) | Interior Lighting High Bay | Bi-Level Controls on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, No Dim Setting |
| Chilled Water Reset | HVAC | One Chiller with Reset of Chilled Water Temperature Setpoint | One Chiller with Fixed Chilled Water Temperature |
| Cogged Belt on 15hp ODP Motor | Motors Pumps | 15HP ODP Motor with Cogged Belts Installed on Supply and/or Return Air Fans | 15HP ODP Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Cogged Belt on 40hp ODP Motor | Motors Pumps | 40HP ODP Motor with Cogged Belts Installed on Supply and/or Return Air Fans | 40HP ODP Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Compressed Air Desiccant Dryer | Process Specific | heated regenerative desiccant dryer without dew point demand controls | heatless regenerative desiccant dryer without dew point demand controls |
| Compressed Air No-Loss Condensate Drains | Process Specific | Install no-loss condensate drains | Install standard condensate drains |
| Compressed Air Storage Tank | Compressed Air | 20 HP Inlet Modulation Fixed-Speed Compressor with Receiver Tank | 20 HP Inlet Modulation Fixed-Speed Compressor, No Receiver Tank |
| Custom Measure - Non-Lighting | HVAC | Custom Improvement to Facility's Operations | Baseline Technology/Process |
| Dairy Refrigeration Heat Recovery | Other | refrigeration equipment with refrigeration heat recovery tank installed | existing dairy farm with refrigeration equipment and a water heater unit without an RHR unit |
| Dedicated Outside Air System (DOAS) | HVAC | Install Dedicated Outside Air System (DOAS) | Typical HVAC by Building Type |
| Demand Controlled Ventilation | HVAC | Return Air System with CO2 Sensors | Standard Return Air System, No Sensors |
| Demand Defrost | Process Cooling | Walk-In Freezer System with Demand-Controlled Electric Defrost Cycle | Walk-In Freezer System with Timer-Controlled Electric Defrost Cycle |
| Dew Point Sensor Control for Dessicant CA Dryer | Compressed Air | 1000 CFM Heated Desicant Air Dryer with Dew Point Controls | 1000 CFM Modulating Heated Desicant Air Dryer |
| Drip Irrigation Nozzles | Other | Flow Control Nozzles | Standard Irrigation Nozzles |
| Dual Enthalpy Economizer | Process Cooling | Standard HVAC Unit with an economizer and dual enthalpy differential control | HVAC unit with no economizer or with a non-functional disabled economizer |
| DX Coil Cleaning | HVAC | DX Coil Cleaning | DX Coil Not Cleaned |
| Efficient Compressed Air Nozzles | Compressed Air | 1/4" Engineered Air Nozzle | 1/4" Open-End Air Nozzle |
| Efficient New Construction Lighting | Interior Lighting High Bay | Efficient New Construction Lighting, 15% Better than Code | New Construction with Lighting Power Density meeting Code Minimum |
| Electric Actuators | Other | Electric Actuator | Pneumatic Actuator |
| Energy Efficient Laboratory Fume Hood | HVAC | Variable Air Volume High Performance Fume Hood | Constant Volume Conventional Bypass Fume Hood |
| Energy Efficient Transformers | Other | Energy Efficient Dry Type Transformer (CSL-3) | Standard Transformer (TP-1) |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Energy Recovery Ventilation System | HVAC | Unitary Cooling Equipment that Incorporates Energy Recovery | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11.2 EER |
| Energy Star LED Directional Lamp | Interior Lighting Other | Energy Star 7.6W Directional LED lamp | 50W Incandescent lamp |
| Energy Star room ac | HVAC | Room AC meeting current ENERGY STAR standards | Code-Compliant Room AC |
| Energy Star windows | HVAC | 100ft2 of Window meeting Energy Star Version 6.0 Requirements (U-Value: 0.27, SHGC: 0.21) | 100ft2 of Window meeting Energy Star Version 5.0 Requirements (U-Value: 0.3, SHGC: 0.3) |
| Engine Block Timer | Other | An engine block heater operated by an outdoor plug-in timer | An engine block heater that is manually plugged in |
| Facility Commissioning | HVAC | Perform facility commissioning | Comparable facility, no commissioning |
| Facility Energy Management System | HVAC | Typical HVAC by Building Type Controlled by Energy Management System | Typical HVAC by Building Type, Manually Controlled |
| Fan Thermostat Controller | HVAC | Typical HVAC by Building Type with Fan Thermostat Controller Installed | Typical HVAC by Building Type with Programmable Thermostat |
| Floating Head Pressure Controller | Process Cooling | Medium-Temperature Refrigeration System with 5HP Compressor and Adjustable Condenser Head Pressure Control Valve | Medium-Temperature Refrigeration System with 5 HP Compressor without Adjustable Condenser Head Pressure Control Valve |
| Grain Bin Aeration Control System | Process Specific | Grain Storage Fan System with Automatic Controls | Grain Storage Fan System with Manual Controls |
| HE Air Cooled Chiller - All Compressor Types - 100 Tons | HVAC | HE Air Cooled Chiller - All Compressor Types - 100 Tons | Code-Compliant Air Cooled Positive Displacement Chiller, 100 Tons |
| HE Air Cooled Chiller - All Compressor Types - 300 Tons | HVAC | Air Cooled Positive Displacement Chiller with Integral VFD, 300 Tons, 13.7 EER | Code-Compliant Air Cooled Positive Displacement Chiller, 300 Tons, 12.5 EER |
| HE DX 11.25-20.0 Tons Elec Heat | HVAC | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 11.25-20.0 Tons Other Heat | HVAC | High Efficiency Packaged or Split DX Unit, 15 Tons, 11.5 SEER | Code-Compliant Packaged or Split DX Unit, 15 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Elect Heat | HVAC | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX 5.4-11.25 Tons Other Heat | HVAC | High Efficiency Packaged or Split DX Unit, 7.5 Tons, 12 SEER | Code-Compliant Packaged or Split DX Unit, 7.5 Tons, 11 SEER |
| HE DX Less than 5.4 Tons Elect Heat | HVAC | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE DX Less than 5.4 Tons Other Heat | HVAC | High Efficiency Packaged or Split DX Unit, 5 Tons, 14.5 SEER | Code-Compliant Packaged or Split DX Unit, 5 Tons, 13 SEER |
| HE Water Cooled Chiller - Centrifugal Compressor - 200 Tons | HVAC | Water Cooled Centrifugal Chiller with Integral VFD, 200 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 200 Tons |
| HE Water Cooled Chiller - Centrifugal Compressor - 500 Tons | HVAC | Water Cooled Centrifugal Chiller with Integral VFD, 500 Tons | Code-Compliant Water Cooled Centrifugal Chiller, 500 Tons |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| HE Water Cooled Chiller - Rotary or Screw Compressor - 175 Tons | HVAC | Water Cooled Positive Displacement Chiller with Integral VFD, 175 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 175 Tons |
| HE Water Cooled Chiller - Rotary or Screw Compressor - 50 Tons | HVAC | Water Cooled Positive Displacement Chiller with Integral VFD, 50 Tons | Code-Compliant Water Cooled Positive Displacement Chiller, 50 Tons |
| High Bay Occupancy Sensors, Ceiling Mounted | Interior Lighting High Bay | Ceiling Mounted Occupancy Sensor, 800 Watts Controlled | 800 Watts of Lighting, Manually Controlled |
| High Efficiency Air Compressor | Compressed Air | 20 HP VFD Air Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| High Efficiency Refrigeration Compressor - Discus | Process Cooling | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Efficiency Refrigeration Compressor - Scroll | Process Cooling | High Efficiency Refrigeration Compressors | Standard Compressor |
| High Efficiency Welder | Process Specific | High Efficiency Welder | Standard Welding Practices |
| High Speed Fans | HVAC | High Speed Fan, 24" - 35" Blade Diameter | Standard Speed Fan, 24" - 35" Blade Diameter |
| High Volume Low Speed Fan (HVLS) | Motors Fans Blowers | 20' High Volume Low Speed Fan | Conventional Circulating Fan |
| Indoor Agriculture - LED Grow Lights | Interior Lighting High Bay | LED grow light | 1000W High Pressure Sodium |
| Indoor daylight sensor | Interior Lighting High Bay | Install Indoor Daylight Sensors, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Industrial Duct Sealing | HVAC | Standard Electric Heating and Central AC with Improved Duct Sealing | Standard Electric Heating and Central AC, Standard Duct Sealing |
| Injection Mold and Extruder Barrel Wraps | Other | 2' Diameter, 20' Long Machine Barrel with 1" Insulation | 2' Diameter, 20' Long Machine Barrel with no Insulation |
| Insulated Pellet Dryer Tanks and Ducts | Process Heating | Insulation for Pellet Tank and Duct | Uninsulated Pellet Tank and Duct |
| LED - 14W_CFL Baseline | Interior Lighting Other | LED (assume 14W) replacing CFL | 100W equivalent CFL |
| LED Canopy Lighting (Exterior) | Exterior Lighting Industrial | One 67.2W LED Canopy Light | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED Display Lighting (Exterior) | Exterior Lighting Industrial | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED Display Lighting (Interior) | Interior Lighting Other | One Letter of LED Signage, < 2ft in Height | One Letter of Neon or Argon-mercury Signage, < 2ft in Height |
| LED exit sign | Interior Lighting Other | One 5W Single-Sided LED Exit Sign | One 9W Single-Sided CFL Exit Sign |
| LED Exterior Wall Packs | Exterior Lighting Industrial | One 35W LED Wall Pack | Average Lumen Equivalent Exterior Incandescent Area Lighting |
| LED High Bay_HID Baseline | Interior Lighting High Bay | One 140W High Bay LED Fixture | Lumen-Equivalent HID High Bay Fixture |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| LED High Bay_LF Baseline | Interior Lighting High Bay | One 140W High Bay LED Fixture | Lumen-Equivalent Linear Fluorescent High Bay Fixture |
| LED Linear - Fixture Replacement | Interior Lighting Linear Fluorescent | 2x4 LED Troffer Fixture | Lumen-Equivalent 32-Watt T8 Fixture |
| LED Linear - Lamp Replacement | Interior Lighting Linear Fluorescent | Linear LED | Lumen-Equivalent 32-Watt T8 Lamp |
| LED Parking Lighting | Exterior Lighting Industrial | One 160W LED Area Light | Average Lumen Equivalent Exterior HID Area Lighting |
| LEED New Construction Whole Building | HVAC | LEED Qualifying New Construction | Comparable facility, code-compliance construction |
| Light Tube | Interior Lighting Other | One 14" Light Tube, Delivering light to 250 S.F. of Industrial Space | 250 S.F. of Industrial Space Lit by Typical Lighting Strategies |
| Low Energy Livestock Waterer | Motors Pumps | Install Thermostatically Controlled Livestock Watering System | Standard Livestock Watering System |
| Low Pressure Sprinkler Nozzles | Motors Pumps | Low Pressure Irrigation Nozzles operate at 35 psi or lower | Standard high pressure irrigation nozzles that operate at 50 psi or greater |
| Low Pressure-drop Filters | Compressed Air | 20 HP Inlet Modulation Fixed-Speed Compressor with Low Pressure Drop Filter | 20 HP Inlet Modulation Fixed-Speed Compressor, No Particulate Removal |
| Milk Pre-Cooler | Other | Installed pre-cooler heat exchanger | no pre-cooler heat exchanger installed |
| Networked Lighting Controls | Interior Lighting Linear Fluorescent | Install Networked Lighting Controls System on Interior Lighting, 500 Watts Controlled | 500 Watts of Lighting, Controlled either Manually or by Sensor as Specified by Code |
| Occupancy Sensors, Ceiling Mounted | Interior Lighting High Bay | Ceiling Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Occupancy sensors, switch mounted | Interior Lighting Linear Fluorescent | Switch Mounted Occupancy Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor Lighting Controls | Exterior Lighting Industrial | Install Exterior Photocell Dimming Controls, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Outdoor motion sensor | Exterior Lighting Industrial | Install Exterior Motion Sensor, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| Packaged Terminal AC | HVAC | High Efficiency Packaged Terminal AC | Code-Compliant PTAC, 10.9 EER |
| Process Cooling Ventilation Reduction | Process Cooling | Standard Process Cooling with Reduced Ventilation | Standard Process Cooling |
| Programmable thermostat | HVAC | Standard Heating and Cooling System with Programmable Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Reflective Roof Treatment | HVAC | Reflective Roof Treatment | Standard Black Roof |
| Refrigeration Commissioning | Process Cooling | Commissioned Refrigeration System | Non-Commissioned Refrigeration System |
| Retro-Commissioning (Existing Construction) | HVAC | Perform Facility Retro-commissioning | |
| Roof insulation | HVAC | Roof Insulation (built-up roof applicable to flat/low slope roofs) | Code-Compliant Flat Roof |

| Measure | End-Use | Description | Baseline |
|---|---|---|---|
| Smart thermostat | HVAC | Standard Heating and Cooling System with Smart Thermostat | Standard Heating and Cooling System with Manual Thermostat |
| Strategic Energy Management | HVAC | SEM goal setting and tracking | No active energy management |
| Synchronous Belt on 15hp ODP Motor | Motors Pumps | 15 HP Open-Drip Proof Motor with Synchronous Belts Installed on Supply and/or Return Air Fans | 15 HP Open-Drip Proof Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Synchronous Belt on 5hp ODP Motor | Motors Pumps | 5 HP Open-Drip Proof Motor with Synchronous Belts Installed on Supply and/or Return Air Fans | 5 HP Open-Drip Proof Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Synchronous Belt on 75hp ODP Motor | Motors Pumps | 75 HP Open-Drip Proof Motor with Synchronous Belts Installed on Supply and/or Return Air Fans | 75 HP Open-Drip Proof Motor with Smooth V-Belts Installed on Supply and/or Return Air Fans |
| Thermal energy storage | HVAC | Deploy thermal energy storage technology (ice harvester, etc.) to shift load | Code compliant chiller |
| Time Clock Control | Interior Lighting High Bay | Time Clock Controlled Lighting, 500 Watts Controlled | 500 Watts of Lighting, Manually Controlled |
| VAV System | HVAC | Variable Air Volume Distribution System | Constant Air Volume Distribution System |
| VFD on Air Compressor | Compressed Air | 20 HP VFD Air Compressor | 20 HP Inlet Modulation Fixed-Speed Compressor |
| VFD on Cooling Tower Fans | Process Cooling | Cooling Tower Fans with VFD Control | Cooling Tower Fans without VFD Control |
| VFD on HVAC Fan | Motors Fans Blowers | 5 HP HVAC Fan Motor, with VFD Control | 5 HP HVAC Fan Motor, no VFD Control |
| VFD on HVAC Pump | Motors Pumps | VFD on HVAC Pump | 7.5 HP HVAC Pump Motor, no VFD Control |
| VFD on process pump | Motors Pumps | 20 HP Process Pump Equipped with VFD Control | 20 HP Process Pump, Constant Speed |
| VSD Controlled Compressor | Process Cooling | Refrigeration System with VSD Control | Refrigeration System with Standard Slide-Valve Control System |
| Water source heat pump | HVAC | Water Source Heat Pump, 2.5 Tons, 17.4 EER, 4.4 COP | Code-Compliant ASHP |
| Waterside economizer | HVAC | Waterside Economizer | No economizer |
| Window shade film | HVAC | Window Film with SHGC of 0.35 Applied to Standard Window | Standard Window with below Code Required Minimum SHGC |

# DR Measure Lists

Table 4: Residential DR Measures

| Measure | Type | Season | Description |
|---|---|---|---|
| Central air conditioner - Load Shed | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central Heating - Load Shed | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central air conditioner - 50% cycling | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Central Heating - 50% cycling | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Smart thermostats - Utility Installation | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| Smart thermostats – BYOT | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| CPP + Tech | Pricing | Summer and Winter | Electricity rate that varies based on time of day. Can be same rate schedule for every day during a given season (time of use, or TOU) and with critical peak pricing (CPP) days when peak period rates are substantially higher for a limited number of days per year (customers receive advance notification of CPP event). Customers also receive technology that they can pre-program to curtail load when an event is called. |
| Water heater control | Direct load control | Summer and Winter | Load control installed on a water heater (integrated or external switch) |
| Pool pump switches | Direct load control | Summer and Winter | Load control program with switch installed on pool pump |
| Room AC | Direct load control | Summer | Load control program that is focused on room AC units rather than central AC |
| Managed EV Charging – switch | Direct load control | Summer and Winter | Load control switch that is installed on an EV charger |
| Managed EV Charging – telematics | Direct load control | Summer and Winter | Direct load control program leveraging EV smart charging software |
| Battery Storage with PV | Pricing/Direct load control | Summer and Winter | PV charges battery and battery discharges to grid |

Table 5: Small C&I DR Measures

| Measure | Type | Season | Description |
|---|---|---|---|
| Central air conditioner - Load Shed | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |

| Measure | Type | Season | Description |
|---|---|---|---|
| Central Heating - Load Shed* | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to shed AC unit load during peak usage period. |
| Central air conditioner - 50% cycling | Direct load control | Summer | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Central Heating - 50% cycling* | Direct load control | Winter | Direct load control program where utility provides day ahead notification that it will send remote signal to cycle AC unit during peak usage period |
| Smart thermostats - Utility Installation* | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| Smart thermostats – BYOT* | Direct load control | Summer and Winter | Similar to AC load control program, but allows customers to participate using a compatible smart thermostat rather than an AC switch |
| CPP + Tech | Pricing | Summer and Winter | Electricity rate that varies based on time of day. Can be same rate schedule for every day during a given season (time of use, or TOU) and with critical peak pricing (CPP) days when peak period rates are substantially higher for a limited number of days per year (customers receive advance notification of CPP event). Customers also receive technology that they can pre-program to curtail load when an event is called. |
| Managed EV Charging – switch | Direct load control | Summer and Winter | Load control switch that is installed on an EV charger |
| Managed EV Charging – telematics | Direct load control | Summer and Winter | Direct load control program leveraging EV smart charging software |
| Battery Storage with PV | Pricing/Direct load control | Summer and Winter | PV charges battery and battery discharges to grid |

Table 6: Large C&I DR Measures

| Measure | Type | Season | Description |
|---|---|---|---|
| CPP + Tech | Pricing | Summer and Winter | Electricity rate that varies based on time of day. Can be same rate schedule for every day during a given season (time of use, or TOU) and with critical peak pricing (CPP) days when peak period rates are substantially higher for a limited number of days per year (customers receive advance notification of CPP event). Customers also receive technology that they can pre-program to curtail load when an event is called. |
| Auto DR | Utility-controlled loads | Summer and Winter | Custom load control of specific end-uses/processes that is triggered by utility signal to building management system; customer can sometimes opt-out of specific events |
| Firm Service Level | Contractual | Summer and Winter | Customer commits to a maximum usage level during peak periods and, when notified by the utility, agrees to cut usage to that level. |
| Guaranteed Load Drop | Contractual | Summer and Winter | Customer agrees to reduce usage by an agreed upon amount when notified |

## DSRE Measure Lists

Table 7: Residential DSRE Measures

| Measure | Description |
|---|---|
| PV System | Roof-mounted system, including multiple panels, AC/DC inverter, racking system, and electrical system interconnections |
| Battery Storage from PV System | Lithium-ion battery system designed to integrate with an on-site PV system to store and discharge excess energy from PV generation |

Table 8: Non-Residential DSRE Measures

| Measure | Description |
|---|---|
| PV System | Roof-mounted system, including multiple panels, AC/DC inverter, racking system, and electrical system interconnections |
| Battery Storage from PV System | Lithium-ion battery system designed to integrate with an on-site PV system to store and discharge excess energy from PV generation |
| CHP – Fuel Cell | An electrochemical cell-based generator that reacts hydrogen fuel with oxygen |
| CHP – Micro Turbine | Small combustion turbine that burns gaseous or liquid fuel to drive a generator |
| CHP – Gas Turbine | A combustion turbine that burns gaseous or liquid fuel to drive a generator |
| CHP – Reciprocating Engine | An engine that uses one or more pistons to convert pressure into rotational motion |
| CHP - Steam Turbine | A turbine that extracts thermal energy from pressured steam to drive a generator |

