EVALUATION OF FLORIDA'S ENERGY EFFICIENCY AND CONSERVATION ACT

Prepared for the Florida Public Service Commission by the University of Florida's Public Utility Research Center, the University of Florida's Program for Resource Efficient Communities, and the National Regulatory Research Institute.

December 7, 2012

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Prepared for
the Florida Public Service Commission
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Any errors or omissions in the report are the responsibilities of the authors.

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December 7, 2012

Mr. Mark Futrell
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Dear Mr. Futrell:

On behalf of the University of Florida's Public Utility Research Center, the University of Florida's Program for Resource Efficient Communities, and the National Regulatory Research Institute, I am providing this report, *Evaluation Of Florida's Energy Efficiency And Conservation Act*, in accordance with the agreement entered into on July 17, 2012, between the Florida Public Service Commission and the University of Florida.

Please feel free to contact me if there are any comments or questions.

Best regards,

Mark A. Jamison, Ph.D.
Director, Public Utility Research Center
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cc Brian Prindle, UF

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ACEEE	American Council for an Energy Efficient Economy
ACF	Avoided Capacity Factor
AIF	Associated Industries of Florida
ASAP	Appliance Standards Awareness Project
Btu	British Thermal Units
CDD	Cooling Degree Days
CF	Savings Capacity Factor
COP	Coefficient of Performance
DCEO	Department of Commerce and Economic Opportunity
DEP	Department of Environmental Protection
DM	Delphi Method
DOE	Department of Energy
DR	Demand Response
DSIRE	Database of State Incentives for Renewables and Efficiency
DSM	Demand Side Management
E-RIM	Modified Version of RIM
E-TRC	Modified Version of TRC
ECCR	Energy Conservation Cost Recovery
ECMs	Electronically Commutated Motors
EE	Energy Efficiency
EEPS	Energy Efficiency Portfolio Standards
EERS	Energy Efficiency Resource Standards
EF	Energy Factor
EIA	Energy Information Administration
EISA	Energy Independence and Security Act of 2007
EM&V	Evaluation, Measurement and Verification
EPA	Environment Protection Agency
EPAct 1992	Energy Policy Act of 1992
EPAct 2005	Energy Policy Act of 2005
EPCA	Energy Policy and Conservation Act
ESCOs	Energy Service Companies
FBC	Florida Building Commission
FDACS	Florida Department of Agriculture and Consumer Services
FEECA	Florida Energy Efficiency and Conservation Act
FERC	Federal Energy Regulatory Commission
FGBC	Florida Green Building Coalition
FHBA	Florida Home Builders Association
FIPUG	Florida Industrial Power Users Group
FIRE	Florida Integrated Resource Evaluation
FlaSEIA	Florida Solar Energy Industry Association
FMEA	Florida Municipal Electric Association
FNGA	Florida Natural Gas Association
FPGA	Florida Propane Gas Association
FPL	Florida Power & Light Company

FPSC	Florida Public Service Commission
FPUC	Florida Public Utilities Company
FRCC	Florida Reliability Coordinating Council
FSC	Florida Solar Coalition
FSEC	Florida Solar Energy Center
FSHCC	Florida State Hispanic Chamber of Commerce
GNHDC	Gainesville Neighborhood Housing and Development Corporation
GPC	Gulf Power Company
GPIF	Generation Performance Incentive Factor
GW	Gigawatt
GWh	Gigawatt hours
HDD	Heating Degree Days
HERS	Home Energy Rating Standards
HSPF	Heating Seasonal Performance Factor
HVAC	Heating, Ventilation, and Air Conditioning
IAQ	Indoor Air Quality
ICC	International Code Council
IEBC	International Existing Building Code
IECC	International Energy Conservation Code
IEQ	Indoor Environmental Quality
IESNA	Illuminating Engineering Society of North America
IGCC	Integrated Gasification Combined Cycle
INPHI	Indiantown Non-Profit Housing, Inc.
IOU	Investor-Owned Utilities
IPMC	International Property Maintenance Code
IRP	Integrated Resource Planning
JEA	Jacksonville Electric Authority
kW	Kilowatt
kWH	Kilowatt Hours
LEED	Leadership in Energy and Environmental Design
LOLP	Loss-Of-Load Probability
MW	Megawatt
MWH	Megawatt Hours
NAECA	National Appliance Energy Conservation Act
NAHB	National Association of Home Builders
NECPA	National Energy Conservation Policy Act
NERC	North American Electric Reliability Corporation
NGBS	National Green Building Standard
NRRI	National Regulatory Research Institute
O&M	Operation and Maintenance
OPEC	Organization of the Petroleum Exporting Countries
OUC	Orlando Utilities Commission
PBC	Public Benefits Charge
PCM	Panel Consensus Method
PEF	Progress Energy Florida
PREC	Program for Research Efficient Communities

PT	Participant Test
PURC	Public Utility Research Center
PURPA	Public Utility Regulatory Policies Act
PV	Photo-Voltaic
RCS	Residential Conservation Service
RESNET	Residential Energy Services Network
RFF	Resources for the Future
RIM	Rate Impact Measure
ROE	Return on Equity
ROI	Return on Investment
RPS	Renewable Portfolio Standards
SCT	Societal Cost Test
SEER	Seasonal Energy Efficiency Ratings
SER	Sustainable Energy Resources
SEU	Sustainable Energy Utility
SHGC	Solar Heat Gain Coefficients
SRC	Synergic Resources Corporation
TECO	Tampa Electric Company
TOU	Time of Use
TRC	Total Resource Cost
TWh	Terawatt Hours
UCT	Utility Cost Test
USGBC	U.S. Green Building Council

1 Executive Summary, Introduction, and Findings and Recommendations

1.1 Energy Efficiency and Conservation in Florida

The Florida Energy Efficiency and Conservation Act (FEECA)[1] is a law that mandates utilities to reduce the growth rates of electrical demand and energy consumption. The 2012 Florida Legislature directed the Florida Public Service Commission (FPSC), in consultation with the Florida Department of Agriculture and Consumer Services (FDACS), to contract for an independent evaluation to determine whether FEECA remains in the public interest.[2] Although other considerations were not precluded, the Legislature directed that the evaluation be based on the costs to ratepayers, the incentives and disincentives associated with the provisions in FEECA, whether the programs create benefits without undue burden on the customer, and the models and methods used to determine conservation goals. The FPSC added to the scope of the Legislature's request to include cross state comparisons and to identify potentially more cost-effective alternatives to the approach taken by FEECA to meet the Act's objectives, including consideration of building codes and appliance efficiency standards and alternative rate designs.

The Florida Legislature enacted FEECA in 1980 to accomplish three objectives: 1) reduce the growth rates for electricity demand at peak times, 2) reduce the consumption of electricity, and 3) conserve expensive resources, particularly oil used as fuel to generate electricity.[3] FEECA's objectives have been amended over time to: 1) control (in addition to reduce) the growth rates of peak demand and consumption of electricity; 2) increase the overall efficiency and cost-effectiveness of electricity and natural gas production and use; 3) encourage development of demand-side renewable energy systems; 4) add greenhouse gases to the factors that could be considered in assessing the cost-effectiveness of FEECA programs; and 5) incorporate consideration of supply-side efficiency improvements. However, the original three objectives set forth in 1980 remain in the Act today and they continue to be the primary focus of the law.

Accomplishing the objectives set out in FEECA requires the state's utility regulator, the FPSC, to establish conservation goals for each utility subject to the goal-setting

1 The full text of the Act is included in this report as Appendix A.
2 Chapter 2012-117, Section 17, LOF.
3 Because electric utilities construct their systems to serve demand when demand is at its highest, namely at the peak, reducing growth in peak demand means utilities do not need to invest as much in their systems as they otherwise would.

provisions of the Act.[4] When enacted in 1980, FEECA covered all electric and natural gas utilities, including municipal utilities and rural electric cooperatives, but excluded very small gas utilities that provided retail services to the public. Today, electric utilities whose annual sales were less than 2,000 gigawatt hours (GWh) as of July 1, 1993 are not subject to FEECA. As a result, all five Florida investor-owned utilities -- Florida Power & Light Company (FPL), Progress Energy Florida Inc. (PEF), Tampa Electric Company (TECO), Gulf Power Company (Gulf Power), and Florida Public Utilities Company (FPUC) – and only two municipal utilities Orlando Utilities Commission (OUC), and Jacksonville Electric Authority (JEA) are subject to FEECA. In this report, those utilities are referred to as FEECA utilities. Together they provide nearly 90 percent of electricity sales in Florida.[5]

Once goals are set, each utility establishes programs, subject to FPSC approval, which are intended to enable customers to improve their energy efficiency. As a consequence of this law, Florida utilities have spent at least $5.4 billion over the years on such programs. As this report explains later, the cost-effectiveness of Florida's programs compares favorably with those of other states. The goal setting, review, and approval process is a significant undertaking for the FPSC and the affected utilities alike. The process involves substantial technical, analytical, and modeling effort, the bulk of which is conducted by the FEECA utilities under the purview of the FPSC.

The FPSC's review of conservation goals must occur at least every five years and the most recent goals were established at the end of 2009.[6] These goals for the period 2010-2019 included reducing winter peak demand by 1,937 megawatts (MW), reducing summer peak demand by 3,024 MW, and reducing annual electricity sales by 7,842 GWh.[7] These goals are consistent with historical practice in Florida: FEECA has had a reported impact of a 6,711 MW decrease in peak demand and an 8,000 GWh of annual energy savings since its inception.[8] Electricity sales by FEECA utilities in 2010 totaled 193,787 GWh.[9]

4 Seven natural gas local distribution companies are also currently covered by FEECA. All utilities (electric and natural gas) subject to FEECA are statutorily required to offer or contract to offer residential energy audits to their customers. However, natural gas utilities are currently not subject to the FPSC's goal setting process. Section 366.82(11), F.S.

5 Florida Public Service Commission. "Annual Report on Activities Pursuant to the Florida Energy Efficiency & Conservation Act", p. 6, 2012.

6 Order No. PSC-09-0855-FOF-EG

7 Florida Public Service Commission. "Annual Report on Activities Pursuant to the Florida Energy Efficiency & Conservation Act", 2012.

8 U.S. Department of Energy, "Database of State Incentives for Renewables and Efficiency," http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=FL25R, accessed October 31, 2012.

9 Florida Public Service Commission. "Annual Report on Activities Pursuant to the Florida Energy Efficiency & Conservation Act," p. 6, 2012.

FEECA utilities have implemented a number of types of energy conservation programs, touching upon almost all aspects of how customers use electricity and natural gas. Some programs seek to encourage customers to use more energy efficient appliances and equipment, such as more water heaters, lighting, and refrigerators. Other programs focus on improving heating and cooling systems, as well as on the efficiencies of residential and commercial buildings themselves. In the latter category are programs targeting ceiling and wall insulation, and energy saving windows, for example. Some FEECA programs seek to alter customer behavior by educating them about how they can use electricity more efficiently and by providing them with advanced systems for energy management. Finally, certain programs encourage customers to use renewable energy resources to produce their own energy. These programs include assisting with the installation of solar panels and the adoption of small-scale generators. Currently, 210 FEECA programs in aggregate are offered by the covered electric utilities.

Since its enactment, FEECA has been but one element of an overall energy strategy for Florida of which energy efficiency is an important objective. The roots of that strategy are found in the energy crisis of the early 1970s. In October of 1973, the Organization of the Petroleum Exporting Countries (OPEC) proclaimed an embargo on shipping petroleum to the United States and other nations that supported Israel in the Yom Kippur War between Israel, Syria, and Egypt. This embargo lasted until March of 1974, but its effects were compounded by the Nixon administration's decision earlier that year to nearly drain the U.S. oil reserves to meet a shortage created by the administration's wage and price controls and by OPEC's 25 percent cut in production in 1974. Those actions pressured buyers worldwide to purchase OPEC's supply.

The impact of the oil embargo had important effects on Florida's electricity industry and customers. At the time of the embargo, Florida generated about 50 percent of its electricity from oil. The embargo period resulted in unprecedented increases in oil prices, from about $4 per barrel in 1972 to more than $30 by 1981. The oil price increases and possible supply disruptions prompted the Florida Legislature to enact laws aimed at decreasing the state's dependence on oil as a fuel for producing electricity. Features of these laws included energy efficiency standards for buildings and for household appliances, regulatory approval of utility plans for meeting future demand, and utility energy efficiency programs.[10]

[10] Energy in Florida 1974, p 32; RAND Oil Markets and U.S. National Security, 13.

1.2 Motivation for this Report

Over the years, many factors have affected the need for and cost-effectiveness of FEECA programs. Growth rates in electrical demand have decreased. Wholesale electric markets have been restructured. Fuel prices have exhibited volatility unprecedented in recent history. Technologies available to improve energy efficiency have changed on the supply-side [11] and the demand side, [12] including improved efficiency in electricity generation and transmission, more efficient pricing schemes, and new appliances. Federal environmental standards for utilities have tightened, and interest in restricting emissions of greenhouse gases has grown. The recent economic downturn has changed the commercial viability of energy alternatives.

In the context of these changes, the Florida Legislature chose to pursue a fresh, independent look at FEECA. Following its procurement process, the FPSC selected the research consortium of the University of Florida's Public Utility Research Center (PURC) and Program for Resource Efficient Communities (PREC), and the National Regulatory Research Institute (NRRI) to conduct the evaluation. This report is the result of that research.

1.3 Issues and Perspectives for this Research

As appears to be true for any public policy issue, the issues confronting the Legislature regarding FEECA involve competing views of reality and objectives. The consequences of these legislative decisions on these issues are not only economic, but also impact energy security and the environment. This study addresses these considerations with five major areas of focus:

1) The objectives and assumptions, including the definition of "public interest," that have guided the evolution of FEECA and its implementation.

2) The uncertainties associated with estimates of cost-effectiveness imply a need for transparency on assumptions made about future conditions and explicit consideration of probabilities about future costs and program effects, as well as equity issues related to the distribution of benefits.

[11] In the context of energy production and consumption, "supply side" refers to the generation, transmission and distribution elements of the energy system. Supply side efficiencies involve using less input to produce and deliver a given amount of electricity.

[12] The "demand side" of the energy production and consumption system refers to the consumer side of the system. Thus, demand side efficiencies encompass activities or programs that reduce electricity use by promoting less use or more efficient use of energy by consumers who may be businesses or individuals.

3) The cost-effectiveness of the policy's structure.[13]

4) The potential effectiveness of other approaches.[14]

5) The wide range of interests and viewpoints that influence the policy debate.[15]

FEECA program impacts are difficult to assess prior to implementation, i.e., *ex ante* and after implementation, i.e., *ex post*. Each type of assessment responds to a different question. An *ex ante* analysis responds to questions about the future, such as: "Would FEECA programs remain in the public interest and continue to be relevant under changed circumstances?" An *ex post* analysis responds to questions about the past, such as: "Did FEECA programs, as currently configured, meet the established objectives?" This study assumed that, as a departure point, FEECA did meet the public interest, that is, the objectives set out in statute. Whether it *remains* in the public interest is the question at hand.

The programs provided under FEECA are largely designed to provide incentives for efficient energy use on the customer, or demand, side of the electric meter, hence the term demand side management (DSM). The size and success of DSM investments depend, in part, on customer behavior; and the cost-effectiveness depends on customer response, utility fuel prices, costs of capacity for generation and transmission, and government energy and utility policies, only some of which are known when programs are designed, adopted, and implemented – and all of which may, and probably will, change during implementation. Thus, goals are set based on best estimates and projections of the interaction of a large number of variables over time.

Evaluating program effectiveness is an attempt to answer to the question, "Did the programs, as currently configured, meet objectives set out for them?" However, in the context of FEECA, one is comparing the actual amount of energy consumed and the actual peak demand for energy to projections of what those amounts were anticipated to be absent the DSM programs. In essence, one is trying to determine the magnitude of

[13] While FEECA programs are designed to be cost-effective, the question remains whether policy could be more cost effective. For example, what is an appropriate balance between demand side and supply side investments to improve energy efficiency?

[14] Mechanisms other than utility-administered demand side conservation and efficiency programs could be used to pursue the objectives articulated in FEECA. Decisions about the future of FEECA should be made with awareness of those alternatives, which need not be mutually exclusive. This study includes a review of some tools available to the Legislature, certain policies and approaches enacted in other jurisdictions, and an overview of their interaction if applied concurrently.

[15] The Florida Legislature will confront a wide range of constituent values and objectives in its deliberations on energy issues. This study applied market research tools to identify the various perspectives of major stakeholder groups and reduce these to either common interests or potential areas of compromise, and to define critical factors driving policy decisions.

demand and usage that did not actually occur. Further, the value of the avoided demand and consumption is based on the projected cost of building additional generating capacity or purchasing additional energy supply. Therefore, *ex post* data are not available to respond to the counter factual: "What would have happened without the program?" That question can only be answered with estimates and models. Further, it is inescapable that many of the costs and benefits of DSM programs are difficult to quantify, leaving room for disagreement and debate. As with any public policy, DSM programs impact different stakeholders differently, so the results of an analysis of cost-effectiveness depend upon which stakeholder perspective is being considered.

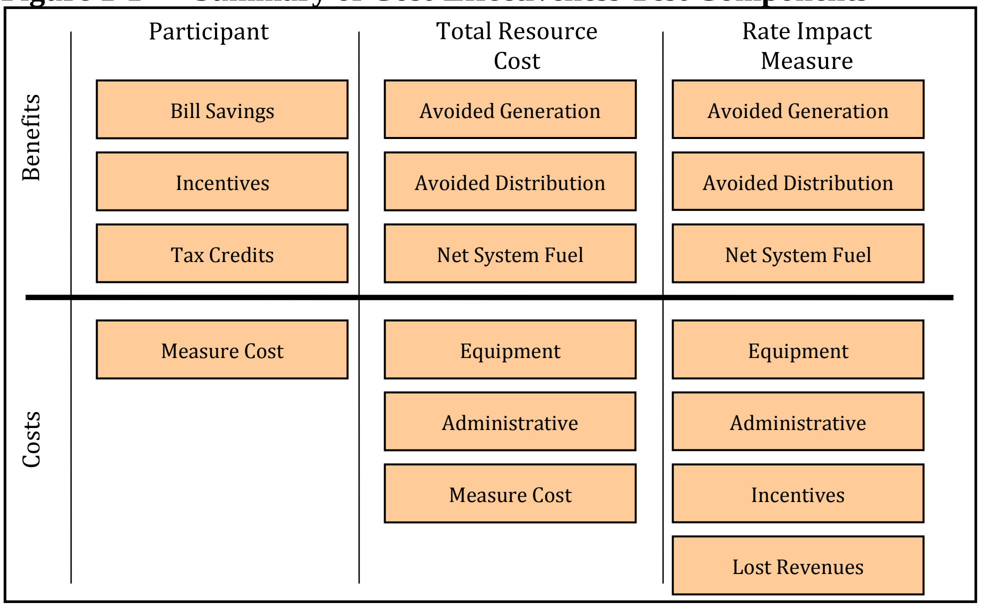
Because the overarching question for this report is whether FEECA remains in the public interest, *ex ante* data are acceptable because outcomes can be simulated under different scenarios. In addition, by addressing questions about FEECA-covered utility programs in the aggregate, and not individually or by utility, this study can use *ex ante* data to overcome the inherent shortcomings of available *ex post* data.

Perhaps one of the most controversial aspects of the FEECA goal setting process is the FPSC decision of which cost-effectiveness test or tests to use in determining the costs and benefits of DSM programs approved by the FPSC. The tests employed by the FPSC for DSM goal setting, individual program approval and program modification and monitoring measure cost-effectiveness from three perspectives, the program participant, the utility ratepayer, and the public's overall cost for energy services. These are called the Participant Test (PT), the Rate Impact Measure (RIM) test, and the Total Resource Cost (TRC) test. The methodology and forms upon which to submit program evaluations for each test are prescribed by FPSC rule. Figure 1-1 summarizes the differences in these three tests.

1.4 Study Approach

Analyzing demand side energy and demand resources has inherent difficulties in forecasting market penetration and the variability and availability of the savings results. Therefore, much of this study focused on the models and methods employed in setting FEECA goals and in monitoring program results, as well as the assumptions applied to these models and methods. This required assembling as much data as was available for the 210 DSM programs currently being offered and the supply-side resources that conservation would avoid. This information was used to perform cost-effectiveness studies on the entire DSM portfolio and to evaluate the sensitivity of cost-effectiveness results to key factors.

Figure 1-1 Summary of Cost-Effectiveness Test Components[16]



As part of this study, focus groups were convened to identify the range of issues and concerns that different stakeholders might have concerning FEECA. Three sessions were conducted -- one each with utility, commercial, and consumer and environmental interest groups -- using a variety of research tools, including brainstorming, multi-voting, and structured questionnaires.

One of the fundamental purposes of DSM programs and incentives is to correct gaps between cost causation and price consequences inherent in conventional utility tariff structures. Advanced rate designs have the potential of reducing this gap, so this research effort included a review of the offering and the adoption rates of various forms of time differentiated rates in Florida to assess their potential as an alternative or adjunct to FEECA programs was conducted. Building and housing codes, and appliance efficiency standards also were reviewed for their potential as alternatives or enhancement to FEECA programs.

Data for this study were drawn from regulatory filings and orders, the federal Department of Energy's Energy Information Administration (EIA), state and federal web sites, and focus group results, and augmented with data and information from the literature on the topic of utility regulation and DSM.

[16] Florida Public Service Commission. (2012). "Annual Report on Activities Pursuant to the Florida Energy Efficiency & Conservation Act".

1.5 Findings and Recommendations

This subsection begins by reviewing the findings regarding whether FEECA remains in the public interest. It then provides recommendations regarding FEECA and its implementing regulations. Finally it provides recommendations for further study.

1.5.1 Findings Regarding Public Interest

Based on the analysis presented in this report, the research team believes that FEECA continues to be in the public interest, subject to certain qualifications.

1) FEECA has contained a public interest statement since its enactment in 1980. This statement was slightly modified in 2008 but the broad policy direction remained the same as in 1980: "The Legislature finds and declares that it is critical to utilize the most efficient and cost-effective demand-side renewable energy systems and conservation systems in order to protect the health, prosperity, and general welfare of the state and its citizens."[17] Data quality and availability limitations made it impossible in the course of this study to make an unqualified determination that FEECA remains in the public interest and specifically that the most cost-effective demand-side renewable energy systems and conservation systems have indeed been used. However, based on the data available, it appears that the FPSC and the FEECA utilities have cost-effectively reduced the growth rates of electricity consumption and demand. There were at least two data shortfalls:

2) A policy assessment ideally has at least two elements, an examination of whether the policy resulted in the desired outcome, and a basis for a prediction of whether the policy will still be relevant given changed circumstances. Good *ex post* data are needed to determine whether the policy performed as expected. *Ex ante* data are acceptable for the predictive part of the examination because those data form the basis for simulating hypothetical scenarios. The examination presented in this report addressed aggregate what if questions, not individual program or utility questions. Therefore, the analyses in the study were able to overcome the inherent shortcomings of *ex ante* data. Data for these analyses came from the numerous filings and testimony presented to the FPSC throughout the 2009 goals setting proceedings. However, some aspects of the research were hindered by difficulties with data format and legibility, incompleteness, and occasional discrepancies. These deficiencies were overcome in part through the use of models to determine

[17] See discussion in Section 2.1.

the cost-effectiveness of the entire set of FEECA goals against the avoided energy and capacity benefits for a hypothetical typical Florida utility.[18]

3) The available *ex post* data were insufficient for a determination of whether FEECA met its statutory objectives. Although this was not the question at hand, the *ex post* data are used as a basis for projections needed to determine whether FEECA remains in the public interest which was the overarching question for this study. There are three sources of *ex post* data. One is the FPSC's cost recovery proceedings authorized by Commission rule, and another is the summary statistics from the FPSC annual reports on FEECA.[19] The data from those proceedings and reports are not presented as empirical *ex post* data (i.e. not the result of metering or statistical analysis of usage data) and have limitations for a public interest assessment because they were gathered for a more limited purpose. The other source of *ex post* data is information provided by utilities to the EIA.[20] These data also are of limited usefulness because they are unaudited and are not reported uniformly by all utilities.

Within the limitations of the data available, the research team believes that FEECA remains in the public interest for at least four reasons:

1) **Costs to ratepayers:** FEECA appears to provide a positive net benefit to ratepayers. FEECA utilities are authorized to recover from their customers prudently incurred costs of approved conservation programs. For the period 2001 through 2010, Florida utilities report having avoided approximately 3.5 percent of their kilowatt hours (kWh) sales at a cost of approximately $0.035 per kWh, and having reduced peak demand by approximately 10 percent at a cost of $61 per kilowatt (kW). These costs compare favorably to utilities' average costs, as reflected in their retail prices. Those costs were on average between $0.11 and $0.12 per kWh for residential customers, about $0.10 per kWh for commercial customers, and around $0.08 per kWh for industrial customer in 2008.[21] Also, based on the benchmarking results presented in Section 9.2.1, Florida's DSM program costs per unit of energy saved and capacity avoided are cost-effective compared with Florida's average costs for electricity, and are in line with costs in similarly situated states.[22]

[18] See discussion in Sections 6.1 and 6.3.
[19] Rule 25-17.015, F.A.C. and FPSC *2012* "Annual Report".
[20] See Sections 6.1, 6.3, and 10.2.
[21] Kury, 2011.
[22] This analysis is based on the EIA data. While these data are unaudited and are not based on uniform reporting standards, they are the best data available on a nationwide basis.

2) **Incentives associated with FEECA:** Current practices for establishing electricity rate structures and the electricity metering technology used in Florida do not provide customers with sufficient economic incentives to conserve electricity and manage their loads. Costs for supplying electricity, including environmental costs, vary greatly throughout the year and are often higher than the prices customers pay, which reflect average costs, rather than real-time costs. With imperfect information about the cost of their electricity, customers may consume more electricity at times than might otherwise be the case if rates and costs were better aligned. Alternative rate designs are currently used by several FEECA utilities on a limited basis to provide better signals to customers to reduce energy consumption. However, most residential and business customers do not participate in these rate designs.[23] FEECA programs that use information and incentives to encourage less consumption therefore offset imperfect price signals inherent in the most common rate structures.

3) **Program benefits without undue consumer burdens, including appropriate cost tests:** The FPSC applies commonly used cost-effectiveness tests to evaluate costs and benefits of FEECA programs and measures for consumers. The RIM and TRC are cost-effectiveness tests employed by the FPSC for setting conservation goals. Both tests examine whether the costs of conservation programs are less than the costs of alternative supply-side methods, such as expanding generation capacity, for serving customers. The RIM test is specifically designed to indicate whether conservation programs would result in upward rate pressure. Although it adopted the E-TRC test in the 2009 goal-setting proceedings, the FPSC cannot say with certainty that the programs will not exert upward pressure on rates. However, the test implies that the approved conservation plans are economical. Finally, the cost of the plans are in line with costs of conservation programs in other states and the levelized average rate impact of approximately 2 percent of electricity prices does not appear to be an undue burden compared to the volatility of fuel and construction prices.

4) **Involvement of Utilities in DSM Efforts:** Each stakeholder group represented in the focus groups convened as part of the study agreed that the utilities' roles in promoting energy efficiency are appropriate. While there were differences opinions as to how best to evaluate the cost-effectiveness of FEECA-approved programs and of strategies to meet FEECA objectives, no group recommended getting Florida utilities out of the DSM business altogether.[24]

[23] See the discussion of electric rate designs and metering technologies in Section 11.5.
[24] See the discussion in Section 8 and specifically, Table 8-6.

