Progress Energy

June 10, 2009

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COMMISSION CLERK

Ms. Ann Cole, Commission Clerk
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, FL 32399-0850

Re: Commission Review of Numeric Conservation Goals
Docket Nos. 080408-EG

Dear Ms. Cole:

Enclosed for filing is an original and 15 copies of corrected Exhibit No. __ (JAM-18) to the Direct Testimony of PEF witness, John Masiello filed June 1, 2009.

Thank you for your assistance in this matter and please let me know if you have any questions.

Sincerely,

John T. Burnett

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Attachments

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GCL 2
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FPSC-COMMISSION CLERK

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Commission review of numeric conservation goals (Progress Energy Florida, Inc.).

Docket No. 080408-EG

Submitted for Filing: June 10, 2009

**PROGRESS ENERGY FLORIDA, INC.'S**
**NOTICE OF FILING CORRECTED EXHIBIT**

Progress Energy Florida, Inc., by and through its undersigned counsel, gives notice of filing corrected Exhibit No. ___ (JAM-18) to the Direct Testimony of John Masiello filed June 1, 2009.

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## CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a true and correct copy of Progress Energy Florida, Inc.'s Notice of Filing Corrected Exhibit in Docket No. 080408-EG has been furnished by U.S. Mail delivery to the following this 10th day of June, 2009.

Attorney

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**Exhibit No. (JAM 18) Itron Inc.'s Direct Testimony & Exhibits**

**BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION**

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

**DIRECT TESTIMONY OF MIKE RUFO**

**DOCKET NO. 080407-EG (Florida Power & Light Company)**

**DOCKET NO. 080408-EG (Progress Energy Florida, Inc.)**

**DOCKET NO. 080409-EG (Tampa Electric Company)**

**DOCKET NO. 080410-EG (Gulf Power Company)**

**DOCKET NO. 080411-EG (Florida Public Utilities Company)**

**DOCKET NO. 080412-EG (Orlando Utilities Commission)**

**DOCKET NO. 080413-EG (JEA)**

**Q: Please state your name, title and business address.**

A. My name is Mike Rufo. I am Managing Director in the Consulting and Analysis Group at Itron, Inc. (Itron), 1111 Broadway Street, Suite 1800, Oakland, California 94607.

**Q: Please describe your education, work experience and qualifications.**

A: I graduated with full honors from Sonoma State University in 1985 with a Bachelor's degree in Environmental Studies and Planning with an Energy Management emphasis. I received a Master's Degree in Technology and Human Affairs from Washington University in St. Louis in 1986. I am currently a Managing Director of Itron's Consulting and Analysis (C&A) group, which specializes in the analysis of energy efficiency (EE), demand response (DR), distributed generation, resource planning, and advanced metering infrastructure (AMI)/SmartGrid. Previously, I was

Senior Vice President at Quantum Consulting, Inc. and Vice President at XENERGY, Inc. (now KEMA, Inc.). I have been employed as an energy consultant since 1987. Since that time, I have conducted numerous EE potential studies, energy program evaluations, energy-related market assessments, energy program best practice assessments, as well as analyses of energy market restructuring.

Organizations for which I have conducted EE potential or EE goals studies include the Public Utilities Commission of Texas (PUCT), PNM (Public Service New Mexico), California Public Utilities Commission (CPUC), California Energy Commission, Energy Foundation, Group Endesa, Idaho Power, Los Angeles Department of Water & Power, Portland General Electric Company, Pacific Gas & Electric Company, Sacramento Municipal Utilities District, San Diego Gas & Electric Company, and Southern California Edison Company. I have also contributed to a number of other potential studies as a subcontractor including studies for Connecticut Energy Conservation Management Board, New Zealand, New Jersey, Rhode Island, San Antonio (City Public Service), and Xcel Energy (Colorado).

I have been conducting EE potential studies since 1989. I recently led the National Energy Efficiency Best Practices project (www.eebestpractices.com), which produced the most systematic and comprehensive assessment of energy programs in the country. I have evaluated a wide variety of EE and DR programs ranging from standard performance contracting programs to critical peak pricing. I conducted the industry's first comprehensive analyses of EE measure costs as part of the Database for Energy Efficiency Resources (DEER) projects throughout the 1990s. I am also co-directing a comprehensive update of the DEER that includes unit energy savings estimates, measure impact load shapes, net-to-gross ratios, and effective useful lives for thousands of measure-market segment combinations.

**Q: Please describe Itron's Consulting and Analysis Group, including its history, organization and services provided.**

A: Itron is made up of the former consulting practices of Regional Economic Research, Inc. (RER) and Quantum Consulting, Inc. Itron's C&A group includes over 50 professional staff with expertise in economics, engineering, statistics, energy policy, business management, and related fields. Itron's C&A group has provided consulting services to the energy industry since the early 1980s, primarily to electric and gas utilities and related public and private sector institutions.

Itron's C&A group has extensive experience and proven success managing consulting contracts ranging from small projects to large multi-year, multi-million dollar efforts. These projects have been conducted for a variety of clients including Florida Power & Light Company (FPL), We Energies, Pacific Gas & Electric Company, Baltimore Gas & Electric Company, Southern California Edison, CPUC, PUCT, and many others.

Itron acquired Quantum Consulting (QC) in April 2006. RER joined Itron in October 2002. QC and RER staff developed and refined some of the industry's most important evaluation, planning, and forecasting tools and approaches including conditional demand (CDA) and statistically-adjusted engineering (SAE) models, discrete choice and net-to-gross methodologies, the duty-cycle approach to load control impacts, the COMMEND and REEPS end-use forecasting models, industry-leading EE potential models, and end-use metering data cleaning and analysis techniques, among others. Itron C&A staff have authored some of the industry's most influential projects and reports including the *2001 Framework for Assessing Publicly Funded Energy Efficiency Programs*, the national *Energy Efficiency Program Best Practices Project*, the *California Secret Surplus Study*, the *California End Use Survey*, the DEER, and the Electric Power Research Institute (EPRI) Duty Cycle method for load control impact analysis, among others.

Itron's C&A staff has extensive experience in performing potential studies and is a proven industry leader in this area. During its early experience in this area in the late 1980s through the mid 1990s, C&A developed a sophisticated computer model called Assessment of Energy Technologies (ASSET$^{TM}$). The model has been used in a wide range of EE potential studies. Itron staff members have also contributed to the development of other widely used demand side management (DSM) potential models, including DSM ASSYST, which is the model used for this study.

**Q: What specific projects or studies has Itron undertaken to assess EE potential?**

Itron has conducted numerous potential studies for various clients over the past few years. The most recent potential studies conducted by Itron are listed in Exhibit MR-1 attached to my testimony.

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

A: The purpose of my testimony is to present and summarize the methodology, input data, and findings contained in the studies of technical potential and achievable potential for cost-effective EE and load management for the seven utilities subject to the requirements of the Florida Energy Efficiency and Conservation Act (FEECA).

**Q: What exhibits are you sponsoring?**

A: I am sponsoring Exhibits MR-1 through MR-11, which are attached to my testimony.

**Q: What is the scope of work for which Itron was retained?**

A: Itron's contract with the FEECA utilities was to assess the technical, economic, and achievable potential for electric energy and peak demand savings from EE and DR measures, as well as customer-scale photovoltaic (PV) and solar thermal installations in the service territories of the seven FEECA utilities. This scope of work included the development of end-use baseline data, development of measure cost and savings data, collection of building characteristics and end-use saturation data via on-site surveys of commercial customers, estimation of technical potential, estimation of economic potential, and estimation of achievable potential.

The analytic boundaries of Itron's potential estimates were limited to residential, commercial, and industrial customers of the seven FEECA utilities. Chapter 2 of each FEECA utility's technical potential report provides a detailed discussion of the analytic boundaries of Itron's study.

**Q: How, if at all, did the work performed by Itron differ across the seven FEECA utilities?**

A: Itron performed the same work for all seven FEECA utilities with one key exception. For Florida Public Utilities (FPU), Orlando Utilities Commission (OUC), and JEA, Itron performed the Rate Impact Measure (RIM) and the Total Resource Cost (TRC) cost-effectiveness analyses for efficiency measures using avoided cost and retail rate forecasts provided by each respective utility. Based on those cost-effectiveness results, Itron then estimated the achievable potential for EE for FPU, OUC, and JEA.

In the case of FPL, Progress Energy Florida, Inc. (PEF), Tampa Electric Company (TECO), and Gulf Power Company (Gulf), Itron provided the measure data inputs required for those utilities to conduct RIM and TRC cost-effectiveness testing for efficiency measures themselves. These utilities chose to do their own cost-effectiveness testing to maintain consistency with cost-effectiveness models and assumptions used in other internal planning and analysis processes at each utility. Based on the cost-effectiveness results as produced and delivered by those utilities to Itron, Itron then estimated achievable potential for EE measures that were determined to be cost-effective for FPL, PEF, TECO, and Gulf.

**Q: Was Itron retained to advocate policy positions before this commission?**

A: No, Itron was retained to provide the technical and achievable potentials based on industry-recognized, unbiased methods and modeling processes in accordance with the direction provided by the FEECA utilities.

**Q: What studies have been or will be produced in the scope of Itron's work?**

A: The studies are listed in Exhibit MR-2 attached to my testimony.

**Q: Are any of the reports listed in Exhibit MR-2 attached to your testimony as separate exhibits?**

A: Yes, the forecast of total achievable potential for all of the FEECA utilities is attached as Exhibit MR-3. The forecasts of achievable potential for each of the FEECA utilities are attached as Exhibits MR-4 through MR-10. The Technical Potential Studies for Electric Energy and Peak Demand Savings in Florida and for each of the FEECA utilities have been filed with the Commission and are part of staff's composite exhibit.

**Q: What were the major steps in the analytical work Itron performed?**

A: The major steps in Itron's analytic work were as follows. The first step was to identify and select the EE, DR, and PV measures to be analyzed in the study. Once measure identification and selection was completed, the next step was to develop measure cost and savings data for each in-scope measure and develop baseline estimates of end-use energy consumption and peak demand savings for all in-scope market segments. Using this end-use baseline and measure data, Itron then estimated technical potential.