# Exhibit JH-9
# Comparison of 2019 Measure List and 2024 Measure List

## EE Measure Lists

EE Measures Added Since 2019 Study

| Sector | Measure |
|---|---|
| Residential | CEE Advanced Tier Clothes Dryer |
| Residential | CEE Advanced Tier Clothes Washer |
| Residential | Ozone Laundry |
| Residential | Energy Star Dishwasher (Gas Water Heating) |
| Residential | Freezer Recycling |
| Residential | LED - 9W_Halogen Baseline |
| Residential | Occupancy Sensors Switch Mounted |
| Residential | Outdoor Motion Sensor |
| Residential | Dehumidifier Recycling |
| Residential | Energy Star Monitor |
| Residential | Energy Star Set-Top Receiver |
| Residential | CEE Tier 3 Refrigerator |
| Residential | Refrigerator Coil Cleaning |
| Residential | Induction Range |
| Residential | 120v Heat Pump Water Heater 50 Gallons |
| Residential | Bathroom Faucet Aerators |
| Residential | Heat Pump Water Heater 50 Gallons-ENERGY STAR |
| Residential | Heat Pump Water Heater 80 Gallons-ENERGY STAR |
| Residential | ECM Circulator Pump |
| Residential | ENERGY STAR EV supply equipment (level 2 charger) |
| Residential | HVAC Economizer |
| Residential | Properly Sized CAC |
| Residential | Residential Whole House Fan |
| Residential | Air-to-Water Heat Pump |
| Residential | ASHP - 15 SEER/14.3 SEER2 from base electric resistance |
| Residential | ASHP - CEE Advanced Tier: 17.8 SEER/17 SEER2; 10.0 HSPF (from elec resistance) |
| Residential | ASHP - CEE Tier 2: 16.8 SEER/16 SEER2; 9.0 HSPF (from elec resistance) |
| Residential | ASHP - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2 (from elect resistance) |

| Sector | Measure |
|---|---|
| Residential | ASHP - ENERGY STAR/CEE Tier 1: 16 SEER/15.2 SEER2, 9.0 HSPF |
| Residential | Ceiling Insulation (R11 to R30) |
| Residential | Ceiling Insulation (R11 to R49) |
| Residential | Ceiling Insulation (R19 to R30) |
| Residential | Ceiling Insulation (R19 to R49) |
| Residential | Ceiling Insulation (R2 to R30) |
| Residential | Ceiling Insulation (R2 to R49) |
| Residential | Ceiling Insulation (R30 to R49) |
| Residential | Ceiling Insulation (R38 to R49) |
| Residential | HVAC Zoning System |
| Residential | Weather stripping |
| Residential | Window Caulking |
| Residential | Filter Whistle |
| Residential | New Construction - Whole Home Improvements - Tier 1 |
| Residential | New Construction - Whole Home Improvements - Tier 2 |
| Residential | Smart Breaker |
| Residential | Smart Panel |
| Commercial | Energy Star convection oven |
| Commercial | Water Heater Setback |
| Commercial | LED Canopy Lighting (Exterior) |
| Commercial | Outdoor motion sensor |
| Commercial | Auto Off Time Switch |
| Commercial | Efficient New Construction Lighting |
| Commercial | Energy Star LED Directional Lamp |
| Commercial | Indoor daylight sensor |
| Commercial | LED Exit Sign |
| Commercial | LED High Bay_LF Baseline |
| Commercial | Light Tube |
| Commercial | Occupancy Sensors, Ceiling Mounted |
| Commercial | Occupancy Sensors, Switch Mounted |
| Commercial | Time Clock Control |
| Commercial | Air Compressor Optimization |
| Commercial | Energy Star EV Chargers |
| Commercial | High Efficiency Air Compressor |
| Commercial | Ozone Laundry Commercial |
| Commercial | Regenerative Drive Elevator Motor |
| Commercial | Data Center Hot Cold Aisle |

| Sector | Measure |
|---|---|
| Commercial | Energy Star Monitors |
| Commercial | Beverage Vending Machine Controls |
| Commercial | Door Gasket (Freezer) |
| Commercial | High Efficiency Refrigeration Compressor_Scroll |
| Commercial | Q-Sync Evaporator Fan Motor |
| Commercial | Refrigeration Commissioning |
| Commercial | Refrigeration Economizer |
| Commercial | Strip Curtains - Refrigerators |
| Commercial | Suction Pipe Insulation - Freezers |
| Commercial | Suction Pipe Insulation - Refrigerators |
| Commercial | Ductless Mini-Split AC |
| Commercial | Energy Star room AC |
| Commercial | HE DX 5.4-11.25 Tons Other Heat |
| Commercial | HE DX Less than 5.4 Tons Other Heat |
| Commercial | HE Water Cooled Chiller - Centrifugal Compressor - 500 Tons |
| Commercial | HE Water Cooled Chiller - Rotary or Screw Compressor - 50 Tons |
| Commercial | Ceiling Insulation (R19 to R30) |
| Commercial | Ceiling Insulation (R19 to R49) |
| Commercial | Ceiling Insulation (R2 to R30) |
| Commercial | Ceiling Insulation (R2 to R49) |
| Commercial | Custom measure - Non-lighting |
| Commercial | Ductless Mini-Split HP |
| Commercial | HE DX 11.25-20.0 Tons Elec Heat |
| Commercial | HE DX 5.4-11.25 Tons Elect Heat |
| Commercial | HE DX Less than 5.4 Tons Elect Heat |
| Commercial | LEED New Construction Whole Building |
| Commercial | VFD on HVAC Pump |
| Commercial | Water source heat pump |
| Commercial | 1.5HP Open Drip-Proof (ODP) Motor |
| Commercial | 20HP Open Drip-Proof (ODP) Motor |
| Commercial | Advanced Rooftop Controller |
| Commercial | Dual Enthalpy Economizer |
| Commercial | Commercial Strategic Energy Management |
| Industrial | Compressed Air Storage Tank |
| Industrial | Efficient Compressed Air Nozzles |
| Industrial | Low Pressure-drop Filters |
| Industrial | VFD on Air Compressor |

| Sector | Measure |
|---|---|
| Industrial | Bi-Level Lighting Control (Exterior) |
| Industrial | LED Display Lighting (Exterior) |
| Industrial | LED Exterior Wall Packs |
| Industrial | LED Parking Lighting |
| Industrial | Outdoor motion sensor |
| Industrial | Air curtains |
| Industrial | Airside economizer |
| Industrial | Chilled Water Reset |
| Industrial | Custom Measure - Non-Lighting |
| Industrial | Dedicated Outside Air System (DOAS) |
| Industrial | Demand Controlled Ventilation |
| Industrial | DX Coil Cleaning |
| Industrial | Energy Efficient Laboratory Fume Hood |
| Industrial | Energy Recovery Ventilation System |
| Industrial | Energy Star room ac |
| Industrial | Energy Star windows |
| Industrial | Facility Commissioning |
| Industrial | Facility Energy Management System |
| Industrial | Fan Thermostat Controller |
| Industrial | HE Air Cooled Chiller - All Compressor Types - 300 Tons |
| Industrial | HE DX 11.25-20.0 Tons Elec Heat |
| Industrial | HE DX 11.25-20.0 Tons Other Heat |
| Industrial | HE DX 5.4-11.25 Tons Elect Heat |
| Industrial | HE DX 5.4-11.25 Tons Other Heat |
| Industrial | HE DX Less than 5.4 Tons Elect Heat |
| Industrial | HE DX Less than 5.4 Tons Other Heat |
| Industrial | HE Water Cooled Chiller - Centrifugal Compressor - 200 Tons |
| Industrial | HE Water Cooled Chiller - Centrifugal Compressor - 500 Tons |
| Industrial | HE Water Cooled Chiller - Rotary or Screw Compressor - 175 Tons |
| Industrial | HE Water Cooled Chiller - Rotary or Screw Compressor - 50 Tons |
| Industrial | High Speed Fans |
| Industrial | Industrial Duct Sealing |
| Industrial | LEED New Construction Whole Building |
| Industrial | Packaged Terminal AC |
| Industrial | Programmable thermostat |
| Industrial | Reflective Roof Treatment |
| Industrial | Smart thermostat |

| Sector | Measure |
|---|---|
| Industrial | Thermal energy storage |
| Industrial | VAV System |
| Industrial | Water source heat pump |
| Industrial | Waterside economizer |
| Industrial | Window shade film |
| Industrial | Auto Off Time Switch |
| Industrial | Bi-Level Lighting Control (Interior) |
| Industrial | Efficient New Construction Lighting |
| Industrial | High Bay Occupancy Sensors, Ceiling Mounted |
| Industrial | Indoor Agriculture - LED Grow Lights |
| Industrial | Indoor daylight sensor |
| Industrial | LED High Bay_LF Baseline |
| Industrial | Occupancy Sensors, Ceiling Mounted |
| Industrial | Time Clock Control |
| Industrial | LED Linear - Lamp Replacement |
| Industrial | Occupancy sensors, switch mounted |
| Industrial | Energy Star LED Directional Lamp |
| Industrial | LED - 14W_CFL Baseline |
| Industrial | LED Display Lighting (Interior) |
| Industrial | LED exit sign |
| Industrial | Light Tube |
| Industrial | High Volume Low Speed Fan (HVLS) |
| Industrial | 20HP Open Drip-Proof (ODP) Motor |
| Industrial | Cogged Belt on 40hp ODP Motor |
| Industrial | Low Energy Livestock Waterer |
| Industrial | Low Pressure Sprinkler Nozzles |
| Industrial | Synchronous Belt on 15hp ODP Motor |
| Industrial | Synchronous Belt on 5hp ODP Motor |
| Industrial | Synchronous Belt on 75hp ODP Motor |
| Industrial | 3-phase High Frequency Battery Charger - 1 shift |
| Industrial | Dairy Refrigeration Heat Recovery |
| Industrial | Drip Irrigation Nozzles |
| Industrial | Electric Actuators |
| Industrial | Energy Efficient Transformers |
| Industrial | Engine Block Timer |
| Industrial | Injection Mold and Extruder Barrel Wraps |
| Industrial | Milk Pre-Cooler |

| Sector | Measure |
|---|---|
| Industrial | Auto Closer on Refrigerator Door |
| Industrial | Demand Defrost |
| Industrial | Dual Enthalpy Economizer |
| Industrial | High Efficiency Refrigeration Compressor - Scroll |
| Industrial | Process Cooling Ventilation Reduction |
| Industrial | VFD on Cooling Tower Fans |
| Industrial | VSD Controlled Compressor |
| Industrial | Compressed Air Desiccant Dryer |
| Industrial | Compressed Air No-Loss Condensate Drains |

EE Measures Eliminated Since 2019 Study

| Sector | Measure |
|---|---|
| Residential | CFL – 15W Flood |
| Residential | CFL – 15W Flood (Exterior) |
| Residential | CFL – 13W |
| Residential | CFL – 23W |
| Residential | Low Wattage T8 Fixture |
| Residential | 15 SEER Central AC |
| Residential | 15 SEER Air Source Heat Pump |
| Residential | 14 SEER ASHP from base electric resistance heating |
| Residential | Two Speed Pool Pump |
| Residential | Variable Speed Pool Pump |
| Residential | Storm Door |
| Commercial | CFL – 15W Flood |
| Commercial | High Efficiency HID Lighting |
| Commercial | LED Street Lights |
| Commercial | LED Traffic and Crosswalk Lighting |
| Commercial | CFL-23W |
| Commercial | High Bay Fluorescent (T5) |
| Commercial | Premium T8 - Fixture Replacement |
| Commercial | Premium T8 - Lamp Replacement |
| Commercial | Two Speed Pool Pump |
| Commercial | Variable Speed Pool Pump |
| Commercial | Tank Wrap on Water Heater |
| Commercial | Ceiling Insulation(R12 to R38) |
| Commercial | Ceiling Insulation(R30 to R38) |

## DR Measure Lists

### DR Measures Added Since 2019 Study

| Sector | Measure |
| --- | --- |
| Residential | Managed EV Charging – switch |
| Residential | Managed EV Charging – telematics |
| Residential | Battery Storage with PV |
| Commercial | Managed EV Charging – switch |
| Commercial | Managed EV Charging – telematics |
| Commercial | Battery Storage with PV |

### DR Measures Eliminated Since 2019 Study

| Sector | Measure |
| --- | --- |
| None | |

## DSRE Measure Lists

DSRE Measures Added Since 2019 Study

| Sector | Measure |
|---|---|
| None | |

DSRE Measures Eliminated Since 2019 Study

| Sector | Measure |
|---|---|
| None | |

# Exhibit JH-10
# DEF Measure Screening and Economic Sensitivities

## Measure Screening

The program development process was initiated with 395 EE measures, 33 DR measures, and 9 DSRE measures contributing to the technical potential, which are detailed in Exhibit JH-8. Table 1 summarizes the number of measures by category and the number of measure permutations, which are the application of individual measures to various customer segments, construction types, and end-uses (*i.e.*, a single air-source heat pump "measure" can be installed in single family, multi-family, and manufactured homes, as well as new and existing vintages of each home type, and impacts both space cooling and space heating end-uses, resulting in twelve separate measure "permutations" analyzed)

Table 1. TP Measure Counts

| Category | Sector | Measures | Permutations |
|---|---|---|---|
| EE | Residential | 119 | 1,173 |
| EE | Commercial | 164 | 5,798 |
| EE | Industrial | 112 | 2,564 |
| DR | Residential | 16 | 48 |
| DR | Small-Medium Business | 13 | 52 |
| DR | Large Commercial & Industrial | 4 | 16 |
| DSRE | Residential | 2 | 2 |
| DSRE | Non-Residential | 7 | 42 |

The subsequent program development process included the following steps that refined the measure lists for the RIM scenario and TRC scenario. The following tables summarize the count of measures and permutations **excluded** at each step:

### Economic Analysis – Cost-effectiveness screening

Measures that did not achieve a cost-effectiveness ratio of 1.0 for the TRC test and PCT were excluded from the TRC scenario. Measures that did not achieve a ratio of 1.0 for the RIM test and PCT were excluded from the RIM scenario for the economic analysis. Individual measures did not include any utility program costs (program administrative or incentive costs), and therefore were evaluated on the basis of measure cost-effectiveness without any utility intervention. Table 2 summarizes the count of unique measures and measure permutations excluded at this step:

Table 2: Measures Excluded – Economic Analysis, TRC scenario and RIM scenario

| Category | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 52 | 641 | 84 | 815 |
| EE | Commercial | 53 | 3,117 | 121 | 5,021 |
| EE | Industrial | 38 | 1,034 | 112 | 2,564 |
| DR | Residential | 3 | N/A* | 0 | N/A* |
| DR | Small-Medium Business | 2 | N/A* | 0 | N/A* |
| DR | Large Commercial & Industrial | 0 | N/A* | 0 | N/A* |
| DSRE | Residential | 2 | 2 | 2 | 2 |
| DSRE | Non-Residential | 7 | 42 | 7 | 42 |

*Screening for the DR economic analysis was done at the measure level, not by permutation

## Measure Adoption Forecast – Cost-effectiveness screening

All technical potential measures were re-screened in the development of the measure adoption forecasts. Associated program costs, including program administrative costs and customer incentives, were included in the economic analysis used for estimating measure adoption forecasts. Because this step occurred prior to each utility developing specific programs aligned with their proposed goals, representative administrative costs were developed using average FEECA Utility program cost data, where available from current programs, and supplemented with other utility program cost data where needed. In order to evenly apply these representative costs to measures with a variety of savings impacts, typical costs were estimated on a variable basis per kWh saved.

Measures that did not achieve a cost-effectiveness ratio of 1.0 for the TRC test and PCT were excluded from the TRC scenario. Measures that did not achieve a ratio of 1.0 for the RIM test and PCT were excluded from the RIM scenario for the economic analysis. Table 3 summarizes the count of unique measures and measure permutations excluded at this step:

Table 3: Measures Excluded – Measure Adoption Forecast, TRC scenario and RIM scenario

| Category | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 47 | 535 | 80 | 717 |
| EE | Commercial | 53 | 3,005 | 117 | 4,931 |
| EE | Industrial | 40 | 1,089 | 112 | 2,564 |
| DR | Residential | 4 | 14 | 5 | 17 |
| DR | Small-Medium Business | 4 | 29 | 6 | 35 |
| DR | Large Commercial & Industrial | 0 | 0 | 0 | 0 |
| DSRE | Residential | 2 | 2 | 2 | 2 |
| DSRE | Non-Residential | 7 | 42 | 7 | 42 |

## Measure Adoption Forecast – Free ridership screening

Consistent with prior DSM analyses in Florida, free ridership was addressed by applying a two-year payback criterion, which eliminated measures having a simple payback of less than two years. In addition to the measures and permutations excluded based on the cost-effectiveness screening summarized in Table 3 above, Table 4 summarizes the count of unique measures and measure permutations excluded at this step:

Table 4: Measures Excluded – Measure Adoption Forecast, 2-year payback screening (additional exclusions)

| Category | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 22 | 171 | 2 | 47 |
| EE | Commercial | 25 | 1,054 | 0 | 89 |
| EE | Industrial | 38 | 881 | 0 | 0 |
| DR | Residential | 0 | 0 | 0 | 0 |
| DR | Small-Medium Business | 0 | 0 | 0 | 0 |
| DR | Large Commercial & Industrial | 0 | 0 | 0 | 0 |
| DSRE | Residential | 0 | 0 | 0 | 0 |
| DSRE | Non-Residential | 0 | 0 | 0 | 0 |

# Economic Sensitivities

As part of the economic analysis, the study included development of sensitivities related to free ridership, future fuel costs, as follows:

## Sensitivity #1: Higher Fuel Prices

For this sensitivity, both the RIM and TRC scenarios were screened using electric utility supply costs adjusted to a "high fuel" cost scenario. The following table summarizes the number of unique measures and measure permutations that are cost effective under each scenario:

Table 5: Economic Sensitivity #1 – Passing Measures, Higher Fuel Prices

| Category* | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 68 | 535 | 36 | 360 |
| EE | Commercial | 114 | 2,753 | 44 | 893 |
| EE | Industrial | 76 | 1,585 | 0 | 0 |

*DR measures were not included in the economic sensitivities as fuel prices do not affect DR results.

*No DSRE measures passed the economic screening for this sensitivity.

## Sensitivity #2: Lower Fuel Prices

For this sensitivity, both the RIM and TRC scenarios were screened using electric utility supply costs adjusted to a "low fuel" cost scenario. The following table summarizes the number of unique measures and measure permutations that are cost effective under each scenario:

Table 6: Economic Sensitivity #2 – Passing Measures, Lower Fuel Prices

| Category* | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 66 | 523 | 35 | 358 |
| EE | Commercial | 108 | 2,575 | 39 | 611 |
| EE | Industrial | 72 | 1,467 | 0 | 0 |

*DR measures were not included in the economic sensitivities as fuel prices do not affect DR results.

*No DSRE measures passed the economic screening for this sensitivity.

## Sensitivity #3: Shorter free-ridership exclusion periods

For this sensitivity, both the RIM and TRC scenarios were screened as described above for the Economic Analysis, but the simple payback screening criteria was reduced to one year or longer:

Table 7: Economic Sensitivity #3 – Passing Measures, Shorter free-ridership exclusion period

| Category* | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 53 | 436 | 32 | 328 |
| EE | Commercial | 98 | 2,061 | 43 | 739 |
| EE | Industrial | 48 | 873 | 0 | 0 |

*DR measures were not included in the economic sensitivities as there is negligible customer incremental cost for DR measures and therefore differences in simple payback do not affect DR results.

*No DSRE measures passed the economic screening for this sensitivity.

## Sensitivity #4: Longer free-ridership exclusion periods

For this sensitivity, both the RIM and TRC scenarios were screened as described above for the Economic Analysis, but the simple payback screening criteria was increased to three years or longer:

Table 8: Economic Sensitivity #4 – Passing Measures, Longer free-ridership exclusion period

| Category* | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 41 | 290 | 29 | 234 |
| EE | Commercial | 72 | 1,065 | 41 | 550 |
| EE | Industrial | 23 | 396 | 0 | 0 |

*DR measures were not included in the economic sensitivities as there is negligible customer incremental cost for DR measures and therefore differences in simple payback do not affect DR results.

*No DSRE measures passed the economic screening for this sensitivity.