Some of the recommendations that follow are intended to strengthen and improve the data gathering and verification process, which would be important for future analyses intended to determine whether FEECA remains in the public interest.

1.5.2 Areas for Improvement

This subsection identifies three areas where the design and implementation of FEECA might be improved. One of the impediments in the goal setting process relates to a lack of transparency. There are two aspects of "transparency" in this context. The first relates to knowing evaluation criteria in advance of performing cost-effectiveness analyses. The second relates to ready access to data needed for modeling and the development of underlying assumptions.

1) **Problems with uncertainty in goal-setting criteria:** One of the concerns raised in the utility focus group was the uncertainty regarding the criteria to be used to establish goals. For example, the FPSC changed its cost-effectiveness criteria late in its most recent FEECA goal-setting proceeding, thus requiring more expensive and time consuming analytical work on the part of utilities than might otherwise have been the case. This situation also made the goal-setting process more contentious and protracted than in the past. *To reduce such uncertainty, this report recommends that the goal-setting process be modified so that criteria for program approval are identified prior to the development of studies used for setting goals. This recommendation could be implemented through an FPSC rulemaking proceeding.*

2) **Improvement of data quality and accessibility:** The FPSC relies on cost-benefit analyses performed by utilities to determine the cost-effectiveness of FEECA programs offered to their customers. While the FPSC staff reported no problems with accessing needed data to discharge its FEECA-related responsibilities, public participation in FEECA proceedings could be eased if stakeholders could easily access data and underlying assumptions of the cost-benefit studies and replicate the analyses.[25] However, this research effort found inexplicable differences in modeling assumptions in some situations, and in other situations found that model descriptions were incomplete and unclear.[26] Some focus group participants believed that there was a lack of transparency in the evaluation, measurement, and verification processes. *To improve data quality and accessibility, and to help*

[25] It is not necessarily true that easing public participation would improve the FPSC's decision making. It could be that stakeholders already provide as much insight, additional perspectives, and analysis as is needed for the FPSC to make effective decisions. If this is the case, then the process changes recommended might lower costs for stakeholder intervention, but at an increased cost for the FPSC and utilities and with no improvement in outcomes.
[26] See Sections 6.1 and 6.3.

improve the transparency of the analytical methods used in FEECA-related cost-benefit studies, this report recommends that the FPSC goal-setting process be modified so that utilities provide data electronically in a uniform manner and that these data be made accessible to the public, except for data that would be considered commercially sensitive. [27] Changes in data reporting format and management would require an initial investment by the FPSC in the appropriate technological infrastructure. Even though the improved quality and lower management costs should make the investment economical within a reasonable period of time, funding should be provided to the FPSC to cover the startup costs for electronic filing and for ongoing management of FEECA data.

3) **Preferred cost-effectiveness tests:** FEECA goal-setting proceedings tend to be lengthy and controversial, in part because the broad objectives articulated in FEECA are subject to interpretation. The motivations behind FEECA reflect concerns for the Florida economy, not just the provision and use of utility services or the lowering of average energy costs. There is also strong interest in ensuring that customers benefit from FEECA programs. As noted in Section 9, at least two states, New Mexico and Illinois, have tied the definition of "cost-effective" to the TRC test. In contrast, FEECA sets out considerations for the FPSC to be used in setting goals and evaluating programs. *This report recommends that cost-effectiveness criteria focus on two issues, namely whether program participants benefit and whether program benefits exceed program costs for Florida as a whole.* Such an approach should simplify and clarify the basis upon which cost-benefit analyses would be conducted. It also would improve the efficiency of the FEECA proceedings. However, such an emphasis would likely mean that some programs would lead to an overall increase in utility rates for customers, which raises equity concerns in that some customers would experience higher rates because other customers have participated in FEECA programs.

1.5.3 Areas Warranting Further Study

In the process of preparing this report, the project team identified several issues that were beyond the scope of this present effort, but warrant further consideration by the FPSC or the Legislature.

[27] Increasing ease for interveners does not necessarily improve outcomes. Interveners might use the added transparency to further pursue their current ideas and preferences. This could add little value to the process and increase workload for the FPSC. Alternatively, interveners might discover new ideas, which would assist the FPSC in fulfilling its statutory obligations.

1) **Identifying best practices:** The FPSC has placed considerable emphasis on customer choice in recent years as a means of improving energy efficiency.[28] This research found that educating Florida's electricity consumers is central to energy audits and many of the conservation programs offered under FEECA. However, there does not appear to be a process within FEECA for utilities to develop and share best practices in education or other important aspects of conservation programs, such as marketing, program development and analysis, and obtaining customer feedback. This report recommends further investigation into methods for improved joint research and information sharing by Florida's utilities.

2) **Portfolio standards:** DSM goals in Florida are set for each utility with separate goals for residential and commercial programs and adherence is then monitored approved program by approved program. As noted in Section 9, several states report setting goals for DSM programs on the basis of their aggregate mix of conservation programs, often referred to as "portfolios", rather than on a program-by-program basis, as is the practice in Florida. Furthermore, participants in the utility focus group expressed a desire for greater flexibility in adjusting programs and the mix of programs. While this research did not include a detailed examination of a portfolio approach and so cannot recommend how such an approach might be managed, it is at least conceivable that such an approach could improve FEECA outcomes if it is incorporated in Florida. This report recommends further investigation into utilizing a portfolio approach to determine whether it would be cost-effective and improve flexibility for utilities to meet DSM goals in Florida.

3) **Alternative rate designs:** Section 11 discusses alternative rate designs as another potential means of meeting the public policy goals of FEECA. Time-of-use, critical period, seasonal, and real time pricing have the potential to provide customers with more efficient price signals than the current electricity pricing structure which utilizes rate design based on average prices. Several utilities offer some of these alternative electric rate structures to certain of their customers on a voluntary basis, although the use of seasonal rates is rare in Florida. Each type of alternative rate structure has advantages as well as disadvantages. The trade-offs need to be better understood before alternative rate structures can be offered on a widespread basis. Participants in the three focus groups convened as part of this research seemed to agree that smart meters were a means of improving price signals. This report recommends that the FPSC conduct or sponsor a study on the advantages and disadvantages of implementing alternative price structures in Florida, and that funding be authorized to support such a study.

[28] See section 2.18.

4) **Housing standards**: Section 10 reviews building codes for new construction, housing codes, and appliance efficiency standards. The conclusion, in part, is that there is an opportunity to improve the efficiency of energy use, especially in tenant-occupied dwellings. This opportunity exists because there is often a misalignment of incentives in the case of tenant-occupied dwellings, namely that landlords may not find it financially beneficial to improve energy efficiency of rental units because they do not typically pay for the utility services. Accordingly, this study recommends that Florida Department of Business and Professional Regulation, which has purview over housing standards, consider developing energy efficiency standards for tenant-occupied dwellings.

5) **Reward and penalty systems:** Section 366.82(8), Florida Statutes (F.S.) authorizes the FPSC to provide financial rewards to electric utilities that exceed their FEECA goals and impose penalties on electric utilities that fail to do so. In addition, Section 366.82(9), F.S. authorizes the FPSC to allow an investor-owned utility an additional return on equity for exceeding its FEECA goals under certain circumstances. Notwithstanding this statutory authorization, the FPSC has not provided rewards or impose penalties. The FPSC also has not promulgated any rules to specify criteria for making decisions regarding rewards and penalties and the statute is silent regarding criteria underlying such decisions. This report recommends that the Legislature consider including in FEECA criteria for making rewards or imposing penalties. Alternatively, the FPSC could adopt a rule identifying the criteria that would inform such decisions.

1.6 Report Organization

The report is divided into 11 sections organized as follows:

1.6.1 Background and Overall Context for Understanding and its Implementation

Section 2 addresses the history and evolution of FEECA and its implementation since 1980. Specifically, a review of Florida's legislative and regulatory history was conducted to ascertain how public interest and cost-effectiveness has been defined in the context of the FPSC's obligations related to electrical supply, as well as how conservation goals have been set, and the development of conservation planning and monitoring processes.

Section 3 describes Florida's unique situation in terms of energy use and supply, focusing on climate, characteristics of Florida's electric utilities, the use of natural gas and the potential for renewable energy, and customer demand. This description provides the context for the conduct of benchmarking studies and for identifying the most feasible sources of renewable energy.

1.6.2 Quantitative Analysis

Section 4 examines methods and models used for planning and for setting goals pursuant to FEECA. This section presents an overview of methodologies available for estimating technical, economic, and achievable levels of DSM and the key factors that create uncertainty in the results. The methodologies used in the FPSC's most recent FEECA goal-setting proceedings are then compared to available options.

Section 5 describes the cost-effectiveness tests currently considered by the FPSC and discusses their application and interpretation. Other cost-effectiveness tests and concepts critical to understanding methodologies used to assess the cost-effectiveness of FEECA programs are likewise discussed. This section also examines potential enhancements to the methodologies and process involved.

Section 6 describes the portfolio of DSM programs for residential, commercial, and industrial customers being implemented by FEECA utilities in Florida and the type of data and metrics needed to evaluate program impacts. and program This section also discusses impacts of those programs on customer rates, prudently incurred costs recovered by utilities for FEECA program delivery, FEECA utilities' avoided energy and capacity costs and forgone revenue, and benefits to ratepayers.

Section 7 presents the results of a sensitivity analysis of the RIM and TRC cost-effectiveness tests to changes in planning assumptions. Specifically, this analysis determines how the tests respond to differences among three generic FEECA programs with respect to how the programs impact energy consumption and the need for capacity. The generic programs used are residential direct load control programs, residential HVAC replacement programs, and commercial lighting programs.

1.6.3 Qualitative Analysis

Section 8 presents stakeholder's views of FEECA by summarizing the results of three stakeholder focus groups conducted as part of this research. This effort enabled the researchers to identify the differences and shared perspectives of utility representatives, commercial customers, consumer advocates, and environmental interests.

1.6.4 Alternative Approaches to Meeting FEECA Goals

Section 9 compares Florida's energy efficiency policies and practices to those of other states, focusing on 27 states that have legally binding energy efficiency standards or goals. Most of the states with restructured electricity markets also have binding energy efficiency resource standards. This study also includes a benchmarking analysis which compared the results of energy efficient programs across states using the most recent ten years of utility DSM program data collected annually by the EIA.

Section 10 examines Florida's building and housing codes, and appliance standards, and electric rate designs. The potential for building and housing codes to affect electrical consumption is heavily dependent on the characteristics of Florida's housing stock which is also characterized in this section.

Section 11 provides a discussion of alternative rate designs. There are applications among FEECA utilities of rate designs that rely on more advanced electric metering than is conventionally used. The alternative rate designs include time of use rates, critical period pricing, and real time pricing. FEECA utilities only offer time-differentiated rates (real time, critical period, and time of use) on a voluntary or optional basis for customers and participation rates are low.

2 Major Changes to FEECA Legislation, Regulation, and Policies since 1980

2.1 Public Interest and Legislative Intent

In 1980, the FEECA[29] established three objectives: 1) reducing the growth rates for weather sensitive peak demand, 2) reducing kilowatt hour consumption, and 3) conserving expensive resources, particularly petroleum fuels.[30] The Legislature stated among its findings in FEECA "... that it is critical to utilize the most efficient and cost-effective energy conservation systems in order to protect the health, prosperity, and general welfare of the state and its citizens. Reduction in the growth rates of electric consumption and of weather sensitive peak demand are [*sic*] of particular importance."[31] The Legislature further found that FEECA should be "liberally construed" to meet the challenges of reducing the growth rates of electricity consumption and demand, increasing the efficiency and cost-effectiveness of electricity and natural gas production and use, and "conserving expensive resources, particularly petroleum fuels."[32] FEECA has been amended multiple times but those original legislatively identified means of protecting the general welfare of Floridians remain in the Act today and they continue to be the primary focus of the law. Table 2-1, displayed at the end of this section, lists the major changes in FEECA through time. As discussed below, changes in federal policies, international markets affecting energy supply, and efficiency-improving measures and technologies have contributed to shape the strategies for meeting FEECA's original intent.

The Legislature designated the FPSC to implement FEECA through development and adoption of overall goals for the conservation of electric energy and natural gas. FEECA further states that the FPSC "shall require each utility to develop plans and programs to meet the overall goals within its service area."[33] The Legislature acknowledged in its findings as part of FEECA that solutions to the state's energy problems are complex.[34] Therefore, the Act encourages the use of solar, other renewable sources, cogeneration,[35] highly efficient systems, and load control.[36]

[29] Section 366.80, Florida Statutes (F.S.) *et seq.*
[30] In 1980, the context for the conservation of expensive resources referred to oil. Over the years, that context has changed. At various times since 1980, natural gas proved to be very expensive.
[31] Sec. 5, Ch. 80-65 Laws of Florida (L.O.F.) codified at Section 366.81, F.S.
[32] *Ibid*.
[33] Section 366.82(7). F.S.
[34] Section 366.81, F.S.
[35] In this context "cogeneration" is the utilization of otherwise wasted heat energy produced by an industrial process to generate electricity. See Section 366.051, F.S. for FPSC authority regarding cogeneration and small power producers.
[36] Load control is a means by which a utility balances the supply of electricity on the network with the electrical load by adjusting or controlling the load rather than the output of the generating facility. An

One portion of the 1980 enactment specifically addressed the relationship between energy conservation, the need for electricity generating capacity and other aspects of utility regulation. As enacted, FEECA directed the Florida Public Service Commission (FPSC or Commission), the entity responsible for determining the need for new power plants, to "expressly consider the conservation measures taken by or reasonably available to the applicant or its members which might mitigate the need for the proposed plant"[37] While that section of FEECA has been recodified, the relationship between conservation and the need for new generating capacity remains in the law.

The Legislature's designation of the FPSC as the sole entity responsible for determining an electric utility's need for new power plants also identified an aspect of the public interest addressed by FEECA. Specifically, FEECA declares that "the Commission's determination of need for an electrical power plant shall create a presumption of **public need and necessity**." (Emphasis added)[38]

The impact on consumers' rates was a legislative concern from the outset. Rates for utility FEECA programs are not to be adopted if they are discriminatory but experimental rates, rate structures, or programs are not precluded by the Act. Thus, in FEECA, the Legislature outlined appropriate action the FPSC may take to protect the public interest and gave the FPSC broad authority to craft solutions to a complex problem.

That type of direction to a state agency is not uncommon in state law. State courts are frequently called upon to determine whether specific actions by state agencies are in the public interest, that is, within boundaries of that concept established by the Legislature as articulated in law. Whether a particular action is or is not in the public interest is generally a finding of fact made on a case-by-case basis. Most explanations of the meaning of the phrase "public interest" include the concepts of welfare or well-being of the general public. The Florida Legislature's intent in 1980, as articulated in FEECA, was, in short, that "the most efficient and cost-effective energy conservation systems" were critical to furthering the general welfare or well-being of Floridians. FEECA has changed in several ways since 1980, but the approach of furthering the general welfare through efficient and cost-effective energy conservation measures has not changed.

The FPSC, in its early rulemaking, identified the potential tension between the cost and availability of energy and the goal of conservation in the context of the public interest.

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example of a load control program is an arrangement by which a utility installs necessary control equipment for customers who are willing to reduce their usage of electricity by allowing the utility to turn off the air conditioner or water heater for short periods of time by remote control.

[37] Sec. 5, Ch. 80-65 Laws of Florida (L.O.F.), Section 366.86, F.S.; subsequently recodified at Section 403.519(3), F.S.

[38] Section 403.519(3), F.S.

The FPSC tied economic development to low energy costs. Essentially, the same language used in a rule adopted at the inception of FEECA[39] is found in the rule today: "Rules 25-17.001 through 25-17.005, F.A.C., shall not be construed to restrict growth in the supply of electric power or natural gas necessary to support economic development by industrial or commercial enterprises. Rather, these rules should be construed so as to enhance job-producing economic growth by lowering energy costs from what they otherwise would be if these goals were not achieved."[40] The costs of conservation measures are a major concern of the FPSC in its implementation of FEECA given the statutory mandate that conservation and energy efficiency goals and the measures designed to meet those goals be cost-effective.

One might gain insight into the FPSC's interpretation of the meaning of "public interest" through its statements in an order denying a motion for reconsideration of its ruling on a petition by Gulf Power Company to bring its generating plants into compliance with the Clean Air Act. The FPSC is statutorily required "to determine whether such plans, the costs necessarily incurred in implementing such plans, and any effect on rates resulting from such implementation are in the public interest."[41] The FPSC noted in its order rejecting Gulf Power's motion that "public interest," in that context, meant "the cost and effect on rates and services provided by Gulf Power Company to its ratepayers." The FPSC further noted that it was not precluded from considering environmental and health factors, but that was not its traditional role and that the Legislature had given the Florida Department of Environmental Protection the primary responsibility for determining if utilities were complying with health and environmental regulations.[42]

In implementing FEECA, the Commission follows legislative direction regarding the parameters of the "public interest" just as it does broadly in its regulation of utilities pursuant to Section 366.01, F.S., which states that "the regulation of public utilities... is declared to be in the public interest and [Chapter 366, F.S.] shall be deemed to be an exercise of the police power of the state for the protection of the public welfare..." Furthermore, at least historically, the FPSC's role has been to be concerned primarily with the impact of utility conservation and related generation expansion plans on customer rates and services. FEECA currently provides direction to the FPSC regarding the importance of cost-effectiveness of energy efficiency and conservation programs by requiring the Commission to consider several aspects of cost while setting goals required by the Act.

[39] Order No. 9634, November 13, 1980.
[40] Rule 25-17.001(7) Florida Administrative Code (F.A.C.).
[41] Section 366.825(3), F.S.
[42] Order No. PSC-94-0264-FOF-EI, March 9, 1994.

2.2 Policy Influences

Federal energy policy changes sometimes represent a reaction to international decisions constraining energy supply and this reaction can have an effect on state policy. Such was the case with FEECA. As former Commissioner Matthew Carter observed: "Many years ago, the Arab Oil Embargo revealed the potential influence that exporters of oil had over the world's economies. The State of Florida recognized and accepted that adverse economic consequences would occur whenever the supply of oil was short, causing oil prices to escalate. Florida's Legislature and Governor reacted to the new reality by passing and signing the Florida Energy Efficiency and Conservation Act (FEECA) in 1980."[43]

The OPEC oil embargo of October 1973 contributed to the nation's awareness that it was heavily dependent on imported oil. The international constraint in oil supply gave rise to calls from the Carter Administration and Congress for the nation to focus on improving energy conservation and efficiency. The National Energy Act of 1978 was composed of five statutes: 1) the federal National Energy Conservation Policy Act (NECPA); 2) the Public Utility Regulatory Policies Act (PURPA); 3) the Energy Tax Act; 4) the Power Plant and Industrial Fuel Use Act (Fuel Use Act); and 5) the Natural Gas Policy Act. The objectives of the National Energy Act were to reduce the nation's reliance on foreign oil and vulnerability to disruptions in oil supply and to encourage development of renewable and alternative energy sources. These objectives resonate in the 1980 FEECA. Specifically, NECPA, PURPA, and the federal Fuel Use Act warrant discussion in their relation to the enactment and implementation of FEECA.

NECPA established the Residential Conservation Service (RCS) Program and required large utilities to offer residential energy audits. Each state was required to submit a plan for complying with the Act. At a minimum, all large regulated and non-regulated electric and natural gas utilities were required to do three things: 1) offer residential customers energy audits; 2) estimate the purchase and installation cost, along with potential energy savings of energy conserving measures; and 3) arrange for the installation and financing of those purchases at the customer's request. As discussed in Section 2.16, energy audits have been central to customer participation in energy conservation programs since the inception of FEECA.

PURPA was aimed at promoting the use of domestic renewable energy sources. Under the law, regulated utilities were required to purchase electricity from independent producers at the utility's avoided cost, or the additional costs that the utility would incur

[43] Matthew M. Carter II, Commissioner, 2007.

if it generated the electricity itself as determined by state regulators.[44] PURPA also encouraged the use of cogeneration facilities that utilize waste steam to generate electricity. The statute also discouraged the use of declining block rates, a rate structure in which the unit cost of electricity declines as consumption increases, unless utilities could show that its production costs were consistent with this rate structure.

PURPA was amended in 1992, 2005, 2007, and 2009, and provisions have been added to address energy efficiency. Utilities are required to offer customers load-management techniques that are practical, reliable, and cost-effective. Utilities are also required to utilize integrated resource planning when assessing the future needs of their system, and any plans filed with state regulators must be updated on a regular basis. The rates utilities charge may include amounts necessary to recover investments in conservation and demand management and efficiency investments in power generation and supply. Electric utilities are required to develop and implement plans to improve the efficiency of their fossil fuel generation facilities. On August 5, 2009, the staff of the FPSC issued a memorandum indicating that all FEECA utilities were in compliance with the requirements of PURPA.[45]

PURPA also affected the structure of the electricity sector by requiring utilities to interconnect with qualified facilities that are not primarily in the business of power production, but which cogenerate power in connection with other processes. The utilities must purchase power from qualified facilities at avoided cost. FEECA also includes provisions aimed at encouraging the efficient use of fossil fuel through cogeneration and the use of renewable resources by small power producers. Both cogeneration and renewable energy sources play a role in meeting FEECA's goals.

The Fuel Use Act of 1978 limited the construction of power plants using oil or natural gas as their primary fuel and encouraged use of coal, nuclear fuel, and alternative fuels to generate electricity. The Fuel Use Act also restricted the industrial use of oil and natural gas in large boilers. FPSC-approved utility projects in the 1980s reflect federal policies that encouraged coal use for base load power. However, oil continues to be used for the

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[44] The term "avoided cost" has a specific meaning in the context of electricity regulation. It is the marginal cost to produce one more unit of electrical energy. It consists of two components: avoided energy costs and avoided capacity costs. When a qualifying facility provides electricity to a utility, the utility avoids the need to produce an equivalent amount of electricity. Thus, the utility avoids the cost of fuel for that amount of electricity and the portion of the generating plant's operation and maintenance costs attributable to that amount of electricity. The sum of these costs is the energy component of the avoided cost. The avoided capacity cost relates to electrical system reliability. As demand for electricity increases in a utility's service area, the utility must at some point add enough capacity to meet that demand and cover its required reserve margin. The amount of electricity provided by a qualified facility to a utility's system allows the utility to defer, or avoid for some period of time, securing additional capacity. The dollar value of that deferral is the capacity component of avoided cost.

[45] Kummer, et al, Memorandum to Carter, et al, "RE: Implementation of the Energy Independence and Security Act of 2007." 2009.

generation of electricity in Florida, particularly as back-up generation and to meet peak demand. It accounted for 4.0 percent of Florida's generating energy mix in 2010 and 20.3 percent of generating capacity.[46]

The passage of the Clean Air Act in 1970 and subsequent amendments to that Act, particularly in 1990, ultimately affected electric utility decisions in their choice of fuels for generating electricity by indirectly favoring natural gas-fueled plants.[47]

The National Energy Policy Act (EPAct) of 1992[48] affected FPSC deliberations in conservation goal setting in the early 1990s and thereafter, in that the Act included federal mandates for energy efficiency and conservation and set standards for integrated resource planning.[49] However, the requirement for Florida utilities to file ten-year site plans[50] was established in 1974, and predates federal standards for integrated resource plans. The state statute requires each utility to file a plan that includes estimates its power-generating needs and any proposed power plant sites. The statute further requires that these plans be submitted and reviewed at least every two years. The current practice is to review the plans annually as they are also utilized in annual reliability assessments by the North American Reliability Corporation. The FPSC is required to classify each of the utility plans as either "suitable" or "unsuitable" and may suggest alternatives to elements of the plan. All findings from the FPSC are then considered by the Department of Environmental Protection (DEP) in any site certification proceeding.[51] The FPSC is required to review 1) the need for electrical power in the area to be served, 2) the effect on fuel diversity in the state,3) anticipated environmental impact, 4) possible alternatives to the plan(s), 5) views of appropriate government agencies, 6) consistency with state comprehensive plans, 7) information on state energy availability, and 8) consumption. The most recent workshop to discuss the ten-year site plans of the Florida utilities was held on August 13, 2012, and the FPSC's annual review of these plans is typically published near the end of the year.

[46] See U.S. Energy Information Administration, State Electricity Profile 2010, Tables 4 and 5, http://www.eia.gov/electricity/state/florida/.
[47] See http://www.epa.gov/regulations/laws/caa.html.
[48] P.L. 102-486.
[49] PURPA defines "integrated resource planning" for electric utilities as "a planning and selection process for new energy resources that evaluates the full range of alternatives, including new generating capacity, power purchases, energy conservation and efficiency, cogeneration and district heating and cooling applications, and renewable energy resources, in order to provide adequate and reliable service to its electric customers at the lowest system cost. The process shall take into account necessary features for system operation, such as diversity, reliability, dispatchability, and other factors of risk; shall take into account the ability to verify energy savings achieved through energy conservation and efficiency and the projected durability of such savings measured over time; and shall treat demand and supply resources on a consistent and integrated basis." P.L. 102-486, sec. 111(d)(19).
[50] Section. 186.801, F.S.
[51] Chapter 403, F.S.

One of its provisions sought to encourage utilities "to make investments in, and expenditures for, all cost-effective improvements in the energy efficiency of power generation, transmission and distribution."[52] Years later, a 2008 amendment of FEECA authorized the Commission to allow cost recovery for such "supply-side" investments: "The commission may allow efficiency investments across generation, transmission, and distribution as well as efficiencies within the user base."[53]

Another provision of the 1992 National EPAct required state public service commissions to consider implementing a standard for investments in conservation and demand management. If implemented, such a standard had to ensure that the "rates allowed to be charged by a State regulated electric utility [be] such that the utility's investment in and expenditures for energy conservation, energy efficiency resources, and other demand-side management measures are at least as profitable, giving appropriate consideration to income lost from reduced sales due to investments in and expenditures for conservation and efficiency, as its investments in and expenditures for the construction of new generation, transmission, and distribution equipment."[54] That provision directly related energy efficiency programs and generation plant expansion.

An area in which federal and state energy conservation policies intersect is that of appliance efficiency standards. Under FEECA, utility conservation programs offer rebates and incentives for appliances that exceed minimum efficiency standards. Those standards for appliance efficiency have increased over the years at both the federal and state levels. Federal initiatives to set standards for appliances preceded Florida's efforts to that end, first through the Energy Policy and Conservation Act of 1975, then through NECPA of 1978, and then through the amendments to NECPA via the 1987 National Appliance Energy Conservation Act (NAECA).[55] As noted in a summary of federal energy efficiency standards, "NAECA, its updates, the Energy Policy Acts of 1992 and 2005 (EPAct 1992 and EPAct 2005), and the Energy Independence and Security Act of 2007 (EISA) are major drivers behind energy-efficiency advances in residential and commercial appliances, lighting products, office equipment, plumbing products, distribution transformers, commercial air conditioning and heat pumps, and small electric motors."[56]

[52] P.L. 102-486, sec. 111(9).
[53] Section 366.82 (2), F.S.
[54] P.L. 102-486, sec. 111(8).
[55] Minimum appliance efficiency standards were codified in Florida law in 1987 but have not been updated in statute since 1993 and in rule since 2000. State appliance standards and tests are based by reference on federal standards and tests.
[56] See Lawrence Berkeley National Laboratory, "Energy Efficiency Standards: The Standard Setting Process," http://ees.ead.lbl.gov/node/2, accessed December 4, 2012.

