



FLORIDA PUBLIC

UTILITIES

**Developing Goals
for the 2005
Demand-Side Management Plan**

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Introduction

The process for developing energy savings and demand reduction goals for any demand side management plan ^A is a "bottom-up" process that involves two distinct types of estimation for every program that is part of the plan – the savings per participant estimation process and the process for estimating **the** number of new program participants for each year that the plan covers. Once both of these estimations are completed for each program in the plan, the company-wide goals are arrived at by adding up the savings across all programs. The residential and commercial – industrial class goals are arrived at by adding up the savings across the programs within their respective sectors.

The 2005 Demand Side Management Plan that was filed by Florida Public Utilities Company with the Florida Public Service Commission on June 1, 2004 contained:

- ▶ Five (5) residential class programs,
- ▶ Three (3) commercial – industrial class programs, and
- ▶ Three (3) educational or research programs.

Only the residential class and commercial – industrial **class** programs contributed savings estimates that were aggregated to the company's goals for the years, 2005 through 2014.

The purpose of this document is to provide the **goal** development detail and thinking that was incorporated into both of the necessary estimation processes mentioned above.

Energy and Demand Savings Estimates - General

For each program in the 2005 Demand Side Management Plan, energy and demand savings were estimated. In most cases, a brief explanation of how the savings estimates were developed was provided. A general point that requires emphasis is that for program savings to be estimated, one must posit some state-of- being that would have existed in the absence of the program. One

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must ask and answer the question, "What would the typical program participant have done if there had been no program to participate in?"

Answering that question requires expert knowledge of the market, its current and expected future conditions, the choices available to consumers, the costs and technical characteristics of those choices, and other, softer, less tangible features of all alternatives. In developing the answers to this question for the programs included in the 2005 Demand Side Management Plan, Florida Public Utilities Company obtained input from its most knowledgeable internal resources, professionals at other utility companies in the region, and from published publicly available information. Nevertheless, the answers required exercising judgment and judgments could reasonably vary. Florida Public Utilities Company took special care to avoid introducing any systematic bias into the process of estimating the energy and demand savings that will obtain from the programs included in its 2005 Demand Side Management Plan.

Future Program Participation - General

For each program in the 2005 Demand Side Management Plan, future program participation was estimated. Once estimated, each year's number of new program participants is multiplied by the energy and demand savings estimates per participant to yield total programmatic savings estimates. These estimates are ultimately aggregated to the customer-class and company level to yield the proposed goals for the 2005 Demand Side Management Plan.

Future program participation depends upon past participation (for existing programs), the program's economics, future market conditions and characteristics, and non-economic factors relating to the program that may affect people's desires to participate. These things are not known with any significant degree of certainty. Things like expected population growth and forecasted economic growth for the area are commonly available and will help guide the estimation process.

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The rate of emergence for new technologies and new performance standards for HVAC and other energy-intensive end uses will affect program participation. The current and expected future state of "typical" construction practices relating to energy-efficiency will also influence program participation. In what follows, the projected participation in each of Florida Public Utilities Company's proposed programs is presented and rationalized. Again, the Company took special care to avoid introducing any systematic bias into the estimation process for future program participation.

Residential Programs

Residential Geothermal Heat Pump Program

The rationale that follows for the energy and demand savings and that for future program participation underpins the table on page 24 of the 2005 Demand Side Management Plan.

▶ Energy and Demand Savings

All kW and kWh reductions are relative to a minimum-code **base** unit of 10.0 SEER. The minimum summer kW reduction projected is 1.2 kW for existing home construction to 1.7 kW for new home construction. The average summer kW reduction is 1.45 for all homes. The annual kWh reductions range from 1,183 for existing homes to 2,841 for new home construction with an average annual net reduction of 2,012 kWh. The kW and kWh savings are measured at the meter.

Calculations for kW and kWh savings were derived from the Residential Building Energy Program (RBEP) computer simulations. Inputs are based on Gulf Power's 1996 and 1997 averages for new home and existing home geothermal installations. The computations include only the effect of equipment efficiency alterations, not Btu/h capacity or thermal package changes. Greater savings in kW and kWh will be realized when thermal packages are also improved.