# Exhibit JH-11
# FPUC Measure Screening and Economic Sensitivities

## Measure Screening

The program development process was initiated with 395 EE measures, 29 DR measures, and 9 DSRE measures contributing to the technical potential, which are detailed in Exhibit JH-8. Table 1 summarizes the number of measures by category and the number of measure permutations, which are the application of individual measures to various customer segments, construction types, and end-uses (*i.e.*, a single air-source heat pump "measure" can be installed in single family, multi-family, and manufactured homes, as well as new and existing vintages of each home type, and impacts both space cooling and space heating end-uses, resulting in twelve separate measure "permutations" analyzed)

Table 1. TP Measure Counts

| Category | Sector | Measures | Permutations |
|---|---|---|---|
| EE | Residential | 119 | 1,173 |
| EE | Commercial | 164 | 5,798 |
| EE | Industrial | 112 | 2,564 |
| DR | Residential | 14 | 14 |
| DR | Small-Medium Business | 11 | 11 |
| DR | Large Commercial & Industrial | 4 | 4 |
| DSRE | Residential | 2 | 2 |
| DSRE | Non-Residential | 7 | 42 |

The subsequent program development process included the following steps that refined the measure lists for the RIM scenario and TRC scenario. The following tables summarize the count of measures and permutations **excluded** at each step:

### Economic Analysis – Cost-effectiveness screening

Technical potential measures that did not achieve a cost-effectiveness ratio of 1.0 for the TRC test and PCT were excluded from the TRC scenario. Measures that did not achieve a ratio of 1.0 for the RIM test and PCT were excluded from the RIM scenario for the economic analysis. Individual measures did not include any utility program costs (program administrative or incentive costs), and therefore were evaluated on the basis of measure cost-effectiveness without any utility intervention. Table 2 summarizes the count of unique measures and measure permutations excluded at this step:

Table 2: Measures Excluded – Economic Analysis, TRC scenario and RIM scenario

| Category | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 68 | 771 | 119 | 1,173 |
| EE | Commercial | 68 | 3,516 | 164 | 5,798 |
| EE | Industrial | 40 | 1,093 | 112 | 2,564 |
| DR | Residential | 12 | N/A* | 1 | N/A* |
| DR | Small-Medium Business | 9 | N/A* | 1 | N/A* |
| DR | Large Commercial & Industrial | 4 | N/A* | 0 | N/A* |
| DSRE | Residential | 2 | 2 | 2 | 2 |
| DSRE | Non-Residential | 7 | 42 | 7 | 42 |

*Screening for the DR economic analysis was done at the measure level, not by permutation

## Measure Adoption Forecast – Cost-effectiveness screening

All technical potential measures were re-screened in the development of the measure adoption forecasts. Associated program costs, including program administrative costs and customer incentives, were included in the economic analysis used for estimating measure adoption forecasts. Because this step occurred prior to each utility developing specific programs aligned with their proposed goals, representative administrative costs were developed using average FEECA Utility program cost data, where available from current programs, and supplemented with other utility program cost data where needed. In order to evenly apply these representative costs to measures with a variety of savings impacts, typical costs were estimated on a variable basis per kWh saved.

Measures that did not achieve a cost-effectiveness ratio of 1.0 for the TRC test and PCT were excluded from the TRC scenario. Measures that did not achieve a ratio of 1.0 for the RIM test and PCT were excluded from the RIM scenario for the economic analysis. Table 3 summarizes the count of unique measures and measure permutations excluded at this step:

Table 3: Measures Excluded – Measure Adoption Forecast, TRC scenario and RIM scenario

| Category | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 71 | 803 | 119 | 1,173 |
| EE | Commercial | 70 | 3,632 | 164 | 5,798 |
| EE | Industrial | 42 | 1,142 | 112 | 2,564 |
| DR | Residential | 14 | 14 | 14 | 14 |
| DR | Small-Medium Business | 11 | 11 | 11 | 11 |
| DR | Large Commercial & Industrial | 4 | 4 | 4 | 4 |
| DSRE | Residential | 2 | 2 | 2 | 2 |
| DSRE | Non-Residential | 7 | 42 | 7 | 42 |

## Measure Adoption Forecast – Free ridership screening

Consistent with prior DSM analyses in Florida, free ridership was addressed by applying a two-year payback criterion, which eliminated measures having a simple payback of less than two years. In addition to the measures and permutations excluded based on the cost-effectiveness screening summarized in Table 3 above, Table 4 summarizes the count of unique measures and measure permutations excluded at this step:

Table 4: Measures Excluded – Measure Adoption Forecast, 2-year payback screening (additional exclusions)

| Category | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 18 | 140 | 0 | 0 |
| EE | Commercial | 38 | 1,268 | 0 | 0 |
| EE | Industrial | 39 | 836 | 0 | 0 |
| DR | Residential | 0 | 0 | 0 | 0 |
| DR | Small-Medium Business | 0 | 0 | 0 | 0 |
| DR | Large Commercial & Industrial | 0 | 0 | 0 | 0 |
| DSRE | Residential | 0 | 0 | 0 | 0 |
| DSRE | Non-Residential | 0 | 0 | 0 | 0 |

## DSM Program Development – Cost-effectiveness screening

As described in Exhibit No. JH-14, RI worked collaboratively with FPUC on the DSM program development process, resulting in a Proposed Goals Scenario, a RIM Scenario, and a TRC Scenario. All technical potential measures were re-analyzed in the DSM program development process.

For the RIM Scenario and TRC Scenario program development, updated non-incentive costs specific to FPUC were developed and applied in the updated cost-effectiveness screening of technical potential measures, which included the following criteria for each scenario:

- RIM-scenario – measures that failed the RIM-scenario criteria (RIM test, PCT, and payback period of at least 2 years) were excluded from the initial measure bundling analysis
- TRC-scenario – measures that failed the TRC-scenario criteria (TRC test, PCT, and payback period of at least 2 years) were excluded from the initial measure bundling analysis

Table 5  summarizes the count of unique measures and measure permutations excluded for each scenario at this step:

Table 5: Measures Excluded – DSM Program Development, TRC Scenario and RIM Scenario

| Category | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 91 | 972 | 119 | 1,173 |
| EE | Commercial | 110 | 4,910 | 164 | 5,798 |
| EE | Industrial | 81 | 1,979 | 112 | 2,564 |
| DR | Residential | 14 | 14 | 14 | 14 |
| DR | Small-Medium Business | 11 | 11 | 11 | 11 |
| DR | Large Commercial & Industrial | 4 | 4 | 4 | 4 |
| DSRE | Residential | 2 | 2 | 2 | 2 |
| DSRE | Non-Residential | 7 | 42 | 7 | 42 |

The development of the Proposed Goals Scenario started with assessment of technical potential measures study that passed, or were close to passing, the economic analysis, as well as measures included in current FPUC programs or that may be logical additions to current FPUC programs. Therefore, all individual EE measures were included in the initial analysis. Due to the DSM program development cost-effectiveness screening resulting in no DSRE measures or DR measures passing the RIM or TRC scenarios, these measures were excluded in the Proposed Goals Scenario analysis.

# Economic Sensitivities

As part of the economic analysis, the study included development of sensitivities related to future fuel costs and free ridership, as follows:

## Sensitivity #1: Higher Fuel Prices

For this sensitivity, both the RIM and TRC scenarios were screened using electric utility supply costs adjusted to a “high fuel” cost scenario. The following table summarizes the number of unique measures and measure permutations that are cost effective under each scenario:

Table 6: Economic Sensitivity #1 – Passing Measures, Higher Fuel Prices

| Category* | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 59 | 444 | 9 | 60 |
| EE | Commercial | 107 | 2,586 | 0 | 0 |
| EE | Industrial | 77 | 1,587 | 0 | 0 |

*DR measures were not included in the economic sensitivities as fuel prices do not affect DR results.

*No DSRE measures passed the economic screening for this sensitivity.

## Sensitivity #2: Lower Fuel Prices

For this sensitivity, both the RIM and TRC scenarios were screened using electric utility supply costs adjusted to a “low fuel” cost scenario. The following table summarizes the number of unique measures and measure permutations that are cost effective under each scenario:

Table 7: Economic Sensitivity #2 – Passing Measures, Lower Fuel Prices

| Category* | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 46 | 349 | 0 | 0 |
| EE | Commercial | 90 | 2,112 | 0 | 0 |
| EE | Industrial | 68 | 1,372 | 0 | 0 |

*DR measures were not included in the economic sensitivities as fuel prices do not affect DR results.

*No DSRE measures passed the economic screening for this sensitivity.

## Sensitivity #3: Shorter free-ridership exclusion periods

For this sensitivity, both the RIM and TRC scenarios were screened as described above for the Economic Analysis, but the simple payback screening criteria was reduced to one year or longer:

Table 8: Economic Sensitivity #3 – Passing Measures, Shorter free-ridership exclusion period

| Category* | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 38 | 312 | 0 | 0 |
| EE | Commercial | 79 | 1,522 | 0 | 0 |
| EE | Industrial | 45 | 824 | 0 | 0 |

*DR measures were not included in the economic sensitivities as there is negligible customer incremental cost for DR measures and therefore differences in simple payback do not affect DR results.

*No DSRE measures passed the economic screening for this sensitivity.

## Sensitivity #4: Longer free-ridership exclusion periods

For this sensitivity, both the RIM and TRC scenarios were screened as described above for the Economic Analysis, but the simple payback screening criteria was increased to three years or longer:

Table 9: Economic Sensitivity #4 – Passing Measures, Longer free-ridership exclusion period

| Category* | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 26 | 153 | 0 | 0 |
| EE | Commercial | 39 | 422 | 0 | 0 |
| EE | Industrial | 22 | 349 | 0 | 0 |

*DR measures were not included in the economic sensitivities as there is negligible customer incremental cost for DR measures and therefore differences in simple payback do not affect DR results.

*No DSRE measures passed the economic screening for this sensitivity.

# Exhibit JH-12
# JEA Measure Screening and Economic Sensitivities

## Measure Screening

The program development process was initiated with 395 EE measures, 33 DR measures, and 9 DSRE measures contributing to the technical potential, which are detailed in Exhibit JH-8. Table 1 summarizes the number of measures by category and the number of measure permutations, which are the application of individual measures to various customer segments, construction types, and end-uses (*i.e.*, a single air-source heat pump "measure" can be installed in single family, multi-family, and manufactured homes, as well as new and existing vintages of each home type, and impacts both space cooling and space heating end-uses, resulting in twelve separate measure "permutations" analyzed)

Table 1. TP Measure Counts

| Category | Sector | Measures | Permutations |
|---|---|---|---|
| EE | Residential | 119 | 1,173 |
| EE | Commercial | 164 | 5,798 |
| EE | Industrial | 112 | 2,564 |
| DR | Residential | 16 | 16 |
| DR | Small-Medium Business | 13 | 52 |
| DR | Large Commercial & Industrial | 4 | 16 |
| DSRE | Residential | 2 | 2 |
| DSRE | Non-Residential | 7 | 42 |

The subsequent program development process included the following steps that refined the measure lists for the RIM scenario and TRC scenario. The following tables summarize the count of measures and permutations **excluded** at each step:

### Economic Analysis – Cost-effectiveness screening

Technical potential measures that did not achieve a cost-effectiveness ratio of 1.0 for the TRC test and PCT were excluded from the TRC scenario. Measures that did not achieve a ratio of 1.0 for the RIM test and PCT were excluded from the RIM scenario for the economic analysis. Individual measures did not include any utility program costs (program administrative or incentive costs), and therefore were evaluated on the basis of measure cost-effectiveness without any utility intervention. Table 2 summarizes the count of unique measures and measure permutations excluded at this step:

Table 2: Measures Excluded – Economic Analysis, TRC scenario and RIM scenario

| Category | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 66 | 755 | 110 | 1,109 |
| EE | Commercial | 70 | 3,592 | 164 | 5,798 |
| EE | Industrial | 42 | 1,143 | 112 | 2,564 |
| DR | Residential | 3 | N/A* | 0 | N/A* |
| DR | Small-Medium Business | 2 | N/A* | 1 | N/A* |
| DR | Large Commercial & Industrial | 0 | N/A* | 0 | N/A* |
| DSRE | Residential | 2 | 2 | 2 | 2 |
| DSRE | Non-Residential | 7 | 42 | 7 | 42 |

*Screening for the DR economic analysis was done at the measure level, not by permutation

## Measure Adoption Forecast – Cost-effectiveness screening

All technical potential measures were re-screened in the development of the measure adoption forecasts. Associated program costs, including program administrative costs and customer incentives, were included in the economic analysis used for estimating measure adoption forecasts. Because this step occurred prior to each utility developing specific programs aligned with their proposed goals, representative administrative costs were developed using average FEECA Utility program cost data, where available from current programs, and supplemented with other utility program cost data where needed. In order to evenly apply these representative costs to measures with a variety of savings impacts, typical costs were estimated on a variable basis per kWh saved.

Measures that did not achieve a cost-effectiveness ratio of 1.0 for the TRC test and PCT were excluded from the TRC scenario. Measures that did not achieve a ratio of 1.0 for the RIM test and PCT were excluded from the RIM scenario for the economic analysis. Table 3 summarizes the count of unique measures and measure permutations excluded at this step:

Table 3: Measures Excluded – Measure Adoption Forecast, TRC scenario and RIM scenario

| Category | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 71 | 804 | 114 | 1,125 |
| EE | Commercial | 79 | 3,874 | 164 | 5,798 |
| EE | Industrial | 48 | 1,294 | 112 | 2,564 |
| DR | Residential | 14 | 14 | 14 | 14 |
| DR | Small-Medium Business | 10 | 47 | 10 | 47 |
| DR | Large Commercial & Industrial | 0 | 8 | 0 | 8 |
| DSRE | Residential | 2 | 2 | 2 | 2 |
| DSRE | Non-Residential | 7 | 42 | 7 | 42 |

## Measure Adoption Forecast – Free ridership screening

Consistent with prior DSM analyses in Florida, free ridership was addressed by applying a two-year payback criterion, which eliminated measures having a simple payback of less than two years. In addition to the measures and permutations excluded based on the cost-effectiveness screening summarized in Table 3 above, Table 4 summarizes the count of unique measures and measure permutations excluded at this step:

Table 4: Measures Excluded – Measure Adoption Forecast, 2-year payback screening (additional exclusions)

| Category | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 18 | 134 | 0 | 0 |
| EE | Commercial | 25 | 842 | 0 | 0 |
| EE | Industrial | 29 | 661 | 0 | 0 |
| DR | Residential | 0 | 0 | 0 | 0 |
| DR | Small-Medium Business | 0 | 0 | 0 | 0 |
| DR | Large Commercial & Industrial | 0 | 0 | 0 | 0 |
| DSRE | Residential | 0 | 0 | 0 | 0 |
| DSRE | Non-Residential | 0 | 0 | 0 | 0 |

## DSM Program Development – Cost-effectiveness screening

As described in Exhibit No. JH-15, RI worked collaboratively with JEA on the DSM program development process, resulting in a Proposed Goals Scenario, a RIM Scenario, and a TRC Scenario. All technical potential measures were re-analyzed in the DSM program development process.

For the RIM Scenario and TRC Scenario program development, updated non-incentive costs specific to JEA were developed and applied in the updated cost-effectiveness screening of technical potential measures, which included the following criteria for each scenario:

- RIM Scenario – measures that failed the RIM Scenario criteria (RIM test, PCT, and payback period of at least 2 years) were excluded from the initial measure bundling analysis
- TRC Scenario – measures that failed the TRC Scenario criteria (TRC test, PCT, and payback period of at least 2 years) were excluded from the initial measure bundling analysis

Table 5 summarizes the count of unique measures and measure permutations excluded for each scenario at this step:

Table 5: Measures Excluded – DSM Program Development, TRC Scenario and RIM Scenario

| Category | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 92 | 956 | 114 | 1,125 |
| EE | Commercial | 104 | 4,718 | 164 | 5,798 |
| EE | Industrial | 77 | 1,955 | 112 | 2,564 |
| DR | Residential | 16 | 16 | 16 | 16 |
| DR | Small-Medium Business | 13 | 52 | 13 | 52 |
| DR | Large Commercial & Industrial | 0 | 12 | 0 | 12 |
| DSRE | Residential | 2 | 2 | 2 | 2 |
| DSRE | Non-Residential | 7 | 42 | 7 | 42 |

The development of the Proposed Goals Scenario started with assessment of technical potential measures study that passed, or were close to passing, the economic analysis, as well as measures included in current JEA programs or that may be logical additions to current JEA programs. Therefore, all individual EE measures were included in the initial analysis, as well as Large Commercial DR measures. Due to the DSM program development cost-effectiveness screening resulting in no DSRE measures or DR measures for Residential or Small-Medium Businesses passing the RIM or TRC scenarios, these measures were excluded in the Proposed Goals Scenario analysis.

# Economic Sensitivities

As part of the economic analysis, the study included development of sensitivities related to future fuel costs and free ridership, as follows:

## Sensitivity #1: Higher Fuel Prices

For this sensitivity, both the RIM and TRC scenarios were screened using electric utility supply costs adjusted to a "high fuel" cost scenario. The following table summarizes the number of unique measures and measure permutations that are cost effective under each scenario:

Table 6: Economic Sensitivity #1 – Passing Measures, Higher Fuel Prices

| Category* | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 57 | 443 | 20 | 152 |
| EE | Commercial | 99 | 2,387 | 0 | 0 |
| EE | Industrial | 72 | 1,478 | 0 | 0 |

*DR measures were not included in the economic sensitivities as fuel prices do not affect DR results.

*No DSRE measures passed the economic screening for this sensitivity.

## Sensitivity #2: Lower Fuel Prices

For this sensitivity, both the RIM and TRC scenarios were screened using electric utility supply costs adjusted to a "low fuel" cost scenario. The following table summarizes the number of unique measures and measure permutations that are cost effective under each scenario:

Table 7: Economic Sensitivity #2 – Passing Measures, Lower Fuel Prices

| Category* | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 45 | 355 | 2 | 8 |
| EE | Commercial | 81 | 1,846 | 0 | 0 |
| EE | Industrial | 63 | 1,266 | 0 | 0 |

*DR measures were not included in the economic sensitivities as fuel prices do not affect DR results.

*No DSRE measures passed the economic screening for this sensitivity.

## Sensitivity #3: Shorter free-ridership exclusion periods

For this sensitivity, both the RIM and TRC scenarios were screened as described above for the Economic Analysis, but the simple payback screening criteria was reduced to one year or longer:

Table 8: Economic Sensitivity #3 – Passing Measures, Shorter free-ridership exclusion period

| Category* | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 41 | 334 | 9 | 64 |
| EE | Commercial | 80 | 1,646 | 0 | 0 |
| EE | Industrial | 53 | 1,014 | 0 | 0 |

*DR measures were not included in the economic sensitivities as there is negligible customer incremental cost for DR measures and therefore differences in simple payback do not affect DR results.

*No DSRE measures passed the economic screening for this sensitivity.

## Sensitivity #4: Longer free-ridership exclusion periods

For this sensitivity, both the RIM and TRC scenarios were screened as described above for the Economic Analysis, but the simple payback screening criteria was increased to three years or longer:

Table 9: Economic Sensitivity #4 – Passing Measures, Longer free-ridership exclusion period

| Category* | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 34 | 257 | 9 | 64 |
| EE | Commercial | 56 | 928 | 0 | 0 |
| EE | Industrial | 34 | 643 | 0 | 0 |

*DR measures were not included in the economic sensitivities as there is negligible customer incremental cost for DR measures and therefore differences in simple payback do not affect DR results.

*No DSRE measures passed the economic screening for this sensitivity.