The next step was to assess the cost-effectiveness for each measure based on the results of the technical potential analysis using the RIM and TRC tests. As described earlier, Itron conducted the cost-effectiveness analysis for FPU, OUC, and JEA using avoided cost and retail rate forecasts provided by those utilities. Itron also determined the maximum incentive levels for each measure for FPU, OUC, and JEA according to the incentive scenarios defined by the FEECA utilities.

For FPL, PEF, TECO, and Gulf, Itron provided the measure data inputs required for calculating RIM and TRC ratios, and those utilities conducted the cost-effectiveness and maximum incentive calculations themselves and provided the results to Itron.

The final step was to estimate the achievable potential for the measures that passed the cost-effectiveness criteria established by the FEECA utilities under various scenarios of measure incentive levels.

## MEASURE IDENTIFICATION AND SELECTION

**Q: Please explain the process by which DSM measures were identified for assessment in the Itron Studies.**

A: The development of the final measure scope was an iterative process that began with the minimum list of measures provided by the FEECA utilities in Appendix A of the original Request for Proposals. Itron then proposed additional measures that had been recently analyzed in previous potential studies conducted in other jurisdictions, as well as additional measures from knowledge of existing DSM programs administered by FPL. Other FEECA utilities also proposed additional measures based on their own current program offerings. Similarly, Southern Alliance for Clean Energy/Natural Resources Defense Council (SACE/NRDC) proposed additional measures based on reviews of the current technology research literature, pilot programs in other jurisdictions, and trade literature.

In general, the scope of measures proposed for consideration in the study was limited to measures that are currently available in the Florida market for which independently-verified cost and savings data are available. In this sense, non-commercialized technologies were specifically excluded from the study.

Once the master list of proposed measures was compiled, Itron conducted assessments of data availability and measure-specific modeling issues and communicated the findings of these assessments to the study collaborative. The FEECA utilities and SACE/NRDC provided responses to these findings. These pieces formed the basis for a series of conference calls designed to either reach consensus among the study collaborative or determine further action items required to finalize the data assessment.

**Q: How were DR measures identified?**

A: For this study, DR measures were identified using a combination of literature review, reviews of current DR program activities of the FEECA utilities, and discussions with FEECA utilities about the near-term outlook for AMI and DR programs in their respective service territories.

**Q: How were the customer-scale PV technologies identified?**

A: Customer-scale PV measures were identified by explicitly considering the following characteristics related to PV electric systems: 1) PV material type, 2) energy storage,

3) tracking versus fixed systems, 4) array mounting design, 5) host sites, and 6) on versus off grid systems. Each of these PV system characteristics is described in more detail on pages 5-1 and 5-2 of each FEECA utility's technical potential report. After discussions with the FEECA utilities, Itron defined one residential rooftop PV system, one commercial rooftop PV system, and one ground-mounted PV system in commercial parking lots for purposes of assessing customer-scale PV potential.

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

A: Yes, the measure identification and selection process was appropriate for the objectives of the study. The final measures list was comprehensive and, indeed, included a significant number of measures that Itron had not previously analyzed in potential studies conducted for other clients.

**Q: Did it allow for the assessment of the full Technical Potential of the FEECA utilities?**

A: Yes, the final measure list was broad enough to allow for a reasonable assessment of the full technical potential of DSM measures for the FEECA utilities.

**Q: How many measures did this measure identification and selection process cause Itron to analyze that it had not previously assessed?**

A: The final measures list included 25 residential measures and 24 commercial measures that Itron had not previously analyzed.

**Q: Ultimately, how many DSM measures were identified for analysis?**

A: The study considered 257 unique EE measures (including 61 residential measures, 78 commercial measures, and 118 industrial measures), seven (7) unique DR measures (five (5) residential measures and two (2) commercial/industrial measures), and three (3) unique PV measures (one (1) residential and two (2) commercial).

The final list included some measures that are likely to face significant supply constraints in near term, e.g., Seasonal Energy Efficiency Ratio (SEER) 19 central air conditioners, hybrid desiccant-direct expansion cooling systems, and heat pump water heaters. The final EE measures list also included some end-use specific renewable energy measures, e.g., solar water heating and PV-powered pool pumps. These renewable measures were included in the efficiency analysis (rather than the PV analysis) because they affect end-use specific loads, rather than whole building loads, and can therefore be treated the same as efficiency measures in the DSM ASSYST modeling framework.

**Q: Once measures were selected by the collaborative, what was the next step in Itron's analysis?**

A: The next step in Itron's analysis was to develop bottom-up baselines of current energy use and peak demand at the end-use and technology level in the market segments of interest. Section 3-3 of each FEECA utility's technical potential report contains detailed discussions of the baseline data required to establish bottom-up modeling baselines and presents the building type and end-use definitions used in the study. Once bottom-up baselines were established, Itron then used data on actual total sales and system peak demand provided by the FEECA utilities to ensure that all of the bottom-up end-use energy and peak demand estimates correctly sum to within a reasonable range of actual sales and observed system peak demand.

## TECHNICAL POTENTIAL

**Q: Please define Technical Potential.**

A: Technical potential is defined in this study as the complete penetration of all measures analyzed in applications where they were deemed technically feasible from an engineering perspective.

It is important to note several key caveats to interpreting and evaluating technical potential estimates. First, it should be understood that technical potential is a theoretical construct that represents the upper bound of EE potential from a technical feasibility sense, regardless of cost, acceptability to customers, or normal replacement rates of equipment. Specifically, feasibility limits measure installation to opportunities where installation is feasible from an engineering perspective and physically practical with respect to constraints such as available space, noise considerations, and lighting level requirements, among other things. However, technical potential does not account for other important real-world constraints such as product availability, contractor/vendor capacity, cost-effectiveness, customer preferences, or normal equipment replacement rates. In this way, technical potential does not reflect – and is not intended to reflect – the amount of EE potential that is achievable through voluntary, utility programs and should not be evaluated as such.

It is also important to note that, as defined, technical potential does not have a time dimension associated with it and, in this way, should be viewed as a snapshot of the technically feasible efficiency resource given available information on measures and the size of the feasible and eligible market.

**Q: What Technical Potential Reports did Itron generate?**

A: Itron generated and delivered the technical potential reports listed in Exhibit MR-2.

**Q: Do these Itron Technical Potential Reports provide a detailed description of Itron's methodology, data, and assumptions?**

A: Yes, each technical potential report provides detailed descriptions of Itron's methodology as well as the input data and assumptions used in the study.

**Q: Do these Technical Potential reports identify the full Technical Potential for the FEECA utilities?**

A: Yes, each technical potential report identifies the full technical potential of the measures analyzed for each FEECA utility.

**Q: Please summarize the methodology, data, and assumptions used to develop the Technical Potential of EE measures for the FEECA utilities.**

A: Total technical potential is developed from estimates of the technical potential of individual measures as they are applied to discrete market segments (commercial building types, residential dwelling types, etc.). The core equation used to calculate the technical potential for energy savings from each individual efficiency measure is shown below (using a commercial measure example).

$$\begin{matrix}\text{Technical} \\ \text{Potential} \\ \text{(GWh)}\end{matrix} = \overbrace{\left(\begin{matrix}\text{Units of} \\ \text{Consumption} \\ (\text{10e6 ft}^2)\end{matrix}\right)\left(\begin{matrix}\text{End-use Tech} \\ \text{Saturation} \\ (\%)\end{matrix}\right)\left(\begin{matrix}\text{Base Tech} \\ \text{EUI} \\ (\text{kWh/ft}^2)\end{matrix}\right)}^{\textit{Baseline Data}}\overbrace{\left(1-\begin{matrix}\text{Measure} \\ \text{Saturation} \\ (\%)\end{matrix}\right)\left(\begin{matrix}\text{Measure} \\ \text{Feasibility} \\ (\%)\end{matrix}\right)\left(\begin{matrix}\text{Measure} \\ \text{Impacts} \\ (\%)\end{matrix}\right)}^{\textit{Measure Data}}$$

As the equation shows, technical potential is estimated by interacting "baseline data" that describe current, end-use energy consumption in a given market segment with "measure data" that describe the energy savings impacts, feasibility, and current saturation of a given measure in a given market segment.

By treating measures independently, their relative cost-effectiveness is analyzed without making assumptions about the order or combinations in which they might be implemented in customer premises. However, total technical potential across measures cannot be accurately estimated by simply summing the individual measure potentials directly, since some savings would be double-counted. For example, the savings from a measure that reduces heat gain into a building, such as window film, are partially dependent on other measures that affect the efficiency of the system being used to cool the building, such as a high-efficiency chiller – the more efficient the chiller, the less energy saved from the application of the window film.

In the second step of the DSM ASSYST modeling framework, total cumulative technical potential is estimated using a supply curve approach. The critical aspect of supply curves is that total potential savings from any given measure are calculated incrementally with respect to measures that precede them. This incremental accounting of measure costs and savings takes into account interactive effects between multiple measures applied to the same end use, such as those described above in the case of efficient chillers and window film measures.

The methodology and data used to estimate the technical potential of EE measures is described in more detail in section 3.2 of each FEECA utility's technical potential report.

**Q: Please summarize the methodology, sources of data and assumptions used to develop Technical Potential for DR measures for the FEECA utilities.**

A: The methodology used to develop technical potential estimates for DR measures was based on an "engineering" approach that relies on a bottom-up engineering accounting of DR potential by end-use and DR-enabling technology. This approach is analogous to the approach used for estimating EE potential and is readily applicable to utility-controlled DR resources (e.g., direct load control).

In this approach, developing technical potential estimates for DR programs requires making judgments about the fraction of buildings that are likely to be integrated into new communications networks (ranging from simple one-way paging to advanced communications networks), the rate choices available to these customers, and the advanced DR technologies likely to be available to each customer class. In this analysis, the availability of communication networks, advanced DR technologies, and dynamic pricing tariffs is driven by technical feasibility of deployment over a 10-year period without consideration of policy or economic factors.