Over the years, increases in seasonal energy efficiency ratings (SEER)[57] of air conditioning units have been driven by federal efficiency standards. As the FPSC noted in its 2012 FEECA annual report, "The enhanced efficiency standards for appliances established by the [U.S.] Department of Energy (DOE) also effectively reduce energy consumption. For example, in 2010 the efficiency of air conditioning equipment, typically a residential customer's most energy intensive device, was increased by 30 percent through DOE's new standards. The DOE is currently considering additional amendments to energy efficiency standards."[58] Florida's treatment of energy efficiency standards is summarized in Section 10 of this report.

Florida initially required mandated building codes during the 1970s and required all municipalities and counties to adopt and enforce one of the four state-recognized model codes, referred to as the "state minimum building codes."[59] In the 1990s, due to a series of natural disasters and complexities of construction regulations, a comprehensive review of the state building code system recommended uniformity and accountability of the state construction regulatory system. In 1998, the Florida Legislature amended Chapter 553, Florida Statues, Building Construction Standards, to create a single state building code (the Florida Building Code) that is to be enforced by local governments. As of March 1, 2002, the Florida Building Code supersedes all local building codes. The Florida Building Commission is a 25-member technical body charged with developing, maintaining, and interpreting the Florida Building Code through a consensus-building process. Specific language regarding energy efficiency was added to the building code statutes in 2008: "The provisions of the Florida Building Code must facilitate and promote the use of cost-effective energy conservation, energy-demand management, and renewable energy technologies in buildings."[60]

For its part, the FPSC has been involved in several measures to promote energy efficient homes, one being a statewide program ranking homes based on energy efficiency. More recently, various utility energy conservation plans approved for FEECA cost recovery have been implemented to encourage construction of energy efficient homes. The BuildSmart program from Florida Power & Light (FPL) is an example of a certification program for energy efficient new homes that became eligible for cost recovery in a 2006 order.[61]

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[57] The efficiency of central air conditioning units is governed by U.S. law and regulated by the U.S. Department of Energy (DOE). Every air conditioning unit is assigned an efficiency rating known as its SEER. The SEER is defined as the total cooling output (in British thermal units or Btu) provided by the unit during its normal annual usage period divided by its total energy input (in watt-hours) during the same period.
[58] FPSC, *2012 FEECA "*Annual Report*".*
[59] *2007 Florida Building Code, Existing Building*, February 2008, iii, https://law.resource.org/pub/us/code/states/fl_existing_building.pdf, accessed December 4, 2012.
[60] Section 553.886, F.S.
[61] Order No. PSC-06-0025-FOF-EG.

2.3 Cost-Effectiveness

Although the language expressing legislative intent in FEECA has evolved over the years, the basic concern has been the use of methods of cost-effective and efficient energy conservation systems to reduce or control the growth rates of electricity consumption and weather sensitive peak demand in order "to protect the health, prosperity, and general welfare of the state and its citizens."[62] The FPSC has over the years examined goals and conservation programs proposed by utilities in light of the estimated cost-effectiveness of their energy efficiency and conservation proposals. Several means of measuring cost-effectiveness have been utilized, but the impact on utility rates and the amounts customers are charged for program measures have been key benchmarks.

FEECA requires utilities' energy efficiency and conservation strategies to be cost-effective, stating "The Legislature finds and declares that it is critical to utilize the most efficient and cost-effective demand-side renewable energy systems[63] and conservation systems in order to protect the health, prosperity, and general welfare of the state and its citizens."[64] Although reference to demand-side renewable energy systems was added to that expression of intent in 2008, nothing has changed with respect to the Legislature's concern that FEECA approaches be efficient and cost-effective.

The required methods for utilities to evaluate costs and benefits in their conservation plans have changed since enactment of FEECA. In an order issued in November 1980, the FPSC observed that a plan's cost-benefit analysis should be confined to a utility's costs and benefits because any analysis of customers' costs and benefits involved too many assumptions.[65] At the time, the FPSC also recognized the importance of comparing analyses from several utilities: "In order to properly analyze the cost-effectiveness of utility conservation plans it is necessary to compare the cost/benefit analysis provided by various utilities. A uniform analysis should be submitted with any modified plan."[66] Rate impacts did not appear to be part of the required utility analysis.

In 1982, the FPSC promulgated a rule for all investor-owned utilities (IOUs), standardizing calculations for determining cost-effectiveness of reported conservation

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[62] Section 366.81, F.S.
[63] "Demand-side renewable energy" is defined in FEECA as "a system located on a customer's premises generating thermal or electric energy using Florida renewable energy resources and primarily intended to offset all or part of the customer's electricity requirements provided such system does not exceed 2 megawatts." Section 366.82(1)(b), F.S.
[64] Section 366.81, F.S.
[65] Order No. 9672, November 26, 1980.
[66] *Ibid*.

measures. The rule took into account the present value of benefits, which include avoided capacity and fuel costs, minus the present value of program costs.[67]

It was July 1991 before the FPSC revisited the test requirements for cost-benefit analyses when it adopted a rule incorporating the testing methodology outlined in the *Florida Public Service Commission Cost Effectiveness Manual for Demand Side Management Programs and Self-Service Wheeling Proposals* (*Cost Effectiveness Manual*).[68] The manual defines: 1) the tests utilities must use; 2) the components of the benefits the test analyzes; 3) the components of the cost the test analyzes; 4) the formulas that utilities must use to express the results in acceptable ways; and 5) the reporting format the utilities must use in conjunction with the tests.

In order to evaluate a DSM program for cost-effectiveness, electric utilities must perform at least three tests identified in the *Cost Effectiveness Manual*: the Participant Test (PT), the Rate Impact Measure (RIM) Test, and the Total Resource Cost (TRC) Test. The tests are briefly described here and discussed in greater detail in Section 5.3. The PT looks at costs and benefits from the program participant's perspective ignoring the impact on the utility and on ratepayers who do not participate in the program. The RIM Test is designed to examine costs and benefits from the perspective of all ratepayers, not just the program's participants.[69] A DSM program that passes the RIM Test would result in electricity rates that are lower than they would have been without the DSM program. The TRC Test measures the economic efficiency of a program by looking at the impact on the total cost of energy within a utility's service territory, i.e., on the program's total cost -- incurred by customers and the utility.

In 2008, the Legislature amended FEECA to add detail to what the FPSC must consider when establishing goals for conservation plans. The considerations that remain in effect are:

1) The costs and benefits to customers participating in the measure.
2) The costs and benefits to the general body of ratepayers as a whole, including utility incentives and participant contributions;
3) The need for incentives to promote both customer-owned and utility-owned energy efficiency and demand-side renewable energy systems.
4) The costs imposed by state and federal regulations on the emission of greenhouse gases.[70]

[67] Order No. 11405, December 13, 1982.
[68] Rule 25-17.008, F.A.C.
[69] The RIM test may be characterized as a measure of equity especially to the extent that it measures impacts on all customers. This is pertinent to measuring cost effectiveness within the context of the regulator's responsibility to set equitable rates. See also the discussion at Section 5.3.
[70] Sec. 39 Ch. 2008-227, L.O.F.

The fourth consideration, regarding the costs of greenhouse gas regulation, has affected the most recent round of goal setting and plan approvals because none of the tests used prior to 2008 were required to take costs associated with environmental compliance into account. While the FPSC also noted that there was no consensus regarding the best test to meet that statutory requirement, for the 2009 round of goal setting, utilities calculated a measure's cost-effectiveness by adding estimated compliance cost impacts of CO_2 to the RIM and TRC tests. The modified versions of the RIM and the TRC tests are referred to as the "E-RIM" and "E-TRC" tests. [71]

Even though the utilities are still required by FPSC rule to analyze their programs using the RIM, TRC, and PT at a minimum, FEECA does not name the specific tests to be used as the basis for the FPSC's determinations of cost-effectiveness. This lack of specificity in the statute allows the FPSC to exercise its discretion in determining the test or mix of tests it uses. As the FPSC explained in its December 2009 order establishing DSM conservation goals, FEECA requires the FPSC to consider "the costs and benefits to customers participating in the measure" which is the purpose of the PT.[72] However, the FPSC also observed in that order that there was no consensus for determining the appropriate tests for two other statutorily required cost-benefit criteria: 1) "the costs and benefits to the general body of ratepayers as a whole, including utility incentives and participant contributions," and 2) "the costs imposed by state and federal regulations on the emission of greenhouse gases."[73] Certain aspects of the requirement to consider "the costs and benefits to the general body of ratepayers as a whole, including utility incentives and participant contributions," apply to both the RIM and TRC tests. Specifically, the RIM test takes into account utility-provided incentives offered to customers, whereas the TRC test does not. Conversely, the TRC test takes into account costs to participants ("participant contributions") as well as to utilities, whereas the RIM test only accounts for costs to utilities.

The FPSC noted that the information generated from these tests has several purposes: "At a minimum, we use the information from the tests in a variety of forums regarding demand-side management (DSM) programs. These include conservation goal setting, conservation plan and program approval, modification to existing programs, and as part of ongoing monitoring of DSM program cost-effectiveness." [74] With the 2008 amendments requiring the Commission to take into account the impact of CO_2, the E-RIM and E-TRC tests were introduced into the mix. However, the FPSC does not rely solely

[71] There is no carbon reduction policy in Florida and no federal policy mandating it, Therefore, utilities cannot use actual costs to determine compliance with "greenhouse" regulations and can only make assumptions about such costs.
[72] Order No. PSC-09-0855-FOF-EG, p. 11.
[73] *Ibid*, p. 15.
[74] Order No. PSC-08-0463-FOF-EU, p. 2.

on test findings to set goals. As noted below, research from technical and cost-effectiveness reports is also analyzed in the goal-setting process.

Part of the equation in determining cost-effectiveness is looking at the impact on customer rates. Rate increases that could result from DSM activities appear to be a persistent concern of the FPSC regardless of the methods of analysis that have been used over time. The FPSC clearly subordinated the application of specific tests used for evaluating cost-effectiveness to the projected rate impact on customers. This set of priorities is reflected in the FPSC's comment in a 1994 order establishing DSM conservation goals for Florida's investor-owned electric utilities:

> We will set overall conservation goals for each utility based on measures that pass both the participant and RIM tests. The record in this docket reflects that the difference in demand and energy saving between RIM and TRC portfolios are negligible. We find that goals based on measures that pass TRC but not RIM would result in increased rates and would cause customers who do not participate in a utility DSM measure to subsidize customers who do participate. **Since the record reflects that the benefits of adopting a TRC goal are minimal, we do not believe that increasing rates, even slightly, is justified.**[75] (Emphasis added.)

The theme was continued in a 1995 FPSC proceeding: "We believe that as a guiding principle, the RIM test is the appropriate test to rely upon at this time. The RIM test ensures that goals set using this criteria [*sic*] would result in rates lower than they otherwise would be."[76]

A 2009 order discussing which tests meet new statutory requirements showed the FPSC's continuing interest in the rate impacts of its conservation goals, as well as the relationship between measures of cost-effectiveness and projected rate impacts:

> ... [W]e find that consideration of both the RIM and TRC tests is necessary to fulfill the requirements of Section 366.82(3)(b), F.S. Both the RIM and the TRC Tests address costs and benefits beyond those associated solely with the program participant. By having RIM and TRC results, we can evaluate the most cost-effective way to balance the goals of deferring capacity and capturing energy savings **while minimizing rate impacts to all customers**.[77] (Emphasis added.)

[75] Order No. PSC-94-1313-FOF-EG, p. 26.
[76] Order No. PSC-95-0461-FOF-EG, p. 4.
[77] Order No. PSC-09-0855-FOF-EG, p. 15.

Some aspects of conservation efforts required by law have not been shown to be cost-effective. Thus, the FPSC observed in its 2009 goal setting order that "[t]he energy conservation achieved through customer education is included in the overall conservation goals and should be credited to the specific program into which the customer enrolls. In order to avoid duplication of demand reduction and energy savings, we find that no separate goals for participation in utility energy audit programs need be established."[78]

Based on the affected utilities' analyses, demand-side renewable energy systems have not been shown to be cost-effective to date, but the systems are encouraged in statute. The FPSC's statement to that end makes this clear: "We find that the [2008] amendments to Section 366.82(2), F.S., require us to establish goals for demand-side renewable energy systems. None of these resources were found to be cost-effective in the utilities' analyses. However, we can meet the intent of the Legislature to place added emphasis on these resources, **while protecting ratepayers from undue rate increases** by requiring the IOUs to offer renewable programs subject to an expenditure cap."[79] (Emphasis added.)

2.4 Energy Conservation Objectives

Several statutory changes to FEECA energy conservation objectives represented a change in the scope of overall objectives. A 1989 amendment added the words "control of" to the existing "reduction in" growth rates of electric consumption as an important method of protecting the health, prosperity and general welfare of the state and its citizens.[80] In doing so, the Legislature appears to have acknowledged that managing growth rates of consumption is also an important objective of FEECA. With respect to an expanded means of reaching FEECA's objectives, the 1989 amendment inserted "encouraging further development of cogeneration facilities" as part of the Legislature's overall objectives.[81]

Amendments made in 2008 addressed two different areas: technologies and system investments. Efficient and cost-effective demand-side renewable energy systems, referenced in Section 2.3, were added to the list of technologies that could be included by utilities in plans to conserve energy and reduce and control growth of electricity use. Utilities also were permitted to make efficiency investments in generation, transmission,

[78] Order No. PSC-09-0855-FOF-EG, p. 31.
[79] *Ibid.*
[80] The amendment changed Section 366.81, F.S. to read, in part: "Reduction in, **and control of**, weather-sensitive peak demand are of particular importance." (Emphasis added)
[81] Ch. 89-292(14) L.O.F.

and distribution systems, commonly referred to as the supply-side, as well as in the user base, referred to as the demand side.[82]

2.5 Changes to Determination of Need Considerations

The 1980 FEECA legislation includes a provision for the FPSC to determine the need for an electric power plant subject to the Florida Electrical Power Plant Siting Act, which applies to all steam or solar electrical generating facilities that generate 75 megawatts or more of electricity. The factors the FPSC needs to weigh in proceedings conducted to determine the need for new power plants have expanded through amendments to FEECA. However, conservation was and continues to be a factor even as the Legislature has developed procedures for determination of need for specific generation technologies such as nuclear power.

The FPSC is the sole entity responsible for determining the need for a new power plant. Since 1980, the need determination process has required the FPSC to consider the "conservation measures taken by or reasonably available to the applicant or its members which might mitigate the need for the proposed plant... ".[83]

Although conservation measures have been a required factor for the FPSC to consider in need determination proceedings since 1973 when the Florida Electrical Power Plant Siting Act was enacted, amendments in 2006 and 2007 to the determination of needs statute placed parameters around that consideration. The 2006 amendments, which primarily addressed the procedure for determination of need for nuclear plants, added to the list of matters the Commission must consider "the need for fuel diversity and supply reliability."[84] That list was expanded again in 2007 to include "whether renewable energy sources and technologies, as well as conservation measures, are utilized to the extent reasonably available."[85] The 2007 amendment also requires the Commission to apply the same procedures to integrated gasification combined cycle (IGCC) power plants as had been applied to nuclear plants by the 2006 amendment.[86]

2.6 Changes in Required Utility Participation in FEECA

Over time, the thresholds for determining participation of utilities in FEECA goal setting have changed. The goal setting process has become more reliant on technical documentation and support and has become more protracted, while the scope of

[82] *Ibid.*
[83] Now Section 403.519, F.S. formerly Section 366.86, F.S.
[84] Section 403.519(3), F.S.
[85] Ch. 2006-230, L.O.F. and Ch. 2007-117, L.O.F.
[86] Section 403.519(4), F.S.

conservation activity that may be included in customer rates has expanded. Incentive systems were codified in 1993 to provide the FPSC with additional tools to spur utilities to meet their program goals. Although the details have changed over time, annual planning workshops for supply and demand forecasting, Commission review to adjust utility expenditures for FEECA-related activities, and reporting requirements imposed by the Legislature and the Commission all provide for accountability for the implementation of FEECA.

When enacted in 1980, FEECA covered all electric and natural gas utilities, including municipal utilities and rural electric cooperatives, which made retail sales to the public. The only exception was for those natural gas companies providing retail service to the public and having annual sales volume of fewer than 100 million therms.[87] The 1989 amendments reduced the group of FEECA utilities to those electric utilities with more than 500 GWh of annual retail sales.[88] The definition of covered utilities changed again in 1996 when municipal utilities and cooperatives with annual retail sales of less than 2,000 GWh as of July 1, 1993 were exempted from FEECA requirements.[89] Thus, the only municipal electric utilities to which FEECA now applies are Jacksonville Electric Authority (JEA) and Orlando Utilities Commission (OUC). The investor-owned utility companies subject to FEECA are: Florida Power & Light Company (FPL), Progress Energy Florida (PEF), Tampa Electric Company (TECO), Gulf Power Company (Gulf Power), and Florida Public Utilities Company (FPUC). These seven utilities (five investor-owned utilities and two municipal utilities) are subject to the FEECA goal setting requirements and must submit conservation plans designed to meet those goals. Investor-owned electric and gas utilities are also allowed to recover prudently incurred costs for FEECA programs approved by the FPSC. The Commission has no ratemaking authority over the municipal electric utilities so does not determine the basis for recovery of costs for FEECA programs offered by those utilities.

Seven natural gas local distribution companies are currently covered by FEECA. These investor-owned gas companies are allowed to recover their costs for energy conservation programs through the FPSC's Energy Conservation Cost Recovery mechanism. All utilities (electric and natural gas) subject to FEECA are statutorily required to offer or contract to offer residential energy audits to their customers. However, natural gas utilities are currently not subject to the FPSC's goal setting process described below.[90]

[87] Ch. 80-65 (5), L.O.F.
[88] Ch. 89-262 (15)(1), L.O.F.
[89] Ch. 96-321(81), L.O.F.
[90] Section 366.82(11), F.S.

2.7 Goal Setting and Conservation Plan Approval Process for Electric Utilities

FEECA set the framework for the establishment of energy conservation goals, along with the plans and programs utilities should implement to achieve those goals. As discussed above, FEECA applies to certain electric utilities and natural gas utilities. However, the treatment of goal setting is different for the various sectors since the FPSC no longer sets goals for natural gas utilities. Therefore, this discussion addresses each sector separately.

The goal setting and approval process for electric utilities involves discrete steps as described in FEECA:

1) The FPSC establishes conservation goals for each affected utility based on certain statutory conditions.
2) The FPSC requires the utility to develop plans and programs to meet those goals within its service area.

The FPSC may require plans and programs to be modified if any changes or additions are deemed to be in the public interest. The FPSC may also modify or deny plans and programs that would have an adverse economic impact on customers.[91] All FEECA goals, programs, and plans for affected utilities are approved, modified, or disapproved in FPSC orders.

A 1989 amendment to FEECA clarified that goal setting, as well as plan and program approvals, would be on a five-year cycle.[92] Prior to that amendment, it appears that the FPSC had more discretion regarding the timing of goal setting and plan/program approval.[93]

In the FPSC's order dated November 26, 1980 approving FPL's plan, the FPSC posed three questions that essentially became the base criteria for approval of utility conservation plans and programs:

1) Does the plan show, on its face, that it will meet the goals set forth in the [goal setting] order?
2) Can the accomplishment of the plan be monitored?

[91] Section 366.82, F.S.
[92] Ch. 89-292(15), L.O.F.
[93] A 1982 amendment provided that "[t]he Commission may change the initial goals for reasonable cause and may reset the time period for accomplishing the goals." Ch. 82-25(5), L.O.F.

3) Is the plan cost-effective?[94]

Similar questions were posited in a goal setting order in 1989. In that order the FPSC stated that conservation programs would be evaluated against the following criteria:

1) Whether the program advances the policy objectives of FEECA and Rule 25-17.001, FAC [rule establishing the general goals under FEECA];
2) Whether the program can be monitored directly and yields measurable results; and
3) Whether the program is cost-effective.[95]

The language added in the 1989 order [related to "measurable results"] appears to be significant because the FPSC has referred to that particular consideration in more recent orders. For example, in a 2010 plan approval order, the FPSC observed: "Our rules do require that program savings be measurable, monitorable, and verifiable."[96] The theme of cost-effectiveness continues to apply to the FPSC's approval process and has its roots in FEECA, although the criteria used to evaluate utility energy conservation programs have changed over time, as discussed below.

While the FPSC's overarching policy concerns informing utility plan approval have remained fairly consistent since the inception of FEECA, the FPSC's goal setting process has undergone several transformations. The initial process was established through rulemaking at the end of 1980 and amended twice in 1982. The first five-year goal for electric utilities was to reduce the growth rates of end use weather sensitive peak demand by 72.25 percent on average and consumption by 75 percent, both by January 1, 1981. This reduction applied to the average annual growth rate of residential customers for 1980-1989. In addition to setting the goals for electric utilities, the FPSC, in the same rule, also set a goal to reduce the use of oil for electric generation by 25 percent by 1989. Oil consumption for generation of electricity was not to exceed 58,734,000 barrels during 1990. The rule included a provision that authorized the construction, if cost-effective, of generation capacity in excess of the estimated demand and consumption, if the new capacity would help meet the goal of reduced oil consumption.[97]

This goal setting process adopted in 1980 remained in effect until the rule establishing the goal was repealed in 1989. A notice of proposed rulemaking issued in November 1989 provided the following justification for repeal:

[94] Order No. 9672.
[95] Order No. 22176.
[96] Order No. PSC-10-0678-PAA-EG.
[97] Order No. 9634.

> The methodology prescribed in the rule sets numerical targets for the 1980s only. As a result, future conservation goals for electric utilities cannot be determined under the rule as it now exists. In addition, FEECA was expanded in the last legislative session to encourage the further development of cogeneration facilities and to encourage the control of, as well as the reduction in, electric utility growth rates.[98]

After the rule was repealed in 1989, the electric utilities continued their conservation programs and were evaluated on a case-by-case basis utilizing the general statement of goals dating from 1980. A new goal-setting rule was adopted in 1993 and has not been amended since its adoption. [99]

The current rule requires the FPSC to establish numerical goals for each utility subject to FEECA. Those goals encompass overall residential and commercial/industrial targets for reduction of demand and consumption for each year for a ten-year period: "... The goals shall be based on an estimate of the total cost-effective kilowatt and kilowatt-hour savings reasonably achievable through demand-side management in each utility's service area over a ten-year period."[100] On its own initiative or in response to a utility's or affected party's petition, the FPSC can modify the goals which must be set once every five years for each utility. The rule prescribes the content of each utility's DSM plan which must be submitted to the FPSC for approval within 90 days of the final order establishing or modifying goals. The rule enumerates factors that must be considered in the utility's ten-year projections: "overlapping measures, rebound effects, free riders, interactions with building codes and appliance efficiency standards, and the utility's latest monitoring and evaluation of conservation programs and measures."[101]

In June 1993, the FPSC issued an order establishing the procedure to be followed in the setting of investor-owned utility goal dockets. The order required the electric investor-owned utilities to submit two reports: a Technical Market Potential Results Report and a Cost-Effectiveness Goals Results Report. The technical report had to analyze the applicability of the 110 potential DSM measures to the submitting utility, as well as consider measures using natural gas, renewables, and the original DSM measures used by the utilities. The cost-effectiveness report had to analyze the cost-effectiveness of the 110 measures as well as those identified in the Technical Market Potential Results Report.[102] The FPSC explained that the two reports were to be viewed as tools to aid it in setting goals by evaluating an array of programs to come up with an "achievable numeric goal

[98] Order No. 22180, November 14, 1989.
[99] Rule 25-17.0021, F.A.C.
[100] *Ibid.*
[101] *Ibid.*
[102] Order No. PSC-93-0953-PCO-EG, June 28, 1993.

for each utility."[103] For its part, a utility could elect to implement its own programs or implement programs evaluated by the Commission.

A FPSC workshop in April 1994 provided a venue for Commissioners to hear from the utilities and other interested parties about the processes and analyses used by utilities in developing their proposed conservation goals. Among the issues raised were the limitations of a report on best practices from Synergic Resources Corporation (SRC) titled "Electricity Conservation and Energy Efficiency in Florida." The use of Integrated Resource Planning (IRP), natural gas substitution for electricity, and low-income consumer needs were other issues raised at the workshop.[104]

In October 1994, the FPSC established annual numeric DSM goals for FPL, PEF, TECO, and Gulf Power.[105] In that order, the FPSC decided not to rely on the SCR report but rather on goal setting based on data included in the utilities' Cost-Effectiveness Goals Results Reports. The exception to the decision was end-use natural gas substitution, an area in which the FPSC did not establish goals and in which it took issue with the quality of data it received. Utilities were directed to obtain better data through demonstration projects. Although the FPSC contended that nothing in rule or statute mandated it to, or prohibited it from, establishing other end-use goals, it opted not to do so in the area of low-income user goals. The FPSC embraced the concept of IRP, but decided not to adopt the federal IRP standards "because of definitional uncertainties associated with the standard and uncertainties as to the role of the Federal government in interpretation and enforcement of the standards."[106]

Finally, the FPSC commented on its interpretation of the phrase "reasonably achievable" as used in its 1993 rule on goals for electric utilities: "The goals shall be based on an estimate of the total cost-effective kilowatt and kilowatt-hour savings reasonably achievable through demand-side management in each utility's service area over a ten-year period."[107] The FPSC determined that this phrase does not lend itself to a strict definition. Rather, the FPSC determined that it needed to exercise discretion in its interpretation of that phrase. The FPSC arrived at that conclusion by reviewing the use of standards applying "reasonable" in other contexts in case law:

> Reasonably achievable" goals would not include goals that are impossible to achieve; nor would overall goals requiring no effort to achieve be

[103] *Ibid.*
[104] FPSC, Workshop Transcript, April 22, 1994, p. 199.
[105] Order No. PSC-94-1313-FOF-EG, October 25, 1994. (Order No. PSC-95-0461-FOF-EG, issued April 10, 1995. Approved various joint stipulations for FPUC, municipal utilities, and rural electric cooperatives in setting goals for the ten-year period through 2004.)
[106] *Ibid.*
[107] *Ibid.*

> considered "reasonably achievable" There is a broad range of discretion between these extremes. The term "reasonably achievable" allows us to exercise broad discretion in setting goals appropriate to carry out the intent of FEECA.[108]

The 2008 amendments made to FEECA impacted the goal setting process that started that year. These statutory changes affected the cost-effectiveness tests used to evaluate the companies' plans and programs. In December 2009, the FPSC established annual numeric goals for the FEECA utilities for summer peak demand, winter peak demand, and annual energy for the 2010 through 2019 period for IOUs subject to FEECA. The FPSC determined that the annual numeric goals for OUC and JEA were to be based on their current programs so that the customers of those municipal utilities would not be unduly subjected to increased rates.