# Exhibit JH-13
# OUC Measure Screening and Economic Sensitivities

## Measure Screening

The program development process was initiated with 395 EE measures, 33 DR measures, and 9 DSRE measures contributing to the technical potential, which are detailed in Exhibit JH-8. Table 1 summarizes the number of measures by category and the number of measure permutations, which are the application of individual measures to various customer segments, construction types, and end-uses (*i.e.*, a single air-source heat pump "measure" can be installed in single family, multi-family, and manufactured homes, as well as new and existing vintages of each home type, and impacts both space cooling and space heating end-uses, resulting in twelve separate measure "permutations" analyzed)

Table 1. TP Measure Counts

| Category | Sector | Measures | Permutations |
|---|---|---|---|
| EE | Residential | 119 | 1,173 |
| EE | Commercial | 164 | 5,798 |
| EE | Industrial | 112 | 2,564 |
| DR | Residential | 16 | 48 |
| DR | Small-Medium Business | 13 | 52 |
| DR | Large Commercial & Industrial | 4 | 16 |
| DSRE | Residential | 2 | 2 |
| DSRE | Non-Residential | 7 | 42 |

The subsequent program development process included the following steps that refined the measure lists for the RIM scenario and TRC scenario. The following tables summarize the count of measures and permutations **excluded** at each step:

### Economic Analysis – Cost-effectiveness screening

Technical potential measures that did not achieve a cost-effectiveness ratio of 1.0 for the TRC test and PCT were excluded from the TRC scenario. Measures that did not achieve a ratio of 1.0 for the RIM test and PCT were excluded from the RIM scenario for the economic analysis. Individual measures did not include any utility program costs (program administrative or incentive costs), and therefore were evaluated on the basis of measure cost-effectiveness without any utility intervention. Table 2 summarizes the count of unique measures and measure permutations excluded at this step:

Table 2: Measures Excluded – Economic Analysis, TRC scenario and RIM scenario

| Category | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 76 | 857 | 119 | 1,173 |
| EE | Commercial | 84 | 4,079 | 163 | 5,784 |
| EE | Industrial | 52 | 1,354 | 112 | 2,564 |
| DR | Residential | 4 | N/A* | 0 | N/A* |
| DR | Small-Medium Business | 2 | N/A* | 0 | N/A* |
| DR | Large Commercial & Industrial | 0 | N/A* | 0 | N/A* |
| DSRE | Residential | 2 | 2 | 2 | 2 |
| DSRE | Non-Residential | 7 | 42 | 7 | 42 |

*Screening for the DR economic analysis was done at the measure level, not by permutation

## Measure Adoption Forecast – Cost-effectiveness screening

All technical potential measures were re-screened in the development of the measure adoption forecasts. Associated program costs, including program administrative costs and customer incentives, were included in the economic analysis used for estimating measure adoption forecasts. Because this step occurred prior to each utility developing specific programs aligned with their proposed goals, representative administrative costs were developed using average FEECA Utility program cost data, where available from current programs, and supplemented with other utility program cost data where needed. In order to evenly apply these representative costs to measures with a variety of savings impacts, typical costs were estimated on a variable basis per kWh saved.

Measures that did not achieve a cost-effectiveness ratio of 1.0 for the TRC test and PCT were excluded from the TRC scenario. Measures that did not achieve a ratio of 1.0 for the RIM test and PCT were excluded from the RIM scenario for the economic analysis. Table 3 summarizes the count of unique measures and measure permutations excluded at this step:

Table 3: Measures Excluded – Measure Adoption Forecast, TRC scenario and RIM scenario

| Category | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 76 | 865 | 119 | 1,173 |
| EE | Commercial | 95 | 4,390 | 163 | 5,784 |
| EE | Industrial | 59 | 1,509 | 112 | 2,564 |
| DR | Residential | 16 | 48 | 16 | 48 |
| DR | Small-Medium Business | 5 | 42 | 6 | 43 |
| DR | Large Commercial & Industrial | 0 | 7 | 0 | 7 |
| DSRE | Residential | 2 | 2 | 2 | 2 |
| DSRE | Non-Residential | 7 | 42 | 7 | 42 |

## Measure Adoption Forecast – Free ridership screening

Consistent with prior DSM analyses in Florida, free ridership was addressed by applying a two-year payback criterion, which eliminated measures having a simple payback of less than two years. In addition to the measures and permutations excluded based on the cost-effectiveness screening summarized in Table 3 above, Table 4 summarizes the count of unique measures and measure permutations excluded at this step:

Table 4: Measures Excluded – Measure Adoption Forecast, 2-year payback screening (additional exclusions)

| Category | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 18 | 140 | 0 | 0 |
| EE | Commercial | 27 | 860 | 0 | 0 |
| EE | Industrial | 37 | 802 | 0 | 0 |
| DR | Residential | 0 | 0 | 0 | 0 |
| DR | Small-Medium Business | 0 | 0 | 0 | 0 |
| DR | Large Commercial & Industrial | 0 | 0 | 0 | 0 |
| DSRE | Residential | 0 | 0 | 0 | 0 |
| DSRE | Non-Residential | 0 | 0 | 0 | 0 |

## DSM Program Development – Cost-effectiveness screening

As described in Exhibit No. JH-16, RI worked collaboratively with OUC on the DSM program development process, resulting in a Proposed Goals Scenario, a RIM Scenario, and a TRC Scenario. All technical potential measures were re-analyzed in the DSM program development process.

For the RIM Scenario and TRC Scenario program development, updated non-incentive costs specific to OUC were developed and applied in the updated cost-effectiveness screening of technical potential measures, which included the following criteria for each scenario:

- RIM Scenario – measures that failed the RIM Scenario criteria (RIM test, PCT, and payback period of at least 2 years) were excluded from the initial measure bundling analysis
- TRC Scenario – measures that failed the TRC Scenario criteria (TRC test, PCT, and payback period of at least 2 years) were excluded from the initial measure bundling analysis

Table 5 summarizes the count of unique measures and measure permutations excluded for each scenario at this step:

Table 5: Measures Excluded – DSM Program Development, TRC Scenario and RIM Scenario

| Category | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 101 | 1,061 | 119 | 1,173 |
| EE | Commercial | 118 | 5,165 | 163 | 5,784 |
| EE | Industrial | 93 | 2,237 | 112 | 2,564 |
| DR | Residential | 16 | 48 | 16 | 48 |
| DR | Small-Medium Business | 13 | 52 | 13 | 52 |
| DR | Large Commercial & Industrial | 0 | 12 | 0 | 12 |
| DSRE | Residential | 2 | 2 | 2 | 2 |
| DSRE | Non-Residential | 7 | 42 | 7 | 42 |

The development of the Proposed Goals Scenario started with assessment of technical potential measures study that passed, or were close to passing, the economic analysis, as well as measures included in current OUC programs or that may be logical additions to current OUC programs. Therefore, all individual EE measures were included in the initial analysis, as well as Large Commercial DR measures. Due to the DSM program development cost-effectiveness screening resulting in no DSRE measures or DR measures for Residential or Small-Medium Businesses passing the RIM or TRC scenarios, these measures were excluded in the Proposed Goals Scenario analysis.

## Economic Sensitivities

As part of the economic analysis, the study included development of sensitivities related to free ridership, future fuel costs, and carbon cost scenarios, as follows:

### Sensitivity #1: Higher Fuel Prices

For this sensitivity, both the RIM and TRC scenarios were screened using electric utility supply costs adjusted to a "high fuel" cost scenario. The following table summarizes the number of unique measures and measure permutations that are cost effective under each scenario:

Table 6: Economic Sensitivity #1 – Passing Measures, Higher Fuel Prices

| Category* | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 46 | 349 | 0 | 0 |
| EE | Commercial | 85 | 2,011 | 1 | 14 |
| EE | Industrial | 67 | 1,338 | 0 | 0 |

*DR measures were not included in the economic sensitivities as fuel prices do not affect DR results.

*No DSRE measures passed the economic screening for this sensitivity.

### Sensitivity #2: Lower Fuel Prices

For this sensitivity, both the RIM and TRC scenarios were screened using electric utility supply costs adjusted to a "low fuel" cost scenario. The following table summarizes the number of unique measures and measure permutations that are cost effective under each scenario:

Table 7: Economic Sensitivity #2 – Passing Measures, Lower Fuel Prices

| Category* | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 41 | 304 | 0 | 0 |
| EE | Commercial | 69 | 1,360 | 1 | 14 |
| EE | Industrial | 53 | 1,049 | 0 | 0 |

*DR measures were not included in the economic sensitivities as fuel prices do not affect DR results.

*No DSRE measures passed the economic screening for this sensitivity.

## Sensitivity #3: Shorter free-ridership exclusion periods

For this sensitivity, both the RIM and TRC scenarios were screened as described above for the Economic Analysis, but the simple payback screening criteria was reduced to one year or longer:

Table 8: Economic Sensitivity #3 – Passing Measures, Shorter free-ridership exclusion period

| Category* | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 32 | 238 | 0 | 0 |
| EE | Commercial | 65 | 1,141 | 1 | 14 |
| EE | Industrial | 36 | 615 | 0 | 0 |

*DR measures were not included in the economic sensitivities as there is negligible customer incremental cost for DR measures and therefore differences in simple payback do not affect DR results.

*No DSRE measures passed the economic screening for this sensitivity.

## Sensitivity #4: Longer free-ridership exclusion periods

For this sensitivity, both the RIM and TRC scenarios were screened as described above for the Economic Analysis, but the simple payback screening criteria was increased to three years or longer:

Table 9: Economic Sensitivity #4 – Passing Measures, Longer free-ridership exclusion period

| Category* | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 19 | 85 | 0 | 0 |
| EE | Commercial | 33 | 426 | 0 | 0 |
| EE | Industrial | 14 | 212 | 0 | 0 |

*DR measures were not included in the economic sensitivities as there is negligible customer incremental cost for DR measures and therefore differences in simple payback do not affect DR results.

*No DSRE measures passed the economic screening for this sensitivity.

## Sensitivity #5: Carbon dioxide ($CO_2$) costs

For this sensitivity, both the RIM and TRC scenarios were screened as described above for the Economic Analysis, but the avoided electric utility supply costs forecast was adjusted to include consideration of an additional impact for emissions assuming that there was an economic charge for carbon dioxide.

Table 10: Economic Sensitivity #5 – Passing Measures, Carbon dioxide costs

| Category* | Sector | TRC Scenario | | RIM Scenario | |
|---|---|---|---|---|---|
| | | Measures | Permutations | Measures | Permutations |
| EE | Residential | 43 | 316 | 0 | 0 |
| EE | Commercial | 82 | 1,835 | 1 | 14 |
| EE | Industrial | 65 | 1,288 | 0 | 0 |

*DR measures were not included in the economic sensitivities as the estimated carbon dioxide costs do not affect DR results.

*No DSRE measures passed the economic screening for this sensitivity.

# Exhibit JH-14
# FPUC Program Development Summary

## Overview

RI worked collaboratively with FPUC on the DSM program development process to develop impacts under three scenarios: 1) potential DSM programs that contribute to proposed DSM goals (Proposed Goals Scenario), 2 ) potential DSM programs that pass the Participant and Rate Impact Measure Tests (RIM Scenario), and 3) potential DSM programs that pass the Participant and Total Resource Cost Tests (TRC Scenario).

## Methodology

The development of DSM programs for each scenario included incorporating the measures and measure impacts developed for the Technical Potential (TP) study, reviewing FPUC's current program offerings, collaboration with FPUC on program concepts that are beneficial for their customers, and analysis of economic impacts and market adoption to create potential DSM programs. This process included the following steps:

### Program Review and Measure Bundling

The analysis began with the measures from the TP study. This measure list was initially refined for program development for each scenario as follows:

1. Proposed Goals scenario – measures that passed, or were close to passing, either the TRC or RIM tests were prioritized in the initial measure bundling analysis. Measures included in current FPUC programs were also identified and included in the initial measure bundling.
2. RIM Scenario – measures that passed the RIM Scenario criteria (RIM test, PCT, and payback period of at least 2 years) were included in the initial measure bundling analysis
3. TRC Scenario – measures that passed the TRC Scenario criteria (TRC test, PCT, and payback period of at least 2 years) were included in the initial measure bundling analysis

Resource Innovations then reviewed current FPUC programs and eligible measures, and mapped individual measures to the appropriate programs for each scenario.  Resource Innovations worked collaboratively with FPUC to collect program information (e.g. program manuals, participation records, energy and demand savings, budgets) and review the existing programs to determine which measures should be included in the initial program portfolios. In addition, a gap analysis was conducted to identify measures included in each scenario that are not currently offered by FPUC. These measures were either included in existing programs where there was a logical fit, or included as a new program concept.

## Program Refinement and Modeling

After identifying the preliminary measure bundles and programs, Resource Innovations worked collaboratively with FPUC to develop incentive amounts and non-incentive costs. Non-incentive costs, which include costs to manage, administer, and market the program, were developed based on current FPUC program costs as well as secondary data on similar programs offered by other utilities, and refined as needed based on the proposed program delivery structure. Incentive costs were developed for each scenario as follows:

1. Proposed Goals scenario – preliminary incentive rates were informed by current incentives offered by FPUC as well as typical incentive levels offered by similar programs regionally and nationally.
2. RIM Scenario – incentive rates were developed based on the available net benefits for each measure, based on total RIM benefits minus RIM costs. Next, the incentive amount that would result in a simple payback period of two years for each measure was calculated. The final incentive applied for the measure was based on the lower of these two values.
3. TRC Scenario – the incentive amount required to result in a simple payback period of two years for each measure was used as the final incentive for the measure.

Measures included in the initial program concepts for each scenario were analyzed in RI's TEA-POT model to update the economic analysis based on the FPUC-specific non-incentive and incentive costs, and to estimate market adoption for each measure. The economic analysis included calculating updated RIM, TRC, and PCT costs and benefits for each measure and re-screening measures for each scenario.

RI's market adoption estimates use a payback acceptance criterion to estimate long-run market shares for measures as a function of measure incremental costs and expected bill savings over the measures' effective useful life (inclusive of utility incentives). Incremental adoption estimates are based on the Bass Diffusion Model, which is a mathematical description of how the rate of new product diffusion changes over time. For this study, adoption curve input parameters were developed for each measure based on specific criteria, including measure maturity in the market, overall measure cost, and whether the measure was currently offered through a utility program. RI's TEA-POT model then calculated demand and energy savings by applying estimated adoption rates to each cost-effective measure.

The TEA-POT modeling results were exported into RI's Program Planner workbook that aggregated the individual measure results into program and portfolio impacts for each scenario. For the TRC Scenario and RIM Scenario no further refinements to the programs were made. For the Proposed Goals scenario, RI continued to work collaboratively with FPUC to identify the measures and program concepts that comprise the proposed DSM goals. These impacts for each scenario are provided below.

# Results

## Proposed Goals Scenario

The Proposed Goals Scenario is described in more detail in Witness Craig's testimony. The following tables include the program-level details for this scenario.

Table 1. Proposed DSM Goals – Annual MWh Targets

| Annual MWh | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Audits/EE Kits | 77 | 79 | 80 | 81 | 82 | 84 | 84 | 86 | 87 | 88 |
| Res Heating & Cooling Upgrade | 216 | 226 | 237 | 247 | 251 | 248 | 237 | 219 | 199 | 182 |
| Res Low Income | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| Res Equipment Rebates | 1 | 2 | 2 | 3 | 4 | 4 | 5 | 5 | 5 | 5 |
| **Residential Total** | 365 | 377 | 390 | 401 | 407 | 406 | 396 | 380 | 361 | 345 |
| Com Heating & Cooling Upgrade | 25 | 29 | 32 | 36 | 39 | 42 | 45 | 46 | 47 | 47 |
| Com Chiller Upgrade | 4 | 4 | 5 | 5 | 6 | 6 | 6 | 7 | 7 | 7 |
| Com Lighting | 70 | 96 | 125 | 157 | 188 | 216 | 236 | 247 | 247 | 240 |
| **Non-Residential Total** | 100 | 129 | 163 | 198 | 233 | 264 | 287 | 300 | 301 | 294 |
| **Portfolio Total** | 465 | 507 | 553 | 599 | 641 | 671 | 683 | 679 | 663 | 638 |

Table 2. Proposed DSM Goals – Annual summer MW Targets

| Annual Summer MW | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Audits/EE Kits | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Res Heating & Cooling Upgrade | 0.03 | 0.04 | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 | 0.04 | 0.03 | 0.03 |
| Res Low Income | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Res Equipment Rebates | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Residential Total** | 0.05 | 0.05 | 0.06 | 0.06 | 0.07 | 0.07 | 0.07 | 0.06 | 0.05 | 0.04 |
| Com Heating & Cooling Upgrade | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Com Chiller Upgrade | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Com Lighting | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| **Non-Residential Total** | 0.02 | 0.02 | 0.03 | 0.03 | 0.04 | 0.04 | 0.04 | 0.04 | 0.05 | 0.04 |
| **Portfolio Total** | 0.06 | 0.07 | 0.09 | 0.10 | 0.10 | 0.11 | 0.11 | 0.10 | 0.10 | 0.09 |

Table 3. Proposed DSM Goals – Annual winter MW Targets

| Annual Winter MW | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Audits/EE Kits | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 |
| Res Heating & Cooling Upgrade | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.10 | 0.10 | 0.09 |
| Res Low Income | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| Res Equipment Rebates | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Residential Total** | 0.15 | 0.15 | 0.16 | 0.16 | 0.16 | 0.15 | 0.15 | 0.15 | 0.14 | 0.14 |
| Com Heating & Cooling Upgrade | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| Com Chiller Upgrade | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Com Lighting | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 |
| **Non-Residential Total** | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| **Portfolio Total** | 0.17 | 0.17 | 0.18 | 0.18 | 0.19 | 0.19 | 0.19 | 0.19 | 0.18 | 0.18 |

Table 4. Proposed DSM Goals – Annual Participation Targets

| Annual Participation (# measures) | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Audits/EE Kits | 110 | 112 | 114 | 115 | 117 | 119 | 120 | 122 | 124 | 125 |
| Res Heating & Cooling Upgrade | 159 | 192 | 227 | 259 | 278 | 277 | 255 | 214 | 169 | 130 |
| Res Low Income | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Res Equipment Rebates | 6 | 8 | 11 | 13 | 15 | 17 | 18 | 20 | 21 | 21 |
| **Residential Total** | 375 | 412 | 452 | 487 | 510 | 513 | 493 | 456 | 414 | 376 |
| Com Heating & Cooling Upgrade | 47 | 53 | 61 | 68 | 74 | 81 | 86 | 88 | 87 | 86 |
| Com Chiller Upgrade | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Com Lighting | 228 | 307 | 398 | 495 | 587 | 671 | 733 | 770 | 782 | 770 |
| **Non-Residential Total** | 278 | 363 | 462 | 566 | 664 | 755 | 822 | 861 | 872 | 859 |
| **Portfolio Total** | 653 | 775 | 914 | 1,053 | 1,174 | 1,268 | 1,315 | 1,317 | 1,286 | 1,235 |

Table 5. Proposed DSM Goals – Annual Program Budget Estimates

| Budgets ($ in thousands) | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Audits/EE Kits | $42 | $43 | $44 | $44 | $45 | $46 | $46 | $47 | $47 | $48 |
| Res Heating & Cooling Upgrade | $343 | $352 | $361 | $368 | $373 | $372 | $365 | $353 | $341 | $329 |
| Res Low Income | $38 | $38 | $38 | $38 | $38 | $38 | $38 | $38 | $38 | $38 |
| Res Equipment Rebates | $6 | $9 | $11 | $14 | $17 | $19 | $21 | $23 | $24 | $24 |
| **Residential Total** | $430 | $442 | $454 | $465 | $472 | $475 | $470 | $461 | $450 | $440 |
| Com Heating & Cooling Upgrade | $7 | $8 | $9 | $10 | $11 | $12 | $13 | $13 | $13 | $13 |
| Com Chiller Upgrade | $5 | $6 | $7 | $7 | $8 | $8 | $8 | $9 | $9 | $10 |
| Com Lighting | $22 | $30 | $39 | $49 | $59 | $67 | $73 | $77 | $78 | $76 |
| **Non-Residential Total** | $35 | $44 | $55 | $66 | $77 | $87 | $94 | $99 | $100 | $99 |
| **Portfolio Total** | $465 | $486 | $509 | $531 | $550 | $561 | $564 | $559 | $550 | $539 |

Table 6. Proposed DSM Goals – Cost-Effectiveness Results

| | TRC | | PCT | | RIM | |
|---|---|---|---|---|---|---|
| **Program Cost-Effectiveness** | Net Benefits ($) | Benefit/ Cost Ratio | Net Benefits ($) | Benefit/ Cost Ratio | Net Benefits ($) | Benefit/ Cost Ratio |
| Res Audits/EE Kits | -20,710 | 1.0 | 737,550 | 11.0 | -758,260 | 0.4 |
| Res Heating & Cooling Upgrade | 244,618 | 1.1 | 2,390,828 | 4.9 | -2,146,210 | 0.4 |
| Res Low Income | -17,581 | 1.0 | 626,103 | 11.0 | -643,684 | 0.4 |
| Res Equipment Rebates | -878 | 1.0 | 27,633 | 2.6 | -28,511 | 0.5 |
| **Residential Total** | **205,449** | **1.08** | **3,782,114** | **5.91** | **-3,576,665** | **0.41** |
| Com Heating & Cooling Upgrade | 38,818 | 1.2 | 325,422 | 2.7 | -286,605 | 0.5 |
| Com Chiller Upgrade | -18,437 | 0.8 | 71,567 | 3.2 | -90,003 | 0.4 |
| Com Lighting | 81,939 | 1.1 | 1,987,725 | 3.6 | -1,905,787 | 0.4 |
| **Non-Residential Total** | **102,319** | **1.07** | **2,384,714** | **3.43** | **-2,282,395** | **0.40** |
| **Portfolio Total** | **307,769** | **1.08** | **6,166,829** | **4.52** | **-5,859,060** | **0.41** |

## RIM Scenario

The RIM Scenario is comprised of measures and programs that achieved a cost-effectivess ratio of 1.0 or higher for the PCT and RIM test, and measures that had a simple payback of two years or more (without consideration of incentives).