Using a residential example, the core equation used for estimating DR technical potential is:

$$\underset{(\text{MW})}{\text{Technical Potential}} = \overbrace{\begin{pmatrix}\text{Units of}\\\text{Consumption}\\\text{(Households)}\end{pmatrix}\begin{pmatrix}\text{End-use Tech}\\\text{Saturation}\\(\%)\end{pmatrix}\begin{pmatrix}\text{Base Tech}\\\text{EUI}\\\text{(kW per}\\\text{Household)}\end{pmatrix}}^{\textit{Baseline Data}}\overbrace{\begin{pmatrix}\text{Communication}\\\text{Network}\\(\%)\end{pmatrix}\begin{pmatrix}\text{Tariff}\\(\%)\end{pmatrix}\begin{pmatrix}\text{DR}\\\text{Technology}\\(\%)\end{pmatrix}\begin{pmatrix}\text{Demand}\\\text{Reduction}\\(\%)\end{pmatrix}}^{\textit{DR Measure Data}}$$

This equation is analogous to the equation used for estimating the EE technical potential. The baseline data used for estimating DR technical potential is the same as that used for estimating the EE technical potential. As such, it should be understood that the technical potential estimates for EE and DR are not strictly additive, since efficiency improvements reduce the baseline peak demand available to be reduced in DR programs.

In order to estimate technical potential, therefore, it is necessary to develop estimates for three key factors for each DR program considered: 1) the availability of communication networks, 2) the availability of advanced DR technologies, and 3) the availability of dynamic pricing tariffs. For DR programs and strategies beyond traditional direct load control programs, however, comprehensive data to support such estimates was not readily available for this study, largely due to the relative newness of advanced DR technologies, dynamic tariffs, and advanced communications networks. Additionally, the scope of Itron's study did not support primary data development for advanced DR measures. As such, Itron developed a scenario-based, assumption-driven analysis framework in order to develop the DR measure data required to estimate technical potential. In this approach, Itron developed an initial set of straw-man values for each factor that was then presented to each of the FEECA utilities. The utilities' feedback was then utilized as the basis for the final parameters. The analysis results were then presented to the FEECA utilities, and Itron incorporated these comments in the final results. The final set of key assumptions is shown in section 4.2 of each FEECA utility's technical potential report.

**Q: Please explain the methodology, sources of data and assumptions used to develop Technical Potential for PV measures for the FEECA utilities.**

The analytic methodology used to estimate technical potential for PV measures consisted of first estimating total roof area suitable for siting customer-scale PV systems and then translating this roof area into estimates of annual electricity generation and power output coincident with the electric system summer and winter peaks. For commercial buildings, the total roof area also is used to estimate parking lot area over which parking shade structures might hold PV systems.

The form of the PV core equation is similar, but not identical, to that of the EE and DR core equations. The core equation used for estimating PV technical potential is (for a commercial sector example):

$$\begin{pmatrix}\text{Technical} \\ \text{Potential} \\ \text{(GWh)}\end{pmatrix} = \overbrace{\begin{pmatrix}\text{Floor space} \\ (10e6ft^2)\end{pmatrix}\begin{pmatrix}\text{Roof space} \\ \text{Ratio} \\ (\%)\end{pmatrix}}^{\textit{Baseline Data}} \overbrace{\begin{pmatrix}1 - \text{Measure Saturation } (\%)\end{pmatrix}\begin{pmatrix}\text{Measure} \\ \text{Feasibility} \\ (\%)\end{pmatrix}\begin{pmatrix}\text{Measure} \\ \text{Size} \\ (kW/ft^2)\end{pmatrix}\begin{pmatrix}\text{Measure} \\ \text{Impacts} \\ (kWh/kW)\end{pmatrix}}^{\textit{Measure Data}}$$

Because PV potential is not correlated with baseline energy consumption but rather

## ECONOMIC COST-EFFECTIVENESS SCREENINGS AND INCENTIVE LEVEL ESTIMATION

**Q: How was economic potential defined and estimated for this study?**

A: For this study, economic potential was defined as the technical potential of all measures determined to be cost-effective according to two different cost-effectiveness tests, the RIM test and the TRC test. In the RIM "portfolio" case, measures were defined as being cost-effective if the calculated RIM value was greater than or equal to 1.01. Measures with RIM values less than 1.01 were excluded from the RIM "portfolio" and screened from the achievable potential analysis. Likewise, in the TRC "portfolio" case, measures were defined as being cost-effective if the calculated TRC value was greater than or equal to 1.01. Measures with TRC values less than 1.01 were excluded from the TRC "portfolio" and screened from the achievable potential analysis.

It is important to note that for the purpose of evaluating cost-effectiveness to estimate economic potential, the measure-specific RIM values were calculated without administrative costs or incentive costs in the denominator. Similarly, the measure-specific TRC values were calculated without administrative costs in the denominator. (Incentives are not considered in the TRC test). In this respect, the cost-effectiveness screening was based on purposefully liberal implementations of the standard RIM and TRC tests.

**Q: Were any additional screening criteria for estimating Achievable Potential used for this study?**

A: Yes, in addition to the aforementioned purely economic screening based on the RIM and TRC tests, measures that demonstrated simple payback periods of less than two years with no incentive applications were excluded from the RIM and TRC "portfolios" and screened from the achievable potential analyses. Additionally, measures with Participant Test values of less than 1.01 were also screened from the achievable potential analysis.

FPL, PEF, TECO, and Gulf also conducted a second phase of screening based on the RIM and TRC test results with administrative costs included in the denominator. Measures with RIM values less than 1.01 (inclusive of administrative costs) were excluded from the RIM "portfolio" and screened from the achievable potential analyses. Similarly, measures with TRC values less than 1.01 (inclusive of administrative costs) were excluded from the TRC "portfolio" and screened from the achievable potential analyses.

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

A: The next major activity was to determine the measure incentive scenarios to be modeled in the adoption forecast. This activity was performed by the FEECA utilities.

**Q: What incentive scenarios were defined for this study?**

A: The FEECA utilities defined three measure incentive scenarios – low, mid, and high – for the TRC and RIM portfolios, respectively.

For the RIM portfolio, the measure incentives in the high case were defined as the lesser of the incentive level that produces a simple payback period to the customer of two years or the maximum incentive allowable that produces a RIM ratio of 1.01 (max RIM). The measure incentives in the mid case were defined as the lesser of 50% of incremental measure cost or max RIM. The measure incentives in the low case were defined as the lesser of 33% of incremental measure cost and max RIM.

For the TRC portfolio, the measure incentives in the high case were defined as the lesser of the incentive level that produces a simple payback period to the customer of two years or 100% incremental measure cost (max TRC). The measure incentives in the mid case were defined as the lesser of 50% of incremental cost and the incentive level that produces a simple payback period to the customer of two years. The measure incentives in the low case were defined as the lesser of 33% of incremental cost and the incentive level that produces a simple payback period to the customer of two years.

**Q: How were the incentive levels determined for the municipal utilities?**

A: For FPU, OUC, and JEA, Itron calculated the incentive levels according to the incentive scenario defined by the FEECA utilities. Specifically, Itron used the measure cost and savings data developed in the technical potential phase of the study together with avoided costs and retail rate forecasts provided by FPU, OUC, and JEA to determine RIM and TRC ratios, simple payback periods, and other metrics required to calculate measure incentives according to the incentive scenarios defined above.

**Q: What was the next step in the development of Achievable Potential?**

A: After cost-effectiveness screenings and incentive level estimation was complete, the next step in the study was to forecast customer adoption of all passing measures and estimate the energy and peak demand savings impacts of utility-funded incentive programs for the period 2010-2019.

## ACHIEVABLE POTENTIAL

**Q: Please explain the methodology and models used by Itron to develop Achievable Potential estimates for the cost-effective EE measures.**

A: I will summarize the methodology and models used by Itron to develop achievable potential for EE measures. A more detailed explanation is attached to my testimony as Exhibit MR-11.

Itron used KEMA's DSM ASSYST model to develop the achievable potential estimates. The achievable potential model of DSM ASSYST was developed in the mid-1990s. The DSM ASSYST achievable potential model has been used by Itron and KEMA staff on a wide variety of EE potential and goals-setting related projects over the past decade, including most of the projects referenced previously in my testimony. This particular achievable potential model has a number of important features and characteristics that make it one of the leading, if not the leading, model of this type in the industry. These features include the following:

- Incorporation of both program information and incentive effects on measure adoption;
- Stock accounting of both physical stock and the fraction of the remaining market that is aware and knowledgeable of each measure;
- Measure adoption curves that reflect both direct and indirect economic factors;
- Internal methodological consistency between forecasts of program adoptions and naturally-occurring adoptions; and
- The ability to assign and calibrate adoption curves to individual measures.

Itron used a method of estimating adoption of EE measures that applies to both program and naturally-occurring analyses. Note that naturally occurring includes "free riders" and is an estimate of the amount of efficiency adoptions predicted to occur without further program interventions. Whether as a result of natural market forces or aided by a program intervention, the rate at which measures are adopted is modeled in the method as a function of the following factors:

- The availability of the adoption opportunity as a function of capital equipment turnover rates and changes in building stock over time;
- Customer awareness and knowledge of the efficiency measure;
- The cost-effectiveness of the efficiency measure; and
- The relative importance of indirect costs and benefits associated with the efficiency measure.

Only measures that pass the measure screening criteria are put into the penetration model for estimation of customer adoption.

A critically important step in the achievable potential methodology is to calibrate the adoption estimates to actual program adoptions as much as possible. For this study, program accomplishments were received from the FEECA utilities and used in this calibration process. Summer peak results were initially calibrated primarily using FPL's recent accomplishments. In addition, for several utilities winter peak results were of equal or greater importance than summer peak. Recent program results for PEF, a winter peaking utility with a strong winter peak focus to their programs, were used to calibrate the adoption results for measures with significant winter impacts. The calibration process utilized was iterative. Itron began with measure-specific adoption curves developed from other recent Itron and KEMA potential studies. Itron then compared the results from using these curves to the FEECA utilities' recent program results. Adjustments were then made to some of the adoption curves to obtain results that better align with actual program accomplishments in Florida. This process was repeated in consultation with the FEECA utilities until the utilities and Itron agreed that the results were consistent with program experience in Florida.