As previously noted, the 2008 amendment permits utilities to make efficiency investments in generation, transmission, and distribution systems (supply-side), as well as in the user base (demand side). In its December 2009 order establishing numeric goals, the FPSC discussed the supply side issue and stated the following:

> The FEECA utilities did not develop supply-side conservation or efficiency measures to the same degree that they did demand-side measures.... Supply-side measures require substantially different analytical methods than do demand-side systems and provide results that are difficult to combine with conservation goals. Supply-side efficiencies and conservation, rendered properly, would result either in less fuel being required or less loss along the transmission and distribution network. The Commission routinely addresses opportunities for supply-side efficiency improvements in our review of Ten-Year Site Plans. Therefore, such measures are better addressed separately from demand-side measures where their options can be better explored.[109]

On a related note the FPSC concluded in that order:

> Efficiency improvements for generation, transmission, and distribution are continually reviewed through the utilities' planning processes in an attempt to reduce the cost of providing electrical service to their customers. With no evidence to suggest efficiency improvements in

[108] *Ibid*, p. 58.
[109] Order No. PSC-09-0855-FOF-EG, December 30, 2009, p. 7.

> generation, transmission, and distribution are not occurring, we find that goals in these areas will not be set as part of this proceeding.[110]

In addition, the 2008 amendments required the FPSC to establish goals for demand-side renewable energy systems. However, as noted above, the FPSC found none of these systems to be cost-effective in the utilities' analyses. In an effort to protect ratepayers from adverse rate impacts, but at the same time meet legislative intent, the FPSC required the investor-owned utilities to offer renewable programs subject to an expenditure cap. In the order they were required to file pilot programs encouraging solar water heating and solar photovoltaic (solar PV) technologies in their DSM program approval proceedings. Expenditures allowed for recovery were limited to 10 percent of the average annual recovery through the Energy Conservation Cost Recovery clause discussed in Section 2.8. The FPSC encouraged utilities "to design programs that take advantage of unique cost-saving opportunities, such as combining measures in a single program, or providing interested customers with the option to provide voluntary support."[111]

During the year following the issuance of the December 2009 order, the seven FEECA utilities filed DSM plans to meet the FPSC's goals. Four of the utilities' plans were approved, and three plans were denied and required to be resubmitted. The FPSC issued several orders on the most recent set of goal-related DSM plans from November 2010 through July 2011. A common theme in the FPSC's decisions about the most recent set of plans was the concern over the impact on ratepayers. In several instances, the utilities were authorized to continue existing conservation programs with few modifications.

2.8 Changes to Cost Recovery Mechanisms

Costs related to conservation programs must be prudently incurred by the utilities in order to qualify for cost recovery. The cost of utility compliance with FEECA requirements is likewise a concern, as evident in the FPSC's recent report, "Compliance Economic Review for Rule 25-17.0021, Florida Administrative Code, Goals for Electric Utilities."[112] The FPSC has historically been concerned, and continues to be concerned, with the overall impact of FEECA programs on consumer rates and services. In that respect, not much appears to have changed since FEECA was enacted.

As noted in Section 1, Florida's investor-owned electric utilities have recovered over $5.4 billion of conservation expenditures through the Energy Conservation Cost Recovery (ECCR) clause, with approximately $2.6 billion of conservation program expenditures

[110] *Ibid.*
[111] Order No. PSC-09-0855-FOF-EG, p. 29.
[112] FPSC, Compliance Economic Review for Rule 25-17.0021, 2012.

approved in the last ten years. The ECCR mechanism was established in December 1980,[113] and the rule governing it was amended most recently in May 1999.[114] In its most recent iteration, the rule requires the FPSC "to conduct annual energy conservation cost recovery (ECCR) proceedings during November of each calendar year. Each utility over which the Commission has ratemaking authority may seek to recover its costs for energy conservation programs."[115] The rule currently creates procedures for true-ups, reporting, and maintaining accounts for each conservation program; and sets conditions for advertising expenses recovered from the ECCR. The rule requires new programs or program modification to be approved by the FPSC before a utility may seek any ECCR cost recovery.

A passage from a FPSC goal setting order from December 30, 2009 explains how the ECCR operates:

> The costs to implement a DSM Program consist of administrative, equipment, and incentive payments to the participants. These costs are recovered by the utility through the Energy Conservation Cost Recovery clause. Cost recovery is reviewed on an annual basis when true-up numbers are confirmed. When approved, the utility allocates that expense to its general body of ratepayers and rates immediately go up for all ratepayers until that cost is recovered. When new DSM programs are implemented or incentive payments to participants are increased, the cost of implementing the program will directly lead to an increase in rates as these costs are recovered.[116]

Not all energy-conservation related costs have been approved for recovery. For example, a 1985 FPSC audit by the Commission staff of ECCR costs recovered by City Gas Co. found them to be incorrectly recovered.[117] In another example:

> ... at the February 1995 conservation hearings, the Commission voted to deny cost recovery of expenditures resulting from participation in Commission dockets related to the development of numeric goals for electric utilities. The Commission stated that only prudent and reasonable conservation expenditures relating directly to an approved conservation program are recoverable through the conservation cost recovery clause.[118]

[113] Order No. 9715, December 17, 1980.
[114] Rule 25-17.015, F.A.C.
[115] *Ibid.*
[116] Order No. PSC-09-0855-FOF-EG, December 30, 2009, p. 25.
[117] Florida Public Service Commission "Annual Report", 1986.
[118] Florida Public Service Commission "Annual Report", 1998.

On the supply-side, in 1980 the FPSC implemented a fuel cost recovery clause based upon projected fuel expenses and electricity sales, with an explicit provision for a monetary incentive to operate generating units as efficiently as possible. The plan from commission staff was labeled the Generating Performance Incentive Factor (GPIF). The concept of the GPIF was straightforward. Equivalent availability and average heat rate performance targets were set for each utility's base load generating units. Equivalent availability reflects the time that the unit was available to produce electricity. Since the utility's base load units are typically the units with the lowest operating costs, it is desirable to have these units available for production. The average heat rate is a measure of the rate at which the generating unit converts fuel to electricity. Heat rate is typically measured as the volume of fuel required to produce a unit of electricity; thus a lower heat rate, all else equal, is more desirable. These targets reflect an expected level of performance over the projected six-month period. A maximum reasonable attainable range of improvement is then determined for each target. These ranges are then weighted to reflect the system benefit if that range is achieved. At the end of the six-month period, the actual unit availability and average heat rates are compared to the targets. Monetary rewards result from improvements in the performance targets, and penalties result from any shortfalls. In this manner, utilities are provided with monetary incentives to operate their baseload generating units more efficiently, and to make them available more often, than the benchmarks specified by the FPSC.

2.9 Goals and Goal Setting for Natural Gas Utilities

As noted in Section 2.6, natural gas companies are not currently subject to the FPSC goal setting process. However, that was not always the case. The FPSC set goals for natural gas utilities in a rulemaking proceeding in November 1980,[119] with the order stating, "an overall goal for natural gas and electric utility systems is to promote use of gas as a substitute for oil or oil derived energy where cost-effective to do so within Florida, since those appliances with the highest end use efficiency usually result in the lowest overall consumption in energy."[120] The target percentages of annual increases in the number of "high priority end users" were 2 percent by January 1, 1983, and 3 percent by December 31, 1985. The intent was, by 1989, natural gas utilities would have enough "high priority end users" to absorb any gas that became available as a result of the federal Fuels Use Act, as amended. In addition to encouraging oil substitution by natural gas, the 1980 FPSC rule sought to reduce gas leakage through increased leak detection, cathodic protection, and similar maintenance programs. The objective was for unaccounted gas not to exceed 1.5 percent. Finally, natural gas usage for residential space and water

[119] Order No. 9634, adopting Rule 25-17.04 F.A.C.
[120] *Ibid*.

heating was to be reduced to 75 percent of 1980 levels by 1985. The FPSC repealed the rule pertaining to natural gas utility goals in April 1990.

2.10 Changes to the FEECA Planning and Monitoring

Data gathering through technical and cost-effectiveness research and reports has been an important means of supporting the FPSC's goal setting process. Over the course of FEECA implementation, the FPSC staff has developed and now uses more sophisticated and uniform data gathering in order to monitor and evaluate progress toward conservation goals. As a result, the FPSC is better able to develop goals for each five-year period, than it was in the 1980s and early 1990s.

A major input to the goal setting process is the forecasting of both electricity capacity and consumption. Utilities are required to propose to the FPSC, for purposes of FEECA goal setting, their ten-year goals and provide projections of DSM savings based on the utility's most recent planning process.[121]

Although not part of FEECA, this forecasting effort also underpins the jurisdictional electric utilities' Ten-Year Site Plans, which must be submitted annually to the FPSC.[122] All the electric utilities required to participate in the goal setting process under FEECA are also required to submit Ten-Year Site Plans to the FPSC. The FPSC must review preliminary site plans and determine if they are either "suitable" or "unsuitable." The governing statute requires that these site plans are made available to the DEP for its consideration in any site certification proceedings subject to the Power Plant Siting Act.[123] As noted in Section 2.5, the FPSC has sole authority for the determination of need proceedings.

Planning for the state's future energy demand, including electricity, is not solely the responsibility of the FPSC. The DEP was charged with many energy-related planning and coordination efforts for the state, including those for electricity. Those responsibilities shifted in 2008 to the Florida Energy & Climate Commission, and once again in 2011 to the Florida Department of Agriculture and Consumer Services (FDACS). [124] Florida law also has designated FDACS with the responsibility of collaborating with the FPSC, which has the responsibility of electricity and natural gas forecasts to "analyze energy data collected and prepare long-range forecasts of energy supply and demand." In addition, FDACS is charged with promoting energy

[121] Rule 25-17.0021(3), F.A.C.
[122] Section 186-801(1), F.S.
[123] Section 186.801(2), F.S.
[124] Sec. 48, Ch. 2008- 227, L.O.F. and Sec. 506, Ch. 2011-142, L.O.F.

conservation in all energy use sectors throughout the state and is the state agency primarily responsible for doing so.[125] Finally, FDACS is statutorily required to "be a party in the proceedings to adopt [FEECA] goals and shall file with the commission comments on the proposed goals."[126]

Although this effort was not a requirement under FEECA, the FPSC has required energy forecasting since the inception of FEECA. Electric utilities had to revisit annually their summer and winter peak demand projections and assumptions, as well as their consumption estimates. These projections form the basis for determining the level of energy consumption that can be reduced through conservation and remaining demand that would require new plant construction or purchase of power. The process for the planning reviews initially involved two workshops each year—one dealing with supply and the other dealing with conservation planning (demand). In 1985, these workshops were merged into a single annual planning hearing that takes place every two years. This was done in recognition that more than a year was needed to evaluate complicated forecast studies.[127]

The planning approach was changed again in 1990. Those rules provided for planning hearings on a periodic basis to give the FPSC opportunities to examine the needs of the state as a whole as well as the needs of each utility. As described in the FPSC's annual report, "This new rule allows the commission the latitude to focus on issues that are important at the time of the planning hearing. In addition, the rule permits individual utilities to submit updated plans to the commission between the periodic planning hearings, to reflect changes that have occurred since their last filing."[128] The FPSC subsequently abandoned the practice of docketed planning hearings and now holds annual non-docketed planning workshops.

2.11 The Use of Research and Development Data

The FPSC has approved pilot projects over the years as a means of allowing electric utilities subject to FEECA to provide information to the FPSC about the feasibility of new technologies and the types of customers who are most likely to participate in FEECA programs. For example, in 1981, the FPSC approved several energy research projects

[125] Section 377.703, F.S

[126] Section 366.82(5). The comments must include, at a minimum, the following provisions: "(a) An evaluation of utility load forecasts, including an assessment of alternative supply-side and demand-side resource options. (b) An analysis of various policy options that can be implemented to achieve a least-cost strategy, including nonutility programs targeted at reducing and controlling the per capita use of electricity in the state.(c) An analysis of the impact of state and local building codes and appliance efficiency standards on the need for utility-sponsored conservation and energy efficiency measures and programs."

[127] Florida Public Service Commission. "Annual Report", 1988.

[128] Florida Public Service Commission. "Annual Report", p. 37, 1990.

designed to generate data on methods of residential energy conservation. The Legislature authorized funding for the projects to be conducted through 1982.[129] In September 1995, the FPSC approved plans filed by the investor-owned utilities to conduct research and development on natural gas technologies for heating, cooling, dehumidification, and water heating. The purpose of the research was to obtain data on these technologies for possible future inclusion as DSM programs.

A more recent example was the FPSC's December 2009 requirement, in response to the 2008 FEECA amendments, that the investor-owned electric utilities include in their conservation plans pilot programs encouraging solar water heating and solar PV technologies. In addition to programs to test the cost-effectiveness and technical viability of energy conservation and efficiency measures, the FPSC has also relied on research provided by consultants to inform its goal setting process. For example, as noted above, the FPSC required the electric utilities in 1993 to file a Technical Market Potential Results Report and a Cost-Effectiveness Goal Results Report.[130] A 2008 amendment to FEECA requires the FPSC to "evaluate the full technical potential of all available demand-side and supply-side conservation and efficiency measures, including demand-side renewable energy systems."[131] For the most recent round of goal setting, the utilities contracted with the consulting firm ITRON for the technical potential study. The FPSC staff contracted with GDS Associates, Inc., an engineering and management consulting firm, to assist with evaluating goals.

2.12 Electric Utility System Conservation End Use Data (End Use Data Rule)[132]

The FPSC plays a role in monitoring utility efforts to gather data on changes to energy efficiency. Specifically, utilities are required to conduct residential customer surveys every four years to gather information on appliance stock, housing characteristics, household demographics, and billing history spanning a year of electricity consumption. Information from these random surveys, also referred to as "appliance saturation" surveys, is used to: 1) inform FPSC goal setting decisions under FEECA; 2) assist the FPSC in estimating electric capacity and consumption savings that can be achieved through energy conservation measures and technologies; and 3) inform the FPSC on the viability of options that would deter the need for new power plant construction in Florida.[133]

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129 Florida Public Service Commission. "Annual Report", 1981.
130 Order No. PSC-93-0943-FOF-EG, June 28, 1993.
131 Section 366.82 (3), F.S.
132 Rule 25-17.006, F.A.C.
133 *Ibid.*

This End Use Data Rule has undergone several changes since its adoption in June 1982. Initially, utilities were required to conduct surveys of end-use appliance saturation in even numbered years. The FPSC revised and expanded the End Use Data Rule in 1984. The 12 largest electric utilities were to jointly conduct a statewide biennial field survey of the residential customer class and report their findings to the FPSC in 1987. In an annual report from 1984-1985 that discussed the intended manner in which the survey was to be conducted, the FPSC observed that "required biennial updates of the field survey will provide current, detailed information on appliance stocks and usage characteristics, housing characteristics, and demographic profiles of Florida's electric customers."[134] Compared to rules adopted in May 1993, the earlier versions of the rule were much more prescriptive with respect to the manner in which the survey was to be conducted.[135]

2.13 Changes to Reporting Requirements

Related to planning and monitoring requirements are reporting requirements. FEECA creates two types of reporting requirements: 1) utility reports to the FPSC, and 2) FPSC reports to the Legislature and Governor. An FPSC rule requires utilities to report progress toward their goals annually. Utilities are also required to report energy conservation audit results every six months, a requirement that has persisted since the program's inception.[136]

The FPSC, in turn, is required to provide the Legislature and the Governor with an annual report by March 1st of each year detailing the FEECA goals it has adopted and the progress of the FEECA utilities toward meeting those goals.[137]

2.14 Changes to the Goal Setting Evaluation Process

The original version of the FPSC rule regarding evaluation of achievement of FEECA goals included a provision for rewarding or penalizing utilities that exceeded or failed to achieve their conservation goals:

> In general, achievement or projected achievement of more than 105 percent of a goal will be considered as a potential basis for reward and achievement or projected achievement of less than 95 percent of a goal will be considered as a potential basis for a penalty when setting or

[134] Florida Public Service Commission. (1984-1985). "Annual Report", p. 25.
[135] Order No. PSC-93-0641A-FOF-EG, May 17, 1993.
[136] Section 366.82 (11), F.S.
[137] Section 366.82 (10), F.S. In the 1980 version of FEECA, the FPSC was required to submit an annual report to the Legislature and the Governor by February 1st, but a 1981 amendment pushed that date back to March 1st.

> determining cost recovery as provided in Rule 25.17.15 [*sic*] for utilities for which the Commission has rate setting authority.[138]

The FPSC began evaluating the applicability of rewards/penalties related to achieving conservation goals in the mid-1980s and ultimately repealed the evaluation rule in May 1993.[139]

The 2008 amendments to FEECA authorized the FPSC to provide appropriate financial rewards and/or penalties to utilities over which it has rate-setting authority. Thus, the FPSC is authorized to allow an investor-owned utility to receive an additional return on equity of up to 50 basis points for exceeding 20 percent of its annual load growth through energy efficiency and conservation measures. The most recent round of utility energy conservation goals goal setting and plans reviewed by the FPSC in 2010-2011 did not result in the grant of any reward or imposition of any penalty pursuant to FEECA.

2.15 Conservation Goals and Customer Rates

In a 2011 order regarding FPL's DSM conservation plan, the FPSC described the two major sources of rate impact resulting from conservation activities:

> Much like investments in generation, transmission, and distribution, investments in energy efficiency have an immediate rate impact but produce savings over time.... While not immediately applied to the customer's [*sic*] bills, energy saving DSM programs can also have an impact on a utility's base rates. When revenues go down because fewer kWh were consumed, the utility may have to make up the difference by requesting an increase in rates to maintain a reasonable Return on Equity (ROE). If a utility's ROE falls below the 100 basis point range we authorize, the utility may file a petition for a rate increase.[140]

The FPSC's rejection in 2011 of DSM plans initially submitted by the FEECA utilities highlighted the tension between meeting conservation goals and maintaining acceptable customer rates. For example, PEF's initial plan was not approved because it did not meet the FPSC's conservation goals for 2010-2019. The FPSC required PEF to modify and resubmit the DSM plan so that it complied with the goals. PEF filed that "compliance" plan accompanied by an alternative plan that would have had a lower rate impact but also a reduced conservation effect. The FPSC's analysis showed that the ECCR factor for the

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138 Rule 25-17.05, F.A.C., as adopted in Order No. 9634, November 13, 1980, p. 11.
139 Florida Public Service Commission. "Annual Report", 1985.
140 Order No. PSC-11-0347-PAA-EG, pp. 6-7.

compliance plan would have had an impact on monthly bills ranging from $4.73 in 2011 to $6.13 in 2014 when goals would be set again. Likewise, the potential increase to the utility's base rate of the compliance plan was found to be unacceptable by the FPSC. In its analysis, the FPSC also found the alternative plan presented by PEF to have an unacceptable impact on customer rates. The FPSC found "that the public interest will be served by requiring modifications to PEF's DSM Plan."[141] The FPSC cited a provision in FEECA authorizing the FPSC to "modify or deny plans or programs that would have an undue impact on the costs passed on to customers" as granting it the flexibility to modify PEF's plan.[142]

2.16 Changes to Energy Audit Requirements

The role of the customer has always been central to both FPSC and utility efforts to reduce energy consumption throughout the life of FEECA. As noted in Section 2.2, a central feature of utility plans in the 1980s was the residential energy audit. All utilities in Florida continue to be required to offer or contract to offer them.[143] Public funding was made available in the earlier years of FEECA to enable consumers to follow up with information gleaned from those energy audits. In the early years of FEECA implementation, guaranteed loans were made available for customers to purchase equipment to improve energy efficiency and reduce energy use. The emphasis on informing customers, always a feature of the utilities' FEECA programs, has recognized that customer behavior is a necessary part of utilities meeting their conservation and energy efficiency objectives. In more recent years, the FPSC has used the words "customer choice" in various proceedings to make that point clear.

The FEECA audit requirement had its origins in a federal mandate requiring large utility companies to offer residential energy audits as part of their state plans under the National Energy Conservation Policy Act (NECPA). Energy audits are considered the basis for all utility DSM/energy conservation programs, according to the FPSC, because they afford utilities the opportunity to evaluate energy conservation options for their customers.[144] In 2010, the most recent year for which the number of energy audits was reported, Florida's investor-owned electric utilities completed almost 226,000 residential energy audits under FEECA.[145]

Three types of residential energy audits are authorized under FEECA: 1) computer-assisted; 2) walk-through; and 3) mail-in. Electric utilities are required to offer the first

141 Order No. PSC-11-0347-PAA-EG, p. 7.
142 *Ibid*, citing Section 366.82(7), F.S.
143 Initially, Section 366.82 (5), F.S., recodified at Section 366.82(11), F.S.
144 FPSC, Compliance Economic Review for Rule 25-17.0021 , 2012, p. 5.
145 *Ibid.*

two and may offer mail-in audits. Commercial and industrial audits may also be offered. A FPSC rule on energy audits provides definitions and expectations for their conduct. The FPSC's rule limits utility charges to customers for audits to 1) not more than $5.00 for walk-through audits; 2) $15.00 for computer-assisted audits, and 3) not more than the actual cost for commercial and industrial audits.[146]

> The FPSC also is required to determine all the minimum criteria for energy auditors used by the utilities and has contractual authority for training, testing, evaluation, or other measures to satisfy legislative intent. A methodology for the residential energy audits (no longer applicable) was set forth in the FPSC's initial FEECA rule-making order in 1980: The number of audits to be performed annually by each utility was determined by proportioning the statewide number of audits by the number of residential customers who used more than 9,000 KWh annually for a given utility to the statewide number of residential customers whose consumption exceeded 9,000 kwh in 1979.[147]

To meet the target thresholds, the rule also authorized the use of industrial and commercial audits, as well as audits for low usage and other customers, to augment residential audits required by the federal Residential Conservation Service program under NECPA. At least initially, priority was to be given to the largest energy users. The FPSC, in conjunction with ten Florida electric utilities, undertook an analysis to ascertain if there was a difference in residential energy consumption after an audit. The analysis compared small and large residential electricity users. The FPSC staff found that there was no statistically significant difference between large and small residential consumers in terms of consumption after audits. However, consumption patterns did change for users between 9,000 kWh and 18,000 kWh, but the results were not economically significant.[148]

The U.S. Department of Energy, which implemented the Residential Conservation Service program, allowed waivers for utilities so they did not need to audit passive solar systems, active solar space systems, flue opening modifications, electronic ignition devices, and wind energy systems. None of these measures were deemed to be cost-effective in Florida.[149]

[146] Rule 17-25.003(4), F.A.C.
[147] Order No. 9634, November 13, 1980.
[148] Florida Public Service Commission. (1984-1985). "Annual Report".
[149] Florida Public Service Commission. (1981-1982). "Annual Report".

2.17 Loan Guarantee Programs

NECPA required utilities to arrange for the installation and financing of those purchases related to energy audit recommendations at the customer's request. In 1980, the Legislature authorized the FPSC to use up to $5 million of its Regulatory Trust Fund proceeds for loan guarantees.[150] In 1982, the FPSC transferred $5 million from the Regulatory Trust Fund to the Florida Energy Trust Fund that had been created when FEECA was enacted. Utilities and financial institutions could make the loans to customers to install systems to reduce peak demand. The FPSC was required to retain reserves equal to 5 percent of any principal proceeds lent. This requirement would allow up to $100 million for guaranteed loans at any time.

Another loan program, the Energy Conservation Loan Test Program, was approved in September 1986**.**[151] This program enabled financial institutions to make loans to residential occupants and owners for retrofitting existing homes. The financial institutions were authorized to participate through approved utility programs and receive an interest subsidy of 4 percent as well as a guarantee of loans made through the program. The program was initially intended to operate for two years but it continued until 1991.

In July 1991, the Governor transferred money from the Florida Energy Trust Fund to the General Revenue Fund but left enough to guarantee the nearly 10,000 outstanding loans under the two loan programs.[152] The General Appropriations Act for FY 1991-1992 ended the FPSC's authority to enter into new financial obligations for energy conservation loans under the two loan programs. The statute establishing the Florida Energy Trust Fund was repealed effective July 1, 1996.[153]

2.18 The Importance of Customer Participation in Conservation Efforts

Energy conservation and energy efficiency programs depend on educating consumers so they can make informed choices about reducing consumption, either through changes to their consumption patterns or through purchases of appropriate energy efficient appliances and devices. As the FPSC noted in 2009:

[150] Sec. 5, Ch 80-65 (366.82(3)), L.O.F.
[151] Order No. 16539, September 3, 1986.
[152] Florida Public Service Commission. (1992). "Annual Report".
[153] Sec. 14, Ch. 95-372, L.O.F., effective July 1, 1996.

> While utility compliance with FEECA is important, consumer choice also plays an essential role in reducing the growth rates of electrical demand and energy in Florida. Smaller, more efficient homes; energy-efficient appliances, including air conditioning systems; energy-efficiency improvements to existing homes to reduce energy losses; and increased use of the most efficient and cost-effective demand-side renewable systems, are areas where customers may actively be involved with electric energy conservation. As power plant sites and transmission corridors grow scarce in Florida, utility efforts to defer future generating units and transmission lines become increasingly important. Customer participation in utility-offered DSM and energy conservation programs as well as personal conservation decisions are paramount to such efforts.[154]

The FPSC made another observation about the importance of customer choice in its most recent ten-year site plan review:

> The first step in any resource planning process is to focus on the efficient use of electricity by consumers. Government mandates, such as building codes and appliance efficiency standards, provide the starting point for energy efficiency. Customer choice is the next step in reducing the state's dependence upon expensive fuels and lowering greenhouse gas emissions. Consequently, educating consumers to make smart energy choices is particularly important. Finally, Florida's utilities can efficiently serve their customers by offering DSM and conservation programs designed to use fewer resources at lower cost.[155]

In addition to the electric utilities' efforts to inform customers about measures that might increase energy conservation and improve energy efficiency, the FPSC has undertaken various consumer education efforts and public outreach initiatives. The FPSC's 2012 FEECA annual report features various outreach programs, including web-based information about energy conservation, and various community events that are often sponsored jointly with other agencies and organizations to help educate consumers about energy conservation.[156]

[154] FPSC, "Annual Report on Activities Pursuant to the Florida Energy Efficiency and Conservation Act", Feb 2009, p. 15.
[155] FPSC, *Review of the 2011 Ten-Year Site Plans for Florida's Electric Utilities*, p. 3.
[156] See section 4, FPSC "Annual Report on Activities Pursuant to the Florida Energy Efficiency and Conservation Act", February 2012.

2.19 Conclusions

When enacted in 1980, FEECA set forth three objectives: 1) reducing the growth rates for weather sensitive peak demand, 2) reducing kilowatt hour consumption, and 3) conserving expensive resources, particularly petroleum fuels. FEECA has been amended, and expanded in some instances, but reducing growth in peak demand and total energy consumption continues to be the focus of the Act's requirements.

Changes to FEECA legislation and regulations have been, in many ways, shaped by federal policies as well as by Florida's unique energy environment. The OPEC oil embargo of 1973 was the driving force behind the National Energy Conservation Policy Act and the Public Utility Regulatory Policy Act. These laws, in turn, spurred the Florida Legislature to enact FEECA. Actions at both the federal and state levels show a public policy shift from embracing coal in the early 1980s as a means of weaning energy generation from petroleum fuels, to greater end-use efficiency standards and measures in the 1990s that sought to mitigate pollution and give greater weight to protecting air quality. State laws can never extricate themselves from the federal policies unfolding around them, and FEECA is no exception.

Although the language expressing legislative intent in FEECA has changed over the years, as summarized above, the basic concern of using cost-effective and efficient energy conservation systems to reduce or control growth rates of electricity consumption and weather sensitive peak demand "to protect the health, prosperity, and general welfare of the state and its citizens" has not changed. The Legislature delegated the responsibility of implementing FEECA to the FPSC in a manner that protects the public interest, that is, the welfare of Floridians.