FPUC did not have any measures or programs that passed the cost-effectiveness screening for the RIM Scenario.

## TRC Scenario

The TRC Scenario is comprised of measures and programs that achieved a cost-effectivess ratio of 1.0 or higher for the PCT and TRC test, and measures that had a simple payback of two years or more (without consideration of incentives). Incentive rates were based on the maximum incentive amount that would result in a simple payback period of two years for each measure. The following tables include the program-level details for this scenario.

Table 7. TRC Scenario – Annual MWh Targets

| Annual MWh | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Audits/EE Kits | 1 | 2 | 3 | 3 | 4 | 5 | 5 | 5 | 5 | 4 |
| Res Heating & Cooling Upgrade | 82 | 88 | 93 | 99 | 104 | 109 | 112 | 114 | 115 | 115 |
| Res New Home | 34 | 46 | 60 | 75 | 89 | 101 | 111 | 118 | 122 | 125 |
| Res Low Income | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Res Building Envelope | 16 | 17 | 18 | 20 | 21 | 23 | 24 | 26 | 27 | 29 |
| Res Water Heating | 109 | 137 | 167 | 198 | 228 | 255 | 277 | 295 | 308 | 317 |
| Res Equipment Rebates | 17 | 22 | 29 | 37 | 45 | 52 | 57 | 58 | 54 | 48 |
| Res HVAC Improvements | 14 | 15 | 17 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| **Residential Total** | 272 | 328 | 389 | 451 | 512 | 566 | 609 | 639 | 657 | 663 |
| Com Heating & Cooling Upgrade | 40 | 45 | 50 | 55 | 59 | 63 | 66 | 69 | 70 | 71 |
| Com Reflective Roof | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Com Chiller Upgrade | 6 | 7 | 7 | 8 | 8 | 9 | 9 | 10 | 10 | 10 |
| Com Small Business | 8 | 11 | 15 | 18 | 22 | 25 | 27 | 29 | 30 | 30 |
| Com Custom | 171 | 191 | 215 | 243 | 272 | 301 | 324 | 339 | 342 | 332 |
| Com Lighting | 68 | 93 | 121 | 152 | 182 | 208 | 228 | 238 | 239 | 231 |
| Com Prescriptive | 59 | 74 | 91 | 109 | 127 | 143 | 156 | 166 | 171 | 173 |
| **Non-Residential Total** | 351 | 420 | 499 | 584 | 670 | 749 | 811 | 850 | 862 | 848 |
| **Portfolio Total** | 624 | 748 | 888 | 1,035 | 1,182 | 1,314 | 1,420 | 1,490 | 1,519 | 1,511 |

Table 8. TRC Scenario – Annual summer MW Targets

| Annual Summer MW | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Audits/EE Kits | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Res Heating & Cooling Upgrade | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| Res New Home | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 |
| Res Low Income | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Res Building Envelope | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Res Water Heating | 0.01 | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| Res Equipment Rebates | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Res HVAC Improvements | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Residential Total** | 0.05 | 0.06 | 0.07 | 0.08 | 0.10 | 0.11 | 0.11 | 0.12 | 0.12 | 0.13 |
| Com Heating & Cooling Upgrade | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| Com Reflective Roof | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Com Chiller Upgrade | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Com Small Business | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Com Custom | 0.03 | 0.03 | 0.03 | 0.04 | 0.04 | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 |
| Com Lighting | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| Com Prescriptive | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| **Non-Residential Total** | 0.06 | 0.07 | 0.08 | 0.09 | 0.10 | 0.11 | 0.12 | 0.13 | 0.13 | 0.13 |
| **Portfolio Total** | 0.11 | 0.13 | 0.15 | 0.18 | 0.20 | 0.22 | 0.24 | 0.25 | 0.25 | 0.25 |

Table 9. TRC Scenario – Annual winter MW Targets

| Annual Winter MW | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Audits/EE Kits | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Res Heating & Cooling Upgrade | 0.04 | 0.04 | 0.04 | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| Res New Home | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Res Low Income | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Res Building Envelope | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 |
| Res Water Heating | 0.03 | 0.03 | 0.04 | 0.05 | 0.06 | 0.06 | 0.07 | 0.07 | 0.08 | 0.08 |
| Res Equipment Rebates | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 |
| Res HVAC Improvements | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Residential Total** | 0.08 | 0.09 | 0.10 | 0.11 | 0.12 | 0.13 | 0.14 | 0.15 | 0.15 | 0.15 |
| Com Heating & Cooling Upgrade | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| Com Reflective Roof | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Com Chiller Upgrade | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Com Small Business | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Com Custom | 0.03 | 0.03 | 0.03 | 0.04 | 0.04 | 0.04 | 0.04 | 0.05 | 0.05 | 0.04 |
| Com Lighting | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.02 |
| Com Prescriptive | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 |
| **Non-Residential Total** | 0.06 | 0.07 | 0.08 | 0.09 | 0.10 | 0.11 | 0.12 | 0.12 | 0.12 | 0.12 |
| **Portfolio Total** | 0.14 | 0.16 | 0.18 | 0.20 | 0.22 | 0.24 | 0.26 | 0.27 | 0.27 | 0.27 |

Table 10. TRC Scenario – Annual Participation Targets

| Annual Participation (# measures) | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Audits/EE Kits | 29 | 40 | 52 | 66 | 81 | 94 | 103 | 103 | 94 | 78 |
| Res Heating & Cooling Upgrade | 73 | 82 | 92 | 100 | 109 | 116 | 122 | 126 | 127 | 125 |
| Res New Home | 8 | 11 | 13 | 16 | 19 | 22 | 24 | 25 | 27 | 27 |
| Res Low Income | 8 | 10 | 13 | 17 | 21 | 24 | 26 | 26 | 24 | 20 |
| Res Building Envelope | 35 | 38 | 41 | 44 | 46 | 50 | 53 | 56 | 60 | 63 |
| Res Water Heating | 113 | 143 | 176 | 209 | 241 | 269 | 290 | 309 | 321 | 328 |
| Res Equipment Rebates | 172 | 229 | 302 | 383 | 467 | 541 | 588 | 591 | 545 | 459 |
| Res HVAC Improvements | 24 | 27 | 30 | 32 | 34 | 36 | 38 | 40 | 41 | 43 |
| **Residential Total** | 462 | 580 | 719 | 867 | 1,018 | 1,152 | 1,244 | 1,276 | 1,239 | 1,143 |
| Com Heating & Cooling Upgrade | 66 | 74 | 78 | 83 | 88 | 91 | 95 | 97 | 100 | 103 |
| Com Reflective Roof | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Com Chiller Upgrade | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Com Small Business | 40 | 52 | 67 | 82 | 96 | 109 | 119 | 126 | 130 | 134 |
| Com Custom | 40 | 45 | 52 | 61 | 67 | 77 | 82 | 87 | 90 | 88 |
| Com Lighting | 218 | 290 | 376 | 470 | 557 | 636 | 694 | 729 | 739 | 728 |
| Com Prescriptive | 61 | 71 | 83 | 95 | 107 | 119 | 128 | 134 | 134 | 137 |
| **Non-Residential Total** | 430 | 537 | 661 | 796 | 920 | 1,037 | 1,123 | 1,178 | 1,198 | 1,195 |
| **Portfolio Total** | 892 | 1,117 | 1,380 | 1,663 | 1,938 | 2,189 | 2,367 | 2,454 | 2,437 | 2,338 |

Table 11. TRC Scenario – Annual Program Budget Estimates

| Budgets ($ in thousands) | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Audits/EE Kits | $1 | $1 | $1 | $1 | $2 | $2 | $2 | $2 | $2 | $2 |
| Res Heating & Cooling Upgrade | $89 | $98 | $105 | $113 | $119 | $125 | $129 | $133 | $136 | $138 |
| Res New Home | $13 | $18 | $23 | $29 | $34 | $39 | $42 | $45 | $47 | $48 |
| Res Low Income | $0 | $0 | $0 | $0 | $0 | $0 | $1 | $1 | $0 | $0 |
| Res Building Envelope | $24 | $26 | $28 | $30 | $32 | $34 | $37 | $39 | $42 | $44 |
| Res Water Heating | $236 | $291 | $351 | $412 | $471 | $525 | $571 | $608 | $638 | $660 |
| Res Equipment Rebates | $3 | $4 | $5 | $6 | $8 | $9 | $9 | $10 | $9 | $9 |
| Res HVAC Improvements | $4 | $4 | $5 | $5 | $6 | $6 | $6 | $7 | $7 | $7 |
| **Residential Total** | $369 | $442 | $519 | $597 | $672 | $740 | $798 | $845 | $881 | $907 |
| Com Heating & Cooling Upgrade | $14 | $16 | $18 | $19 | $21 | $22 | $23 | $24 | $25 | $25 |
| Com Reflective Roof | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Com Chiller Upgrade | $6 | $7 | $8 | $8 | $9 | $10 | $10 | $10 | $11 | $11 |
| Com Small Business | $3 | $4 | $5 | $6 | $7 | $8 | $9 | $9 | $9 | $10 |
| Com Custom | $36 | $39 | $43 | $47 | $52 | $56 | $60 | $62 | $62 | $60 |
| Com Lighting | $21 | $29 | $38 | $48 | $57 | $65 | $71 | $75 | $75 | $74 |
| Com Prescriptive | $11 | $14 | $18 | $21 | $24 | $27 | $30 | $31 | $32 | $32 |
| **Non-Residential Total** | $92 | $109 | $129 | $149 | $170 | $188 | $203 | $212 | $215 | $212 |
| **Portfolio Total** | $462 | $551 | $647 | $746 | $842 | $928 | $1,001 | $1,057 | $1,096 | $1,120 |

Table 12. TRC Scenario – Cost-Effectiveness Results

| | **TRC** | | **PCT** | | **RIM** | |
|---|---|---|---|---|---|---|
| **Program Cost-Effectiveness** | Net Benefits ($) | Benefit/Cost Ratio | Net Benefits ($) | Benefit/Cost Ratio | Net Benefits ($) | Benefit/Cost Ratio |
| Res Audits/EE Kits | 475 | 1.0 | 32,626 | 3.4 | -32,151 | 0.4 |
| Res Heating & Cooling Upgrade | 463,150 | 1.3 | 2,014,437 | 3.1 | -1,551,287 | 0.3 |
| Res New Home | 371,130 | 1.7 | 982,183 | 3.8 | -611,053 | 0.6 |
| Res Low Income | 119 | 1.0 | 8,156 | 3.4 | -8,038 | 0.4 |
| Res Building Envelope | 98,763 | 1.3 | 461,433 | 2.4 | -362,670 | 0.4 |
| Res Water Heating | 10,014,754 | 2.8 | 15,834,646 | 3.9 | -5,819,893 | 0.2 |
| Res Equipment Rebates | 30,657 | 1.2 | 237,813 | 2.7 | -207,156 | 0.5 |
| Res HVAC Improvements | 110,285 | 2.1 | 179,830 | 3.1 | -69,545 | 0.7 |
| **Residential Total** | **11,089,333** | **2.36** | **19,751,125** | **3.71** | **-8,661,792** | **0.32** |
| Com Heating & Cooling Upgrade | 71,682 | 1.2 | 585,797 | 2.9 | -514,115 | 0.5 |
| Com Reflective Roof | 38 | 1.7 | 123 | 3.4 | -85 | 0.5 |
| Com Chiller Upgrade | 1,693 | 1.0 | 116,310 | 3.3 | -114,617 | 0.4 |
| Com Small Business | 21,509 | 1.2 | 250,843 | 3.5 | -229,334 | 0.4 |

| | TRC | | PCT | | RIM | |
|---|---|---|---|---|---|---|
| **Program Cost-Effectiveness** | Net Benefits ($) | Benefit/Cost Ratio | Net Benefits ($) | Benefit/Cost Ratio | Net Benefits ($) | Benefit/Cost Ratio |
| Com Custom | 715,191 | 1.6 | 4,255,057 | 5.3 | -3,539,866 | 0.3 |
| Com Lighting | 79,182 | 1.1 | 1,970,849 | 3.7 | -1,891,668 | 0.4 |
| Com Prescriptive | 281,726 | 1.5 | 1,544,942 | 4.2 | -1,263,216 | 0.4 |
| **Non-Residential Total** | **1,171,020** | **1.35** | **8,723,921** | **4.30** | **-7,552,900** | **0.37** |
| **Portfolio Total** | **12,260,353** | **2.07** | **28,475,046** | **3.87** | **-16,214,692** | **0.35** |

# Exhibit JH-15
# JEA Program Development Summary

## Overview

RI worked collaboratively with JEA on the DSM program development process to develop impacts under three scenarios: 1) potential DSM programs that contribute to proposed DSM goals (Proposed Goals Scenario), 2) potential DSM programs that pass the Participant and Rate Impact Measure Tests (RIM Scenario), and 3) potential DSM programs that pass the Participant and Total Resource Cost Tests (TRC Scenario).

## Methodology

The development of DSM programs for each scenario included incorporating the measures and measure impacts developed for the Technical Potential (TP) study, reviewing JEA's current program offerings, collaboration with JEA on program concepts that are beneficial for their customers, and analysis of economic impacts and market adoption to create potential DSM programs. This process included the following steps:

### Program Review and Measure Bundling

The analysis began with the measures from the TP study. This measure list was initially refined for program development for each scenario as follows:

1. Proposed Goals scenario – measures that passed, or were close to passing, either the TRC or RIM tests were prioritized in the initial measure bundling analysis. Measures included in current JEA programs were also identified and included in the initial measure bundling.
2. RIM Scenario – measures that passed the RIM Scenario criteria (RIM test, PCT, and payback period of at least 2 years) were included in the initial measure bundling analysis
3. TRC Scenario – measures that passed the TRC Scenario criteria (TRC test, PCT, and payback period of at least 2 years) were included in the initial measure bundling analysis

Resource Innovations then reviewed current JEA programs and eligible measures, and mapped individual measures to the appropriate programs for each scenario. Resource Innovations worked collaboratively with JEA to collect program information (e.g. program manuals, participation records, energy and demand savings, budgets) and review the existing programs to determine which measures should be included in the initial program portfolios. In addition, a gap analysis was conducted to identify measures included in each scenario that are not currently offered by JEA. These measures were either included in existing programs where there was a logical fit, or included as a new program concept.

## Program Refinement and Modeling

After identifying the preliminary measure bundles and programs, Resource Innovations worked collaboratively with JEA to develop incentive amounts and non-incentive costs. Non-incentive costs, which include costs to manage, administer, and market the program, were developed based on current JEA program costs as well as secondary data on similar programs offered by other utilities, and refined as needed based on the proposed program delivery structure. Incentive costs were developed for each scenario as follows:

1. Proposed Goals scenario – preliminary incentive rates were informed by current incentives offered by JEA as well as typical incentive levels offered by similar programs regionally and nationally.
2. RIM Scenario – incentive rates were developed based on the available net benefits for each measure, based on total RIM benefits minus RIM costs. Next, the incentive amount that would result in a simple payback period of two years for each measure was calculated. The final incentive applied for the measure was based on the lower of these two values.
3. TRC Scenario – the incentive amount required to result in a simple payback period of two years for each measure was used as the final incentive for the measure.

Measures included in the initial program concepts for each scenario were analyzed in RI's TEA-POT model to update the economic analysis based on the JEA-specific non-incentive and incentive costs, and to estimate market adoption for each measure. The economic analysis included calculating updated RIM, TRC, and PCT costs and benefits for each measure and re-screening measures for each scenario.

RI's market adoption estimates use a payback acceptance criterion to estimate long-run market shares for measures as a function of measure incremental costs and expected bill savings over the measures' effective useful life (inclusive of utility incentives). Incremental adoption estimates are based on the Bass Diffusion Model, which is a mathematical description of how the rate of new product diffusion changes over time. For this study, adoption curve input parameters were developed for each measure based on specific criteria, including measure maturity in the market, overall measure cost, and whether the measure was currently offered through a utility program. RI's TEA-POT model then calculated demand and energy savings by applying estimated adoption rates to each cost-effective measure.

The TEA-POT modeling results were exported into RI's Program Planner workbook that aggregated the individual measure results into program and portfolio impacts for each scenario. For the TRC Scenario and RIM Scenario no further refinements to the programs were made. For the Proposed Goals scenario, RI continued to work collaboratively with JEA to identify the measures and program concepts that comprise the proposed DSM goals. These impacts for each scenario are provided below.

# Results

## Proposed Goals Scenario

The Proposed Goals Scenario is described in more detail in Witness Pippin's testimony. The following tables include the program-level details for this scenario.

Table 1. Proposed DSM Goals – Annual MWh Targets

| Annual MWh | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Home Efficiency Upgrade | 1,039 | 1,196 | 1,363 | 1,535 | 1,702 | 1,854 | 1,983 | 2,088 | 2,171 | 2,237 |
| Res EE Products | 1,055 | 1,389 | 1,800 | 2,281 | 2,797 | 3,279 | 3,625 | 3,730 | 3,537 | 3,088 |
| Res Neighborhood | 1,078 | 1,086 | 1,094 | 1,101 | 1,109 | 1,117 | 1,125 | 1,133 | 1,141 | 1,149 |
| **Residential Total** | 3,172 | 3,670 | 4,257 | 4,917 | 5,608 | 6,250 | 6,733 | 6,951 | 6,850 | 6,474 |
| Com Lighting | 3,346 | 3,562 | 3,771 | 3,975 | 4,169 | 4,334 | 4,444 | 4,470 | 4,403 | 4,257 |
| **Non-Residential Total** | 3,346 | 3,562 | 3,771 | 3,975 | 4,169 | 4,334 | 4,444 | 4,470 | 4,403 | 4,257 |
| **Portfolio Total** | 6,518 | 7,232 | 8,028 | 8,893 | 9,777 | 10,584 | 11,176 | 11,422 | 11,252 | 10,731 |

Table 2. Proposed DSM Goals – Annual summer MW Targets

| Annual Summer MW | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Home Efficiency Upgrade | 0.13 | 0.15 | 0.17 | 0.19 | 0.21 | 0.23 | 0.25 | 0.26 | 0.28 | 0.29 |
| Res EE Products | 0.40 | 0.54 | 0.72 | 0.92 | 1.14 | 1.35 | 1.50 | 1.55 | 1.46 | 1.26 |
| Res Neighborhood | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 |
| **Residential Total** | 0.68 | 0.84 | 1.03 | 1.26 | 1.50 | 1.73 | 1.90 | 1.96 | 1.89 | 1.70 |
| Com Lighting | 0.44 | 0.47 | 0.50 | 0.53 | 0.56 | 0.58 | 0.60 | 0.60 | 0.59 | 0.57 |
| **Non-Residential Total** | 0.44 | 0.47 | 0.50 | 0.53 | 0.56 | 0.58 | 0.60 | 0.60 | 0.59 | 0.57 |
| **Portfolio Total** | 1.12 | 1.31 | 1.53 | 1.79 | 2.06 | 2.31 | 2.50 | 2.56 | 2.48 | 2.27 |

Table 3. Proposed DSM Goals – Annual winter MW Targets

| Annual Winter MW | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Home Efficiency Upgrade | 0.45 | 0.50 | 0.55 | 0.61 | 0.66 | 0.70 | 0.74 | 0.77 | 0.79 | 0.81 |
| Res EE Products | 0.17 | 0.23 | 0.30 | 0.38 | 0.47 | 0.55 | 0.60 | 0.61 | 0.57 | 0.49 |
| Res Neighborhood | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.27 | 0.27 | 0.27 | 0.27 |
| **Residential Total** | 0.88 | 0.99 | 1.11 | 1.25 | 1.38 | 1.51 | 1.60 | 1.65 | 1.63 | 1.57 |
| Com Lighting | 0.37 | 0.39 | 0.41 | 0.42 | 0.44 | 0.45 | 0.46 | 0.46 | 0.46 | 0.45 |
| **Non-Residential Total** | 0.37 | 0.39 | 0.41 | 0.42 | 0.44 | 0.45 | 0.46 | 0.46 | 0.46 | 0.45 |
| **Portfolio Total** | 1.24 | 1.37 | 1.51 | 1.67 | 1.82 | 1.96 | 2.07 | 2.11 | 2.09 | 2.02 |