Q: **Please explain the methodology and models used by Itron to develop Achievable Potential estimates for PV and DR measures.**

A: In the case of PV measures, Itron did not produce estimates of achievable potential due to the fact that PV measures did not pass the cost-effectiveness criteria established by the FEECA utilities for purposes of this study, i.e. TRC, RIM, and/or Participant tests.

In the case of DR measures, Itron used a scenario-based, assumption-driven forecasting approach. The core equation used for estimating DR achievable potential is (example is for the residential sector):

$$\begin{pmatrix} \text{Achievable} \\ \text{Potential} \\ (MW) \end{pmatrix} = \begin{pmatrix} \text{Units of} \\ \text{Consumption} \\ (\text{Households}) \end{pmatrix} \begin{pmatrix} \text{End-use} \\ \text{Technology} \\ \text{Saturation} \\ (\%) \end{pmatrix} \begin{pmatrix} \text{Base Tech} \\ EUI \\ (kW\ \text{per} \\ \text{Household}) \end{pmatrix} \begin{pmatrix} \text{Communication} \\ \text{Network} \\ (\%) \end{pmatrix} \begin{pmatrix} \text{Tariff} \\ (\%) \end{pmatrix} \begin{pmatrix} DR \\ \text{Tech} \\ (\%) \end{pmatrix} \begin{pmatrix} \text{Program} \\ \text{Participation} \\ \text{Rate} \\ (\%) \end{pmatrix} \begin{pmatrix} \text{Load} \\ \text{Reduction} \\ (\%) \end{pmatrix}$$

The methodology for estimating the first six quantities in the identity shown above was described previously in this testimony. The methodology for estimating the last two quantities – program participation and load reduction – is described here.

For this study, program participation is viewed from the perspective of a "typical" year of a mature program, with the understanding that a multiyear ramp-up period will be necessary, and that ongoing participation may be subject to fluctuations due to factors both within and outside of the program administrator's control. Although various quantitative methods are available for estimating DR program participation, this study used a combination of expert judgment and internal projections from the FEECA utilities to develop the assumptions used for future program participation for DR programs.

Similar to DR program participation, customer load reductions during DR events may vary yearly, seasonally, and from event to event. The operational trigger for using DR programs is usually a system reliability event. Consequently, predicting the number of DR events (i.e. when the trigger conditions occur) and the circumstances in which they are dispatched is uncertain. For this study, load reduction is viewed from the perspective of average expected reductions over multiple events, with the understanding that size of load reductions will vary from event to event and may be subject to fluctuations due to factors both within and out of the program operator's and customer's control.

Itron used two different methods to estimate customer load reductions during DR events for Critical Peak Pricing (CPP) tariffs and direct load control (DLC) programs, respectively. In the case of CPP tariffs, Itron used an "economic" analysis approach to estimate load reduction. The "economic" approach relies on empirical modeling of the customer's likely behavior in response to economic signals (e.g., the difference between critical peak event and non-event on-peak prices). The "economic" approach consists of estimating price elasticities from the consumption data of customers exposed to varying prices or tariffs. The price elasticities are then used for estimating the load reduction. Assumptions about DR program design (specifically, CPP) and price elasticities (used in the "economic" approach) were developed on the basis of an extensive literature review of existing programs in different parts of the U.S. and were reviewed with and approved by all seven FEECA utilities.

In the case of DLC programs, Itron used an "engineering" analysis approach to estimate customer load reductions. The "engineering" approach consists of explicit "bottom-up" accounting of end-uses, applicability of DR technologies, and historical estimates of observed load reductions. Assumptions about load reductions from DLC programs were developed in collaboration with the FEECA utilities based on past evaluations of existing DLC programs.

Given the assumption-driven forecasting framework used to estimate achievable potential for DR measures in this study, an important aspect of the analysis was the use of scenarios to capture a range of assumptions and outcomes, particularly with regard to future program participation in CPP tariffs. While the scenarios developed for this study should be properly viewed as a subset of possible future outcomes (rather than a comprehensive assessment of all possible future outcomes), it should be noted that the scenarios were designed to reflect the range of possible outcomes that is consistent with expert judgment (based on past program experience) and each utility's internal analysis, ongoing projects, future plans, and projections.

**Q: Please explain how the residential and commercial new construction market segments were addressed in the analysis of Achievable Potential.**

A: The residential and commercial new construction market segments were modeled as separate market segments in the achievable potential study, using the same supply-curve and adoption forecasting methodologies that were applied to the residential and commercial existing construction markets. The only differences between the new construction and existing construction analyses for the residential and commercial sectors were related to the baseline data, the measure data, and the population data. Each of these differences is described in more detail below.

In the new construction analyses, the baseline end-use energy intensities (kWh/home for residential and kWh/square foot for commercial) were adjusted to reflect minimum code baselines for new construction in Florida. Specifically, the residential heating, ventilation, and air conditioning (HVAC) baselines were adjusted to reflect the 13 SEER federal minimum efficiency standard for central air conditioners and heat pumps. In commercial new construction, the lighting, HVAC, and refrigeration baselines were adjusted to reflect end-use energy intensities consistent with the 2007 Florida Building Code.

The second key difference in the new construction analyses was the list of EE measures modeled. In residential new construction, the achievable potential forecast was based on a direct subset of the measures modeled in the existing construction analysis reflecting only those measures that were applicable to residential new construction. For example, the AC Maintenance and Proper Refrigerant Charging measures were not applicable to new construction and were thus removed from the analysis. Similarly, the R-0 to R-19 Ceiling Insulation measure was not applicable to new construction due to minimum code requirements. In commercial new construction, the FEECA utilities choose to consider measure "packages" that reflected integrated design approaches with whole-building energy reduction targets rather than a direct subset of the itemized measures considered in the commercial existing construction analysis. These measure "packages" were defined to achieve the following energy reduction targets relative to code: 15% more efficient lighting, 25% more efficient lighting, 10% more efficient cooling and ventilation, 30% more efficient cooling and ventilation, 10% more efficient commercial refrigeration, and 20% more efficient commercial refrigeration.

The third key difference in the new construction analyses was the population data used to estimate the size of the eligible market. For the existing construction analyses, the eligible market was defined by the current residential and commercial building stocks for each FEECA utility. For the new construction analysis, the eligible market was defined by the annual new construction rates expected for each FEECA utility. For this study, Itron developed estimates of annual residential and commercial new construction rates based on the revised load forecasts developed by each FEECA utility for their 2009 Ten-Year Site Plan filings submitted in April 2009.

**Q: Are the methodology and models Itron employed to develop Achievable Potential estimates for the FEECA utilities analytically sound?**

A: Yes, the methods and models used by Itron are analytically sound. The methods and models used have a history of success because they appropriately blend theory and practice. The models use advanced stock and awareness accounting along with measure-specific adoption curves that reflect real-world differences in end user adoption of efficiency measures as a function of direct and indirect measure attributes. The calibration of the adoption models to the FEECA utilities' actual program experience provides an additional important grounding to the study results.

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

A: Yes, these methods and models have been used by Itron and KEMA to develop EE potential estimates and EE goals in a variety of jurisdictions. For example, the methods and models were used to conduct the potential studies in California that were used by the CPUC to set EE goals for 2004-2011. The methods and models were also used to complete a report on EE goals for the Texas Legislature pursuant to a contract with the PUCT. The methods and models have been used for many other related projects including those for Xcel Energy (Colorado), PNM, Idaho Power, Los Angeles Department of Water & Power, Northwestern Energy, as well as many others.

**Q: Can you summarize your estimates of the amount of EE and demand reduction that can reasonably be achieved by the FEECA utilities?**

A: Across the seven FEECA utilities, Itron estimates that the 10-year cumulative savings potential for the RIM-based EE portfolios modeled to range from 1,174 GWh to 2,675 GWh of electric energy consumption, 373 to 963 MW of system coincident summer peak demand, and 232 to 460 MW of system coincident winter peak demand, depending on the level of incentive levels assumed. For the TRC-based EE portfolios modeled, Itron estimates 10-year cumulative savings potential to range from 1,581 to 4,554 GWh of electric energy consumption, 424 to 1,492 MW of system coincident summer peak demand, and 252 to 983 MW of system coincident winter peak demand, depending on the incentive levels assumed.

For DR, Itron estimates that the 10-year cumulative savings potential for the DR programs modeled to range from 504 to 545 MW of system coincident summer peak demand and 353 to 481 MW of system coincident winter peak demand, depending on the relative participation in CPP tariffs and DLC programs assumed. Note that the DR savings potential is additional and incremental to the existing DR resources in the FEECA utilities.

**Q: Please describe the sensitivity and robustness of the estimates of Achievable Potential to variations in your assumptions.**

A: As noted previously, achievable potential results were developed for several scenarios. Use of multiple scenarios is an effective and common way of testing sensitivities and increasing the robustness of results. Achievable potential estimates are sensitive to a variety of factors including measure costs, measure savings, program information and knowledge building activities, program incentives, and non-energy measure costs and benefits. Differences in incentive levels and cost effectiveness tests are the defining elements of these scenarios. By their nature as forecasts of end user adoption over a 10-year period, there is of course uncertainty associated with these and all such estimates. Calibration of the achievable potential results to program adoptions in recent FEECA utility programs is an important part of the study and serves to increase the reliability of the results by tying them to actual customer measure adoption rather than simply hypothesized adoption levels. In addition, the adoption methods and curves used for this study are informed by the results of similar work conducted by the project team for many other clients. The Itron and KEMA team's adoption forecasts have been shown to be robust over time as evidenced by comparison of our previous studies' results with subsequent actual portfolio accomplishments.

**Q: Are these estimates of Achievable Potential a reasonable basis for FEECA utilities to propose DSM Goals?**

A: Yes, Itron's study results provide directly relevant estimates of achievable potential for the measures passing the cost-effectiveness and screening criteria. These estimates are a reasonable basis for FEECA utilities to propose DSM goals. FEECA utilities can use these results in conjunction with their own assessments of their utility's resource needs, along with their recent actual program and portfolio experiences, to develop their goals.

**Q: Does this conclude your testimony?**

A: Yes, this concludes my testimony.