Over time, the thresholds determining participation of utilities in FEECA goal setting have changed. The goal setting process has come to rely more on technical documentation and support and has become more protracted. Also, the scope of activity that may be recovered from ratepayers as conservation measures has expanded. Incentive systems were created to provide the FPSC with additional tools to spur utilities to meet their programmatic goals. Although the details have changed over time, annual planning reviews for supply and demand forecasting, FPSC true-up procedures to adjust cost recovery for prudent utility expenditures for FEECA-related activities, and reporting requirements imposed by the Legislature and the FPSC inject accountability for the implementation of FEECA. In power plant determination of need proceedings, the factors the FPSC must weigh have expanded but conservation was, and continues to be, among them.

Despite changes to the FPSC's implementation and oversight of FEECA, the overarching questions that have guided the FPSC in its review of electric utility proposals have remained fairly constant. In its November 26, 1980 order approving FPL's plan, the FPSC posed three questions:

1) Does the plan show, on its face, that it will meet the goals set forth in the order?
2) Can the accomplishment of the plan be monitored?
3) Is the plan cost-effective?[157]

The methods of evaluating cost-effectiveness have evolved, as discussed above, but the questions underpinning the Commission's evaluation are similar now to the ones raised in 1980.

Data gathering through technical and cost-effectiveness research and reports has been an important means of supporting the FPSC's goal setting process. Over the course of FEECA's implementation, the FPSC staff has developed and now uses more sophisticated and uniform data gathering in order to monitor and evaluate progress toward conservation goals. The FPSC is now able to develop goals for each five-year period, unlike the situation in the 1980s and early 1990s.

Costs that utilities incurred for conservation programs have always been required to be prudently incurred. The cost of utility compliance with FEECA requirements is likewise a concern to the FPSC, as evident in the FPSC's recent report, "Compliance Economic Review for Rule 25-17.0021, Florida Administrative Code, Goals for Electric Utilities." As noted above, the FPSC's primary concern has been, and continues to be, the overall impact of FEECA programs on consumer rates and services. In that respect, not much appears to have changed.

The role of the customer has always been central to both FPSC and utility efforts throughout the life of FEECA. A central feature of utility plans in the 1980s was the energy audit. All utilities in Florida were, and still are, required to offer them. Public funding was made available in the earlier years of FEECA to enable consumers to follow up with information gleaned from those energy audits. The emphasis on informing customers, always a feature of the utilities' FEECA programs, has recognized that customer behavior is a necessary part of utilities meeting their conservation and energy efficiency objectives. In more recent years, the FPSC has used the words "customer choice" in various proceedings to make that point clear.

[157] Order No. 9672, November 26, 1980, p. 2.

Table 2-1 Chronology of Major Actions Related to Florida Energy Efficiency and Conservation Act

Year	State Law (citations to Florida Statutes (F.S.))	Rules (citations to Florida Administrative Code (F.A.C.))	FPSC Order/Action
1980	FEECA enacted (Ch. 80-65; codified at 366.80, *et seq*; and 403.519)		Order No. 9512 – September 2, 1980 – adopting emergency rules and setting goals
1980		25-17.01-25-17.05 adopted – re: initial rule implementing FEECA, including initial goals	Order No. 9552 – Sept. 17, 1980 – proposing permanent rules, including numeric goals Order No. 9634 – November 13, 1980 – adopting permanent rules and setting energy conservation goals; Rule. 25-17.01, F.A.C. general goals; Rule 27-17.02, R.A.C. numeric goals
1980			Order No. 9672 – November 26, 1980 – articulating three criteria for approving plans (essentially same criteria used in subsequent program approval proceedings; see current version in Order No. 22176, 1989); establishing monitoring procedures, including residential demand and usage; noting that supply-side efficiencies would not be considered in meeting conservation goals
1980		25-17.015 adopted effective January 27, 1981 (originally 25-17.15) re: ECCR	Order No. 9715 – December 17, 1980 – adopting rule establishing procedure for conservation cost recovery proceedings
1981	366.82 amended by Ch. 81-131 (annual report date moved to March 1 from Feb. 1); 366.80, amended by Ch. 81-318 (subjecting FEECA to Sunset review)	25-17.11 adopted – re: utility loans for customers installing systems to reduce peak demand	
1982		25-17.006 – adopted – June 14, 1982 – establishing information gathering method for setting conservation goals, monitoring, and evaluation; requiring surveys of end-use residential appliance saturation biannually	
1982		25-17.008 adopted – November 28, 1982 – establishing conservation and self-service wheeling cost-effectiveness data reporting format	Order No. 11303 – creating uniform filing requirements for conservation cost-effectiveness analyses; defining "cost-effective" in relationship to the RIM; requiring three analyses for program filings: All Customer Cost Benefit Analysis, Florida Societal Benefit, and Embedded Cost Benefit Analysis to Participating Customers

Table 2-1 Chronology of Major Actions Related to Florida Energy Efficiency and Conservation Act (cont.)

Year	State Law (citations to Florida Statutes (F.S.))	Rules (citations to Florida Administrative Code (F.A.C.))	FPSC Order/Action
1985		25-17.006 amended – Jan. 20, 1985 – requiring biennial survey of residential appliance efficiency; requiring modification of residential load profiles	
1986			Order No. 16539 – September 3, 1986 – creating the Energy Conservation Loan Test Program
1989	366.80, 366.81, 366.82 amended by Ch. 89-292; amendments encourage development of cogeneration facilities and control of, as well as reduction in, electric utility growth rates; FEECA as scheduled for repeal per Sunset law revived and readopted; sunset review and repeal rescheduled for October 1, 1999.	25-17.002 – Repealed – re: initial numeric conservation goals	Order No. 22176 and Order No. 22180 – November 14, 1989 – repealing F.A.C. 25-17.002; adopting (non-numeric) goals in existing F.A.C. 25-17.001; ordering submission of new and revised conservation plans and programs; requiring cost-effectiveness determination based on F.A.C. 25-17.008; requiring electric utilities to develop cost-effective programs for use of natural gas for space conditioning and water heating or explain why programs cannot be developed; articulating criteria for conservation programs: 1. "Does each component program advance the policy objectives set forth in Rule 25-17.001 and the FEECA statute? 2. Is each component program directly monitorable and yields measurable results? 3. Is each component program cost-effective?"
1990	403.519, amended by Ch. 90-331	25-17.015 amended – August 22, 1990 – re: ECCR	Order No 22586 – Feb. 21, 1990 – finding that requiring electric utilities to develop programs for promotion of use of natural gas is contrary to the 1989 revision of FEECA; relieving electric utilities of requirement of Order No. 22176 to develop programs for use of natural gas

Table 2-1 Chronology of Major Actions Related to Florida Energy Efficiency and Conservation Act (cont.)

Year	State Law (citations to Florida Statutes (F.S.))	Rules (citations to Florida Administrative Code (F.A.C.))	FPSC Order/Action
1991	366.80, 366.81, 366.82 amended by Ch. 91-429; Transferring $1.6 million from Florida Energy Trust Fund to General Revenue Fund; eliminating funding for energy conservation loan guarantee program; repeal of requirements Sunset review of FEECA in 1999		
1991		25-17.008 – amended July 19, 1991 – re: conservation and self-service wheeling cost effectiveness and data reporting; incorporating *Florida Public Service Commission Cost Effectiveness Manual for Demand Side Management Programs and Self-Service Wheeling Proposals* (7-7-91)	Order No. 24745 – July 2, 1991 – revising the cost-effectiveness filing requirements; adopting the "Manual on Cost-Effectiveness of Demand-Side Management Programs Self-Service Wheeling"; requiring, as in 1982 rule, three tests for all program filings: Participant, Total Resource Cost Test (TRC), and Rate Impact Measure (RIM) tests
1992	Section 22, Ch. 92-132 – codified at 366.825 – Florida Clean Air Act compliance statutes enacted		
1993		Adopted 25-17.0021, 25-17.0025; amended 25-17.001, 25-17.003, 25-17.006; and repealed 25.17.005 and 25-17.007	Order No. PSC-93-0641A-FOF-EG – May 17, 1993 – adopting and amending various "goals rules"; replacing non-numeric conservation goals with requirement for utilities to establish numeric goals

Table 2-1 Chronology of Major Actions Related to Florida Energy Efficiency and Conservation Act (cont.)

Year	State Law (citations to Florida Statutes (F.S.))	Rules (citations to Florida Administrative Code (F.A.C.))	FPSC Order/Action
1995			Order No. PSC-95-0065-S-EG – Jan. 12, 1995 --approving stipulation setting goals for FPUC for 1994-2003 as percent of goals set for Gulf and JEA
1995	Section 14, Ch. 95-372, effective July 1, 1996; repealing authority for the Florida Energy Trust Fund		
1996		25.17.009 – adopted April 18, 1996 – requirements for reporting cost-effectiveness data for DSM programs of natural gas utilities	
1996	366.82 amended by Ch. 96-321 exempting certain municipal and cooperative utilities from FEECA		Order No. PSC-96-1517 – FOF-EG – December 13, 1996 – exempting, due to 1996 amendments of FEECA, most municipal, and cooperative electric utilities from PSC-95-0461-FOF-EG setting FEECA goals; JEA and OUC continue to be subject to FEECA
1999			Order No. PSC-99-1942-FOF-EG -- October 1, 1999 – establishing numeric conservation goals to replace those adopted in 1994 for FPL, FPC, Gulf and TECO for 2000-2009; noting new goals lower than 1994 goals; declining to impose penalties for failure to meet 1994 goals; noting goal setting based on RIM test
2000			Order No. PSC-00-0588-FOF-EG -- March 23, 2000 – establishing JEA numeric conservation goals 2001-2010; noting JEA used FIRE model to evaluate cost-effectiveness of DSM measures; noting no DSM measures found to be cost-effective thus, goal set at zero; noting JEA to determine whether programs should be continued as JEA best suited to determine customers' needs Order No. PSC-00-0587-FOF-EG March 23, 2000 -- establishing OUC numeric goals for 2001-2010; OUC used FIRE model; noting no DSM measures found to be cost-effective so goals set at zero; noting OUC to determine whether programs should be continued as OUC best suited to determine customers' needs

Table 2-1 Chronology of Major Actions Related to Florida Energy Efficiency and Conservation Act (cont.)

Year	State Law (citations to Florida Statutes (F.S.))	Rules (citations to Florida Administrative Code (F.A.C.))	FPSC Order/Action
2004			Order No. PSC-04-0767-PAA-EG -- August 9, 2004 -- approving OUC's DSM goals set at zero for 2005-2014; acknowledging DSM plan; OUC to determine programs to offer as utility is in best position to determine customers' needs Order No. PSC-04-0768-PAA-EG – August 9, 2004 – approving numeric conservation goals for JEA; goals set at zero for 2005-2014; noting continuation of existing DSM plan; noting utility is in best position to determine customers' needs Order No. PSC-04-0769-PAA-EG -- August 9, 2004 -- setting PEF goals for 2005-2014 and approving DSM plan; noting 5 of 6 goals lower than prior goals due to impact of appliance energy codes and decrease in participation due to saturation Order No. PSC-04-0764-PAA-EG -- August 9, 2004 -- approving Gulf goals 2005-2014 lower than prior goals; noting Gulf had not met prior goals Order No. PSC-04-0766-PAA-EG – August 9, 2004 – approving conservation goals and DSM plan for FPUC for 2005-2014; noting FPUC surpassed then-current numeric demand and conservation goals set in 2000;RIM and participants tests used to determine cost-effective level of goals; RIM, TRC and participant tests used to determine cost-effectiveness of programs Order No. PSC-04-0763-PAA-EG – August 9, 2004 – approving FPL's numeric goals for 2005-2014; establishing goals based on measure passing RIM and Participant tests and with payback of 2 years or more; noting impact of new FL state energy code effective 2005
2006	403.519 amended Ch. 2006-230		
2007	403.519 amended by Ch. 2007-117		

Table 2-1 Chronology of Major Actions Related to Florida Energy Efficiency and Conservation Act (cont.)

Year	State Law (citations to Florida Statutes (F.S.))	Rules (citations to Florida Administrative Code (F.A.C.))	FPSC Order/Action
2010			Order No. PSC-10-0554-PAA-EG – September 3, 2010 – approving OUC DSM plan for 2010-2019; noting that OUC's proposal to continue existing DSM programs should limit rate impact on customers; considering traditional RIM and TRC tests
			Order No. PSC-10-608-PAA-EG – October 4, 2010 – rejecting Gulf Power's DSM plan; approving solar pilot program Order No. PSC-10-0609-PAA-EG -- October 4, 2010 – approving DSM plan for JEA for 2010-2019; noting plan based on continuation of existing programs; noting that projections show goals would not be met in commercial/industrial sector during 2015-2019, but that total for 10 year period would be met; noting results of traditional RIM, TRC and participants tests showing minimal rate impact of existing programs
2010			Order No. PSC-10-0678-PAA=EG – November 12, 2010 – approving FPUC revised DSM plan for 2010-2019; noting energy goals for the period 91% higher than in prior 10-year period; noting program energy savings vary from previous programs partially due to increased efficiency standards and building codes; noting inclusion of savings from energy audits in DSM plan and FPUC proposal to measure audit savings; noting all proposed programs pass Participant test and none pass E-RIM test; noting approved goals based on E-TRC test; noting anticipated ECCR factor to increase 53%; approving proposed pilot solar projects within expenditure cap

Table 2-1 Chronology of Major Actions Related to Florida Energy Efficiency and Conservation Act (cont.)

Year	State Law (citations to Florida Statutes (F.S.))	Rules (citations to Florida Administrative Code (F.A.C.))	FPSC Order/Action
2011			Order No. PSC-11-0079-PAA-EG – Jan. 31, 2011 – rejecting FPL DSM plan; approving FPL solar pilot program
2011			Order No. PSC-11-0114-PAA-EG – Feb. 11, 2011 – approving Gulf revised DSM plan to meet goals established in 2009; noting estimates of participation levels increased; noting adjustments may be required if estimated participation is not achieved; noting all programs cost-effective under E-TRC and Participant tests; noting minimal rate impact acceptable
2011	366.82 amended by Ch. 2011-142		
2011			Order No. PSC-11-0347-PAA-EG – August 16, 2011—approving revised DSM plan for PEF by approving continuation of 2004 plan; noting minimal rate impact projected using existing plan vs. two other revised plans; clarifying treatment regarding rewards and penalties Order No. PSC 11-0346-PAA-EG – August 16, 2011 – approving revised DSM plan for FPL for 2009-2019; continuing prior programs; noting minimal rate impact; clarifying treatment regarding rewards and penalties
2012	Ch. 2012-117 enacted requiring FPSC to commission study of whether FEECA remains in the public interest		

3 Energy Use and Supply in Florida

3.1 Florida's Climate

Florida's climate plays an integral role in the way energy is used by its citizens. Nearly the entire burden of providing air conditioning in the summer and home heating in the winter is borne by electricity, accounting for 93 percent of the direct energy use by residential customers in 2010.[158] This section describes the climatic drivers for electricity consumption in Florida, discuss the evolution of these drivers over time, and compare them to other states.

3.1.1 Seasonal Data

The effect of daily temperatures on electricity demand is typically measured in heating and cooling degree days, which are measures of the extent to which average daily temperatures are either above (cooling) or below (heating) 65 degrees Fahrenheit. For example, if the average daily temperature is 70 degrees, then that day is said to have 5 cooling degrees. State-level data on annual heating and cooling degree days are available from the National Climatic Data Center,[159] which population-weights the heating and cooling degree days collected from individual climate monitoring stations.[160] These degree days are then aggregated annually or monthly. As shown on Table 3-1, Florida had the highest number of cooling degree days among the 48 contiguous states during the period 1981 to 2010. Florida experiences approximately 500 more cooling degree days than the next warmest state, Arizona. These cooling degree days lead to greater demand for air conditioning in the summer. Since the majority of Florida's electricity customers are in the residential and commercial class, the primary consumers of air conditioning services, Florida tends to have high peak electricity demand, relative to its overall electricity consumption. While Florida also enjoyed the lowest number of heating degree days among the 48 contiguous states during the period 1981 to 2010, abnormally cold winters, such as the winter of 2009-2010, can cause Florida's electric utilities to operate at near capacity during the winter.

[158] United States Department of Energy, Energy Information Administration, "State Energy Data System," http://www.eia.gov/state/seds/ , accessed December 4, 2012.
[159] National Climatic Data Center, "Heating & Cooling Degree Day Data," http://www.ncdc.noaa.gov/oa/documentlibrary/hcs/hcs.html, accessed December 4, 2012.
[160] If, for example, half of a state's population experiences 70 degree temperatures and half of the population experiences 74 degree temperatures, then the National Climatic Data Center would record 7 cooling degrees, the weighted average of 5 and 9, for that state, for that day.

Table 3-1 Average Annual Cooling (CDD) and Heating (HDD) Degree Days: 48 Contiguous States, 1981-2010[161]

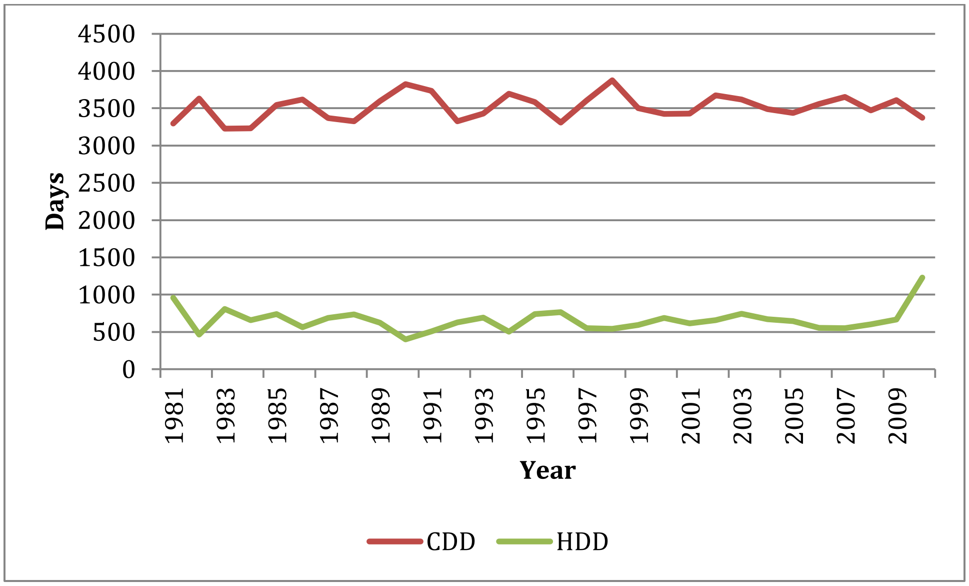
State	CDD	HDD	State	CDD	HDD
Alabama	1,935	2,742	Nebraska	1,022	6,325
Arizona	3,047	1,977	Nevada	2,097	3,569
Arkansas	1,813	3,342	New Hampshire	331	7,315
California	949	2,498	New Jersey	829	5,253
Colorado	308	7,159	New Mexico	968	4,577
Connecticut	605	5,870	New York	663	5,877
Delaware	1,121	4,512	North Carolina	1,448	3,407
Florida	3,515	660	North Dakota	468	9,150
Georgia	1,760	2,790	Ohio	780	5,783
Idaho	507	6,686	Oklahoma	1,925	3,521
Illinois	894	6,146	Oregon	257	4,994
Indiana	919	5,729	Pennsylvania	695	5,763
Iowa	846	6,807	Rhode Island	520	5,693
Kansas	1,470	4,902	South Carolina	1,872	2,705
Kentucky	1,233	4,426	South Dakota	750	7,544
Louisiana	2,645	1,720	Tennessee	1,413	3,858
Maine	237	7,787	Texas	2,720	1,910
Maryland	1,083	4,644	Utah	750	6,325
Massachusetts	476	6,242	Vermont	281	7,902
Michigan	593	6,696	Virginia	1,108	4,330
Minnesota	515	8,382	Washington	212	5,330
Mississippi	2,122	2,488	West Virginia	806	5,177
Missouri	1,272	5,025	Wisconsin	525	7,481
Montana	279	7,915	Wyoming	324	7,997

In addition to the magnitude of cooling degree days that Florida experiences, the state's humidity also plays a role in electricity consumption. High temperatures coupled with relatively high humidity levels increase customer demand for climate control.

Despite this daily volatility, Florida's climate has been relatively stable over time. Figure 3-1 shows the number of heating and cooling degree days in each year from 1981 through 2010. While the overall intensity of Florida's summers has been high, they have not deviated from the average by more than 400 degree days over the past 30 years. The winter of 2009/2010, on the other hand, deviated from the average winter by more than 600 degree days, and this deviation resulted in the highest winter peak demand in the state's history.

[161] *Ibid.*

Figure 3-1 Florida Annual Cooling (CDD) and Heating (HDD) Degree Days: 48 Contiguous States, 1981-2010[162]



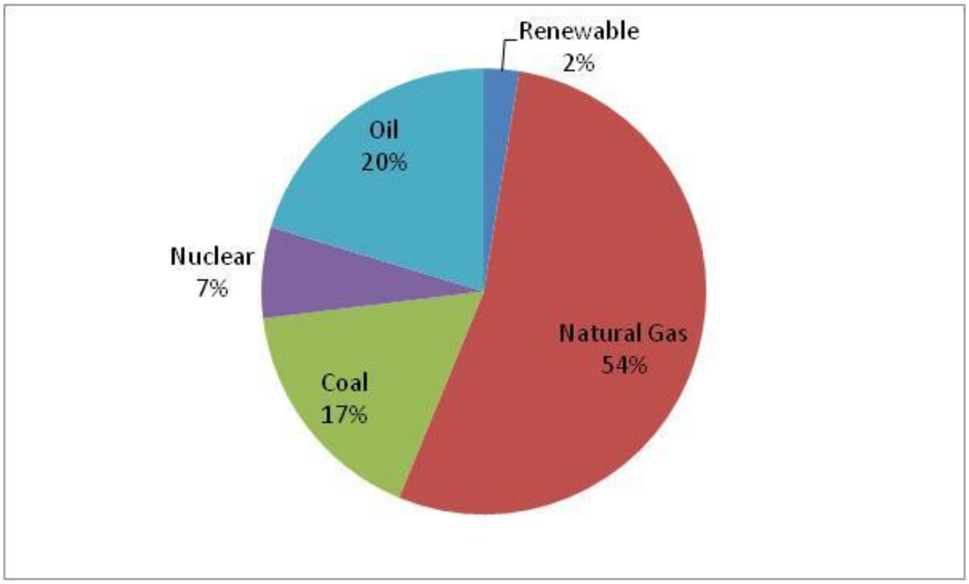
3.2 CURRENT ENERGY SUPPLY

3.2.1 Electricity

Capacity. As of 2010, the state of Florida had approximately 60 gigawatts (GW) of installed capacity, according to the EIA.[163] The EIA conducts an annual survey of utilities in which the utilities report the status of their existing and planned generating units, and the EIA aggregates this data and publishes the results. The percentage that each technology contributes to this total capacity is shown in Figure 3-2. More than half of this generating capacity is natural gas, followed by oil, representing one-fifth of the state's capacity, and coal, representing 17 percent. The balance of the state's generating capacity (9 percent) comes from nuclear energy and renewable energy. While this supply mix describes the state's capabilities to provide electricity service, it does not reflect the manner in which this service is actually provided.

[162] *Ibid.*
[163] U.S. Department of Energy's EIA Form 860 ("Annual Electric Generator Report").

Figure 3-2 Florida Generating Capacity by Fuel Type - 2010[164]

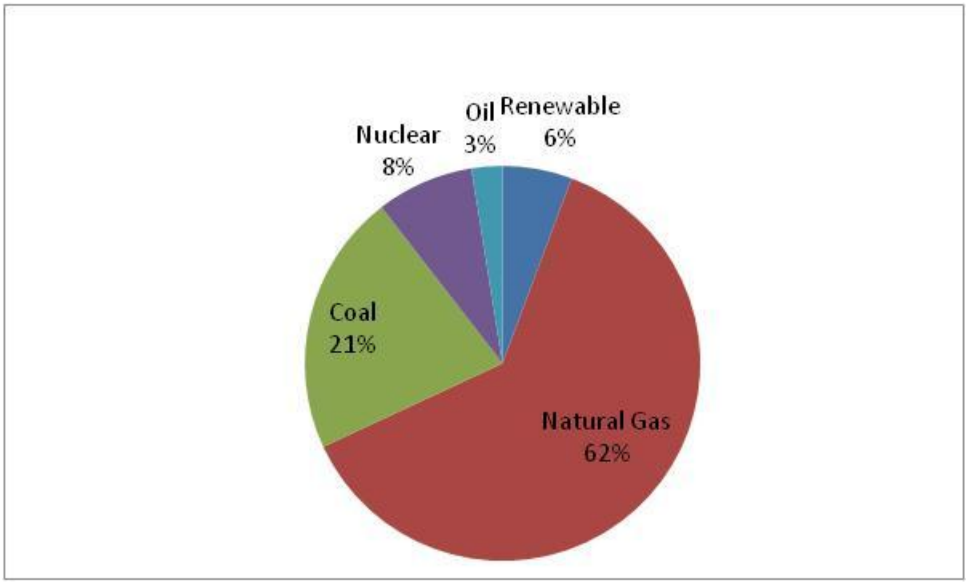


Fuel Use by Type. While generating capacity measures the potential to generate electricity, it does not always reflect the way the electricity is actually produced. The actual generation is determined by a combination of the capabilities of the generating plant and the economics of the fuels used to generate it. Electricity is generated in Florida with a variety of fuel sources. This diversity is desirable because Florida imports nearly all of its fuel, and diversity contributes to security of supply.

We can measure the relative impact of different generating fuels by analyzing data on the operation of Florida's power plants. The Department of Energy collects data on all electricity generating plants in the United States in an annual survey.[165] Data are collected on both a monthly and annual basis. The data reported includes the prime mover and fuel sources of each plant, as well as the location of the plant and its operator.[166] The relative contribution of each fuel used to generate electricity in Florida in the year 2010 is reported in Figure 3-3.

[164] U.S. Department of Energy's EIA Form 860 ("Annual Electric Generator Report").
[165] U.S. Department of Energy's EIA Form 923 ("Power Plant Data").
[166] It does not contain data on the ownership of the plant. For example, if two utilities jointly own a given power plant, and each share 50 percent of its output, this information is not reported on the EIA Form 923, only the identity of the plant's operator. As a result, our data does not include information on plants that are partially owned by Florida utilities, but located outside of the state.

Figure 3-3 Florida Electricity Generation by Fuel Type - 2010[167]



Even though oil-fired generators make up 20 percent of Florida's generating capacity mix, only 6 percent of the electricity produced in the state comes from these units. This situation is due to the economics of oil prices relative to the prices of other generating fuels and the comparatively less expensive operating characteristics of natural gas generating plants, as well as the FPSC's initiative, referenced in Section 2.7, to reduce oil consumption. Coal and natural gas, on the other hand, produced more electricity, relative to their capacity share, in 2010.

The relative influence of each fuel type has changed over the last ten years. Figure 3-4 shows the percentage of Florida's electricity generated with each fuel in 2001. Note that nearly 40 percent more electricity was generated with natural gas in 2010 than in 2001; and coal, oil, and nuclear have seen their relative shares decline from 2001 through 2010.