Table 4. Proposed DSM Goals – Annual Participation Targets

| **Annual Participation (# measures)** | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Home Efficiency Upgrade | 351 | 431 | 519 | 612 | 700 | 783 | 853 | 909 | 950 | 981 |
| Res EE Products | 2,680 | 3,438 | 4,353 | 5,409 | 6,536 | 7,587 | 8,349 | 8,603 | 8,229 | 7,317 |
| Res Neighborhood | 1,273 | 1,281 | 1,289 | 1,298 | 1,307 | 1,316 | 1,325 | 1,335 | 1,344 | 1,350 |
| **Residential Total** | 4,304 | 5,150 | 6,161 | 7,319 | 8,543 | 9,686 | 10,527 | 10,847 | 10,523 | 9,648 |
| Com Lighting | 11,203 | 11,898 | 12,503 | 13,037 | 13,500 | 13,874 | 14,133 | 14,244 | 14,199 | 14,029 |
| **Non-Residential Total** | 11,203 | 11,898 | 12,503 | 13,037 | 13,500 | 13,874 | 14,133 | 14,244 | 14,199 | 14,029 |
| **Portfolio Total** | 15,507 | 17,048 | 18,664 | 20,356 | 22,043 | 23,560 | 24,660 | 25,091 | 24,722 | 23,677 |

Table 5. Proposed DSM Goals – Annual Program Budget Estimates

| **Budgets ($ in thousands)** | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Home Efficiency Upgrade | $1,112 | $1,340 | $1,588 | $1,845 | $2,096 | $2,325 | $2,520 | $2,680 | $2,805 | $2,904 |
| Res EE Products | $280 | $366 | $472 | $595 | $728 | $852 | $941 | $968 | $920 | $806 |
| Res Neighborhood | $444 | $446 | $448 | $450 | $452 | $454 | $456 | $458 | $460 | $462 |
| **Residential Total** | $1,836 | $2,153 | $2,509 | $2,891 | $3,276 | $3,630 | $3,917 | $4,106 | $4,185 | $4,172 |
| Com Lighting | $900 | $974 | $1,044 | $1,111 | $1,174 | $1,228 | $1,266 | $1,281 | $1,270 | $1,238 |
| **Non-Residential Total** | $900 | $974 | $1,044 | $1,111 | $1,174 | $1,228 | $1,266 | $1,281 | $1,270 | $1,238 |
| **Portfolio Total** | $2,736 | $3,127 | $3,553 | $4,002 | $4,450 | $4,858 | $5,182 | $5,386 | $5,455 | $5,409 |

Table 6. Proposed DSM Goals – Cost-Effectiveness Results

| | **TRC** | | **PCT** | | **RIM** | |
|---|---|---|---|---|---|---|
| **Program Cost-Effectiveness** | Net Benefits ($) | Benefit/ Cost Ratio | Net Benefits ($) | Benefit/ Cost Ratio | Net Benefits ($) | Benefit/ Cost Ratio |
| Res Home Efficiency Upgrade | 9,026,783 | 1.6 | 18,157,755 | 2.6 | -9,130,972 | 0.6 |
| Res EE Products | 5,361,319 | 1.4 | 18,094,140 | 3.5 | -12,732,821 | 0.6 |
| Res Neighborhood | 975,832 | 1.2 | 9,031,701 | 6.4 | -8,055,869 | 0.4 |
| **Residential Total** | **15,363,935** | **1.48** | **45,283,597** | **3.22** | **-29,919,662** | **0.56** |
| Com Lighting | 3,616,165 | 1.2 | 55,998,344 | 4.5 | -52,382,179 | 0.3 |
| **Non-Residential Total** | **3,616,165** | **1.19** | **55,998,344** | **4.46** | **-52,382,179** | **0.30** |
| **Portfolio Total** | **18,980,100** | **1.38** | **101,281,941** | **3.77** | **-82,301,841** | **0.42** |

## RIM Scenario

The RIM Scenario is comprised of measures and programs that achieved a cost-effectivess ratio of 1.0 or higher for the PCT and RIM test, and measures that had a simple payback of two years or more (without consideration of incentives). Incentive rates were calculated from the RIM net benefit available and the incentive amount that would result in a simple payback period of two years for each measure. The maximum incentive was based on the lower of these two values. The following tables include the program-level details for this scenario.

### Energy Efficiency Programs

Table 7. RIM Scenario – Annual MWh Targets

| Annual MWh | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Home Efficiency Upgrade | 12.39 | 12.06 | 11.72 | 11.36 | 10.99 | 10.61 | 10.23 | 9.84 | 9.46 | 9.08 |
| **Residential Total** | 12.39 | 12.06 | 11.72 | 11.36 | 10.99 | 10.61 | 10.23 | 9.84 | 9.46 | 9.08 |
| **Non-Residential Total** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Portfolio Total** | 12.39 | 12.06 | 11.72 | 11.36 | 10.99 | 10.61 | 10.23 | 9.84 | 9.46 | 9.08 |

Table 8. RIM Scenario – Annual summer MW Targets

| Annual Summer MW | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Home Efficiency Upgrade | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Residential Total** | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Non-Residential Total** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Portfolio Total** | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |

Table 9. RIM Scenario – Annual winter MW Targets

| Annual Winter MW | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Home Efficiency Upgrade | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Residential Total** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Non-Residential Total** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Portfolio Total** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

Table 10. RIM Scenario – Annual Participation Targets

| **Annual Participation (# measures)** | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Home Efficiency Upgrade | 8 | 8 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 6 |
| **Residential Total** | 8 | 8 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 6 |
| **Non-Residential Total** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Portfolio Total** | 8 | 8 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 6 |

Table 11. RIM Scenario – Annual Program Budget Estimates

| **Budgets ($ in thousands)** | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Home Efficiency Upgrade | $3.03 | $2.95 | $2.86 | $2.78 | $2.69 | $2.59 | $2.50 | $2.40 | $2.31 | $2.22 |
| **Residential Total** | $3.03 | $2.95 | $2.86 | $2.78 | $2.69 | $2.59 | $2.50 | $2.40 | $2.31 | $2.22 |
| **Non-Residential Total** | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| **Portfolio Total** | $3.03 | $2.95 | $2.86 | $2.78 | $2.69 | $2.59 | $2.50 | $2.40 | $2.31 | $2.22 |

Table 12. RIM Scenario – Cost-Effectiveness Results

| | **TRC** | | **PCT** | | **RIM** | |
|---|---|---|---|---|---|---|
| **Program Cost-Effectiveness** | Net Benefits ($) | Benefit/ Cost Ratio | Net Benefits ($) | Benefit/ Cost Ratio | Net Benefits ($) | Benefit/ Cost Ratio |
| Res Home Efficiency Upgrade | 124,743 | 3.0 | 124,733 | 3.9 | 10 | 1.0 |
| **Residential Total** | **124,743** | **2.98** | **124,733** | **3.93** | **10** | **1.00** |
| **Non-Residential Total** | **0** | **0.00** | **0** | **0.00** | **0** | **0.00** |
| **Portfolio Total** | **124,743** | **2.98** | **124,733** | **3.93** | **10** | **1.00** |

## Demand Response Programs

The RIM Scenario analysis resulted in four cost-effective demand response measures for the largest commercial and industrial segment, which includes customers over 500 kW. The four DR measures are presented as individual potential program options in the following tables. Each's program's cost and impact estimates were developed independent of the other programs; therefore, because the measures apply to the same target population of large commercial and industrial customers, the savings and participation are not additive.

Table 13. RIM Scenario – Commercial Demand Response - Automated DR Program

| **Annual Impacts** | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Annual MWh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Summer MW (Cumulative) | 11.4 | 20.2 | 27.2 | 32.6 | 36.8 | 40.1 | 42.6 | 44.6 | 46.2 | 47.4 |
| Winter MW (Cumulative) | 8.9 | 15.8 | 21.2 | 25.5 | 28.8 | 31.3 | 33.3 | 34.9 | 36.1 | 37.1 |
| Participation (Cumulative) | 8 | 13 | 18 | 22 | 24 | 27 | 28 | 30 | 31 | 32 |
| Program Costs ($ in Thousands) | $3,671 | $1,885 | $2,049 | $2,176 | $2,276 | $2,353 | $2,414 | $2,461 | $2,498 | $2,527 |

| **COST EFFECTIVENESS** | Net Benefits | Benefit/Cost Ratio |
|---|---|---|
| TRC | $8,483,023 | 1.38 |
| RIM | $8,483,023 | 1.38 |

Table 14. RIM Scenario – Commercial Demand Response – Critical Peak Pricing (CPP) Program

| **Annual Impacts** | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Annual MWh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Summer MW (Cumulative) | 9.4 | 16.8 | 22.5 | 27.0 | 30.4 | 33.2 | 35.3 | 36.9 | 38.2 | 39.2 |
| Winter MW (Cumulative) | 7.4 | 15.8 | 21.2 | 25.5 | 28.8 | 31.3 | 33.3 | 34.9 | 36.1 | 37.1 |
| Participation (Cumulative) | 8 | 13 | 18 | 22 | 24 | 27 | 28 | 30 | 31 | 32 |
| Program Costs ($ in Thousands) | $3,671 | $1,740 | $1,875 | $1,981 | $2,063 | $2,127 | $2,177 | $2,217 | $2,247 | $2,271 |

| **COST EFFECTIVENESS** | Net Benefits | Benefit/Cost Ratio |
|---|---|---|
| TRC | $4,935,709 | 1.24 |
| RIM | $4,935,709 | 1.24 |

Table 15. RIM Scenario – Commercial Demand Response – Firm Service Level Program

| **Annual Impacts** | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Annual MWh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Summer MW (Cumulative) | 9.4 | 16.8 | 22.5 | 27.0 | 30.4 | 33.2 | 35.3 | 36.9 | 38.2 | 39.2 |
| Winter MW (Cumulative) | 7.4 | 13.1 | 17.6 | 21.1 | 23.8 | 25.9 | 27.6 | 28.9 | 29.9 | 30.7 |
| Participation (Cumulative) | 8 | 13 | 18 | 22 | 24 | 27 | 28 | 30 | 31 | 32 |
| Program Costs ($ in Thousands) | $1,721 | $1,674 | $1,759 | $1,825 | $1,876 | $1,916 | $1,947 | $1,972 | $1,991 | $2,006 |

| **COST EFFECTIVENESS** | Net Benefits | Benefit/Cost Ratio |
|---|---|---|
| TRC | $8,454,026 | 1.50 |
| RIM | $8,454,026 | 1.50 |

Table 16. RIM Scenario – Commercial Demand Response – Guaranteed Load Drop Program

| **Annual Impacts** | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Annual MWh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Summer MW (Cumulative) | 9.4 | 16.8 | 22.5 | 27.0 | 30.4 | 33.2 | 35.3 | 36.9 | 38.2 | 39.2 |
| Winter MW (Cumulative) | 7.4 | 13.1 | 17.6 | 21.1 | 23.8 | 25.9 | 27.6 | 28.9 | 29.9 | 30.7 |
| Participation (Cumulative) | 8 | 13 | 18 | 22 | 24 | 27 | 28 | 30 | 31 | 32 |
| Program Costs ($ in Thousands) | $1,721 | $1,674 | $1,759 | $1,825 | $1,876 | $1,916 | $1,947 | $1,972 | $1,991 | $2,006 |

| **COST EFFECTIVENESS** | Net Benefits | Benefit/Cost Ratio |
|---|---|---|
| TRC | $8,454,026 | 1.50 |
| RIM | $8,454,026 | 1.50 |

### Demand-Side Renewable Energy Programs

JEA did not have any DSRE measures or programs that passed the cost-effectiveness screening for the RIM Scenario.

## TRC Scenario

The TRC Scenario is comprised of measures and programs that achieved a cost-effectivess ratio of 1.0 or higher for the PCT and TRC test, and measures that had a simple payback of two years or more (without consideration of incentives). Incentive rates were based on the maximum incentive amount that would result in a simple payback period of two years for each measure. The following tables include the program-level details for this scenario.

## Energy Efficiency Programs

Table 17. TRC Scenario – Annual MWh Targets

| Annual MWh | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Audit | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res Home Efficiency Upgrade | 4,760 | 5,843 | 7,045 | 8,307 | 9,544 | 10,667 | 11,615 | 12,368 | 12,939 | 13,364 |
| Res EE Products | 165 | 186 | 206 | 224 | 241 | 256 | 270 | 283 | 295 | 305 |
| Res Marketplace | 915 | 1,258 | 1,688 | 2,195 | 2,743 | 3,254 | 3,621 | 3,731 | 3,525 | 3,047 |
| Res New Home | 663 | 922 | 1,222 | 1,543 | 1,859 | 2,146 | 2,385 | 2,572 | 2,711 | 2,814 |
| Res Neighborhood | 43 | 58 | 78 | 102 | 127 | 149 | 165 | 168 | 156 | 132 |
| Res Solar Water Heating | 478 | 536 | 589 | 637 | 679 | 716 | 748 | 776 | 800 | 820 |
| **Residential Total** | 7,023 | 8,804 | 10,828 | 13,007 | 15,192 | 17,188 | 18,804 | 19,897 | 20,426 | 20,483 |
| Com Audit | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Com Prescriptive | 3,683 | 4,378 | 5,131 | 5,927 | 6,729 | 7,472 | 8,070 | 8,443 | 8,552 | 8,424 |
| Com Lighting | 2,888 | 3,029 | 3,165 | 3,296 | 3,419 | 3,522 | 3,585 | 3,590 | 3,529 | 3,414 |
| Com Custom | 7,874 | 8,258 | 8,765 | 9,356 | 9,973 | 10,535 | 10,952 | 11,154 | 11,108 | 10,833 |
| Com Small Business | 869 | 958 | 1,057 | 1,167 | 1,279 | 1,377 | 1,441 | 1,448 | 1,389 | 1,277 |
| **Non-Residential Total** | 15,314 | 16,623 | 18,118 | 19,746 | 21,400 | 22,905 | 24,048 | 24,636 | 24,578 | 23,948 |
| **Portfolio Total** | 22,338 | 25,427 | 28,946 | 32,753 | 36,592 | 40,093 | 42,852 | 44,533 | 45,003 | 44,430 |

Table 18. TRC Scenario – Annual summer MW Targets

| Annual Summer MW | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Audit | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Res Home Efficiency Upgrade | 0.71 | 0.85 | 1.02 | 1.19 | 1.36 | 1.51 | 1.64 | 1.75 | 1.83 | 1.90 |
| Res EE Products | 0.04 | 0.04 | 0.04 | 0.05 | 0.05 | 0.05 | 0.06 | 0.06 | 0.06 | 0.06 |
| Res Marketplace | 0.38 | 0.53 | 0.71 | 0.92 | 1.16 | 1.38 | 1.54 | 1.58 | 1.49 | 1.28 |
| Res New Home | 0.18 | 0.25 | 0.33 | 0.42 | 0.51 | 0.60 | 0.67 | 0.72 | 0.77 | 0.80 |
| Res Neighborhood | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 |
| Res Solar Water Heating | 0.05 | 0.06 | 0.06 | 0.07 | 0.07 | 0.08 | 0.08 | 0.09 | 0.09 | 0.09 |
| **Residential Total** | 1.36 | 1.74 | 2.18 | 2.66 | 3.17 | 3.63 | 4.00 | 4.22 | 4.26 | 4.14 |
| Com Audit | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Com Prescriptive | 0.77 | 0.90 | 1.05 | 1.19 | 1.34 | 1.48 | 1.59 | 1.67 | 1.71 | 1.70 |
| Com Lighting | 0.39 | 0.41 | 0.43 | 0.45 | 0.47 | 0.49 | 0.50 | 0.50 | 0.49 | 0.48 |
| Com Custom | 1.00 | 1.06 | 1.13 | 1.22 | 1.32 | 1.40 | 1.47 | 1.51 | 1.50 | 1.46 |
| Com Small Business | 0.10 | 0.11 | 0.12 | 0.13 | 0.14 | 0.15 | 0.15 | 0.15 | 0.15 | 0.14 |
| **Non-Residential Total** | 2.26 | 2.48 | 2.73 | 3.00 | 3.27 | 3.52 | 3.72 | 3.83 | 3.85 | 3.78 |
| **Portfolio Total** | 3.62 | 4.22 | 4.91 | 5.67 | 6.44 | 7.15 | 7.72 | 8.05 | 8.11 | 7.93 |

Table 19. TRC Scenario – Annual winter MW Targets

| Annual Winter MW | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Audit | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Res Home Efficiency Upgrade | 1.53 | 1.80 | 2.11 | 2.42 | 2.73 | 3.00 | 3.24 | 3.42 | 3.56 | 3.66 |
| Res EE Products | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 |
| Res Marketplace | 0.16 | 0.22 | 0.29 | 0.38 | 0.47 | 0.56 | 0.61 | 0.63 | 0.58 | 0.50 |
| Res New Home | 0.08 | 0.11 | 0.15 | 0.18 | 0.22 | 0.25 | 0.28 | 0.30 | 0.31 | 0.32 |
| Res Neighborhood | 0.01 | 0.01 | 0.02 | 0.03 | 0.03 | 0.04 | 0.04 | 0.04 | 0.04 | 0.03 |
| Res Solar Water Heating | 0.12 | 0.13 | 0.15 | 0.16 | 0.17 | 0.18 | 0.18 | 0.19 | 0.20 | 0.20 |
| **Residential Total** | 1.91 | 2.30 | 2.73 | 3.19 | 3.64 | 4.05 | 4.38 | 4.60 | 4.72 | 4.74 |
| Com Audit | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Com Prescriptive | 0.56 | 0.67 | 0.79 | 0.92 | 1.06 | 1.19 | 1.28 | 1.33 | 1.32 | 1.26 |
| Com Lighting | 0.31 | 0.32 | 0.33 | 0.34 | 0.35 | 0.35 | 0.36 | 0.36 | 0.35 | 0.34 |
| Com Custom | 1.01 | 1.06 | 1.13 | 1.21 | 1.29 | 1.38 | 1.44 | 1.48 | 1.48 | 1.44 |
| Com Small Business | 0.10 | 0.11 | 0.13 | 0.14 | 0.16 | 0.17 | 0.18 | 0.18 | 0.18 | 0.16 |
| **Non-Residential Total** | 1.97 | 2.15 | 2.37 | 2.61 | 2.86 | 3.09 | 3.27 | 3.35 | 3.33 | 3.21 |
| **Portfolio Total** | 3.88 | 4.45 | 5.10 | 5.80 | 6.50 | 7.14 | 7.64 | 7.95 | 8.04 | 7.95 |

Table 20. TRC Scenario – Annual Participation Targets

| Annual Participation (# measures) | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Audit | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res Home Efficiency Upgrade | 3,573 | 4,430 | 5,372 | 6,361 | 7,328 | 8,212 | 8,964 | 9,569 | 10,036 | 10,395 |
| Res EE Products | 700 | 787 | 867 | 942 | 1,009 | 1,071 | 1,127 | 1,178 | 1,224 | 1,267 |
| Res Marketplace | 4,554 | 6,352 | 8,513 | 10,947 | 13,476 | 15,827 | 17,693 | 18,809 | 19,068 | 18,603 |
| Res New Home | 140 | 193 | 256 | 322 | 388 | 448 | 498 | 536 | 565 | 586 |
| Res Neighborhood | 612 | 838 | 1,122 | 1,456 | 1,813 | 2,142 | 2,366 | 2,411 | 2,239 | 1,887 |
| Res Solar Water Heating | 323 | 362 | 398 | 430 | 458 | 483 | 505 | 524 | 540 | 554 |
| **Residential Total** | 9,902 | 12,962 | 16,528 | 20,458 | 24,472 | 28,183 | 31,153 | 33,027 | 33,672 | 33,292 |
| Com Audit | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Com Prescriptive | 5,470 | 6,257 | 7,072 | 7,892 | 8,718 | 9,463 | 10,062 | 10,432 | 10,534 | 10,414 |
| Com Lighting | 8,633 | 9,080 | 9,461 | 9,794 | 10,076 | 10,293 | 10,437 | 10,488 | 10,439 | 10,314 |
| Com Custom | 1,147 | 1,372 | 1,630 | 1,908 | 2,188 | 2,440 | 2,649 | 2,800 | 2,891 | 2,941 |
| Com Small Business | 3,438 | 4,007 | 4,667 | 5,412 | 6,181 | 6,866 | 7,315 | 7,377 | 6,991 | 6,233 |
| **Non-Residential Total** | 18,688 | 20,716 | 22,830 | 25,006 | 27,163 | 29,062 | 30,463 | 31,097 | 30,855 | 29,902 |
| **Portfolio Total** | 28,590 | 33,678 | 39,358 | 45,464 | 51,635 | 57,245 | 61,616 | 64,124 | 64,527 | 63,194 |