**Recent Potential Studies Conducted by Itron**

| Project Name | Client | Year | Lead Firm - Description |
|---|---|---|---|
| **Potential Studies** | | | |
| Assessment of the Feasible and Achievable Levels of Electricity Savings from Investor Owned Utilities in Texas: 2009-2018 | Texas Public Utilities Commission | 2008 | Itron worked with a team of nine investor-owned utilities and the state's public utility commission to develop estimates of economic and achievable potential to save electricity and peak demand. High and low estimates of achievable savings were compared to the Legislature's goal targets for 2012 and 2015. Energy efficiency-related policy questions were also investigated and addressed. |
| California PUC Energy Efficiency Savings Goal Support Study | California Public Utilities Commission | 2008 | Itron conducted an innovative scenario analysis of energy efficiency potential that includes a variety of policy instruments (e.g., utility resource programs, states and federal codes & standards (C&S), C&S compliance improvement, and market transformation strategies). This scenario analysis includes a range of savings estimates for each policy instrument and utilizes an end use model that blends rich bottom-up efficiency model results (like those from Itron's ASSET model and KEMA's DSM ASSYST) into a flexible top-down tool that enables "what if" analysis on both efficiency potential and changes in end use service demands (e.g., increases in illumination levels, plug loads, house size, etc.). Itron's work will be the technical centerpiece of the CPUC's energy savings proceeding in spring 2008. |
| California IOU Energy Efficiency Savings Potential Study Update | Pacific Gas & Electric Company | 2008 | In this project, coordinated by PG&E on behalf of the California investor-owned utilities, Itron updated its 2006 CA IOU potential study using the latest energy savings, costs, market saturation, and end user measure adoption data available in the industry. Itron developed and consolidated 10- and 20-year estimates of technical, economic, and market energy potential for 16 climate zones, consolidated to service areas. Itron used its ASSET model to update the potential for new, retrofit, and replace-on-burnout energy efficiency measures with existing residential and commercial customers. The results of the market potential analysis were calibrated to actual 2004-2005 gas and electric program results. The final report included estimates of market potential under alternative program incentive levels. This project was overseen by an Advisory Committee consisting of electric and gas utility staff as well as staff from the CEC and the CPUC. The results are being used by the CPUC as a key input into their 2012-2020 energy efficiency goal-setting process. |
| DSM Potential Study | Public Service New Mexico | 2006 | Itron and KEMA conducted this DSM potential study that covered all customer segments. The study includes a 10-year forecast of several achievable potential scenarios along, with regulatory and stakeholder working group support. This study includes estimates of load control as well as energy efficiency potential. Itron also provided technical support on development of residential, commercial, and industrial mail surveys developed to provide PNM-specific saturation data for the analysis. |

**Recent Potential Studies Conducted by Itron**

| Project Name | Client | Year | Lead Firm - Description |
|---|---|---|---|
| Sacramento Municipal Utility District EE Potential Study | Sacramento Municipal Utility District | 2006 | This study was designed to estimate the technical, economic, and market potential for energy efficiency measures in SMUD's service area. Market potential was estimated under a variety of incentive scenarios. Forecasts of technical, economic, and market potential are being developed using ASSET. |
| DSM Potentials Support for CIP Filing and IRP Process Xcel Energy | Xcel Energy | 2002 & 2004 | In this project, which is the last in a long series of studies performed for Xcel, Itron provided support for Xcel's CIP filing and its IRP process. This study was designed to estimate the technical and achievable potential for residential, commercial, and industrial DSM in Xcel's service area. |
| Energy Efficiency Potential Study | Los Angeles Water and Power | 2005 | Itron and KEMA conducted this comprehensive EE potential study that was closely reviewed by senior LADWP management and Board members. The study included a program best practices gap analysis with portfolio recommendations. |
| Residential and Commercial Achievable Potential | Florida Power & Light Company | 2005 | Itron developed five-year forecasts of achievable potential for FPL's core energy efficiency program measures. These forecasts were thoroughly reviewed by FPL staff and serve as the basis for the company's five-year goals. |
| DSM Potential Study | Xcel Energy – Colorado | 2005-2006 | KEMA and Itron conducted a comprehensive DSM potential study that included targeted primary data collection, including on-site surveys. Project included several presentations to a large stakeholder group. |
| Idaho Power DSM Potential Study | Idaho Power | 2003 | Itron and KEMA conducted a combined energy efficiency and demand response potential study for Idaho Power. This study included development of end use consumption and saturation baselines. In addition to energy efficiency measures, potential was estimated for several classes of demand response resources including load control, pricing programs, bidding, and interruptible programs. |

# Studies Within the Scope of Itron's Work

## Technical Potential

1) Technical Potential for Electric Energy and Peak Demand Savings in Florida (Staff's composite exhibit)
2) Technical Potential for Electric Energy and Peak Demand Savings for Florida Power & Light Company
3) Technical Potential for Electric Energy and Peak Demand Savings for Progress Energy of Florida
4) Technical Potential for Electric Energy and Peak Demand Savings for Tampa Electric Company
5) Technical Potential for Electric Energy and Peak Demand Savings for Gulf Power Company
6) Technical Potential for Electric Energy and Peak Demand Savings for JEA
7) Technical Potential for Electric Energy and Peak Demand Savings for Orlando Utilities Commission
8) Technical Potential for Electric Energy and Peak Demand Savings for Florida Public Utilities Company

## Analytic Forecasts

1) Forecasts of Net Achievable Savings Potential in 2019 from Energy Efficiency and Demand Response Measures for all FEECA Utilities (Exhibit MR-3)
2) Forecasts of Net Achievable Savings Potential in 2019 from Energy Efficiency and Demand Response Measures for Florida Power & Light Company(Exhibit MR-4)
3) Forecasts of Net Achievable Savings Potential in 2019 from Energy Efficiency and Demand Response Measures for Progress Energy of Florida (Exhibit MR-5)
4) Forecasts of Net Achievable Savings Potential in 2019 from Energy Efficiency and Demand Response Measures for Tampa Electric Company (Exhibit MR-6)
5) Forecasts of Net Achievable Savings Potential in 2019 from Energy Efficiency and Demand Response Measures for Gulf Power Company (Exhibit MR-7)
6) Forecasts of Net Achievable Savings Potential in 2019 from Energy Efficiency and Demand Response Measures for JEA (Exhibit MR-8)
7) Forecasts of Net Achievable Savings Potential in 2019 from Energy Efficiency and Demand Response Measures for Orlando Utilities Commission (Exhibit MR-9)
8) Forecasts of Net Achievable Savings Potential in 2019 from Energy Efficiency and Demand Response Measures for Florida Public Utilities Company (Exhibit MR-10)

**Achievable Potential**

1) Achievable Potential for Electric Energy and Peak Demand Savings for FEECA Utilities
2) Achievable Potential for Electric Energy and Peak Demand Savings for Florida Power & Light Company
3) Achievable Potential for Electric Energy and Peak Demand Savings for Progress Energy of Florida
4) Achievable Potential for Electric Energy and Peak Demand Savings for Tampa Electric Company
5) Achievable Potential for Electric Energy and Peak Demand Savings for Gulf Power Company
6) Achievable Potential for Electric Energy and Peak Demand Savings for JEA
7) Achievable Potential for Electric Energy and Peak Demand Savings for Orlando Utilities Commission
8) Achievable Potential for Electric Energy and Peak Demand Savings for Florida Public Utilities Company
9) Equipment and Saturation Report: Florida Commercial On-Site Survey

## FEECA Utilities Total - Program Net Achievable Savings Potential in 2019

| | Incentive Scenarios | | | | | |
|---|---|---|---|---|---|---|
| *Energy Efficiency* | RIM-L | RIM-M | RIM-H | TRC-L | TRC-M | TRC-H |
| **Residential** | | | | | | |
| Annual GWh | 652 | 805 | 988 | 884 | 1,116 | 2,384 |
| System Coincident Summer MW | 283 | 357 | 451 | 306 | 402 | 899 |
| System Coincident Winter MW | 208 | 270 | 359 | 224 | 293 | 886 |
| **Commercial** | | | | | | |
| Annual GWh | 481 | 675 | 1,613 | 642 | 988 | 2,022 |
| System Coincident Summer MW | 86 | 133 | 503 | 112 | 184 | 575 |
| System Coincident Winter MW | 20 | 29 | 93 | 22 | 33 | 84 |
| **Industrial** | | | | | | |
| Annual GWh | 40 | 57 | 74 | 55 | 85 | 148 |
| System Coincident Summer MW | 5 | 7 | 9 | 6 | 10 | 19 |
| System Coincident Winter MW | 4 | 6 | 8 | 6 | 9 | 13 |
| **Total** | | | | | | |
| Annual GWh | 1,174 | 1,536 | 2,675 | 1,581 | 2,190 | 4,554 |
| System Coincident Summer MW | 373 | 497 | 963 | 424 | 596 | 1,492 |
| System Coincident Winter MW | 232 | 305 | 460 | 252 | 335 | 983 |

| | *CPP/TOU Enrollment Scenarios* | |
|---|---|---|
| *Demand Response* | High CPP Low DLC | Low CPP High DLC |
| **Residential** | | |
| System Coincident Summer MW | 290 | 253 |
| System Coincident Winter MW | 338 | 265 |
| **Commercial** | | |
| System Coincident Summer MW | 220 | 220 |
| System Coincident Winter MW | 119 | 72 |
| **Industrial** | | |
| System Coincident Summer MW | 36 | 31 |
| System Coincident Winter MW | 23 | 16 |
| **Total** | | |
| System Coincident Summer MW | 545 | 504 |
| System Coincident Winter MW | 481 | 353 |