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► **Future Program Participation**

Historically, Florida Public Utilities Company has acquired one or two residential customers every other year or so who elected to participate in this program. While the program, from the perspective of the non-participating customer, is highly cost-effective, from the participant's perspective the high first cost of a residential geothermal heat pump system precludes its cost-effectiveness. While the energy cost savings are substantial, they fall short in overcoming the high cost differential with a more conventional HVAC system. For these reasons, Florida Public Utilities Company is reluctant to forecast any level of participation in this program. Nevertheless, because the program so easily passes the RIM test and because every now and then a residential customer comes along that is very interested in geothermal heat pumps for reasons other than economics (i.e., environmental, "early adopter", prefer the quieter operation), Florida Public Utilities Company wants to keep the program. With no certain future participation, the program will not contribute to the formation of the goals.

Goodcents Home/Energy Star Program

The rationale that follows for the energy and demand savings and that for future program participation underpins the table on page 27 of the 2005 Demand Side Management Plan.

► **Energy and Demand Savings**

Regardless of its designation as GoodCents or Goodcents and Energy Star, the average Goodcents home constructed in northwest Florida today achieves a 0.5 kW demand reduction in the summer, 0.9 kW demand reduction in the winter, and 929 kWh annual energy reduction. The energy and demand savings were determined through engineering analysis using the Residential Building Energy Program (RBEP) to compare an 1,800-square-foot Goodcents /Energy Star Home to the same home built to the Florida Model Energy Code minimum standard as outlined below.

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	Code Built Home	GoodCents/Energy Star Home
Wall Insulation	R -11 Wall Insulation	R-13 Wall Insulation
Ceiling Insulation	R-30 Attic Insulation	R-38 Attic Insulation
Windows	Double Pane Windows	Double Pane Windows
Doors	Wood Doors	Insulated Doors
Heating	.78 AFUE / 3.1 COP	.90 AFUE / 3.25 COP
Cooling	10.0 SEER	12.0 SEER

▶ **Future Program Participation**

Previously the participation goals for this program were set in the high fifties per year tapering off to the mid-thirties per year for the last four years of the ten-year DSM plan. Recent history has shown that Florida Public Utilities Company **has** significantly exceeded its goals for this program. Ordinarily this would argue for significantly increasing **the** goals for the program.

Florida Public Utilities Company is recommending that this program's **goals** be increased but not significantly. There **are** two reasons for this. The first is that the distinction between a standard code home and a GoodCents/Energy Star certified home continues to decrease. This **makes** the perceived benefits of certification smaller to both builders and prospective homebuyers. The second reason relates to the principle of conservatism. If goals are set too high, they will fail to motivate **and** can actually **retard** a program's prospects for **success**. Neither should goals be set too low. If an error is to be made when setting goals, it is better for the program to set them a bit too low than a bit too high. This is the principle of conservatism **as** applied to this program.

Florida Public Utilities will work with GoodCents and Energy Star to insure that certification standards are maintained to clearly define the distinction between homes that are simply built to code and those receiving the GoodCents/Energy Star certification.

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For these reasons Florida Public Utilities Company proposes a target of 60 GoodCents / Energy Star new home certifications per year between 2005 and 2014.

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GoodCents Energy Survey Program

The rationale that follows for the energy and demand savings and that for future program participation underpins the table on page 39 of the 2005 Demand Side Management Plan.

▶ Energy and Demand Savings

The Residential Building Energy Program (RBEP) was used to estimate energy consumption impacts. Based on the RBEP analysis for a typical northwest Florida home, it is estimated that the GoodCents Energy Survey Program yields an approximate reduction in demand of 0.1 kW per customer, and an energy reduction of 211 kWh per customer on an annual basis. The reduction is greater if duct leakage has been identified and repairs are made. In this case, the estimated annual energy savings are 500 kWh per customer.

▶ Future Program Participation

The 2001 DSM Plan's goals for this program were to have performed 300 audits per year. In 2001, Florida Public Utilities Company performed 833. This was followed by 770 audits in 2002 and 470 audits in 2003. Even though the trend for these years has been declining, the Company believes that the 2001 goal of 300 GoodCents energy audits per year is too small. Accordingly, the 2005 Demand Side Management Plan has proposed an increase in the targeted number of audits per year to 360,

Residential Heating & Cooling Efficiency Upgrade Program

The rationale that follows for the energy and demand savings and that for future program participation underpins the table on page 43 of the 2005 Demand Side Management Plan.

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▶ **Energy and Demand Savings**

The Residential Building Energy Program (RBEP) was used to estimate energy consumption impacts. Based on the RBEP analysis for typical northwest Florida homes and the energy and demand savings reported for similar programs elsewhere, it is estimated that the Residential Heating and Cooling Efficiency Upgrade Program will yield demand and energy savings for both Type 1 and Type 2 changes. Both Type 1 and 2 changes yield an approximate average reduction in summer peak demand of 0.5 kW per participant. Energy savings for a Type 1 change was estimated at 1,800 kWh per year per participant while that for Type 2 was 900 kWh per year per participant.