Every utility group in Florida employs either natural gas or coal to produce electricity, and most utilities employ both fuels. The 2010 data by utility operator is shown in Figure 3-5.[168] Again, the data reflect the electricity generated by Florida plants and does not necessarily reflect ownership shares of the plant output or interest in plants outside the state of Florida.

This change in the way electricity is produced is not realized uniformly across all utilities in Florida, however. Figure 3-6 shows the quantity of electricity generated with various fuel types by utility operator over the period 2001 through 2010. In these figures, the

[167] Department of Energy's EIA Form 923 ("Power Plant Data").
[168] Note that FPUC does not operate any generating units.

relative growth of natural gas usage can be seen, with every utility except OUC increasing the amount of natural gas utilized at the plants that it operates. However, the degree to which each utility relies on natural gas varies.

Figure 3-4 Florida Electricity Generation by Fuel Type - 2001[169]

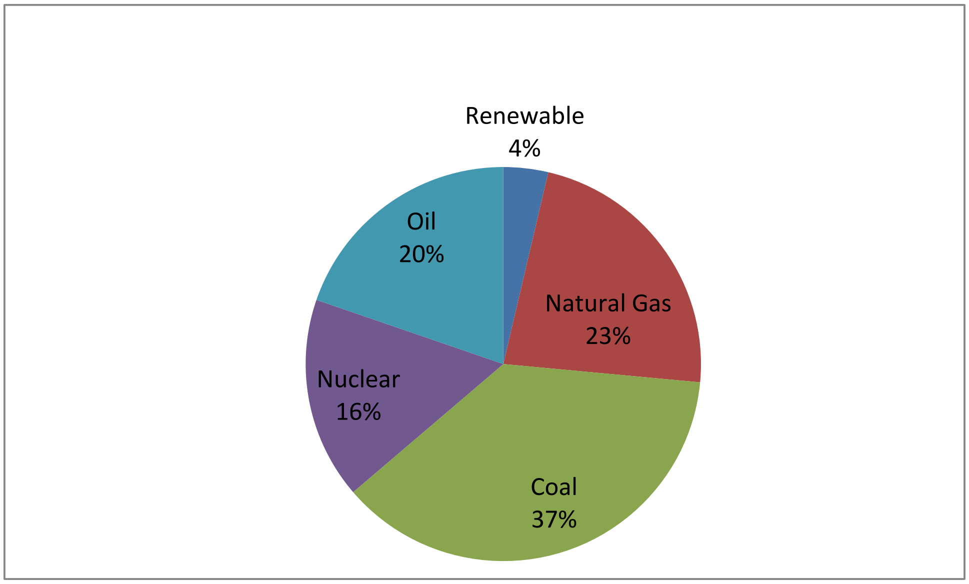
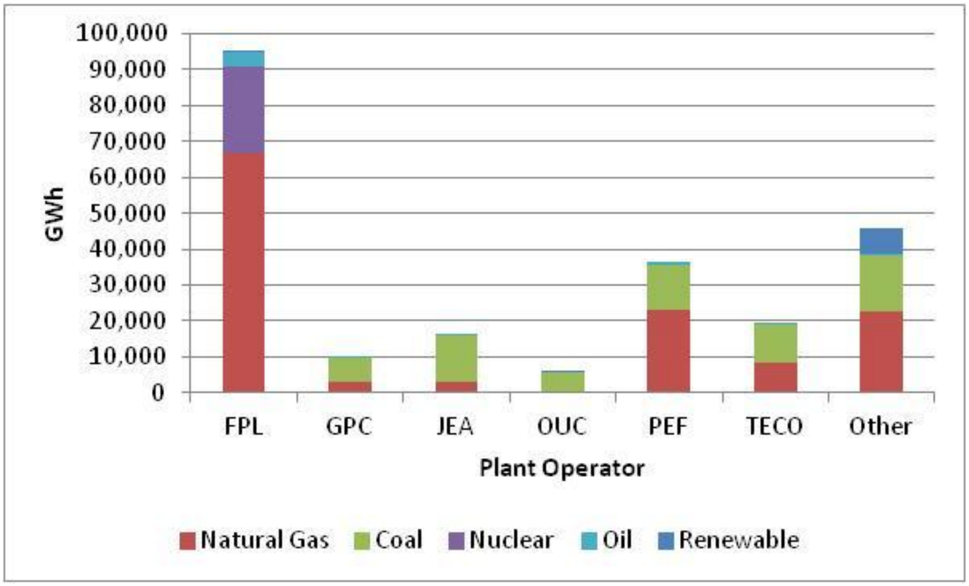
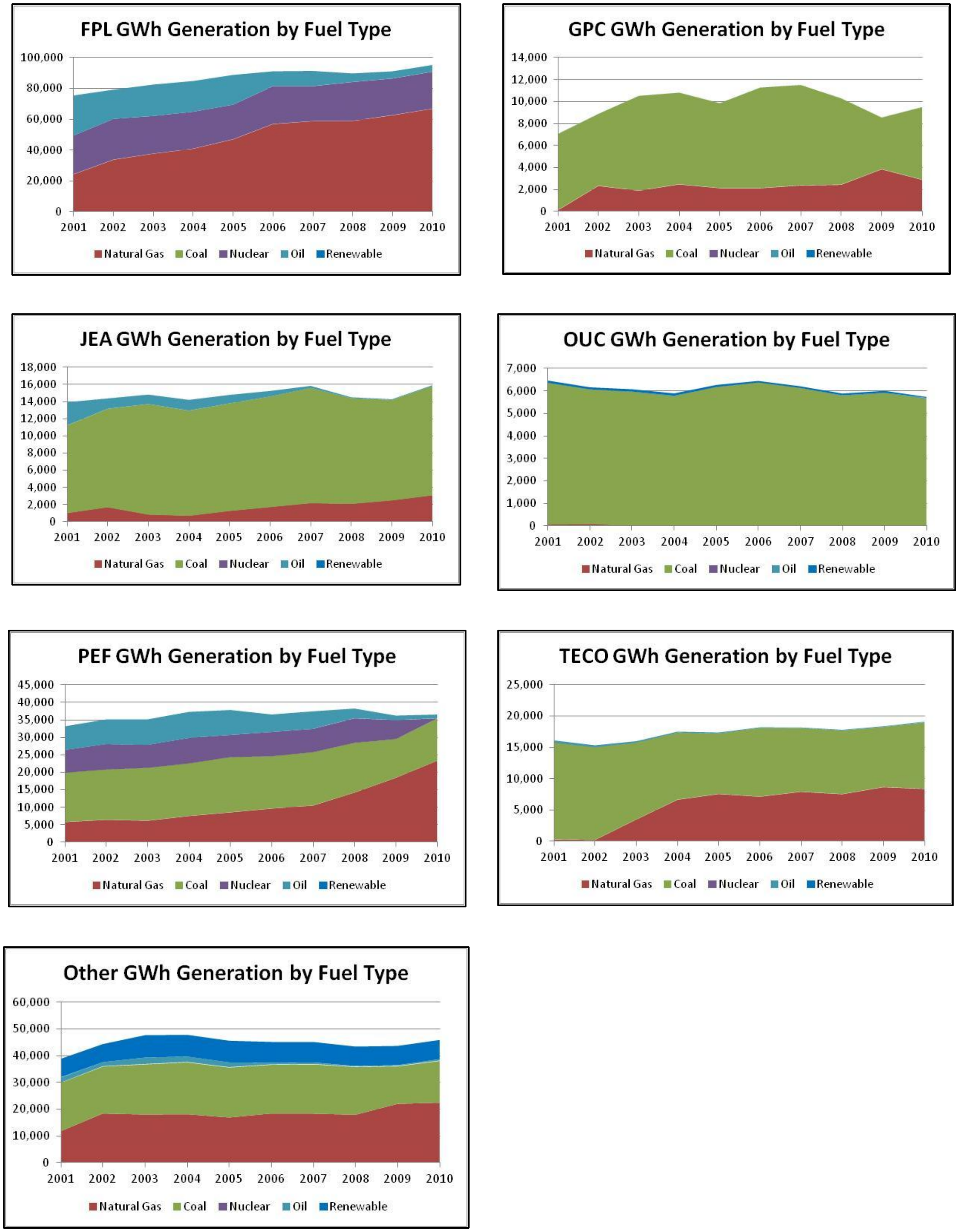


Figure 3-5 Florida Electricity Generation by Fuel and Plant Operator - 2010[170]



169 Department of Energy's EIA Form 923 ("Power Plant Data").
170 Department of Energy's EIA Form 923 ("Power Plant Data"). "Other" refers to an aggregation of the remaining electric utilities in the state and non-utility generators.

Figure 3-6 Electricity GWh Generation by Plant Operator and Fuel Type - 2001 through 2010[171]

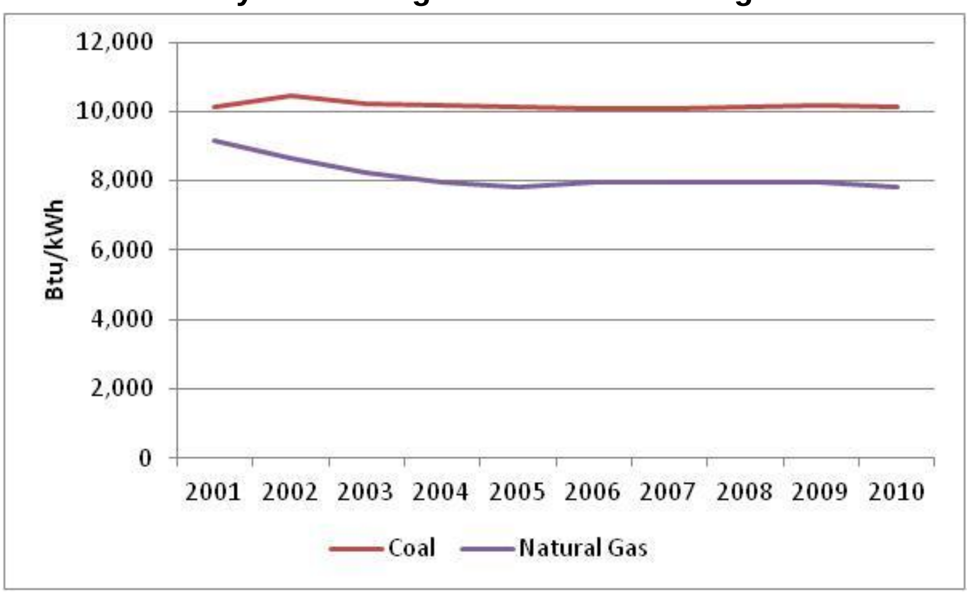


[171] Department of Energy's EIA Form 923 ("Power Plant Data"). "Other" refers to an aggregation of the remaining electric utilities in the state and non-utility generators.

3.2.2 Generation Efficiency

The thermal efficiency of a generating unit, or the efficiency with which a generating unit uses fuel to produce electricity, is measured by the heat rate of the generating unit. The heat rate is measured by calculating the units of fuel required to produce a given quantity of electricity. Since generating fuel is costly, a lower heat rate is desirable as it will result in lower costs, all else equal. The past ten years has seen an increase in the efficiency with which Florida utilities utilize natural gas. Over the past ten years, the heat rate of coal plants in the state has remained fairly constant, while the heat rate of natural gas plants has decreased by approximately 15 percent. This reflects the vintage of the plants utilizing these fuels, as newer plants tend to be more efficient; and the efficiency of generating plants tend to decrease as they age. It also reflects the technological advances in natural gas generating technology, and the manner in which these technologies are employed by Florida utilities. Figure 3-7 shows the average thermal efficiency (measured by the heat rate) of coal and natural gas plants operated by utilities in the state of Florida.[172]

Figure 3-7 Thermal Efficiency Measured by Heat Rate of Florida Electricity Generating Plants – 2001 through 2010[173]

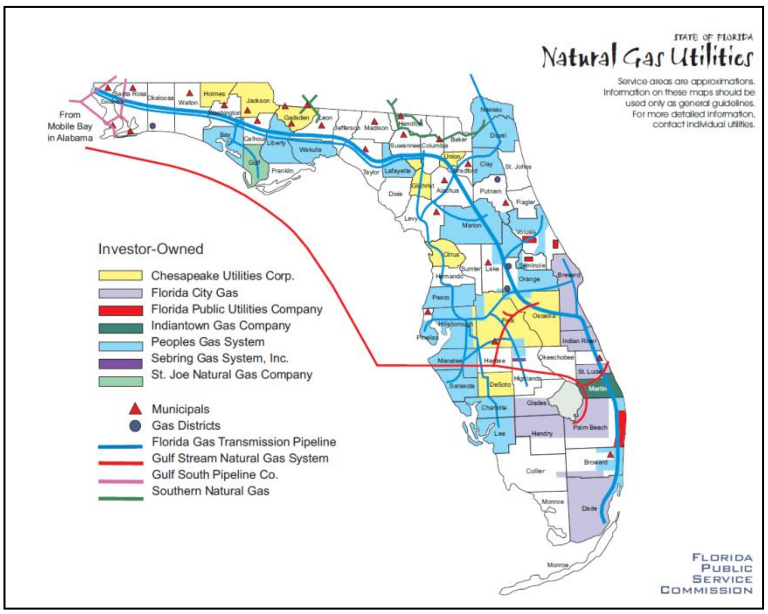


[172] This figure utilizes the EIA Form 923 data, and the numbers are derived by aggregating the total heat value of coal and natural gas burned in each year, and dividing by the electricity produced by each fuel.
[173] Department of Energy's EIA Form 923 ("Power Plant Data")

3.2.3 Natural Gas

The capability for natural gas consumption by utilities and consumers spans nearly the entire state. In all, 59 of Florida's 67 counties have natural gas service available. Figure 3-8, from the Florida Public Service Commission, shows the current infrastructure within the state. Florida is served by two pipelines from the Gulf of Mexico region, and one pipeline from Southern Natural Gas Company into North Florida. Since most natural gas in Florida is used to generate electricity, any prolonged service interruptions on these pipelines would limit the ability of Florida's utilities to provide electricity service.

Figure 3-8 Florida Natural Gas Infrastructure[174]



3.2.4 Renewable Energy Potential

Solar. As shown in Figure 3-9, the solar resources in Florida are capable of producing over 5 kWh per square meter, a rate of production that exceeds the capabilities of 29 other states. Florida's potential for concentrating solar power, shown in Figure 3-10, is lower than the potential in the 29 other states, with the resources throughout most of the state capable of 4 to 4½ kWh per square meter. Solar energy suffers from the fact that it is only available when the sun is shining, and the potential contribution of solar energy will be enhanced as advances in storage technology are realized. The contribution of solar energy to Florida's generation mix is expected to increase over the next ten years.[175]

[174] Florida Public Service Commission, "State of Florida Natural Gas Utilities," http://www.psc.state.fl.us/publications/pdf/electricgas/naturalgasutilities.pdf, accessed December 4, 2012.
[175] Per the Florida Reliability Coordinating Council 2012 Load and Resource Plan.

Figure 3-9 Photovoltaic Solar Resources of the U.S.[176]

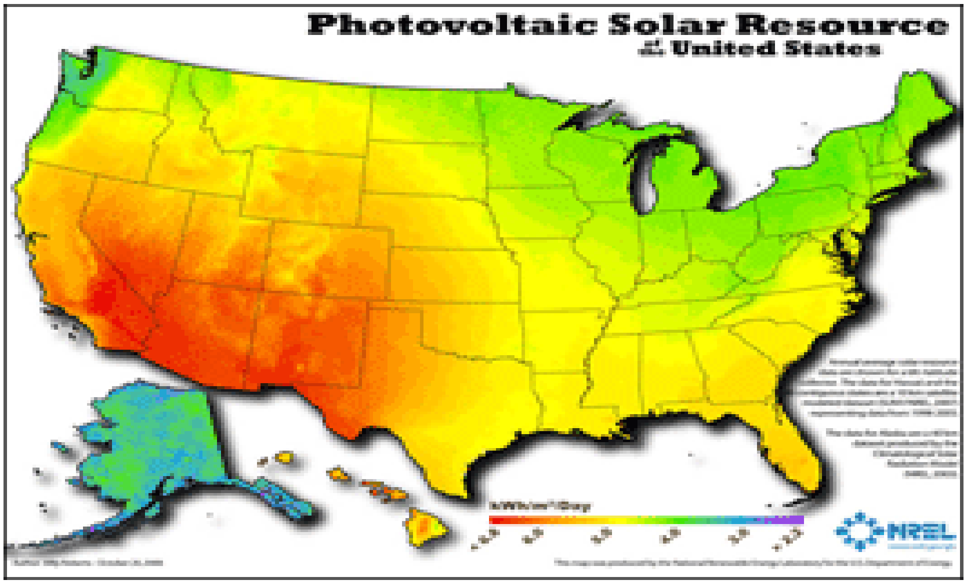
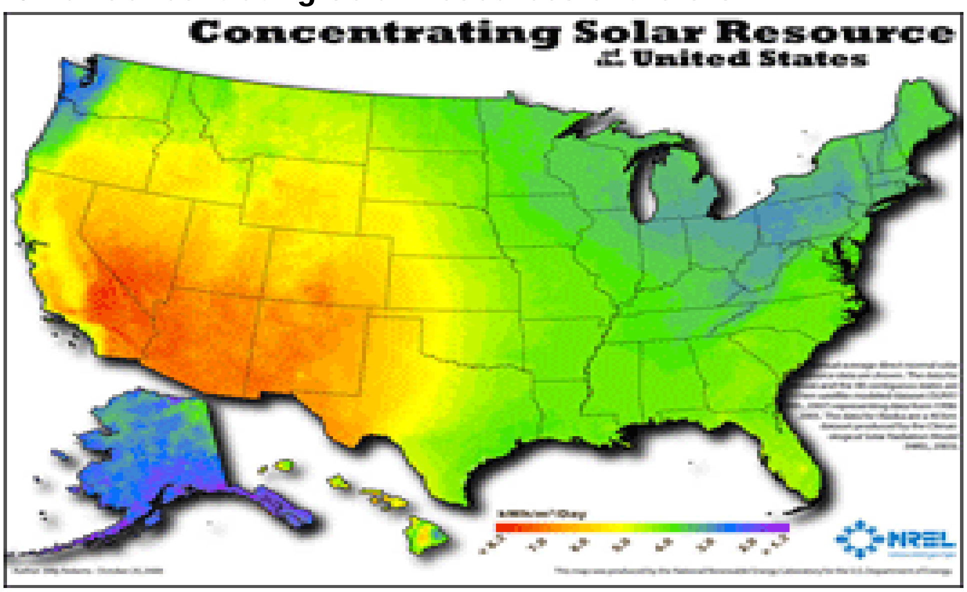


Figure 3-10 Concentrating Solar Resources of the U.S.[177]

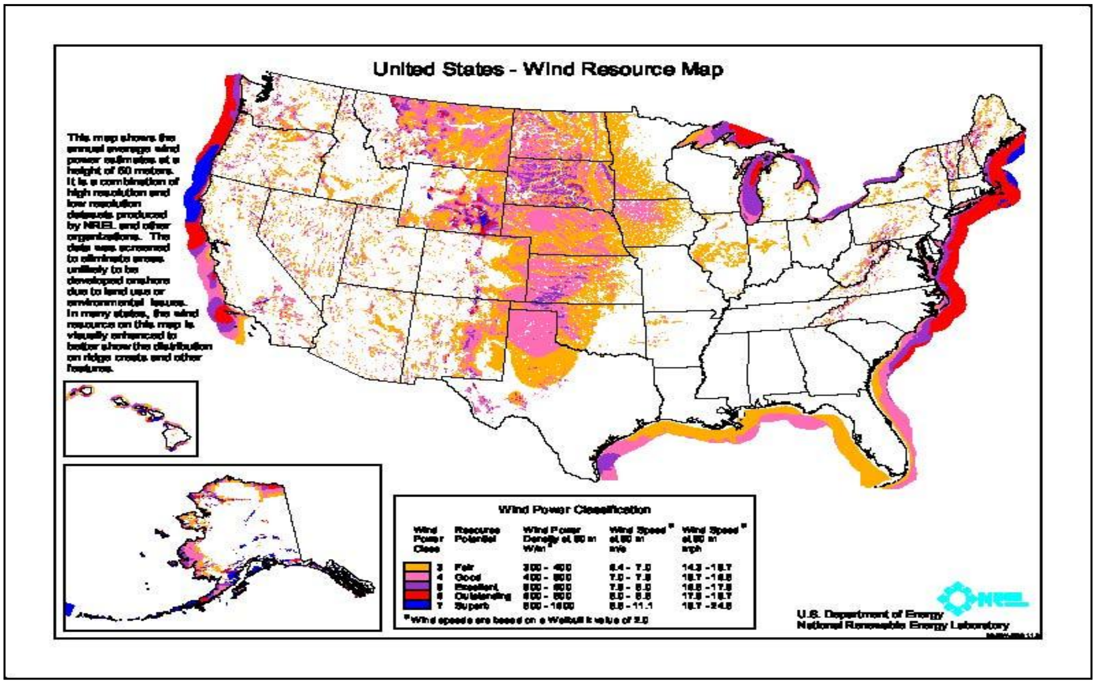


Wind. As shown in Figure 3-11, Florida's potential for on-shore wind power is not measured by the National Renewable Energy Lab, and its off-shore wind resources are assessed as "Fair" to "Good." However, the state has not conducted any detailed feasibility studies of its own. Off-shore wind power is also associated with negative

[176] National Renewable Energy Laboratory, "Dynamic Maps, GIS Data, & Analysis Tools: Solar Maps," http://www.nrel.gov/gis/solar.html, accessed December 4, 2012.
[177] *Ibid*.

externalities related to the aesthetics of the turbines, and wind projects in the United States have been met with costly legal challenges. It is likely that any future legal battles will be fought in the northeastern United States, where the potential for off-shore wind is greater and the benefits are more certain. Wind power, either on-shore or off-shore, is not likely to play an important role in Florida's energy future over the next ten years.

Figure 3-11 Wind Resource Map of the U.S.[178]

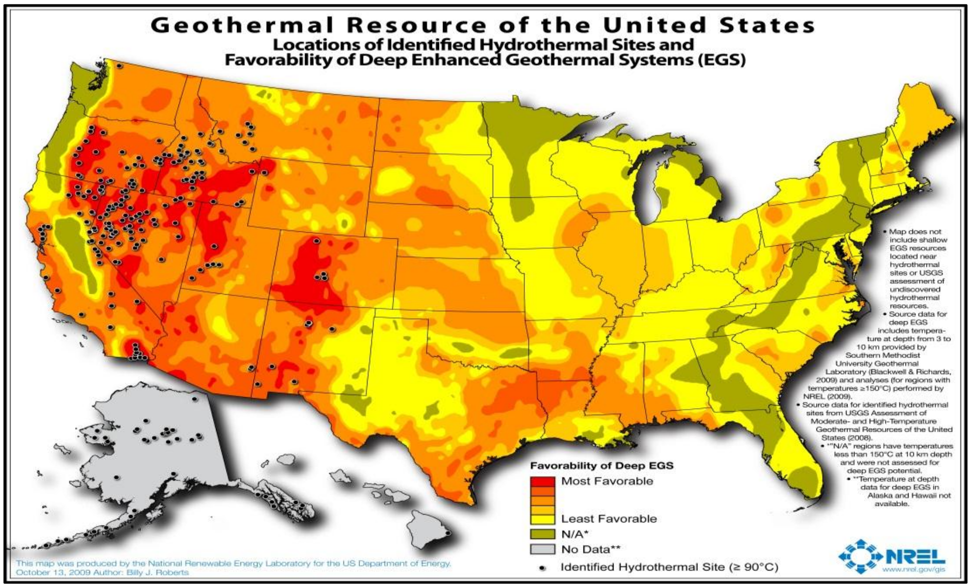


Geothermal. As shown in Figure 3-12, the potential for geothermal electricity generation in Florida is low, and the National Renewable Energy Lab has assessed Florida's potential for geothermal generating resources as "Least Favorable." Electricity generated from geothermal sources is not expected to play a role in Florida. However, Florida remains one of the top manufacturers and consumers of geothermal heat pumps,[179] which have the potential to mitigate the amount of electricity and natural gas required to meet the climate control needs of consumers.

Hydro. Florida's potential for hydroelectric power is limited by its geography. Some Florida utilities in the panhandle region employ hydroelectric generation through participation shares in power projects located outside of Florida, such as the Southeastern Power Administration.

[178] National Renewable Energy Laboratory, "Dynamic Maps, GIS Data, & Analysis Tools: Wind Maps," http://www.nrel.gov/gis/wind.html, accessed December 4, 2012.
[179] Department of Energy EIA Form EIA-902, "Annual Geothermal Heat Pump Manufacturers Survey."

Figure 3-12 Geothermal Resources of the U.S.[180]



Biomass. Figure 3-13 shows the biomass resources in the United States by county. The figure shows that nine counties in Florida have more than 250,000 tons per year of biomass resources available. Biomass resources come from crop residues, forest and primary mill residues, secondary mill and urban wood waste, methane emissions from landfills, domestic wastewater treatment, and animal manure. The contributions of biomass to the Florida energy portfolio are expected to increase by about 35 percent over the next ten years.[181]

Municipal Solid Waste. Figure 3-14 shows an assessment of the municipal waste resources in the United States, by county. Thirteen Florida counties have the potential for more than 50,000 dry tons per year of urban wood residues, but the contribution of municipal waste to the Florida resource portfolio is not expected to increase substantially over the next ten years, as these resources are already being utilized for electricity generation. [182]

Landfill Gas. Figure 3-15 shows an assessment of the methane emissions from landfills. Fifteen counties in Florida have resources capable of producing more than 10,000 tons per year of methane emissions, but the contribution of landfill gas to the Florida resource portfolio is not expected to increase over the next ten years.[183]

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[180] National Renewable Energy Laboratory, "Dynamic Maps, GIS Data, & Analysis Tools: Geothermal Maps," http://www.nrel.gov/gis/geothermal.html, accessed December 4, 2012.
[181] Per Florida Reliability Coordinating Council 2012 Load and Resource Plan.
[182] Per Florida Reliability Coordinating Council 2012 Load and Resource Plan.
[183] Per Florida Reliability Coordinating Council 2012 Load and Resource Plan.