## Florida Power & Light Company - Program Net Achievable Savings Potential in 2019

| | *Incentive Scenarios* | | | | | |
|---|---|---|---|---|---|---|
| ***Energy Efficiency*** | **RIM-L** | **RIM-M** | **RIM-H** | **TRC-L** | **TRC-M** | **TRC-H** |
| **Residential** | | | | | | |
| Annual GWh | 183.20 | 258.65 | 354.63 | 241.68 | 330.26 | 790.28 |
| System Coincident Summer MW | 84.42 | 123.38 | 175.35 | 88.56 | 127.72 | 353.20 |
| System Coincident Winter MW | 23.51 | 45.17 | 89.02 | 28.77 | 49.37 | 246.73 |
| **Commercial** | | | | | | |
| Annual GWh | 344.48 | 486.02 | 1289.49 | 368.21 | 583.67 | 1298.94 |
| System Coincident Summer MW | 54.55 | 84.66 | 401.62 | 59.56 | 101.19 | 403.91 |
| System Coincident Winter MW | 15.18 | 22.11 | 79.06 | 12.66 | 19.01 | 57.78 |
| **Industrial** | | | | | | |
| Annual GWh | 25.86 | 39.68 | 56.15 | 25.32 | 39.49 | 87.80 |
| System Coincident Summer MW | 3.03 | 4.55 | 6.63 | 2.97 | 4.57 | 11.63 |
| System Coincident Winter MW | 2.70 | 4.26 | 6.27 | 2.61 | 4.08 | 7.66 |

| | *CPP/TOU Enrollment Scenarios* | |
|---|---|---|
| ***Demand Response*** | **High CPP Low DLC** | **Low CPP High DLC** |
| **Residential** | | |
| System Coincident Summer MW | 43.12 | 120.82 |
| System Coincident Winter MW | 41.02 | 109.24 |
| **Commercial** | | |
| System Coincident Summer MW | 66.26 | 159.09 |
| System Coincident Winter MW | 23.38 | 49.28 |
| **Industrial** | | |
| System Coincident Summer MW | 10.60 | 24.04 |
| System Coincident Winter MW | 5.29 | 11.59 |

# Progress Energy Florida - Program Net Achievable Savings Potential in 2019

| | Incentive Scenarios | | | | | |
|---|---|---|---|---|---|---|
| ***Energy Efficiency*** | **RIM-L** | **RIM-M** | **RIM-H** | **TRC-L** | **TRC-M** | **TRC-H** |
| **Residential** | | | | | | |
| Annual GWh | 372.10 | 433.51 | 487.52 | 425.07 | 516.22 | 1207.11 |
| System Coincident Summer MW | 156.97 | 185.04 | 210.27 | 136.83 | 173.02 | 394.14 |
| System Coincident Winter MW | 159.01 | 196.42 | 220.36 | 163.79 | 201.67 | 536.30 |
| **Commercial** | | | | | | |
| Annual GWh | 20.31 | 35.59 | 119.89 | 82.58 | 133.62 | 351.08 |
| System Coincident Summer MW | 7.63 | 13.66 | 50.85 | 15.87 | 26.93 | 87.99 |
| System Coincident Winter MW | 0.54 | 1.14 | 5.79 | 2.16 | 3.68 | 10.28 |
| **Industrial** | | | | | | |
| Annual GWh | 4.97 | 5.91 | 6.39 | 8.15 | 16.34 | 26.32 |
| System Coincident Summer MW | 0.58 | 0.74 | 0.82 | 0.92 | 1.85 | 3.16 |
| System Coincident Winter MW | 0.58 | 0.67 | 0.71 | 0.85 | 1.69 | 2.42 |

| | CPP/TOU Enrollment Scenarios | |
|---|---|---|
| ***Demand Response*** | **High CPP Low DLC** | **Low CPP High DLC** |
| **Residential** | | |
| System Coincident Summer MW | 194.04 | 55.90 |
| System Coincident Winter MW | 233.41 | 65.12 |
| **Commercial** | | |
| System Coincident Summer MW | 127.67 | 26.65 |
| System Coincident Winter MW | 82.30 | 11.39 |
| **Industrial** | | |
| System Coincident Summer MW | 22.46 | 3.94 |
| System Coincident Winter MW | 16.12 | 2.45 |

## Tampa Electric Company - Program Net Achievable Savings Potential in 2019

| | Incentive Scenarios | | | | | |
|---|---|---|---|---|---|---|
| ***Energy Efficiency*** | **RIM-L** | **RIM-M** | **RIM-H** | **TRC-L** | **TRC-M** | **TRC-H** |
| **Residential** | | | | | | |
| Annual GWh | 51.56 | 54.56 | 59.03 | 80.01 | 101.15 | 133.94 |
| System Coincident Summer MW | 25.51 | 27.00 | 29.19 | 36.28 | 45.99 | 63.00 |
| System Coincident Winter MW | 21.43 | 21.95 | 23.39 | 23.90 | 31.25 | 53.67 |
| **Commercial** | | | | | | |
| Annual GWh | 81.60 | 106.04 | 136.49 | 88.29 | 124.33 | 166.20 |
| System Coincident Summer MW | 16.95 | 24.54 | 35.27 | 17.46 | 26.22 | 38.44 |
| System Coincident Winter MW | 3.12 | 3.96 | 4.72 | 3.68 | 5.04 | 6.54 |
| **Industrial** | | | | | | |
| Annual GWh | 4.80 | 5.67 | 6.25 | 6.14 | 8.57 | 10.09 |
| System Coincident Summer MW | 0.58 | 0.72 | 0.82 | 0.67 | 0.98 | 1.23 |
| System Coincident Winter MW | 0.52 | 0.61 | 0.66 | 0.65 | 0.91 | 0.96 |

| | *CPP/TOU Enrollment Scenarios* | |
|---|---|---|
| ***Demand Response*** | **High CPP Low DLC** | **Low CPP High DLC** |
| **Residential** | | |
| System Coincident Summer MW | 4.07 | 0.75 |
| System Coincident Winter MW | 5.13 | 0.94 |
| **Commercial** | | |
| System Coincident Summer MW | 11.28 | 12.41 |
| System Coincident Winter MW | 6.19 | 4.10 |
| **Industrial** | | |
| System Coincident Summer MW | 1.06 | 0.88 |
| System Coincident Winter MW | 0.81 | 0.54 |

## Gulf Power Company - Program Net Achievable Savings Potential in 2019

| | *Incentive Scenarios* | | | | | |
|---|---|---|---|---|---|---|
| ***Energy Efficiency*** | **RIM-L** | **RIM-M** | **RIM-H** | **TRC-L** | **TRC-M** | **TRC-H** |
| **Residential** | | | | | | |
| Annual GWh | 45.28 | 57.82 | 86.79 | 58.63 | 78.24 | 153.91 |
| System Coincident Summer MW | 15.83 | 21.50 | 35.69 | 17.15 | 23.80 | 51.94 |
| System Coincident Winter MW | 3.63 | 6.12 | 25.93 | 5.37 | 8.87 | 47.50 |
| **Commercial** | | | | | | |
| Annual GWh | 34.84 | 47.01 | 66.79 | 36.47 | 53.71 | 89.45 |
| System Coincident Summer MW | 6.77 | 10.22 | 15.65 | 6.84 | 10.59 | 18.51 |
| System Coincident Winter MW | 1.19 | 1.70 | 2.93 | 1.33 | 2.03 | 5.44 |
| **Industrial** | | | | | | |
| Annual GWh | 4.51 | 5.40 | 5.42 | 5.74 | 7.23 | 8.64 |
| System Coincident Summer MW | 0.44 | 0.53 | 0.54 | 0.52 | 0.66 | 0.86 |
| System Coincident Winter MW | 0.56 | 0.67 | 0.67 | 0.69 | 0.86 | 0.91 |

| | *CPP/TOU Enrollment Scenarios* | |
|---|---|---|
| ***Demand Response*** | **High CPP Low DLC** | **Low CPP High DLC** |
| **Residential** | | |
| System Coincident Summer MW | 11.29 | 7.02 |
| System Coincident Winter MW | 13.28 | 7.87 |
| **Commercial** | | |
| System Coincident Summer MW | 5.16 | 6.18 |
| System Coincident Winter MW | 2.84 | 1.96 |
| **Industrial** | | |
| System Coincident Summer MW | 0.54 | 0.46 |
| System Coincident Winter MW | 0.55 | 0.37 |

## JEA - Program Net Achievable Savings Potential in 2019

| | *Incentive Scenarios* | | | | | |
|---|---|---|---|---|---|---|
| ***Energy Efficiency*** | **RIM-L** | **RIM-M** | **RIM-H** | **TRC-L** | **TRC-M** | **TRC-H** |
| **Residential** | | | | | | |
| Annual GWh | 0.00 | 0.00 | 0.00 | 52.08 | 59.01 | 64.66 |
| System Coincident Summer MW | 0.00 | 0.00 | 0.00 | 17.63 | 19.96 | 23.46 |
| System Coincident Winter MW | 0.00 | 0.00 | 0.00 | 1.59 | 1.90 | 1.87 |
| **Commercial** | | | | | | |
| Annual GWh | 0.00 | 0.00 | 0.00 | 35.95 | 50.39 | 62.46 |
| System Coincident Summer MW | 0.00 | 0.00 | 0.00 | 7.05 | 10.64 | 14.22 |
| System Coincident Winter MW | 0.00 | 0.00 | 0.00 | 1.04 | 1.51 | 1.83 |
| **Industrial** | | | | | | |
| Annual GWh | 0.00 | 0.00 | 0.00 | 6.90 | 10.07 | 11.39 |
| System Coincident Summer MW | 0.00 | 0.00 | 0.00 | 0.88 | 1.30 | 1.52 |
| System Coincident Winter MW | 0.00 | 0.00 | 0.00 | 0.66 | 0.96 | 1.03 |

| | *CPP/TOU Enrollment Scenarios* | |
|---|---|---|
| ***Demand Response*** | **High CPP Low DLC** | **Low CPP High DLC** |
| **Residential** | | |
| System Coincident Summer MW | 30.20 | 64.43 |
| System Coincident Winter MW | 37.00 | 77.48 |
| **Commercial** | | |
| System Coincident Summer MW | 4.71 | 9.70 |
| System Coincident Winter MW | 1.75 | 2.98 |
| **Industrial** | | |
| System Coincident Summer MW | 0.77 | 1.45 |
| System Coincident Winter MW | 0.41 | 0.72 |