Table 21. TRC Scenario – Annual Program Budget Estimates

| **Budgets ($ in thousands)** | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Audit | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Res Home Efficiency Upgrade | $4,445 | $5,556 | $6,783 | $8,068 | $9,326 | $10,468 | $11,433 | $12,202 | $12,789 | $13,229 |
| Res EE Products | $50 | $56 | $62 | $67 | $72 | $77 | $81 | $85 | $89 | $92 |
| Res Marketplace | $385 | $534 | $716 | $924 | $1,143 | $1,347 | $1,504 | $1,581 | $1,566 | $1,471 |
| Res New Home | $185 | $258 | $342 | $432 | $521 | $601 | $669 | $721 | $760 | $789 |
| Res Neighborhood | $12 | $16 | $22 | $28 | $35 | $41 | $45 | $46 | $43 | $36 |
| Res Solar Water Heating | $2,891 | $3,244 | $3,564 | $3,851 | $4,106 | $4,329 | $4,523 | $4,691 | $4,836 | $4,962 |
| **Residential Total** | $7,967 | $9,663 | $11,488 | $13,370 | $15,203 | $16,864 | $18,255 | $19,327 | $20,083 | $20,578 |
| Com Audit | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Com Prescriptive | $856 | $1,028 | $1,218 | $1,425 | $1,636 | $1,831 | $1,984 | $2,068 | $2,068 | $1,994 |
| Com Lighting | $659 | $700 | $737 | $773 | $806 | $833 | $851 | $857 | $848 | $827 |
| Com Custom | $1,535 | $1,626 | $1,745 | $1,883 | $2,027 | $2,159 | $2,260 | $2,315 | $2,315 | $2,265 |
| Com Small Business | $244 | $269 | $296 | $326 | $355 | $382 | $399 | $402 | $388 | $361 |
| **Non-Residential Total** | $3,294 | $3,623 | $3,998 | $4,407 | $4,824 | $5,205 | $5,495 | $5,641 | $5,619 | $5,447 |
| **Portfolio Total** | $11,261 | $13,286 | $15,485 | $17,777 | $20,027 | $22,069 | $23,750 | $24,968 | $25,701 | $26,025 |

Table 22. TRC Scenario – Cost-Effectiveness Results

| | **TRC** | | **PCT** | | **RIM** | |
|---|---|---|---|---|---|---|
| **Program Cost-Effectiveness** | Net Benefits ($) | Benefit/ Cost Ratio | Net Benefits ($) | Benefit/ Cost Ratio | Net Benefits ($) | Benefit/ Cost Ratio |
| Res Audit | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| Res Home Efficiency Upgrade | 48,391,423 | 1.4 | 173,407,418 | 2.8 | -125,015,995 | 0.4 |
| Res EE Products | 249,064 | 1.2 | 1,927,784 | 3.5 | -1,678,719 | 0.5 |
| Res Marketplace | 70,134,223 | 5.3 | 86,243,142 | 8.6 | -16,108,920 | 0.5 |
| Res New Home | 9,542,239 | 2.2 | 20,594,117 | 3.8 | -11,051,878 | 0.6 |
| Res Neighborhood | 254,297 | 1.5 | 1,030,818 | 4.3 | -776,521 | 0.5 |
| Res Solar Water Heating | 153,748,769 | 4.6 | 197,514,152 | 5.8 | -43,765,384 | 0.1 |
| **Residential Total** | **282,320,014** | **2.55** | **480,717,432** | **4.07** | **-198,397,417** | **0.37** |
| Com Audit | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| Com Prescriptive | 12,628,405 | 1.5 | 88,818,228 | 4.9 | -76,189,823 | 0.3 |
| Com Lighting | 4,982,096 | 1.4 | 50,986,863 | 5.6 | -46,004,767 | 0.3 |
| Com Custom | 21,485,142 | 1.6 | 242,017,859 | 9.6 | -220,532,717 | 0.2 |
| Com Small Business | 865,840 | 1.2 | 16,379,322 | 5.2 | -15,513,482 | 0.3 |
| **Non-Residential Total** | **39,961,483** | **1.51** | **398,202,272** | **7.00** | **-358,240,789** | **0.25** |
| **Portfolio Total** | **322,281,498** | **2.23** | **878,919,704** | **4.94** | **-556,638,206** | **0.30** |

## Demand Response Programs

The TRC Scenario analysis resulted in four cost-effective demand response measures for the largest commercial and industrial segment, which includes customers over 500 kW. The four DR measures are presented as individual potential program options in the following tables. Each's program's cost and impact estimates were developed independent of the other programs; therefore, because the measures apply to the same target population of large commercial and industrial customers, the savings and participation are not additive.

Table 23. TRC Scenario – Commercial Demand Response - Automated DR Program

| Annual Impacts | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Annual MWh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Summer MW (Cumulative) | 11.4 | 20.2 | 27.2 | 32.6 | 36.8 | 40.1 | 42.6 | 44.6 | 46.2 | 47.4 |
| Winter MW (Cumulative) | 8.9 | 15.8 | 21.2 | 25.5 | 28.8 | 31.3 | 33.3 | 34.9 | 36.1 | 37.1 |
| Participation (Cumulative) | 8 | 13 | 18 | 22 | 24 | 27 | 28 | 30 | 31 | 32 |
| Program Costs ($ in Thousands) | $3,671 | $1,885 | $2,049 | $2,176 | $2,276 | $2,353 | $2,414 | $2,461 | $2,498 | $2,527 |

| COST EFFECTIVENESS | Net Benefits | Benefit/Cost Ratio |
|---|---|---|
| TRC | $8,483,023 | 1.38 |
| RIM | $8,483,023 | 1.38 |

Table 24. TRC Scenario – Commercial Demand Response – Critical Peak Pricing (CPP) Program

| Annual Impacts | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Annual MWh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Summer MW (Cumulative) | 9.4 | 16.8 | 22.5 | 27.0 | 30.4 | 33.2 | 35.3 | 36.9 | 38.2 | 39.2 |
| Winter MW (Cumulative) | 7.4 | 15.8 | 21.2 | 25.5 | 28.8 | 31.3 | 33.3 | 34.9 | 36.1 | 37.1 |
| Participation (Cumulative) | 8 | 13 | 18 | 22 | 24 | 27 | 28 | 30 | 31 | 32 |
| Program Costs ($ in Thousands) | $3,671 | $1,740 | $1,875 | $1,981 | $2,063 | $2,127 | $2,177 | $2,217 | $2,247 | $2,271 |

| COST EFFECTIVENESS | Net Benefits | Benefit/Cost Ratio |
|---|---|---|
| TRC | $4,935,709 | 1.24 |
| RIM | $4,935,709 | 1.24 |

Table 25. TRC Scenario – Commercial Demand Response – Firm Service Level Program

| Annual Impacts | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Annual MWh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Summer MW (Cumulative) | 9.4 | 16.8 | 22.5 | 27.0 | 30.4 | 33.2 | 35.3 | 36.9 | 38.2 | 39.2 |
| Winter MW (Cumulative) | 7.4 | 13.1 | 17.6 | 21.1 | 23.8 | 25.9 | 27.6 | 28.9 | 29.9 | 30.7 |
| Participation (Cumulative) | 8 | 13 | 18 | 22 | 24 | 27 | 28 | 30 | 31 | 32 |
| Program Costs ($ in Thousands) | $1,721 | $1,674 | $1,759 | $1,825 | $1,876 | $1,916 | $1,947 | $1,972 | $1,991 | $2,006 |

| COST EFFECTIVENESS | Net Benefits | Benefit/Cost Ratio |
|---|---|---|
| TRC | $8,454,026 | 1.50 |
| RIM | $8,454,026 | 1.50 |

Table 26. TRC Scenario – Commercial Demand Response – Guaranteed Load Drop Program

| **Annual Impacts** | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Annual MWh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Summer MW (Cumulative) | 9.4 | 16.8 | 22.5 | 27.0 | 30.4 | 33.2 | 35.3 | 36.9 | 38.2 | 39.2 |
| Winter MW (Cumulative) | 7.4 | 13.1 | 17.6 | 21.1 | 23.8 | 25.9 | 27.6 | 28.9 | 29.9 | 30.7 |
| Participation (Cumulative) | 8 | 13 | 18 | 22 | 24 | 27 | 28 | 30 | 31 | 32 |
| Program Costs ($ in Thousands) | $1,721 | $1,674 | $1,759 | $1,825 | $1,876 | $1,916 | $1,947 | $1,972 | $1,991 | $2,006 |

| **COST EFFECTIVENESS** | Net Benefits | Benefit/Cost Ratio |
|---|---|---|
| TRC | $8,454,026 | 1.50 |
| RIM | $8,454,026 | 1.50 |

## Demand-Side Renewable Energy Programs

JEA did not have any DSRE measures or programs that passed the cost-effectiveness screening for the TRC Scenario.

# Exhibit JH-16
# OUC Program Development Summary

## Overview

RI worked collaboratively with OUC on the DSM program development process to develop impacts under three scenarios: 1) potential DSM programs that contribute to proposed DSM goals (Proposed Goals scenario), 2) potential DSM programs that pass the Participant and Rate Impact Measure Tests (RIM Scenario), and 3) potential DSM programs that pass the Participant and Total Resource Cost Tests (TRC Scenario).

## Methodology

The development of DSM programs for each scenario included incorporating the measures and measure impacts developed for the Technical Potential (TP) study, reviewing OUC's current program offerings, collaboration with OUC on program concepts that are beneficial for their customers, and analysis of economic impacts and market adoption to create potential DSM programs. This process included the following steps:

### Program Review and Measure Bundling

The analysis began with the measures from the TP study. This measure list was initially refined for program development for each scenario as follows:

1. Proposed Goals scenario – measures that passed, or were close to passing, either the TRC or RIM tests were prioritized in the initial measure bundling analysis. Measures included in current OUC programs were also identified and included in the initial measure bundling.
2. RIM Scenario – measures that passed the RIM Scenario criteria (RIM test, PCT, and payback period of at least 2 years) were included in the initial measure bundling analysis
3. TRC Scenario – measures that passed the TRC Scenario criteria (TRC test, PCT, and payback period of at least 2 years) were included in the initial measure bundling analysis

Resource Innovations then reviewed current OUC programs and eligible measures, and mapped individual measures to the appropriate programs for each scenario. Resource Innovations worked collaboratively with OUC to collect program information (e.g. program manuals, participation records, energy and demand savings, budgets) and review the existing programs to determine which measures should be included in the initial program portfolios. In addition, a gap analysis was conducted to identify measures included in each scenario that are not currently offered by OUC. These measures were either included in existing programs where there was a logical fit, or included as a new program concept.

## Program Refinement and Modeling

After identifying the preliminary measure bundles and programs, Resource Innovations worked collaboratively with OUC to develop incentive amounts and non-incentive costs. Non-incentive costs, which include costs to manage, administer, and market the program, were developed based on current OUC program costs as well as secondary data on similar programs offered by other utilities, and refined as needed based on the proposed program delivery structure. Incentive costs were developed for each scenario as follows:

1. Proposed Goals scenario – preliminary incentive rates were informed by current incentives offered by OUC as well as typical incentive levels offered by similar programs regionally and nationally.
2. RIM Scenario – incentive rates were developed based on the available net benefits for each measure, based on total RIM benefits minus RIM costs. Next, the incentive amount that would result in a simple payback of two years for each measure was calculated. The final incentive applied for the measure was based on the lower of these two values.
3. TRC Scenario – the incentive amount required to result in a simple payback period of two years for each measure was used as the final incentive for the measure.

Measures included in the initial program concepts for each scenario were analyzed in RI's TEA-POT model to update the economic analysis based on the OUC-specific non-incentive and incentive costs, and to estimate market adoption for each measure. The economic analysis included calculating updated RIM, TRC, and PCT costs and benefits for each measure and re-screening measures for each scenario.

RI's market adoption estimates use a payback acceptance criterion to estimate long-run market shares for measures as a function of measure incremental costs and expected bill savings over the measures' effective useful life (inclusive of utility incentives). Incremental adoption estimates are based on the Bass Diffusion Model, which is a mathematical description of how the rate of new product diffusion changes over time. For this study, adoption curve input parameters were developed for each measure based on specific criteria, including measure maturity in the market, overall measure cost, and whether the measure was currently offered through a utility program. RI's TEA-POT model then calculated demand and energy savings by applying these estimated adoption rates to each cost-effective measure.

The TEA-POT modeling results were exported into RI's Program Planner workbook that aggregated the individual measure results into program and portfolio impacts for each scenario. For the TRC Scenario and RIM Scenario no further refinements to the programs were made. For the Proposed Goals scenario, RI continued to work collaboratively with OUC to identify the measures and program concepts that comprise the proposed DSM goals. These impacts for each scenario are provided below.

# Results

## Proposed Goals Scenario

The Proposed Goals Scenario is described in more detail in Witness Noonan's testimony. The following tables include the program-level details for this scenario.

Table 1. Proposed DSM Goals – Annual MWh Targets

| **Annual MWh** | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Existing Home | 849 | 895 | 940 | 985 | 1,032 | 1,076 | 1,125 | 1,183 | 1,248 | 1,322 |
| Res Efficiency Delivered | 74 | 77 | 81 | 85 | 88 | 92 | 96 | 101 | 106 | 112 |
| Res New Home | 113 | 119 | 126 | 133 | 139 | 146 | 153 | 161 | 171 | 181 |
| **Residential Total** | 1,035 | 1,092 | 1,147 | 1,203 | 1,259 | 1,313 | 1,374 | 1,445 | 1,525 | 1,616 |
| Com Prescriptive | 637 | 672 | 698 | 720 | 739 | 753 | 763 | 769 | 772 | 772 |
| Com Lighting | 1,569 | 1,697 | 1,796 | 1,881 | 1,951 | 2,004 | 2,044 | 2,070 | 2,086 | 2,091 |
| Com Custom | 1,001 | 1,139 | 1,275 | 1,417 | 1,558 | 1,689 | 1,799 | 1,876 | 1,912 | 1,904 |
| **Non-Residential Total** | 3,207 | 3,508 | 3,769 | 4,019 | 4,247 | 4,446 | 4,605 | 4,715 | 4,770 | 4,767 |
| **Portfolio Total** | 4,242 | 4,600 | 4,916 | 5,221 | 5,507 | 5,760 | 5,979 | 6,160 | 6,295 | 6,382 |

Table 2. Proposed DSM Goals – Annual summer MW Targets

| **Annual Summer MW** | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Existing Home | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.10 | 0.10 | 0.10 | 0.11 | 0.11 |
| Res Efficiency Delivered | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Res New Home | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Residential Total** | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.12 | 0.12 | 0.12 | 0.13 | 0.13 |
| Com Prescriptive | 0.08 | 0.09 | 0.09 | 0.09 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| Com Lighting | 0.19 | 0.21 | 0.22 | 0.23 | 0.24 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| Com Custom | 0.21 | 0.24 | 0.26 | 0.30 | 0.33 | 0.35 | 0.38 | 0.39 | 0.40 | 0.40 |
| **Non-Residential Total** | 0.49 | 0.53 | 0.58 | 0.62 | 0.66 | 0.70 | 0.73 | 0.75 | 0.76 | 0.75 |
| **Portfolio Total** | 0.59 | 0.64 | 0.69 | 0.73 | 0.77 | 0.81 | 0.85 | 0.87 | 0.88 | 0.89 |

Table 3. Proposed DSM Goals – Annual winter MW Targets

| Annual Winter MW | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Existing Home | 0.14 | 0.15 | 0.16 | 0.17 | 0.18 | 0.19 | 0.20 | 0.21 | 0.22 | 0.23 |
| Res Efficiency Delivered | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| Res New Home | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| **Residential Total** | 0.18 | 0.19 | 0.20 | 0.21 | 0.22 | 0.23 | 0.24 | 0.25 | 0.27 | 0.28 |
| Com Prescriptive | 0.09 | 0.09 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| Com Lighting | 0.20 | 0.22 | 0.23 | 0.24 | 0.25 | 0.25 | 0.26 | 0.26 | 0.26 | 0.26 |
| Com Custom | 0.09 | 0.10 | 0.11 | 0.12 | 0.14 | 0.15 | 0.16 | 0.16 | 0.17 | 0.16 |
| **Non-Residential Total** | 0.38 | 0.41 | 0.44 | 0.46 | 0.49 | 0.50 | 0.52 | 0.53 | 0.53 | 0.53 |
| **Portfolio Total** | 0.56 | 0.60 | 0.63 | 0.67 | 0.70 | 0.73 | 0.76 | 0.78 | 0.80 | 0.81 |

Table 4. Proposed DSM Goals – Annual Participation Targets

| Annual Participation (# measures) | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Existing Home | 517 | 511 | 509 | 505 | 506 | 506 | 511 | 520 | 533 | 548 |
| Res Efficiency Delivered | 40 | 42 | 42 | 44 | 43 | 42 | 46 | 47 | 48 | 51 |
| Res New Home | 45 | 46 | 47 | 47 | 48 | 52 | 52 | 55 | 57 | 60 |
| **Residential Total** | 602 | 599 | 598 | 596 | 597 | 600 | 609 | 622 | 638 | 659 |
| Com Prescriptive | 1,521 | 1,612 | 1,675 | 1,726 | 1,763 | 1,790 | 1,803 | 1,813 | 1,814 | 1,807 |
| Com Lighting | 4,329 | 4,627 | 4,836 | 5,005 | 5,134 | 5,223 | 5,277 | 5,312 | 5,321 | 5,306 |
| Com Custom | 1,827 | 1,977 | 2,099 | 2,207 | 2,299 | 2,374 | 2,437 | 2,486 | 2,519 | 2,538 |
| **Non-Residential Total** | 7,677 | 8,216 | 8,610 | 8,938 | 9,196 | 9,387 | 9,517 | 9,611 | 9,654 | 9,651 |
| **Portfolio Total** | 8,279 | 8,815 | 9,208 | 9,534 | 9,793 | 9,987 | 10,126 | 10,233 | 10,292 | 10,310 |

Table 5. Proposed DSM Goals – Annual Program Budget Estimates

| Budgets ($ in thousands) | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Existing Home | $2,100 | $2,306 | $2,499 | $2,686 | $2,868 | $3,037 | $3,216 | $3,415 | $3,633 | $3,875 |
| Res Efficiency Delivered | $91 | $98 | $104 | $110 | $116 | $122 | $128 | $134 | $142 | $151 |
| Res New Home | $137 | $149 | $160 | $171 | $182 | $192 | $202 | $214 | $228 | $242 |
| **Residential Total** | $2,328 | $2,552 | $2,763 | $2,967 | $3,166 | $3,350 | $3,547 | $3,763 | $4,003 | $4,268 |
| Com Prescriptive | $99 | $102 | $104 | $106 | $107 | $107 | $108 | $107 | $107 | $107 |
| Com Lighting | $201 | $215 | $225 | $233 | $239 | $243 | $246 | $248 | $248 | $248 |
| Com Custom | $131 | $147 | $163 | $180 | $196 | $211 | $224 | $233 | $237 | $237 |
| **Non-Residential Total** | $431 | $465 | $493 | $519 | $542 | $562 | $578 | $588 | $593 | $592 |
| **Portfolio Total** | $2,759 | $3,017 | $3,256 | $3,486 | $3,708 | $3,912 | $4,124 | $4,352 | $4,596 | $4,859 |

Table 6. Proposed DSM Goals – Cost-Effectiveness Results

| | TRC | | PCT | | RIM | |
|---|---|---|---|---|---|---|
| **Program Cost-Effectiveness** | Net Benefits ($) | Benefit/Cost Ratio | Net Benefits ($) | Benefit/Cost Ratio | Net Benefits ($) | Benefit/Cost Ratio |
| Res Existing Home | -1,439,576 | 0.9 | 12,998,056 | 3.4 | -14,437,631 | 0.3 |
| Res Efficiency Delivered | -341,217 | 0.6 | 935,030 | 3.0 | -1,276,247 | 0.3 |
| Res New Home | -144,686 | 0.9 | 1,787,071 | 3.7 | -1,931,757 | 0.3 |
| **Residential Total** | **-1,925,478** | **0.84** | **15,720,157** | **3.40** | **-17,645,636** | **0.29** |
| Com Prescriptive | 185,353 | 1.1 | 5,594,996 | 3.2 | -5,409,642 | 0.4 |
| Com Lighting | 173,098 | 1.0 | 14,591,930 | 3.1 | -14,418,832 | 0.4 |
| Com Custom | 1,078,887 | 1.2 | 12,025,921 | 3.4 | -10,947,034 | 0.4 |
| **Non-Residential Total** | **1,437,337** | **1.09** | **32,212,846** | **3.20** | **-30,775,509** | **0.36** |
| **Portfolio Total** | **-488,141** | **0.98** | **47,933,004** | **3.26** | **-48,421,145** | **0.34** |

## RIM Scenario

The RIM Scenario is comprised of measures and programs that achieved a cost-effectivess ratio of 1.0 or higher for the PCT and RIM test, and measures that had a simple payback of two years or more (without consideration of incentives).