Figure 3-13 Biomass Resources by U.S. County[184]

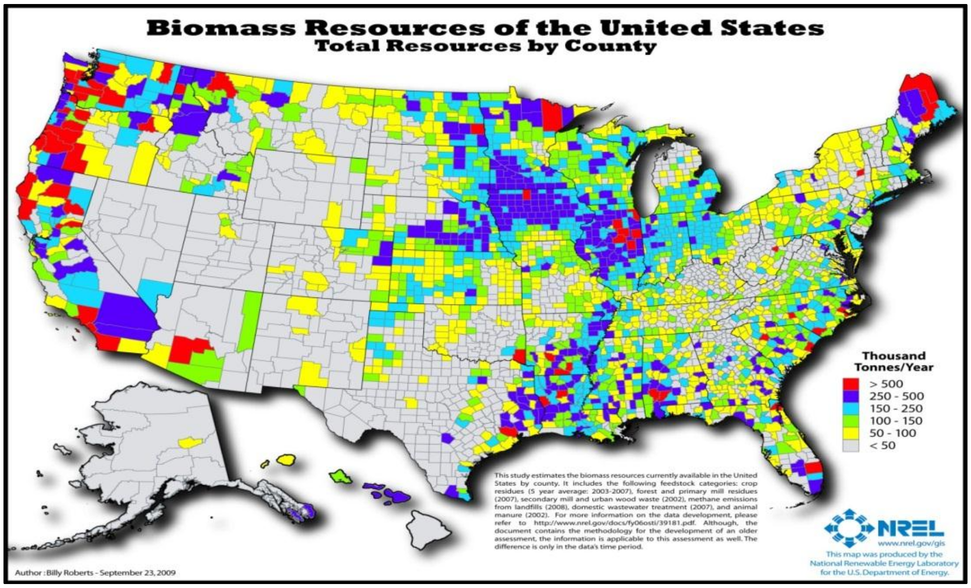
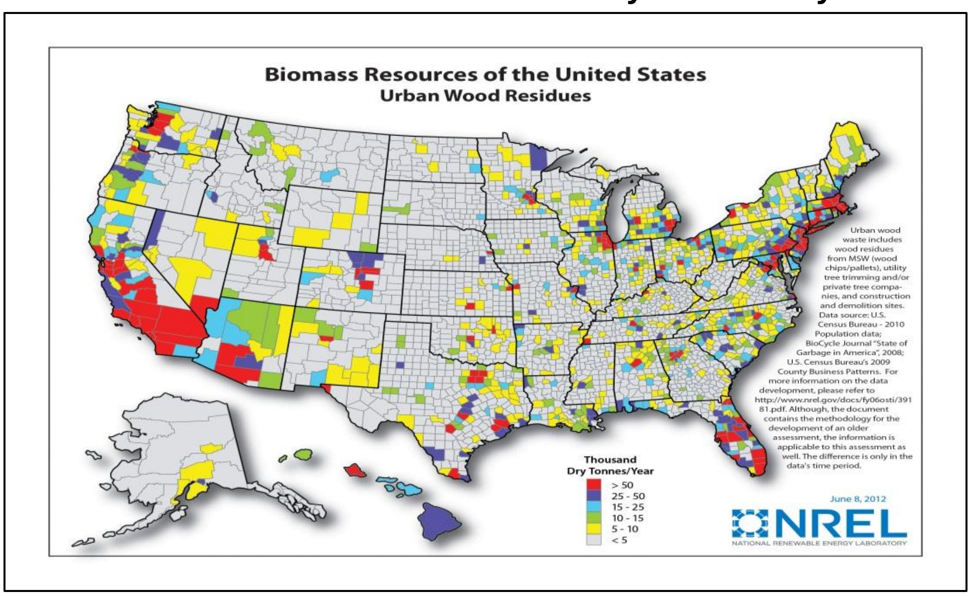


Figure 3-14 Urban Wood Residue Resources by U.S. County[185]



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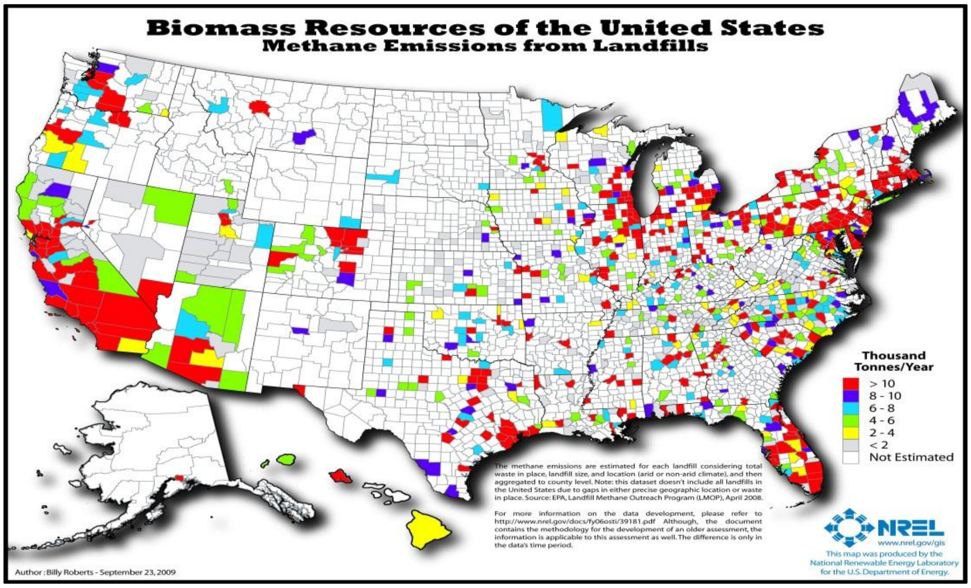
[184] National Renewable Energy Laboratory, "Dynamic Maps, GIS Data, & Analysis Tools: Biomass Maps," http://www.nrel.gov/gis/biomass.html, accessed December 4, 2012.
[185] *Ibid.*

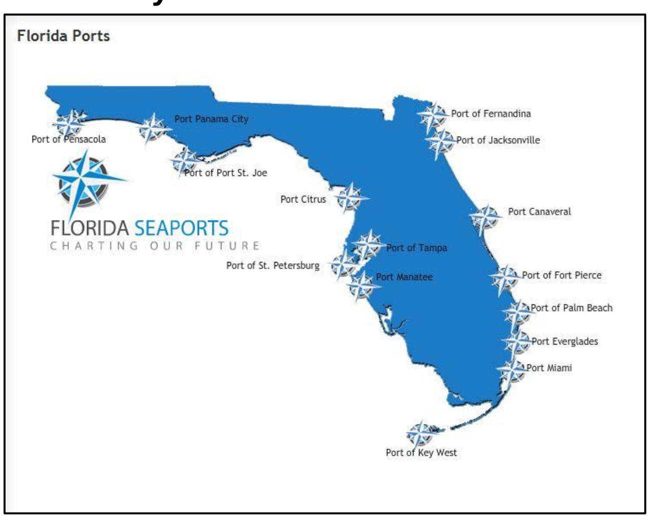
Figure 3-15 Landfill Gas Resources by U.S. County[186]



3.2.5 Coal and Petroleum Coke Rail Lines/Ports

Florida enjoys access to both rail systems and an extensive port system. This allows commodity to be delivered at centralized ports as well as at the site of generating plants. Figure 3-16 shows a map of Florida's port system. Coal for power plants tends to be delivered directly to the site of the generating plant, while oil products are delivered to the state's ports.

Figure 3-16 Florida Port System[187]



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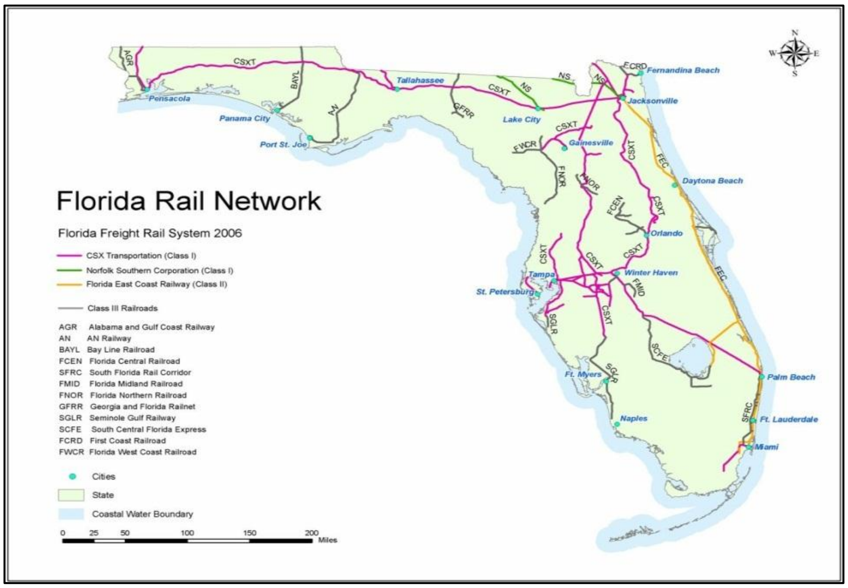
[186] *Ibid.*

[187] Florida Seaports, "Florida Ports," http://www.flaports.org/Sub_Content2.aspx?id=3, accessed December 4, 2012.

Figure 3-17 shows that Florida's rail network spans the entire state, but Florida's presence "at the end of the line" makes it susceptible to supply disruptions, such as the flooding that affected coal deliveries to a number of southeastern states in April and May of 2011.[188] Florida's ability to receive commodities by way of a variety of transportation modes offers insurance against any disruption by any one transportation mode.

Figure 3-17 Florida Rail Network[189]

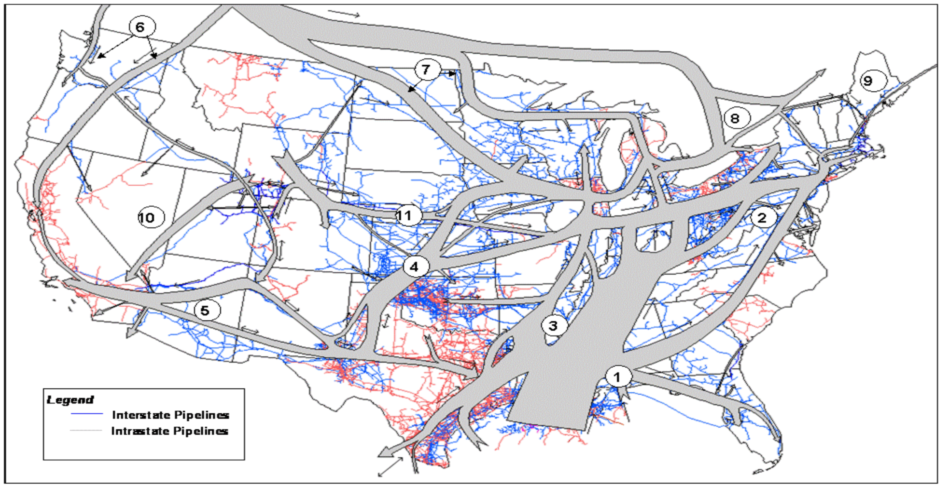


3.2.6 Natural Gas Pipelines

Florida is served by three major pipelines, two from the Gulf region of the U.S. and one through North Florida. Figure 3-18, from the EIA, shows primary natural gas transportation corridors in the U.S., and reflects the fact that Florida receives the majority of its natural gas from the Gulf region. This is significant because tropical disturbances during the summer, when Florida's demand for electricity is high, have interrupted natural gas production and transportation in the past. The pipeline into North Florida serves a portion of JEA's natural gas requirements and gives the state access to the liquefied natural gas terminal in Georgia. However, since the increased usage of hydraulic fracturing technologies in the northeast, the U.S. has not been an importer of liquefied natural gas and is not expected to be over the next ten years.[190]

[188] United States Department of Energy, Energy Information Administration, "Today in Energy," http://www.eia.gov/todayinenergy/detail.cfm?id=3790, accessed December 4, 2012.
[189] Florida Department of Transportation, "Florida Rail Network," http://www.dot.state.fl.us/rail/Publications/Maps/FloridaRailMap2006.JPG, accessed December 4, 2012.
[190] Per Department of Energy's EIA Annual Energy Outlook 2012.

Figure 3-18 Primary Natural Gas Transportation Corridors in the U.S.[191]



Source: Energy Information Administration, Office of Oil and Gas, Natural Gas Division, GasTran Gas Transportation Information System.

The EIA has determined that the informational map displays here do not raise security concerns, based on the application of the Federal Geographic Data Committee's *Guidelines for Providing Appropriate Access to Geospatial Data in Response to Security Concerns*.

3.3 Energy Use by Fuel Type and Sector – The FEECA Utilities

In 2010, the FEECA utilities accounted for 84 percent of all electricity sales in the state of Florida. This concentration means that energy efficiency programs enacted under FEECA have the potential to affect the majority of electricity usage in the state. Each utility reports, in its response to the annual EIA Form 861 survey, its total electricity sales by broad customer class (Residential, Commercial, Industrial, and Transportation). These reported volumes have been aggregated in Figure 3-19, which shows the relative contribution of each utility to this total.

Figure 3-19 shows that Florida's two largest utilities, FPL and PEF, accounted for approximately 62 percent of all electricity sales in 2010. These electricity sales are substantially driven by consumption within the residential and commercial customer classes, shown in Figure 3-20. The figure shows electricity sales, by broad customer class, for each of the seven FEECA utilities, as well as an aggregation of the remaining Florida electric utilities. Residential and commercial customers, which consume nearly 93 percent of the state's electricity, are characterized by relatively low load factors. That is, these customer classes use less energy relative to their peak demand than do industrial customers. The demand from this customer profile results in more extreme system peaks.

[191] United States Department of Energy, Energy Information Administration, "About Natural Gas Pipelines," http://www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/ngpipeline/ngpipeline_maps.html, accessed December 4, 2012.

Figure 3-19: Florida Electricity Sales by Utility - 2010[192]

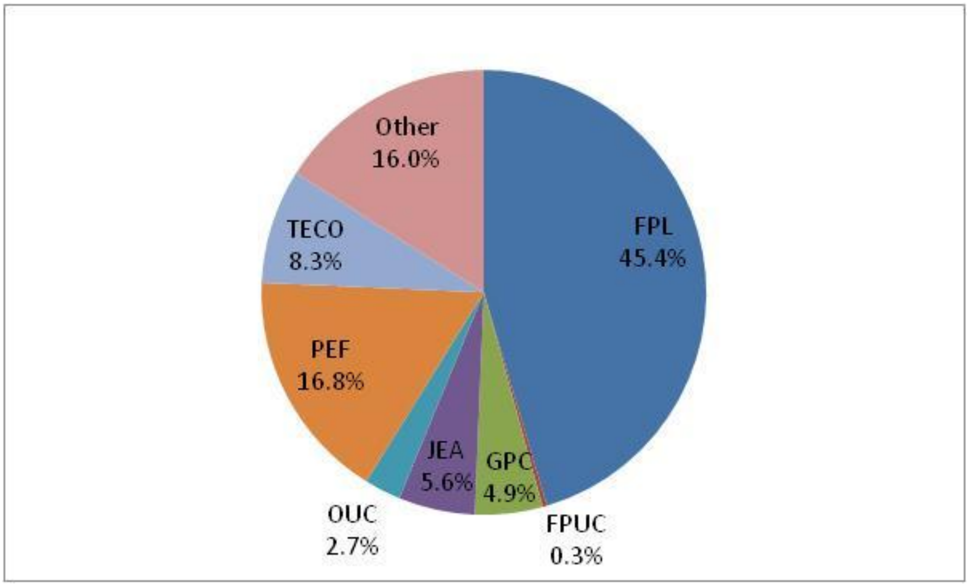
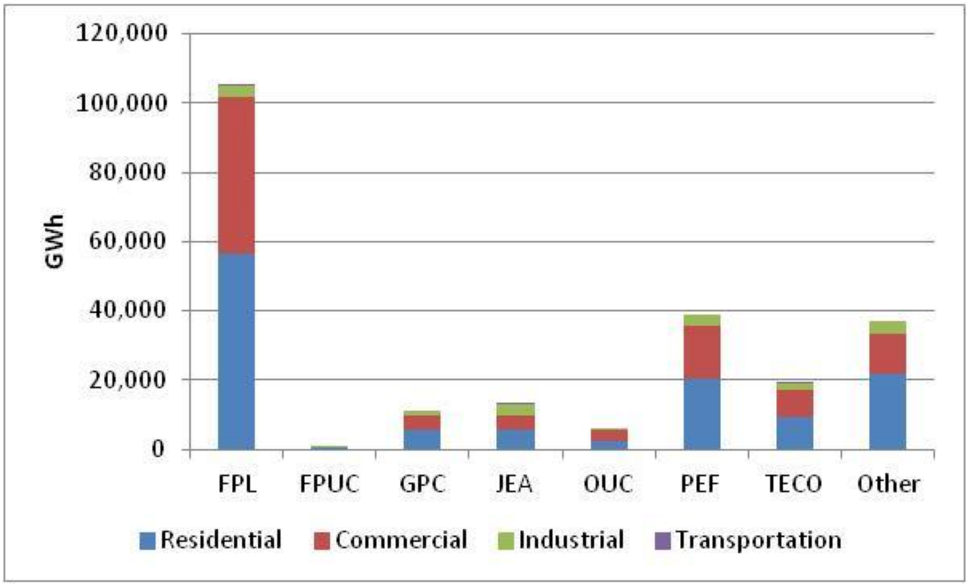


Figure 3-20: Florida Electricity Sales by Utility and Customer Class - 2010[193]



The overall consumption trend for the state from 2001 through 2010 has been increasing, but less than what was expected in 2001. In 2001, the ten-year load forecast for Florida projected summer peak demand to grow by approximately 24 percent by 2010, while the

[192] U.S. Department of Energy's EIA Form 861 ("Annual Electric Power Industry Report"). "Other" refers to an aggregation of the remaining electric utilities in the state.
[193] U.S. Department of Energy's EIA Form 861 ("Annual Electric Power Industry Report"). "Other" refers to an aggregation of the remaining electric utilities in the state.

winter peak was expected to grow by 22 percent. [194] Since the assumed load factor used in the forecasts is approximately equal, the expected growth for electricity usage is roughly the same as the peak demand. Actual growth in electricity consumption has been slightly smaller. Table 3-2 shows the growth in electricity consumption for each of the FEECA utilities, as well as the balance of the utilities in the state, during the period 2001-2010. Only one utility, OUC, has experienced sales growth that exceeds the projected load growth for the state in 2001.

Table 3-2 Growth in Florida Electricity Sales from 2001-2010[195]

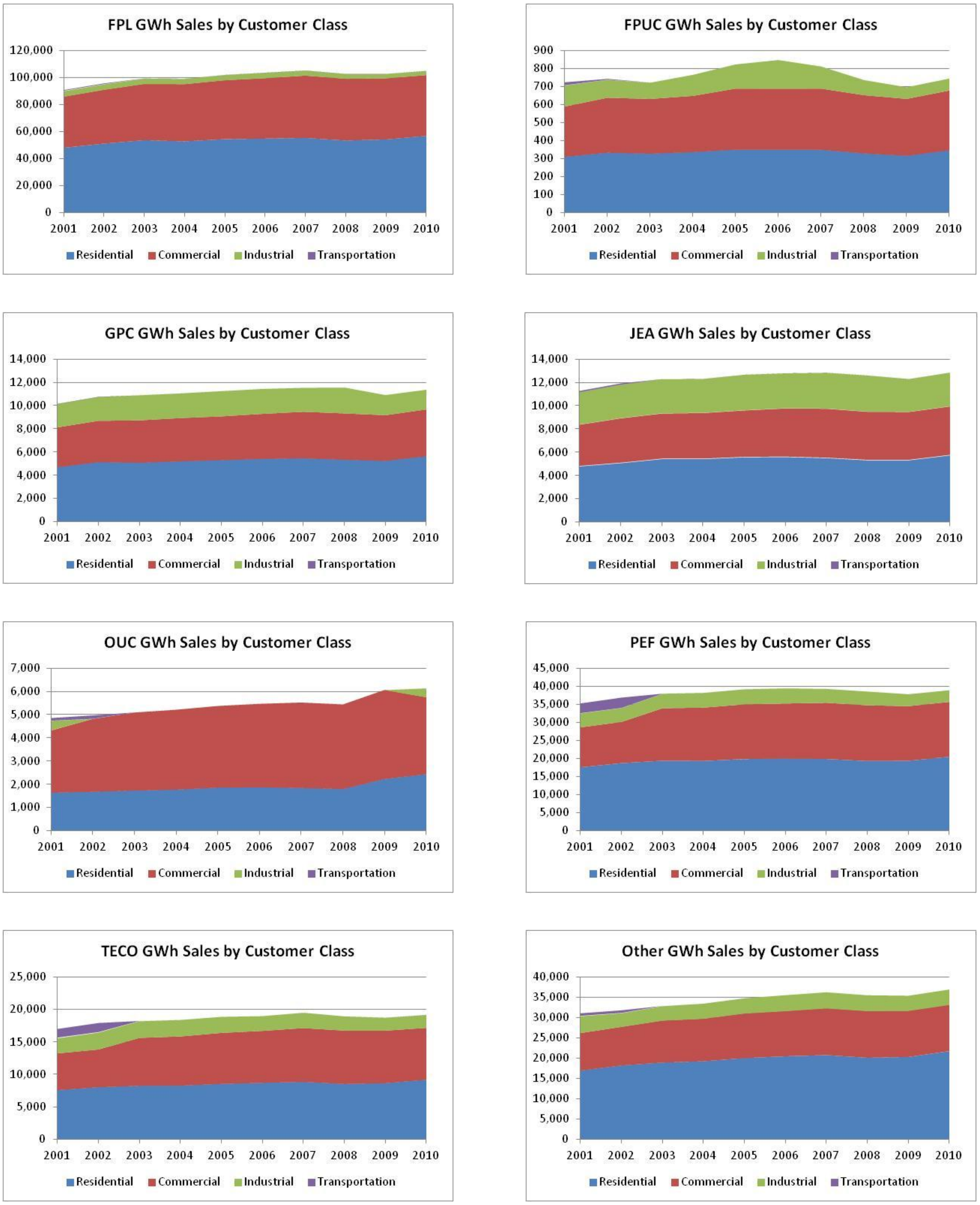
Utility	Growth (%)
FPL	16
FPUC	3
GPC	12
JEA	14
OUC	27
PEF	10
TECO	13
Other	19

Growth trends have not been uniform across utilities, nor have they been uniform across customer classes. Figure 3-21 shows the evolution of sales for each FEECA utility, as well as one chart for the balance of the utilities in Florida. Most of the growth during the period 2001-2010 was in the residential and commercial customer classes, and this growth in the residential and commercial classes has been relatively consistent across all of Florida utilities.

This increase in electricity usage over the period from 2001 through 2010 in Florida has been mirrored when broader energy usage is considered. The State Energy Data System from the EIA tracks all energy usage in the Residential, Commercial, Industrial and Transportation sector. Figure 3-22 shows the amount of electricity, solid fuels (such as wood or coal), liquid fuels (primarily petroleum products), and gaseous fuels (natural gas and derivatives) consumed by each sector in the state over the period 2001 through 2010.

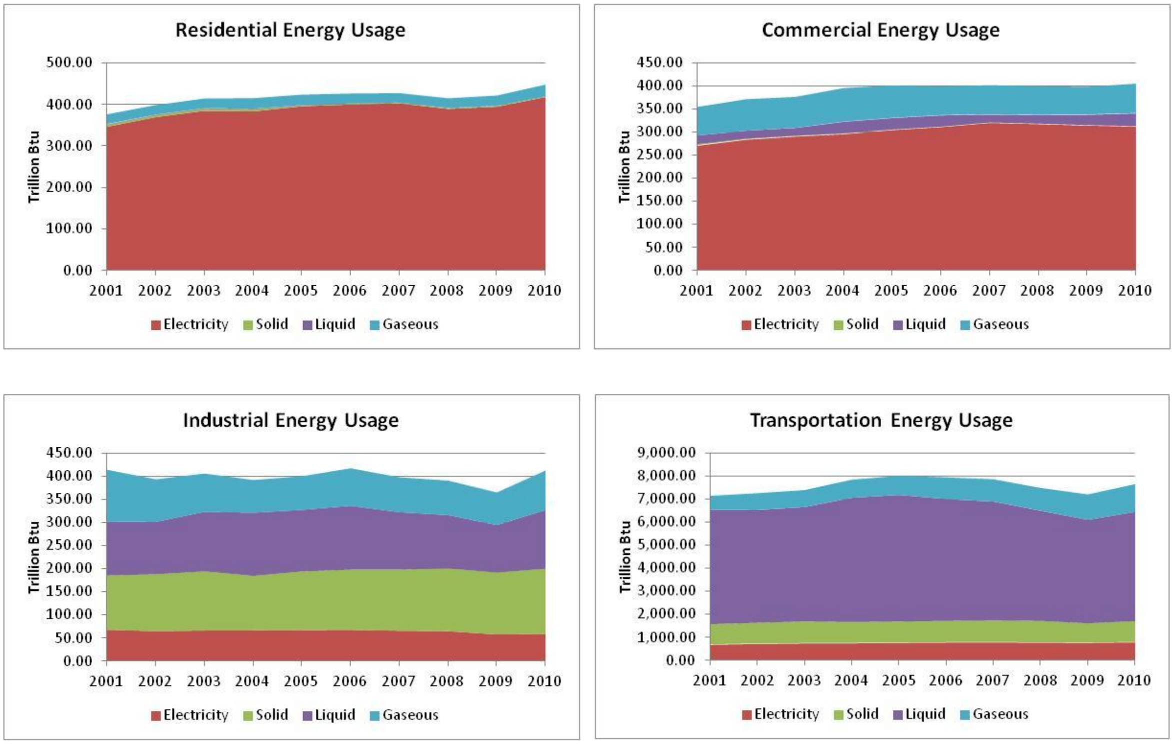
[194] Per the Florida Reliability Coordinating Council 2001 Load and Resource Plan.
[195] U.S. Department of Energy's EIA Form 861 ("Annual Electric Power Industry Report"). "Other" refers to an aggregation of the remaining electric utilities in the state.

Figure 3-21 Florida Electricity Sales by Utility and Customer Class - 2001 through 2010[196]



[196] U.S. Department of Energy's EIA Form 861 ("Annual Electric Power Industry Report"). "Other" refers to an aggregation of the remaining electric utilities in the state.

Figure 3-22 Florida Total Energy Use by Customer Class – 2001 through 2010[197]



Total Residential energy consumption in Florida increased by 19 percent from 2001 through 2010, while commercial consumption increased by 14 percent and Transportation by 7 percent. Total Industrial energy use has fallen by almost 0.5 percent over the same period. While total energy usage has increased in Florida, the economic downturn appears to have affected per capita energy use. Figure 3-23 shows Florida's per capita energy use from 1991-2010. Energy usage in the state began a sustained decline in 2004, and then fell dramatically in 2008 and 2009 before showing an upturn in 2010.