## Orlando Utilities Commission - Program Net Achievable Savings Potential in 2019

| | *Incentive Scenarios* | | | | | |
|---|---|---|---|---|---|---|
| ***Energy Efficiency*** | **RIM-L** | **RIM-M** | **RIM-H** | **TRC-L** | **TRC-M** | **TRC-H** |
| **Residential** | | | | | | |
| Annual GWh | 0.00 | 0.00 | 0.00 | 23.38 | 27.03 | 28.75 |
| System Coincident Summer MW | 0.00 | 0.00 | 0.00 | 8.57 | 10.73 | 11.68 |
| System Coincident Winter MW | 0.00 | 0.00 | 0.00 | 0.27 | 0.02 | -0.20 |
| **Commercial** | | | | | | |
| Annual GWh | 0.00 | 0.00 | 0.00 | 25.47 | 36.70 | 47.45 |
| System Coincident Summer MW | 0.00 | 0.00 | 0.00 | 4.36 | 6.83 | 9.88 |
| System Coincident Winter MW | 0.00 | 0.00 | 0.00 | 0.87 | 1.22 | 1.73 |
| **Industrial** | | | | | | |
| Annual GWh | 0.00 | 0.00 | 0.00 | 1.70 | 2.37 | 2.62 |
| System Coincident Summer MW | 0.00 | 0.00 | 0.00 | 0.21 | 0.30 | 0.34 |
| System Coincident Winter MW | 0.00 | 0.00 | 0.00 | 0.18 | 0.24 | 0.26 |

| | *CPP/TOU Enrollment Scenarios* | |
|---|---|---|
| ***Demand Response*** | **High CPP Low DLC** | **Low CPP High DLC** |
| **Residential** | | |
| System Coincident Summer MW | 6.22 | 3.79 |
| System Coincident Winter MW | 7.23 | 4.12 |
| **Commercial** | | |
| System Coincident Summer MW | 4.36 | 4.99 |
| System Coincident Winter MW | 2.71 | 1.78 |
| **Industrial** | | |
| System Coincident Summer MW | 0.20 | 0.20 |
| System Coincident Winter MW | 0.13 | 0.11 |

# Florida Public Utilities Company - Program Net Achievable Savings Potential in 2019

| | Incentive Scenarios | | | | | |
|---|---|---|---|---|---|---|
| ***Energy Efficiency*** | **RIM-L** | **RIM-M** | **RIM-H** | **TRC-L** | **TRC-M** | **TRC-H** |
| **Residential** | | | | | | |
| Annual GWh | 0.00 | 0.00 | 0.00 | 3.58 | 4.55 | 5.14 |
| System Coincident Summer MW | 0.00 | 0.00 | 0.00 | 0.69 | 1.00 | 1.25 |
| System Coincident Winter MW | 0.00 | 0.00 | 0.00 | 0.34 | 0.39 | 0.40 |
| **Commercial** | | | | | | |
| Annual GWh | 0.00 | 0.00 | 0.00 | 4.58 | 5.70 | 6.87 |
| System Coincident Summer MW | 0.00 | 0.00 | 0.00 | 0.91 | 1.22 | 1.60 |
| System Coincident Winter MW | 0.00 | 0.00 | 0.00 | 0.11 | 0.14 | 0.15 |
| **Industrial** | | | | | | |
| Annual GWh | 0.00 | 0.00 | 0.00 | 0.84 | 0.88 | 0.92 |
| System Coincident Summer MW | 0.00 | 0.00 | 0.00 | 0.09 | 0.09 | 0.10 |
| System Coincident Winter MW | 0.00 | 0.00 | 0.00 | 0.09 | 0.09 | 0.10 |

| | *CPP/TOU Enrollment Scenarios* | |
|---|---|---|
| ***Demand Response*** | **High CPP Low DLC** | **Low CPP High DLC** |
| **Residential** | | |
| System Coincident Summer MW | 0.77 | 0.47 |
| System Coincident Winter MW | 0.93 | 0.54 |
| **Commercial** | | |
| System Coincident Summer MW | 0.47 | 0.54 |
| System Coincident Winter MW | 0.24 | 0.17 |
| **Industrial** | | |
| System Coincident Summer MW | 0.09 | 0.06 |
| System Coincident Winter MW | 0.07 | 0.04 |

# Achievable Potential Method

Itron used KEMA's DSM ASSYST model to develop the achievable potential estimates. The achievable potential module of DSM ASSYST was developed in the mid-1990s by staff at KEMA and Itron (these staff, including myself, were then employed at XENERGY Inc., later acquired by KEMA Inc.). The DSM ASSYST achievable potential model has been used by Itron and KEMA staff on a wide variety of energy efficiency potential and goals-setting related projects over the past decade, including most of the projects referenced previously in my testimony. This particular achievable potential model has a number of important features and characteristics that make it one of the leading, if not the, leading model of this type in the industry. These include the following:

- Incorporation of both program information and incentive effects on measure adoption;
- Stock accounting of both physical stock and the fraction of the remaining market that is aware and knowledgeable of each measure;
- Measure adoption curves that reflect both energy economics and non-economic factors;
- Internal methodological consistency between forecasts of program adoptions and naturally-occurring adoptions; and
- The ability to assign and calibrate adoption curves to individual measures.

## Adoption Method Overview

We use a method of estimating adoption of energy efficiency measures that applies both to our program and to naturally occurring analyses. Whether as a result of natural market forces or aided by a program intervention, the rate at which measures are adopted is modeled in our method as a function of the following factors:

- The availability of the adoption opportunity as a function of capital equipment turnover rates and changes in building stock over time;
- Customer awareness and knowledge of the efficiency measure;
- The cost-effectiveness of the efficiency measure; and
- The relative importance of indirect costs and benefits associated with the efficiency measure.

The method employed is executed in the measure penetration module of KEMA's DSM ASSYST model. Only measures that pass the measure screening criteria are put into the penetration module for estimation of customer adoption.

## Availability

The model uses a stock accounting algorithm that handles capital turnover and stock decay over a period of up to 20 years. Using the commercial sector as an example, in the first step of our achievable potential method, we calculate the number of customers for whom each measure will apply. The input to this calculation is the total floor space (alternatively, households for residential and base kWh for industrial) available for the measure from the technical potential analysis, i.e., the total floor space multiplied by the applicability, not complete, and feasibility factors described in our Technical Potential report. We call this the eligible stock. The stock algorithm keeps track of the amount of floor space available for each efficiency measure in each year based on the total eligible stock and whether the application is new construction, retrofit, or replace-on-burnout.[1]

Retrofit measures are available for implementation by the entire eligible stock. The eligible stock is reduced over time as a function of adoptions[2] and building decay.[3] Replace-on-burnout measures are available only on an annual basis, approximated as equal to the inverse of the service life.[4] The annual portion of the eligible market that does not accept the replace-on-burnout measure does not have an opportunity again until the end of the service life.

[1] Replace-on-burnout measures are defined as the efficiency opportunities that are available only when the base equipment turns over at the end of its service life. For example, a high-efficiency chiller measure is usually only considered at the end of the life of an existing chiller. By contrast, retrofit measures are defined to be constantly available, for example, application of a window film to existing glazing.

[2] That is, each square foot that adopts the retrofit measure is removed from the eligible stock for retrofit in the subsequent year.

[3] An input to the model is the rate of decay of the existing floor space. Floor space typically decays at a very slow rate.

[4] For example, a base-case technology with a service life of 15 years is only available for replacement to a high-efficiency alternative each year at the rate of 1/15 times the total eligible stock. For example, the fraction of the market that does not adopt the high-efficiency measure in year $t$ will not be available to adopt the efficient alternative again until year $t + 15$.

New construction applications are available for implementation in the first year. Those customers that do not accept the measure are given subsequent opportunities corresponding to whether the measure is a replacement or retrofit-type measure.

## Awareness and Knowledge

In our modeling framework, customers cannot adopt an efficient measure merely because there is stock available for conversion. Before they can make the adoption choice, they must be aware and knowledgeable about the efficiency measure's costs, savings, and other characteristics. Thus, in the second stage of the process, the model calculates the portion of the available market that is informed. An initial user-specified parameter sets the initial level of awareness for each measure. Awareness levels can vary by measure as a function of the relative cost-effectiveness of the measure. More cost-effective measures have higher awareness levels than less cost-effective measures, all else being equal.

Incremental increases in awareness are estimated in the model as a function of the amount of money spent on awareness and knowledge building and how well those knowledge-building resources are directed to target markets.

The model also controls for information retention. An information decay parameter in the model is used to control for the percentage of customers that will retain program information from one year to the next. Information retention is based on the characteristics of the target audience and the temporal effectiveness of the marketing techniques employed.

## Measure Adoption

The portion of the total market that is available and informed can now face the choice of whether or not to adopt a particular measure. Only those customers for whom a measure is available for implementation (stage 1) and, of those customers, only those who have been informed about the program/measure (stage 2), are in a position to make the implementation decision.

In the third stage of our penetration process, the model calculates the fraction of the market that adopts each efficiency measure as a function of the participant test, since this represents the end user's perspective. The participant test is a benefit-cost ratio that is calculated as follows:

$$\text{Benefits} = \sum_{t=1}^{N} \frac{\text{Customer Bill Savings (\$)}_t}{(1+d)^{t-1}}$$ Eqn. 2-3

$$\text{Costs} = \sum_{t=1}^{N} \frac{\text{Participant Costs (\$)}_t}{(1+d)^{t-1}}$$ Eqn. 2-4

where:

d = the discount rate
t = time (in years)
n = 20 years

We use a normalized measure life of 20 years in order to compare the cost-effectiveness associated with measures with different service lives. Measures with lives shorter than 20 years are "re-installed" in our analysis as many times as necessary to reach the normalized 20-year life of the analysis. For example, the costs for a measure with a 10-year lifetime would include the costs in Year 1 plus the present value of the costs of installing the measure again in Year 11. The benefits would be the present value of the 20-year stream of avoided costs reductions associated with the measure.

The bill reductions are calculated by multiplying measure energy savings and customer peak demand impacts by retail energy and demand rates over the life of the measure.

The model uses measure implementation curves to estimate the percentage of the informed market that will accept each measure based on the participant's benefit-cost ratio. The model provides enough flexibility so that each measure in each market segment can have a separate implementation rate curve. The functional form used for the implementation curves is:

$$y = \frac{a}{\left(1+e^{-\ln\frac{x}{d}}\right)\times\left(1+e^{-c\ln(bx)}\right)}$$ Eqn. 2-5

where:

y = the fraction of the market that installs a measure in a given year from the pool of informed applicable customers;
x = the customer's benefit-cost ratio for the measure;

a = the maximum annual acceptance rate for the technology;

b = the inflection point of the curve. It is generally 1 over the benefit-cost ratio that will give a value of 1/2 the maximum value; and

d, c = parameters that determines the general shape (slope) of the curve.