### Energy Efficiency Programs

OUC did not have any EE measures or programs that passed the cost-effectiveness screening for the RIM Scenario.

### Demand Response Programs

The RIM Scenario analysis resulted in four cost-effective demand response measures for the largest commercial and industrial segment, which includes customers over 500 kW. The four DR measures are presented as individual potential program options in the following tables. Each's program's cost and impact estimates were developed independent of the other programs; therefore, because the measures apply to the same target population of large commercial and industrial customers, the savings and participation are not additive.

Table 7. RIM Scenario – Commercial Demand Response - Automated DR Program

| Annual Impacts | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Annual MWh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Summer MW (Cumulative) | 13.5 | 24.0 | 32.2 | 38.5 | 43.5 | 47.4 | 50.5 | 52.8 | 54.7 | 56.1 |
| Winter MW (Cumulative) | 9.9 | 17.7 | 23.7 | 28.4 | 32.1 | 35.0 | 37.2 | 38.9 | 40.3 | 41.4 |
| Participation (Cumulative) | 19 | 34 | 46 | 55 | 62 | 67 | 72 | 75 | 78 | 80 |
| Program Costs ($ in Thousands) | $4,032 | $2,099 | $2,642 | $3,066 | $3,397 | $3,655 | $3,856 | $4,013 | $4,135 | $4,230 |

| COST EFFECTIVENESS | Net Benefits | Benefit/Cost Ratio |
|---|---|---|
| TRC | $9,599,458 | 1.33 |
| RIM | $9,599,458 | 1.33 |

Table 8. RIM Scenario – Commercial Demand Response – Critical Peak Pricing (CPP) Program

| Annual Impacts | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Annual MWh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Summer MW (Cumulative) | 11.1 | 19.8 | 26.6 | 31.9 | 36.0 | 39.3 | 41.8 | 43.7 | 45.2 | 46.4 |
| Winter MW (Cumulative) | 8.2 | 14.6 | 19.6 | 23.5 | 26.6 | 28.9 | 30.8 | 32.2 | 33.4 | 34.2 |
| Participation (Cumulative) | 19 | 34 | 46 | 55 | 62 | 67 | 72 | 75 | 78 | 80 |
| Program Costs ($ in Thousands) | $3,970 | $1,916 | $2,366 | $2,717 | $2,991 | $3,204 | $3,371 | $3,501 | $3,602 | $3,681 |

| COST EFFECTIVENESS | Net Benefits | Benefit/Cost Ratio |
|---|---|---|
| TRC | $6,016,084 | 1.23 |
| RIM | $6,016,084 | 1.23 |

Table 9. RIM Scenario – Commercial Demand Response – Firm Service Level Program

| Annual Impacts | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Annual MWh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Summer MW (Cumulative) | 11.1 | 19.8 | 26.6 | 31.9 | 36.0 | 39.3 | 41.8 | 43.7 | 45.2 | 46.4 |
| Winter MW (Cumulative) | 8.2 | 14.6 | 19.6 | 23.5 | 26.6 | 28.9 | 30.8 | 32.2 | 33.4 | 34.2 |
| Participation (Cumulative) | 19 | 34 | 46 | 55 | 62 | 67 | 72 | 75 | 78 | 80 |
| Program Costs ($ in Thousands) | $1,942 | $1,851 | $2,310 | $2,668 | $2,947 | $3,165 | $3,334 | $3,467 | $3,570 | $3,651 |

| COST EFFECTIVENESS | Net Benefits | Benefit/Cost Ratio |
|---|---|---|
| TRC | $8,360,168 | 1.36 |
| RIM | $8,360,168 | 1.36 |

Table 10. RIM Scenario – Commercial Demand Response – Guaranteed Load Drop Program

| Annual Impacts | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Annual MWh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Summer MW (Cumulative) | 11.1 | 19.8 | 26.6 | 31.9 | 36.0 | 39.3 | 41.8 | 43.7 | 45.2 | 46.4 |
| Winter MW (Cumulative) | 8.2 | 14.6 | 19.6 | 23.5 | 26.6 | 28.9 | 30.8 | 32.2 | 33.4 | 34.2 |
| Participation (Cumulative) | 19 | 34 | 46 | 55 | 62 | 67 | 72 | 75 | 78 | 80 |
| Program Costs ($ in Thousands) | $1,942 | $1,851 | $2,310 | $2,668 | $2,947 | $3,165 | $3,334 | $3,467 | $3,570 | $3,651 |

| COST EFFECTIVENESS | Net Benefits | Benefit/Cost Ratio |
|---|---|---|
| TRC | $8,360,168 | 1.36 |
| RIM | $8,360,168 | 1.36 |

## Demand-Side Renewable Energy Programs

OUC did not have any DSRE measures or programs that passed the cost-effectiveness screening for the RIM Scenario.

# TRC Scenario

The TRC Scenario is comprised of measures and programs that achieved a cost-effectivess ratio of 1.0 or higher for the PCT and TRC test, and measures that had a simple payback of two years or more (without consideration of incentives). Incentive rates were based on the maximum incentive amount that would result in a simple payback period of two years for each measure. The following tables include the program-level details for this scenario.

## Energy Efficiency Programs

Table 11. TRC Scenario – Energy Efficiency – Annual MWh Targets

| Annual MWh | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Home Energy Survey | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res Existing Home | 1,165 | 1,277 | 1,385 | 1,493 | 1,598 | 1,695 | 1,797 | 1,907 | 2,025 | 2,154 |
| Res Efficiency Delivered | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Res New Home | 428 | 457 | 472 | 484 | 501 | 518 | 541 | 567 | 598 | 632 |
| Res Marketplace | 18 | 15 | 12 | 10 | 9 | 7 | 6 | 5 | 5 | 4 |
| Res Products | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Residential Total** | 1,614 | 1,751 | 1,872 | 1,990 | 2,109 | 2,223 | 2,346 | 2,481 | 2,630 | 2,792 |
| Com Prescriptive | 1,946 | 2,155 | 2,359 | 2,565 | 2,767 | 2,955 | 3,119 | 3,261 | 3,376 | 3,463 |
| Com Lighting | 453 | 502 | 547 | 590 | 630 | 663 | 687 | 698 | 696 | 683 |
| Com Custom | 285 | 351 | 424 | 507 | 592 | 674 | 742 | 783 | 790 | 763 |
| Com Green Building | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Com Chiller Maintenance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Non-Residential Total** | 2,684 | 3,009 | 3,330 | 3,663 | 3,990 | 4,293 | 4,549 | 4,742 | 4,864 | 4,911 |
| **Portfolio Total** | 4,298 | 4,760 | 5,202 | 5,653 | 6,100 | 6,516 | 6,896 | 7,224 | 7,494 | 7,703 |

Table 12. TRC Scenario – Energy Efficiency – Annual summer MW Targets

| Annual Summer MW | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Home Energy Survey | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Res Existing Home | 0.14 | 0.16 | 0.18 | 0.20 | 0.22 | 0.24 | 0.25 | 0.27 | 0.29 | 0.31 |
| Res Efficiency Delivered | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Res New Home | 0.11 | 0.12 | 0.12 | 0.12 | 0.13 | 0.13 | 0.14 | 0.15 | 0.15 | 0.16 |
| Res Marketplace | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Res Products | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Residential Total** | 0.26 | 0.28 | 0.31 | 0.33 | 0.35 | 0.37 | 0.40 | 0.42 | 0.45 | 0.47 |
| Com Prescriptive | 0.59 | 0.66 | 0.72 | 0.79 | 0.85 | 0.91 | 0.97 | 1.01 | 1.05 | 1.07 |
| Com Lighting | 0.03 | 0.03 | 0.03 | 0.04 | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| Com Custom | 0.05 | 0.06 | 0.07 | 0.09 | 0.10 | 0.12 | 0.13 | 0.14 | 0.14 | 0.13 |
| Com Green Building | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Com Chiller Maintenance | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Non-Residential Total** | 0.66 | 0.75 | 0.83 | 0.92 | 1.00 | 1.08 | 1.15 | 1.20 | 1.23 | 1.25 |
| **Portfolio Total** | 0.92 | 1.03 | 1.14 | 1.25 | 1.35 | 1.45 | 1.54 | 1.62 | 1.68 | 1.72 |

Table 13. TRC Scenario – Energy Efficiency – Annual winter MW Targets

| Annual Winter MW | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Home Energy Survey | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Res Existing Home | 0.19 | 0.20 | 0.22 | 0.23 | 0.25 | 0.26 | 0.28 | 0.29 | 0.31 | 0.33 |
| Res Efficiency Delivered | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Res New Home | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 |
| Res Marketplace | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Res Products | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Residential Total** | 0.23 | 0.25 | 0.26 | 0.28 | 0.29 | 0.31 | 0.32 | 0.34 | 0.36 | 0.38 |
| Com Prescriptive | 0.11 | 0.12 | 0.13 | 0.14 | 0.15 | 0.16 | 0.16 | 0.17 | 0.17 | 0.17 |
| Com Lighting | 0.04 | 0.04 | 0.05 | 0.05 | 0.06 | 0.06 | 0.06 | 0.07 | 0.07 | 0.06 |
| Com Custom | 0.03 | 0.04 | 0.05 | 0.06 | 0.07 | 0.08 | 0.09 | 0.09 | 0.09 | 0.09 |
| Com Green Building | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Com Chiller Maintenance | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Non-Residential Total** | 0.18 | 0.20 | 0.22 | 0.25 | 0.28 | 0.30 | 0.32 | 0.33 | 0.33 | 0.33 |
| **Portfolio Total** | 0.41 | 0.45 | 0.49 | 0.53 | 0.57 | 0.61 | 0.64 | 0.67 | 0.70 | 0.71 |

Table 14. TRC Scenario – Energy Efficiency – Annual Participation Targets

| Annual Participation | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Home Energy Survey | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Res Existing Home | 1,025 | 1,144 | 1,256 | 1,368 | 1,475 | 1,576 | 1,678 | 1,783 | 1,895 | 2,015 |
| Res Efficiency Delivered | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Res New Home | 65 | 69 | 71 | 73 | 76 | 78 | 82 | 85 | 90 | 95 |
| Res Marketplace | 44 | 37 | 31 | 26 | 22 | 18 | 16 | 14 | 12 | 11 |
| Res Products | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Residential Total** | 1,140 | 1,256 | 1,363 | 1,472 | 1,578 | 1,677 | 1,781 | 1,887 | 2,002 | 2,126 |
| Com Prescriptive | 3,536 | 3,917 | 4,259 | 4,577 | 4,873 | 5,141 | 5,381 | 5,611 | 5,826 | 6,026 |
| Com Lighting | 855 | 952 | 1,040 | 1,128 | 1,208 | 1,275 | 1,323 | 1,346 | 1,344 | 1,321 |
| Com Custom | 115 | 142 | 172 | 206 | 241 | 274 | 299 | 308 | 301 | 278 |
| Com Green Building | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Com Chiller Maintenance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Non-Residential Total** | 4,507 | 5,012 | 5,472 | 5,912 | 6,323 | 6,691 | 7,004 | 7,266 | 7,472 | 7,626 |
| **Portfolio Total** | 5,647 | 6,268 | 6,835 | 7,384 | 7,901 | 8,368 | 8,785 | 9,153 | 9,474 | 9,752 |

Table 15. TRC Scenario – Energy Efficiency – Annual Program Budget Estimates

| Budgets $ in thousands | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Res Home Energy Survey | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Res Existing Home | $2,628 | $2,914 | $3,181 | $3,436 | $3,682 | $3,908 | $4,145 | $4,401 | $4,681 | $4,986 |
| Res Efficiency Delivered | $4 | $4 | $3 | $3 | $3 | $3 | $3 | $3 | $3 | $3 |
| Res New Home | $164 | $175 | $181 | $185 | $192 | $198 | $207 | $217 | $229 | $242 |
| Res Marketplace | $3 | $2 | $2 | $2 | $1 | $1 | $1 | $1 | $1 | $1 |
| Res Products | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Residential Total** | $2,799 | $3,095 | $3,367 | $3,627 | $3,878 | $4,111 | $4,356 | $4,622 | $4,913 | $5,231 |
| Com Prescriptive | $211 | $233 | $255 | $277 | $300 | $321 | $340 | $356 | $368 | $375 |
| Com Lighting | $88 | $96 | $103 | $110 | $115 | $120 | $123 | $125 | $126 | $125 |
| Com Custom | $42 | $51 | $61 | $71 | $82 | $92 | $101 | $106 | $106 | $103 |
| Com Green Building | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Com Chiller Maintenance | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Non-Residential Total** | $341 | $381 | $419 | $459 | $498 | $534 | $564 | $586 | $600 | $603 |
| **Portfolio Total** | $3,140 | $3,475 | $3,786 | $4,085 | $4,376 | $4,644 | $4,920 | $5,208 | $5,513 | $5,834 |

Table 16. TRC Scenario – Energy Efficiency – Cost-Effectiveness Results

| | TRC | | PCT | | RIM | |
|---|---|---|---|---|---|---|
| **Program Cost-Effectiveness** | Net Benefits ($) | Benefit/Cost Ratio | Net Benefits ($) | Benefit/Cost Ratio | Net Benefits ($) | Benefit/Cost Ratio |
| Res Home Energy Survey | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| Res Existing Home | 74,117,690 | 2.8 | 124,910,898 | 4.6 | -50,793,209 | 0.2 |
| Res Efficiency Delivered | 2,867 | 1.1 | 50,929 | 2.6 | -48,062 | 0.3 |
| Res New Home | 86,901 | 1.0 | 6,609,346 | 4.9 | -6,522,445 | 0.3 |
| Res Marketplace | 16,122 | 1.4 | 73,404 | 3.5 | -57,282 | 0.5 |
| Res Products | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **Residential Total** | **74,223,580** | **2.65** | **131,644,578** | **4.66** | **-57,420,997** | **0.18** |
| Com Prescriptive | 3,454,640 | 1.4 | 18,370,613 | 3.4 | -14,915,973 | 0.4 |
| Com Lighting | 349,477 | 1.1 | 5,157,917 | 3.4 | -4,808,440 | 0.4 |
| Com Custom | 814,419 | 1.4 | 5,316,015 | 4.0 | -4,501,595 | 0.4 |
| Com Green Building | 1,745 | 1.4 | 13,147 | 4.8 | -11,402 | 0.3 |
| Com Chiller Maintenance | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **Non-Residential Total** | **4,620,280** | **1.36** | **28,857,691** | **3.51** | **-24,237,411** | **0.42** |
| **Portfolio Total** | **78,843,861** | **2.36** | **160,502,269** | **4.38** | **-81,658,408** | **0.27** |

## Demand Response Programs

The TRC Scenario analysis resulted in four cost-effective demand response measures for the largest commercial and industrial segment, which includes customers over 500 kW. The four DR measures are presented as individual potential program options in the following tables. Each's program's cost and impact estimates were developed independent of the other programs; therefore, because the measures apply to the same target population of large commercial and industrial customers, the savings and participation are not additive.

Table 17. TRC Scenario – Commercial Demand Response - Automated DR Program

| **Annual Impacts** | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Annual MWh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Summer MW (Cumulative) | 13.5 | 24.0 | 32.2 | 38.5 | 43.5 | 47.4 | 50.5 | 52.8 | 54.7 | 56.1 |
| Winter MW (Cumulative) | 9.9 | 17.7 | 23.7 | 28.4 | 32.1 | 35.0 | 37.2 | 38.9 | 40.3 | 41.4 |
| Participation (Cumulative) | 19 | 34 | 46 | 55 | 62 | 67 | 72 | 75 | 78 | 80 |
| Program Costs ($ in Thousands) | $4,032 | $2,099 | $2,642 | $3,066 | $3,397 | $3,655 | $3,856 | $4,013 | $4,135 | $4,230 |

| **COST EFFECTIVENESS** | Net Benefits | Benefit/Cost Ratio |
|---|---|---|
| TRC | $9,599,458 | 1.33 |
| RIM | $9,599,458 | 1.33 |

Table 18. TRC Scenario – Commercial Demand Response – Critical Peak Pricing (CPP) Program

| **Annual Impacts** | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Annual MWh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Summer MW (Cumulative) | 11.1 | 19.8 | 26.6 | 31.9 | 36.0 | 39.3 | 41.8 | 43.7 | 45.2 | 46.4 |
| Winter MW (Cumulative) | 8.2 | 14.6 | 19.6 | 23.5 | 26.6 | 28.9 | 30.8 | 32.2 | 33.4 | 34.2 |
| Participation (Cumulative) | 19 | 34 | 46 | 55 | 62 | 67 | 72 | 75 | 78 | 80 |
| Program Costs ($ in Thousands) | $3,970 | $1,916 | $2,366 | $2,717 | $2,991 | $3,204 | $3,371 | $3,501 | $3,602 | $3,681 |

| **COST EFFECTIVENESS** | Net Benefits | Benefit/Cost Ratio |
|---|---|---|
| TRC | $6,016,084 | 1.23 |
| RIM | $6,016,084 | 1.23 |

Table 19. TRC Scenario – Commercial Demand Response – Firm Service Level Program

| **Annual Impacts** | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Annual MWh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Summer MW (Cumulative) | 11.1 | 19.8 | 26.6 | 31.9 | 36.0 | 39.3 | 41.8 | 43.7 | 45.2 | 46.4 |
| Winter MW (Cumulative) | 8.2 | 14.6 | 19.6 | 23.5 | 26.6 | 28.9 | 30.8 | 32.2 | 33.4 | 34.2 |
| Participation (Cumulative) | 19 | 34 | 46 | 55 | 62 | 67 | 72 | 75 | 78 | 80 |
| Program Costs ($ in Thousands) | $1,942 | $1,851 | $2,310 | $2,668 | $2,947 | $3,165 | $3,334 | $3,467 | $3,570 | $3,651 |

| **COST EFFECTIVENESS** | Net Benefits | Benefit/Cost Ratio |
|---|---|---|
| TRC | $8,360,168 | 1.36 |
| RIM | $8,360,168 | 1.36 |

Table 20. TRC Scenario – Commercial Demand Response – Guaranteed Load Drop Program

| **Annual Impacts** | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|---|---|
| Annual MWh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Summer MW (Cumulative) | 11.1 | 19.8 | 26.6 | 31.9 | 36.0 | 39.3 | 41.8 | 43.7 | 45.2 | 46.4 |
| Winter MW (Cumulative) | 8.2 | 14.6 | 19.6 | 23.5 | 26.6 | 28.9 | 30.8 | 32.2 | 33.4 | 34.2 |
| Participation (Cumulative) | 19 | 34 | 46 | 55 | 62 | 67 | 72 | 75 | 78 | 80 |
| Program Costs ($ in Thousands) | $1,942 | $1,851 | $2,310 | $2,668 | $2,947 | $3,165 | $3,334 | $3,467 | $3,570 | $3,651 |

| **COST EFFECTIVENESS** | Net Benefits | Benefit/Cost Ratio |
|---|---|---|
| TRC | $8,360,168 | 1.36 |
| RIM | $8,360,168 | 1.36 |

## Demand-Side Renewable Energy Programs

OUC did not have any DSRE measures or programs that passed the cost-effectiveness screening for the TRC Scenario.