▶ **Future Program Participation**

This is a new program offering for Florida Public Utilities Company. As such, there is a substantial degree of uncertainty regarding the expected take rate for this program. Deliberations by knowledgeable staff concluded that an ultimate goal to gain an annual number of participants in this program equal to 20% of the annual number of audits performed would be appropriate. Because it is a new program offering, the consensus was to begin with low expected participation and grow into the 20% target over time. Florida Public Utilities Company recognizes that it is difficult to predict what the participation rate will be or how well the program will do. The Company hopes HVAC dealers will embrace this program but it will take time to advertise, promote, and develop program awareness. The program's goals are based on following participation path.

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Participants	11	11	12	18	27	36	45	54	63	72



Residential Ceiling Insulation Upgrade Program

The rationale that follows for the energy and demand **savings** and that for future program participation underpins the table on page **64** of the 2005 Demand Side Management Plan.

► Energy and Demand Savings

The Residential Building Energy Program (RBEP) was used to estimate energy consumption impacts. Based on the RBEP analysis for typical northwest Florida homes, it is estimated that the Residential Ceiling Insulation Upgrade Program yields an approximate average reduction in summer peak demand of 0.4 kW per participant, and an annual average energy reduction of 1,216 kWh per participant.

► Future Program Participation

This is a new program offering for Florida Public Utilities Company. **As** such, there is a substantial degree of uncertainty regarding the expected take rate for this program. Deliberations by knowledgeable staff concluded that an ultimate goal to gain an annual number of participants in this program equal to 20% of the annual number of audits performed would be appropriate. Because it is a new program offering, the consensus **was** to begin with low expected participation and grow into the 20% target over time. Florida Public Utilities Company recognizes that it is difficult to predict what the participation rate will be or how well the program will do. The Company hopes **HVAC** dealers will embrace this program and promote it to customers when heating and cooling upgrades are being made but it will take time to advertise, promote, and develop program awareness. The program's goals are based on following participation path.

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Participants	11	11	12	18	27	36	45	54	63	72



Commercial / Industrial Programs

GoodCents Commercial Building Program

The rationale that follows for the energy and demand savings and that for future program participation underpins the table on **page 82** of the 2005 Demand **Side** Management Plan.

► Energy and Demand Savings

The following summary table describes the features **used** in order to prepare the expected savings **estimates** for participants in this program.

GoodCents Commercial Building Program

	Florida Public Utilities GoodCents Commercial Building	Florida Model Energy Code
Square Feet	14,444	14,444
Glass	1/2" Double Pane	- -
	0.55 SC	- -
	1/4" Plate	1/4" Clear Plate
	~12% of Gross Walls/West	340 Sq. Ft./West
Ceiling	R-30	R-10
HVAC	11 SEER/120 MBtu/h	10 SEER/1444 MBtu/h
	Cooling w/Resistance Heat	Heat Pumps
kWh	80,008	88,679
kW Summer Peak	123.60kW	28.25 kW
kW Winter Peak	12.64 kW	13.00 kW
Design Total Heat Gain Btu/h/sq. ft. of Thermal Envelope	5.5 Btu/h/Sq. Ft.	13.6 Btu/h/sq. ft.

The kW and kWh savings estimates used in the cost-effectiveness determination were weighted between the new and improved customers with an estimate of 80 percent new and 20 percent improved.

The evaluation of alternative **HVAC systems** were designed to calculate the total energy use and demands of a building, including the variations that normally occur in the number of people

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occupying the building and the variations in building equipment **use**. Using building specific information, energy requirements were calculated in hourly intervals. The evaluation required that specified temperature and humidity conditions be maintained. Total building energy, demands, and individual equipment energy and demands were estimated and displayed in a wide variety of report formats. The following input data was needed for the analyses:

- General information, construction data, and building use information
- Interior and exterior building loads (people and equipment)
- Profiles of occupancy and equipment use
- Building zone specifications (orientation, glass, wall, floor, and ceiling areas; percent of base loads in the zone; number of people; etc.)
- Thermal system types, cooling primary system types, and heating primary system types for each building zone
- Controls (temperature, humidity, time clocks, etc.)

► **Future Program Participation**

The previous participation goals for this program are shown in the following table.

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Participants	10	10	10	11	11	11	8	8	8	8

Based upon past participation in this program, growth predictions in the commercial sector, and the principle of conservatism, Florida Public Utilities proposes a new participation goal for this program of a constant 12 new participants per year.