The primary curves utilized in our model are shown in Exhibit A. These curves produce base year program results that are calibrated to actual measure implementation results associated with major IOU commercial efficiency programs over the past several years. Different curves are used to reflect different levels of indirect costs (also called market barriers) and benefits for different efficiency measures. A list of market barriers is shown in Exhibit C. The implicit premise of efficiency programs is that it is the existence of these barriers that necessitates program interventions to increase the adoption of energy efficiency measures. (For more information on market barriers, see Eto, Prahl, and Schlegel (1997), Golove and Eto (1996), DeCanio (2000), and DeCanio (1998)).

Note that for the moderate, high, and extremely high barrier curves, the participant benefit-cost ratios have to be very high before significant adoption occurs. This is because the referential participant benefit-cost ratios are calculated using a 15-percent discount rate. A consumer discount rate of roughly this level reflects likely adoption if there were no market barriers or market failures, as reflected in the no-barriers curve in the figure (i.e., under the no barriers curve roughly half the market adopts with a participant B-C ratio of 1.0 using the 15 percent discount rate). Real-world program and market experience shows, however, that actual adoption behavior does not follow the no barrier curve for the vast majority of measures. Instead, most measure adoption levels observed in real markets and programs correlate with implicit discount rates several times those that would be expected in a perfect market (i.e., a market without barriers to the adoption of efficiency measures).[5]

[5] For some, it is easier to consider adoption as a function of simple payback. However, the relationship between payback and the participant benefit-cost ratio varies depending on measure life and discount rate; hence, we prefer to use B-C ratios. For comparison purposes, a long-lived measure of 15 years and a 15-percent discount rate, the equivalent payback at which half of the market would adopt a measure is roughly 6 months, based on the low barrier curve in the exhibit (or roughly 2 years based on the low barrier curve). At a 1-year payback, one-quarter of the market would adopt the measure on the high barrier curve. The curves reflect the real-world observation that implicit discount rates can be well over 100 percent. (See, for example, Train, Kenneth "Discount Rates in Consumers' Energy Related Decisions: A Review of the Literature," *Energy* 10(12): 1243-1253 (1985); Train, K. and T. Atherton, "Rebates, Loans, and Customers' Choice of Appliance Efficiency Level: Combining Stated- and Revealed-Preference Data," Energy Journal, Vol. 16, No. 1 (1995), pp. 55-69).

The model estimates adoption under both naturally occurring and program intervention situations. There are only two differences between the naturally occurring and program analyses. First, in any program intervention case in which measure incentives are provided, the participant benefit-cost ratios are adjusted based on the incentives. Thus, if an incentive that pays 50 percent of the incremental measure cost is applied in the program analysis, the participant benefit-cost ratio for that measure will double (since the costs have been halved). The effect on the amount of adoption estimated depends on where the pre- and post-incentive benefit-cost ratios fall on the curve. This effect is illustrated in Exhibit B.

Achievable potential energy efficiency forecasts were developed for each of the scenarios defined previously. The results vary principally as a function of the differences in measure-specific incentive levels and inclusion/exclusion measure screening results across scenarios.

**Exhibit A**

**Example Measure Implementation Curves Used in Adoption Model**

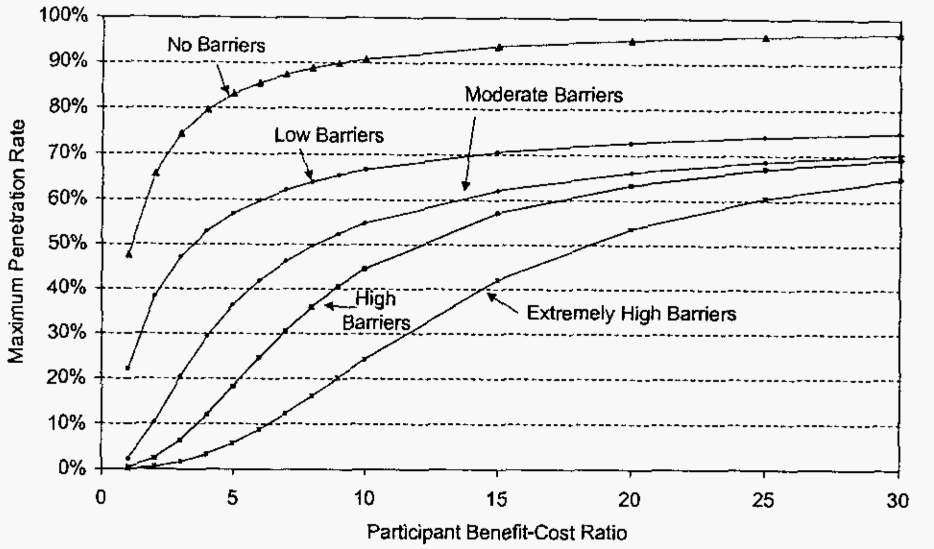


**Exhibit B**
**Illustration of Effect of Incentives on Adoption Level as Characterized in Implementation Curves**

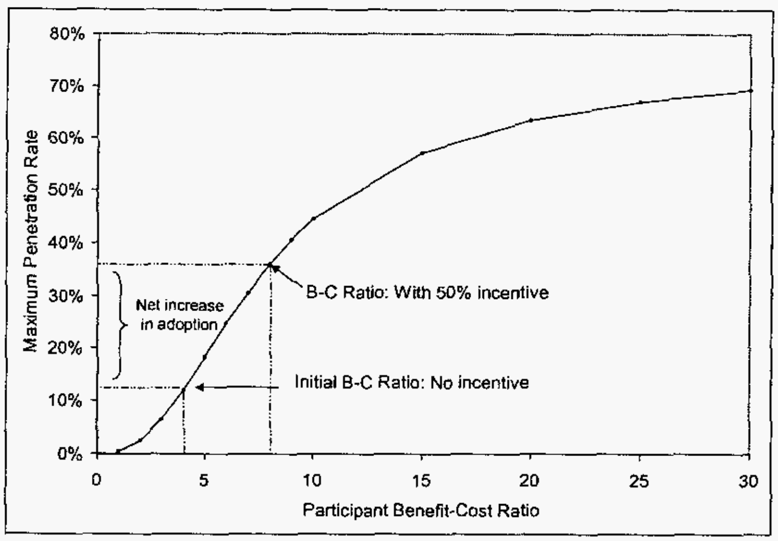

**Exhibit C**

| | Summary Description of Market Barriers from Eto, Prahl, and Schlegel (1997) |
|---|---|
| **Barrier** | **Description** |
| Information or Search Costs | The costs of identifying energy-efficient products or services or of learning about energy-efficient practices, including the value of time spent finding out about or locating a product or service or hiring someone else to do so. |
| Performance Uncertainties | The difficulties consumers face in evaluating claims about future benefits. Closely related to high search costs, in that acquiring the information needed to evaluate claims regarding future performance is rarely costless. |
| Asymmetric Information and Opportunism | The tendency of sellers of energy-efficient products or services to have more and better information about their offerings than do consumers, which, combined with potential incentives to mislead, can lead to sub-optimal purchasing behavior. |
| Hassle or Transaction Costs | The indirect costs of acquiring energy efficiency, including the time, materials and labor involved in obtaining or contracting for an energy-efficient product or service. (Distinct from search costs in that it refers to what happens once a product has been located.) |
| Hidden Costs | Unexpected costs associated with reliance on or operation of energy-efficient products or services - for example, extra operating and maintenance costs. |
| Access to Financing | The difficulties associated with the lending industry's historic inability to account for the unique features of loans for energy savings products (i.e., that future reductions in utility bills increase the borrower's ability to repay a loan) in underwriting procedures. |
| Bounded Rationality | The behavior of an individual during the decision-making process that either seems or actually is inconsistent with the individual's goals. |
| Organization Practices or Customs | Organizational behavior or systems of practice that discourage or inhibit cost-effective energy efficiency decisions, for example, procurement rules that make it difficult to act on energy efficiency decisions based on economic merit. |
| Misplaced or Split incentives | Cases in which the incentives of an agent charged with purchasing energy efficiency are not aligned with those of the persons who would benefit from the purchase. |
| Product or Service Unavailability | The failure of manufacturers, distributors, or vendors to make a product or service available in a given area or market. May result from collusion, bounded rationality, or supply constraints. |
| Externalities | Costs that are associated with transactions, but which are not reflected in the price paid in the transaction. |
| Non-externality Pricing | Factors other than externalities that move prices away from marginal cost. An example arises when utility commodity prices are set using ratemaking practices based on average (rather than marginal) costs. |
| Inseparability of Product Features | The difficulties consumers sometimes face in acquiring desirable energy efficiency features in products without also acquiring (and paying for) additional undesired features that increase the total cost of the product beyond what the consumer is willing to pay. |
| Irreversibility | The difficulty of reversing a purchase decision in light of new information that may become available, which may deter the initial purchase, for example, if energy prices decline, one cannot resell insulation that has been blown into a wall. |

## Achievable Potential Calibration

A critically important step in the achievable potential methodology is to calibrate the adoption estimates to actual program adoptions as much as possible. For this study, program accomplishments were received from the FEECA utilities and used in the calibration process. Summer peak results were calibrated primarily using Florida Power & Light's recent accomplishments. In addition, for several utilities winter peak results were of equal or greater importance than summer peak. Recent program results for Progress Energy Florida, Inc., a winter peaking utility with a strong winter peak focus to their programs, were used to calibrate the adoption results for measures with significant winter impacts. The calibration process utilized is iterative. We began with measure-specific adoption curves developed from other recent Itron and KEMA potential studies. We then compared the results from using these curves to FEECA utilities' recent program results. Adjustments were then made to some of the adoption curves to obtain results that better align with actual program accomplishments in Florida. This process was repeated in consultation with the FEECA utilities until the utilities and Itron agreed that the results were consistent with program experience in Florida.