GoodCents Commercial Technical Assistance Audit Program

The rationale that follows for the energy and demand savings and that for future program participation underpins the table on page 94 of the 2005 Demand Side Management Plan.

► **Energy and Demand Savings**

The Technical Assistance Audit (TAA) Program is an interactive program that assists commercial customers in identifying advanced energy conservation opportunities. It is customized to meet the individual needs of large customers as required; therefore, it is an evolving program.

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The Technical Assistance Audit process consists of an on-site review of the customer's facility operation, equipment, and energy usage pattern by a Florida Public Utilities Company Conservation Specialist. The specialist identifies **all** areas of potential reduction in kW demand and kWh consumption **as well as** identifying end-use technology opportunities. A technical evaluation is then performed to determine the economic payback or life cycle cost for various improvements to the facility.

The benefits to Florida Public Utilities Company come from the resulting energy conservation. Energy efficiency levels resulting in lower operating costs, improved customer satisfaction, and kW and kWh reductions is monitored to help determine the program's effectiveness. The program yields an expected annual average energy reduction per participant of 5,887 kWh and a winter and summer peak demand reduction of 1.6 kW per participant.

▶ **Future Program Participation**

This program has attracted significantly greater participation than was expected. Accordingly Florida Public Utilities Company has increased annual participation **goals** from the mid-thirties to forty TAAs per year.

Commercial Indoor Efficient Lighting Rebate Program

The rationale that follows for the energy and demand savings and that for future program participation underpins **the** table on page 98 of the 2005 Demand Side Management Plan.

▶ **Energy and Demand Savings**

The energy and demand savings for this program **were** estimated from two standard replacements of 100 fixtures. The **first** scenario is the retrofitting 100 existing fixtures characterized as "2 **lamp** 4 foot wrap, strip, industrial, or troffer utilizing 2 standard 4 foot T12 **lamps and 1** standard magnetic **ballast, GEN-2/40STD/STD-(EF)"** with 100 fixtures characterized as "(2) - T8 Octron **lamps** and (1) - electronic ballast, **GEN-2/32T8/ELEC-(R)"**. The second scenario

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involves retrofitting 100 existing fixtures characterized as "4 lamp 4 foot wrap, strip, industrial, or troffer utilizing 4 standard 4 foot T12 lamps and 2 standard magnetic ballasts GEN-4/40STD/STD-(EF)" with 100 fixtures characterized as "two lamp T8 PLUS ballast, GEN-2/32T8 ELEC PLUS-(R)". Florida Public Utilities Company's internal expertise believes that about 40% of the time, scenario one will best reflect the upgrade and 60% will best be reflected by scenario 2.

Scenario	Weight	Annual lighting kWh Saved	Average Lighting Demand Reduction	Average A/C Demand Reduction	Average Total kW Demand Reduction
100 Fixture Change Out Scenario 1	40%	11,825	3.79	1.41	5.20
100 Fixture Change Out Scenario 2	60%	41,170	13.20	4.90	18.10

While the lighting upgrade will also tend to reduce the kWh consumption for cooling, to be conservative the Company elected to only use the lighting kWh saved¹. Since the demand reduction is so critical to the cost-effectiveness of the program, the total demand reduction was deemed appropriate. The weighted average savings per participant that was used in the cost-effectiveness analysis were 12.94 kW and 29,432 kWh per year.

► Future Program Participation

This is a new program offering for Florida Public Utilities Company. As such, there is a substantial degree of uncertainty regarding the expected take rate for this program. Deliberations by knowledgeable staff concluded that an initial goal to gain an annual number of participants in this program equal to 5% of the annual number of commercial technical assistance audits would be appropriate, Because it is a new program offering, the consensus was to begin with low expected participation and grow the target over time. Florida Public Utilities Company recognizes that it is

¹ Adding in the reduction in kWh due to the lighter cooling load would have marginally reduced the RIM because of the associated revenue loss but the lower resulting RIM was still comfortably above one.

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difficult to predict what the participation rate will be or how well the program will do. The Company **hopes** commercial customers and lighting **dealers** will embrace this program and promote it but it will take time to advertise, promote, and develop program awareness. The program's **goals** are based on following **participation** path.

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Participants	2	2	2	3	3	4	4	5	6	7

Conclusion

This concludes the logic and basis for estimating the savings **per** participant and the future path for participation in each of the programs that contribute to the formulation of Florida Public Utilities **Company's** 2005 Demand **Side** Management goals. The summary tables **in** the executive summary of the plan reflect the foregoing.