3.4 Forecasts of Electricity Customer, Load, and Energy

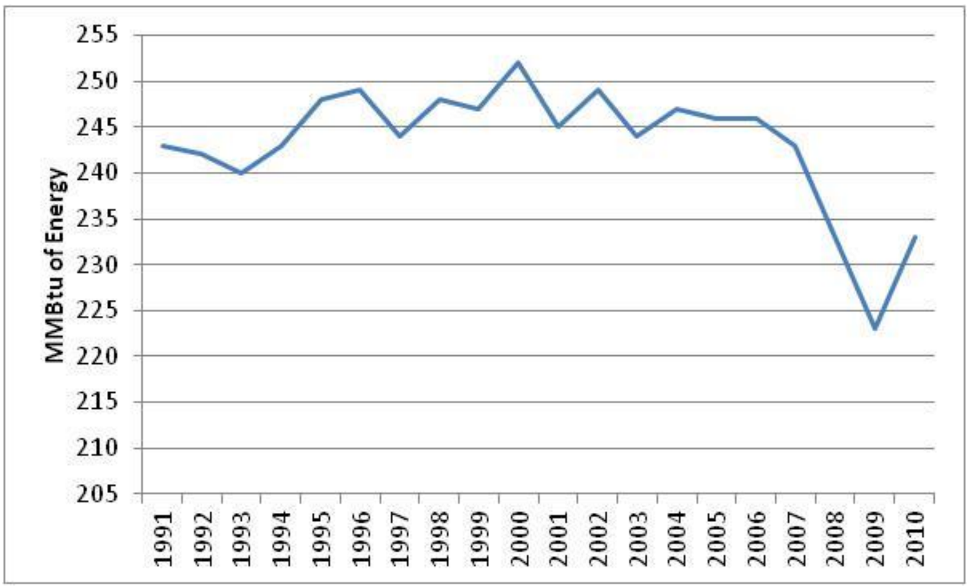
3.4.1 Historical Compared to Current

The load forecast prepared annually by each utility as part of the Ten-Year Site Plan review by the FPSC is a critical component in assessing the needs of the electricity system. Utility assets are long-lived, with multiyear planning and construction requirements. Thus, in order to meet the electricity needs of the state, utilities need to be aware of the number, type, and capacity of future generating units years in advance of the

[197] United States Department of Energy, Energy Information Administration, "State Energy Data System," http://www.eia.gov/state/seds/ , accessed December 4, 2012.

actual need for the unit to be in service. This need for future generating capacity is assessed through the long-term load forecast. However, load forecasts involve many assumptions, including such factors as "normal" weather and projected population growth; and any deviation from those assumptions is going to affect the accuracy of the forecast. Figures 3-24 and 3-25 show the range of forecasted values for the summer peak demand and winter peak demand as a grey bar and the actual peak demand as a line. Actual summer peak demand has been above, below, or within the band over the last 15 years, while the actual winter peak tends to be below the forecasted range. Only the winters of 2002/2003 and 2009/2010, the coldest in the last 30 years, were at the top of the forecasted range. The actual peak data also shows that the winter peak in Florida tends to be more volatile than the summer peak.

Figure 3-23 Florida per Capita Energy Usage - 1991 through 2010[198]



3.4.2 Projected Electricity Capacity Replacements/Additions

New capacity additions in Florida are likely to come primarily from natural gas. While Florida has the potential for renewable energy production from solar, biomass, and tidal and current sources, all have limitations that currently preclude their use as major sources of energy. Until economical storage solutions are developed, solar energy cannot be used to serve load 24 hours per day, and thus requires another generating source to provide electricity when the solar panels are not producing energy. Biomass generation has the potential to produce electricity 24 hours per day, but land use for feedstock production competes with land use for development. The potential for new coal-fired generation

198 *Ibid.*

Figure 3-24 FRCC Forecast Range vs. Actual Summer Peak Demand[199]

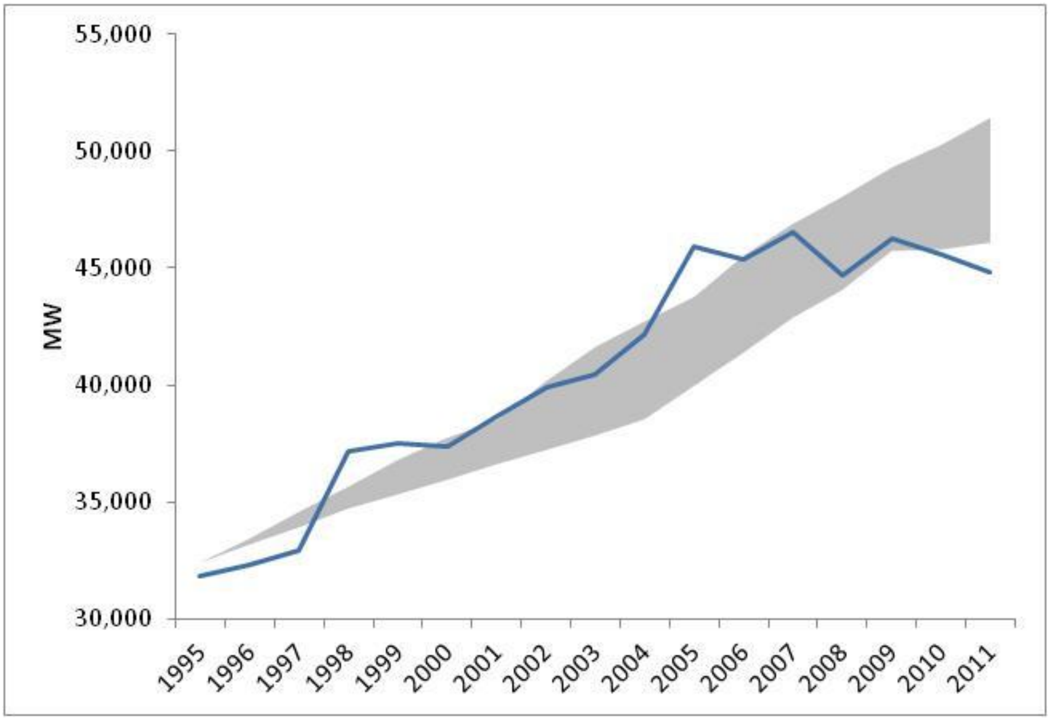
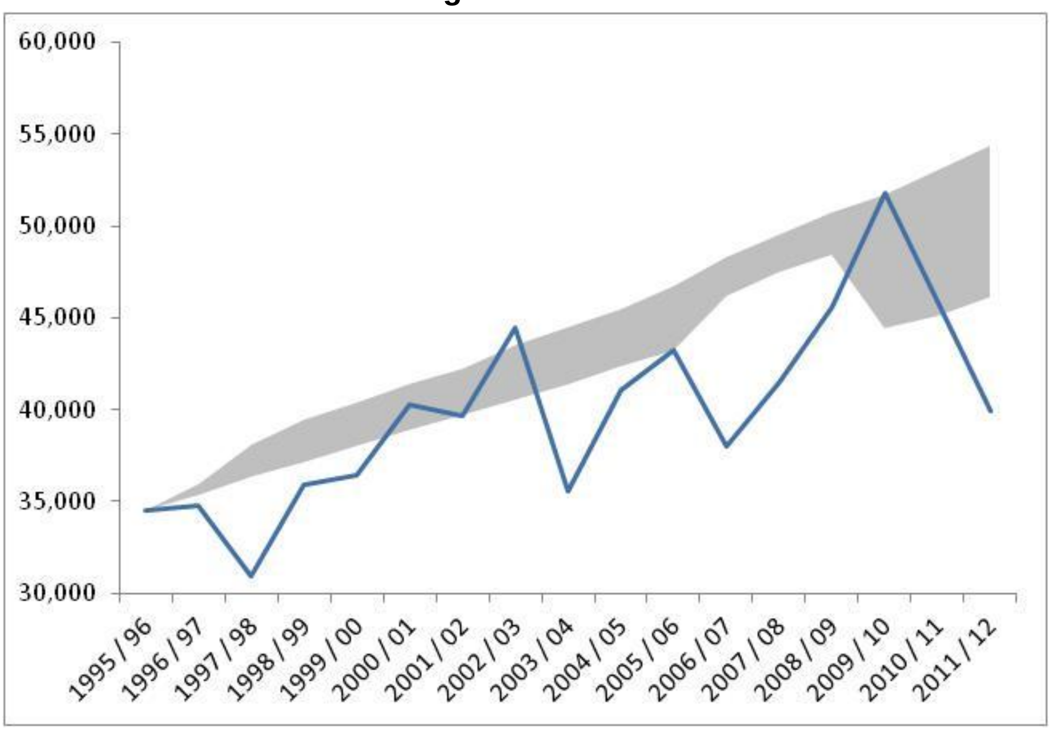


Figure 3-25 FRCC Forecast Range vs. Actual Winter Peak Demand[200]



[199] Florida Reliability Coordinating Council Reliability Assessments 2000-2012
[200] Florida Reliability Coordinating Council Reliability Assessments 2000-2012

capacity in Florida is ambiguous. Even if the current governor were to reverse the previous administration's stance on new coal plants, new EPA regulations limiting the amount of carbon dioxide emissions from new generating units might make such a reversal moot. Nuclear generation remains a potential source of electricity in Florida's future.[201] However, if reported efforts to repeal utilities' ability to recover costs prior to placing plants in service under the nuclear cost recovery clause are successful, the large capital costs and long construction times associated with nuclear units will make their construction difficult, if not impossible.[202] Given the uncertainty associated with the expansion of coal and nuclear generation in the future, natural gas remains the primary fuel for new generation capacity in the state. While projected prices for natural gas remain relatively low in the short term, natural gas prices have been subject to considerable volatility over the past ten years.

3.4.3 Current Fuel Mix Compared to Projected Fuel Mix

Table 3-3 shows the projected electricity production by fuel source from 2011 through 2021. The current plan anticipates significant growth in both nuclear and natural gas generating capacity and assumes that the Crystal River nuclear plant will return to service in 2014, and the Levy County nuclear plant will begin service in 2021. Thus, as the table shows, nuclear energy output is anticipated to increase by nearly 20,000 GWh from approximately 23,000 GWh to approximately 42,000 GWh by 2021. While that remains the current plan for both units, there is still considerable uncertainty surrounding the future of these plants. If these expectations are not met, other resources will be required to replace that energy. Natural gas-fueled electricity production is also estimated to increase by approximately 20,000 GWh during the ten year period.

[201] Current coal-fired generating technology cannot meet the emission standards proposed by the EPA Carbon Pollution Standard for New Power Plants.
[202] Section 366.93, F.S., allows for the recovery of some expenses related to nuclear plant construction prior to placing the generation unit into service.

Table 3-3 Projected Florida Electricity Sources - 2011 through 2021[203]

2012
LOAD AND RESOURCE PLAN
STATE OF FLORIDA

FRCC Form 9.1
ENERGY SOURCES (GWH)
AS OF JANUARY 1, 2012

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	ENERGY SOURCES		UNITS	ACTUAL 2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
(1)	FIRM INTER-REGION INTERCHANGE		GWH	6,928	5,051	2,955	3,058	2,517	1,297	102	-816	-1,440	-1,300	-1,517
(2)	NUCLEAR		GWH	22,828	20,576	27,924	30,540	36,392	37,855	38,356	36,437	38,245	37,834	42,044
(3)	COAL		GWH	56,014	50,634	55,276	56,849	57,135	59,572	60,807	61,757	63,550	62,946	63,874
	RESIDUAL													
(4)		STEAM	GWH	847	1,038	426	239	283	358	308	281	292	345	450
(5)		CC	GWH	0	0	0	0	0	1	1	1	1	3	0
(6)		CT	GWH	0	0	0	0	0	0	0	0	0	0	0
(7)		TOTAL:	GWH	847	1,038	426	239	283	359	309	282	293	348	450
	DISTILLATE													
(8)		STEAM	GWH	63	21	22	23	23	24	24	24	25	25	25
(9)		CC	GWH	130	34	44	31	30	35	34	33	39	46	52
(10)		CT	GWH	138	278	199	263	223	231	242	286	334	354	266
(11)		TOTAL:	GWH	331	333	265	317	276	290	300	343	398	425	343
	NATURAL GAS													
(12)		STEAM	GWH	9,612	5,956	3,878	4,713	4,848	4,913	4,682	4,919	4,330	4,382	3,722
(13)		CC	GWH	123,976	140,122	134,935	135,825	134,585	135,237	138,123	142,240	144,248	149,311	150,692
(14)		CT	GWH	3,655	2,886	2,767	2,434	2,540	2,064	1,850	2,014	2,097	2,409	1,857
(15)		TOTAL:	GWH	137,243	148,964	141,580	142,972	141,973	142,214	144,655	149,173	150,675	156,102	156,271
(16)	NUG		GWH	2,611	2,793	2,580	1,648	1,655	1,659	1,660	1,663	1,668	1,677	1,676
	RENEWABLES													
(17)		BIOFUELS	GWH	21	13	13	13	13	13	13	13	13	13	13
(18)		BIOMASS	GWH	737	611	579	995	1,002	932	930	930	930	932	930
(19)		HYDRO	GWH	8	21	21	21	21	18	20	21	21	21	21
(20)		LANDFILL GAS	GWH	334	367	608	585	601	579	540	413	346	321	316
(21)		MSW	GWH	1,655	1,875	1,867	1,851	1,866	1,868	1,451	1,451	1,451	1,456	1,451
(22)		SOLAR	GWH	116	284	294	303	313	322	324	327	327	329	327
(23)		WIND	GWH	0	0	0	0	0	0	0	0	0	0	0
(24)		OTHER RENEW.	GWH	28	3	4	4	4	3	4	4	4	3	4
(25)		TOTAL:	GWH	2,899	3,174	3,386	3,772	3,820	3,735	3,282	3,159	3,092	3,075	3,062
(26)	OTHER		GWH	7,957	6,082	7,240	5,923	6,547	7,568	8,727	9,486	8,856	9,190	9,316
(27)	NET ENERGY FOR LOAD		GWH	237,658	238,645	241,632	245,318	250,598	254,549	258,198	261,484	265,337	270,297	275,519

[203] Florida Reliability Coordinating Council Load and Resource Plan 2012.

4 Methods and Models for Planning and Setting Goals

4.1 Introduction

This section presents a discussion of the methods and models for planning and goal setting pursuant to FEECA. It begins with an overview of methodologies available for estimating technical, economic, and achievable levels of DSM and the key factors that create uncertainty in the results. The methodologies used in the FPSC's most recent FEECA goal-setting proceedings are compared to available options. That comparison forms part of the basis of formulating policy recommendations discussed in Section 1.

Section 2 of this report describes the FPSC's role in planning and goal setting in accordance with FEECA. The FPSC's obligations under FEECA include setting and periodically reviewing DSM goals. Effectively carrying out these responsibilities is complicated by the technical challenge of reasonably forecasting the level of energy and demand reduction obtainable at a given level of cost. The factors that should be considered are different from those associated with electric power supply-side planning, which can be compared to forecasting auto sales in a situation where there is only one make of car available with only one color and one feature package at a single price. This simple scenario reduces the complexity of estimating the total number of new cars customers will want to purchase in a given year. Forecasting for DSM planning purposes is more like trying to produce individual forecasts for not only numerous combinations of automobile makes, models, colors, feature packages, and prices, but also other modes of transportation like motorcycles, trucks, scooters and bicycles. The product combinations, internal substitutability, evolving customer tastes, and other features complicate the forecasting.

4.2 Available Methods and Models

4.2.1 Technical, Economic, and Achievable DSM Potential

An apt analogy to DSM potential is the measurement of oil reserves. The level of oil reserves is primarily a measure of geological risk. Possible reserves generally have at least a 10 percent chance of being recovered. Probable reserves would likely be recovered. Proven reserves have a reasonable certainty, often cited at 90 percent or greater, of being recovered. In addition to geologic factors, the probability of economically producing oil from any particular formation can change when prices and technologies change.

In DSM planning and forecasting, the analogous concepts are technical potential, achievable potential, and economic potential with each type of potential identified through specific studies. Estimates of these potentials typically incorporate the assumption that consumers will seek to preserve their current levels of service or comfort. However, customers may take advantage of improved efficiency to enjoy higher levels of service or comfort.[204]

In general, technical potential studies focus on what is physically achievable and omit factors such as customer discount rates, equipment replacement rates, capital shortfalls, and incomplete knowledge on the part of consumers. Achievable potential studies take into account additional factors of life, such as property ownership status, equipment availability and compatibility, customer confidence in the technologies, sales pressure, current weather, and expected time to stay in a home. [205] Thus, achievable potential tends to be a fraction of technical potential.

Economic potential studies address cost-effectiveness by incorporating economic factors, such as payback time, as decision drivers. For example, the marginal cost of improving efficiency is much less if equipment is being replaced for other reasons, such as to address technical failures and high maintenance costs. Economic potential studies assume that customers know all relevant economic information and that customers can accurately process the information. Successfully conducting such studies depends on obtaining valid inputs, such as proper customer discount rates and opportunity costs. Economic potential can be substantially less than technical potential.

4.2.2 Bottom-Up, Top-Down, and Conjoint-Analysis Approaches

There are three basic approaches to estimating technical, economic, and achievable conservation potential, namely the bottom-up approach, the top-down approach, and the conjoint-analysis approach.[206]

The bottom-up approach estimates energy consumption by combining the expected use of energy using equipment and appliances. The approach begins with detailed end-use and appliance data, and information on the capacity factor[207] and coincidence factor[208] for

[204] This is referred to as the rebound effect. Analytically, the rebound effect can be addressed by modeling the improved efficiency as a reduction in price and, through the application of appropriate price elasticity estimates, the new quantity of electricity demanded can be predicted.
[205] Mosenthal, et. al. 2007
[206] Mosenthal et. al. 2007; Navigant 2011
[207] Capacity factor is a measurement of the amount of time an energy conservation measure avoids energy. For example, a streetlight that runs 8 hours a day has a capacity factor of thirty percent.
[208] Coincidence factors adjust capacity factors to reflect whether or not an energy conservation measure saves energy during the time of system peak. The streetlight described above saves no energy during a daytime summer peak and has a summer peak coincidence factor of zero percent.

each device or end-use. Technological substitutions are assumed. Energy savings are then estimated by multiplying the number of devices by the average efficiency change and the demand and energy savings attributed to each device and end-use. Summing these products for all evaluated devices and end-uses provides an aggregate estimate of the technical potential. This approach is data intensive. There are practical limitations on estimating technical potential using a bottom-up approach, including:

1) Errors in the estimated market saturations of various appliance types, especially in the commercial and industrial sectors.
2) The difficulty and cost of obtaining complete end use and appliance data because of the large number of manufacturers, models and efficiencies.
3) Variations in the ages, condition, and operating efficiencies of devices.
4) Impacts of human operators on efficiency that can be significant but are effectively unknowable.
5) The availability of a variety of replacement technologies for a given device or end use each of which would likely have a different net impact on energy efficiency.
6) Reliance on estimates of energy use and savings potential whose statistical confidence intervals are difficult to accurately estimate.

The top-down approach is less data intensive than the bottom-up approach, but may be more subjective. In a top-down study, total system energy use is identified by customer sector and major end-use through analysis of revenue metering data. Standardized industrial classification codes can sometimes be used to further separate commercial accounts into building types and functions. Base heating and cooling end-uses can be identified through seasonal trend analysis for residential customers, but this approach is problematic for larger commercial customers who need to eject heat from buildings year-round due to internal heat loads. Once the energy uses are separated, savings percentages are applied using literature values from case studies and other types of studies.

The conjoint-analysis approach avoids some of the deficiencies of the top-down and bottom-up approaches by examining, in-depth, the physical, economic, and social contexts of a sample of customers.[209] This approach can be more expensive than the other two approaches because it involves actual fieldwork or surveys. One method for applying conjoint-analysis is to perform an energy audit on a sample of customers and develop an optimal set of solutions based on these customers' circumstances. Another method is to gather detailed information on customer circumstances and the energy efficiency decisions that they make. Whatever method is employed, the conjoint-analysis should provide an estimate of economic potential that takes into account the interactions

[209] See, for example, Poortinga, Wouter, et al, 2003.

among conservation measures, the ages and operating characteristics of the equipment, and individual behavioral patterns.

4.2.3 Interaction of DMS Policies with Other Policies

DSM policies do not operate in a vacuum. Analysis of the potential impact of those policies and of their cost-effectiveness is affected by energy-related building codes, housing codes, and standards for appliance efficiency. These external factors can either diminish the effective benefits of a DSM program through time or enhance participation rates. Other policies and standards such as those affecting the efficiency with which utilities generate electricity and transmit it to customers also impact the cost-effectiveness of DSM programs, because they change the economic value of the avoided energy and capacity.

In regard to the impact of appliance standards and housing codes on DSM programs, two hypothetical examples illustrate these interactions.

Example 1: A utility offers rebates to customers who purchase HVAC equipment that exceeds a SEER 15 during a period when the minimum federal standard is SEER 13, thus providing an incentive for customers to purchase equipment that exceeds the minimum standard.[210] Further, assume that the rebate levels and program cost-effectiveness were established based on benefits of avoided energy and capacity costs using an equipment life cycle of 15 years. Then three years after the program has been initiated, a more stringent standard is established requiring that all new HVAC equipment must be at least SEER 15. The economic benefits of the rebate investment by the utility are immediately diminished (unless the program standards are changed) because the new standard has eliminated the need for the economic incentive for customers to purchase equipment rated at SEER 15.

Example 2: A utility offers a rebate of $0.25 per square foot of ceiling insulation, justified on the basis of the energy and capacity savings from increasing the R-value from R-11 to R-30.[211] Unfortunately, owners of rental properties with very little insulation may not have an incentive to participate if they will not receive direct economic benefit in the form of lower energy bills. The state in which the utility operates amends the housing code to require a new, higher minimum level of insulation in rental property.

[210] The efficiency of central air conditioning units is governed by U.S. law and regulated by the U.S. Department of Energy (DOE). Every air conditioning unit is assigned an efficiency rating known as its "seasonal energy efficiency ratio" (SEER). The SEER is defined as the total cooling output (in British thermal units or Btu) provided by the unit during its normal annual usage period divided by its total energy input (in watt-hours) during the same period.

[211] R-value measures a material's resistance to heat flow. It indicates the material's usefulness as an insulator.

Because of the new insulation requirement, owners of poorly insulated rental properties find it financially beneficial to participate in the utility's ceiling insulation rebate program. As a result over time, the average insulation value in rental properties changes from R-8 to R-30, which leads to greater energy and capacity savings and enhances the cost-effectiveness of the insulation program, provided that the ratio of free riders to induced participants does not change.[212]

Although legislation or regulation can mandate utilities to offer DSM programs and incentives, customers typically participate voluntarily. Exceptions to this general principle include certain rate structures or other customer charges, some of which may have been designed in part to promote the efficient use of resources (e.g., time-of-use rates). Building codes, housing codes, and appliance efficiency standards are other examples of non-voluntary energy conservation programs. Strategically utilizing non-voluntary programs to overcome a misalignment of costs and benefits may enhance achievement of overall energy efficiency and conservation goals.

Calculating the cost-effectiveness of DSM programs can also be complicated by the impact of any supply side energy efficiency efforts undertaken by the utility. When a demand side program, such as an incentive for the purchase of more energy efficient appliances, is evaluated the benefit depends in part on the cost of the energy and capacity that would have been necessary absent the efficient appliance. The program is deemed cost-effective based on the costs of program implementation plus the costs of the avoided energy and capacity. However, supply side energy efficiency measures can change the cost of providing the energy and capacity and thus change the cost-effectiveness of the demand side program. Therefore, it is important to understand the interrelationship between demand- and supply-side programs when identifying energy efficiency strategies.

4.2.4 Forecasting Market Penetration

A number of methods can be used to forecast market penetration and customer participation in DSM programs. These methods, which can be applied singularly or in combination, include: 1) subjective estimation methods, 2) market surveys, 3) historical analogy models, 4) cost models, 5) diffusion models, 6) time series models, and 7) other econometric models.[213]

[212] If requiring landlord to improve energy efficiency increases their costs, it seems likely that these costs would be passed onto tenants in the form of higher rent. There would be a net savings to tenants in situations where their lower utility bills more than compensated for the higher rent. However, there would be situations where the energy efficiency requirement leads to higher overall housing costs. This would likely decrease disposable income for renters, which could be a burden on some low-income households.

[213] Packney,1993.

Subjective estimation models rely on judgment and intuition and draw, in qualitative ways, from the experiences and expectations of those involved in creating the estimate. Factors that might come into play include the age of the program or technology and the degree of experience the target consumers might have with the incentive and technology being offered. The literature describes two versions of this approach – the Panel Consensus Method (PCM) and the Delphi Method (DM). The PCM method involves gathering a group of decision makers to offer a consensus opinion after discussion. This approach leverages the participants' shared knowledge and experience, but the consensus can be affected by personalities and group dynamics. The DM approach involves a group of experts, but no group meetings are held. Individuals instead provide their estimates in writing, which are then pooled and distributed in an iterative process. The process continues until a consensus is reached, or the forecasters no longer change their estimates.

Market survey methods, sometimes called "intention surveys," involve asking a sample of individuals in the target consumer group what they would do in a given circumstance. Because intentions and actual behavior can be different, this approach can either overestimate or underestimate potential. Surveys can be structured to gain insight into the factors and considerations involved in making a decision to purchase a product or participate in a program.

Historical analogy models involve comparing an existing product or program's market penetration to that of a similar new product or program. Effectively using this method requires careful selection of comparable products or programs, and careful definition of product or program dimensions that make them similar or different. Competing products, programs, geography, and demographics must also be identified.

Cost model methodologies involve identifying competing products or programs, and comparing those alternatives using appropriate economic metrics. To work appropriately, the model needs accurate data, all factors that materially impact adoption must be quantifiable, and the decision-making algorithms must reflect decision-making processes used by customers. One example of a cost model is known as a "payback acceptance curve" or "implementation curve".

Diffusion model methodologies posit a market maximum penetration, and an adoption rate governed by the behavior of both innovators and imitators. Innovators are early adopters of a technology, while imitators wait until a certain level of market penetration has occurred. Imitators are heavily influenced by the number of people who have already adopted a technology, along with word-of-mouth. Diffusion model forecasts tend to adopt a logistic curve pattern of market penetration through time. Diffusion models can be combined with cost models to set the maximum penetration potential while addressing the rate of adoption.

Simple time series models require only data on one variable and are driven by historical information. Analysis indicates the appropriate model specification, such as linear, exponential, or more sophisticated autoregressive specifications. More sophisticated econometric models require additional data beyond simple time series models, but provide greater statistical validity. Outside factors affecting the adoption or use of a product or service are identified and historical relationships subjected to statistical analysis. The estimated parameters then form a basis for predicting future outcomes.

The choice of methodology for forecasting market penetration is determined to a large extent by the available data or the possibility of similar circumstances. Methodologies are often combined in the end. Subjective estimates, for example, can be combined with more rigorous mathematical techniques. An ideal market penetration model easily forecasts both program-driven adoption of conservation technologies and adoption that would occur without the programs with minimal effort and cost.

4.2.5 Free-Riders and Spillovers

Ideally, managers of conservation programs could easily distinguish between customers who would adopt conservation measures even without an incentive, customers who would adopt the measures only with an incentive, and customers who would not adopt them under any circumstances. In the real world however, these distinctions are rarely, if ever, perfectly made, leading to issues of free-riders and spillovers (sometimes called free-drivers).

In the context of public benefits and utility energy efficiency programs, a free rider is someone who did not need an incentive to adopt an energy efficiency measure, but who participates in and receives the program incentive anyway.[214] Free-riders decrease the cost-effectiveness of an incentive because the cost of the incentive is essentially wasted on them.

Free-ridership in DSM programs has been studied in a number of states using a variety of research tools. These include surveys, energy use analysis, appliance sales and inventory comparisons between geographical areas, and the exercise of market penetration models. The survey approach is similar to the "intention" surveys described above but it encounters similar methodological challenges, such as the integrity of the respondents. The energy analysis approach requires sophisticated comparisons of customers who

[214] Lui et. al. 1990

participate in the program to control groups without the opportunity to participate. Appliance sales and inventory analyses are similar in concept. Finally, a fully specified market penetration model that measures the effect of utility incentives could be used to allow free-ridership to be taken into account.

The hypothetical diagram in Figure 4-1 illustrates how an implementation curve could be used to estimate free ridership. In this illustration, the portion of free riders is estimated to be slightly over 10 percent.

Figure 4-1 Application of an implementation curve to forecast naturally occurring and induced market penetration as the consequence of offering a financial incentive [215]

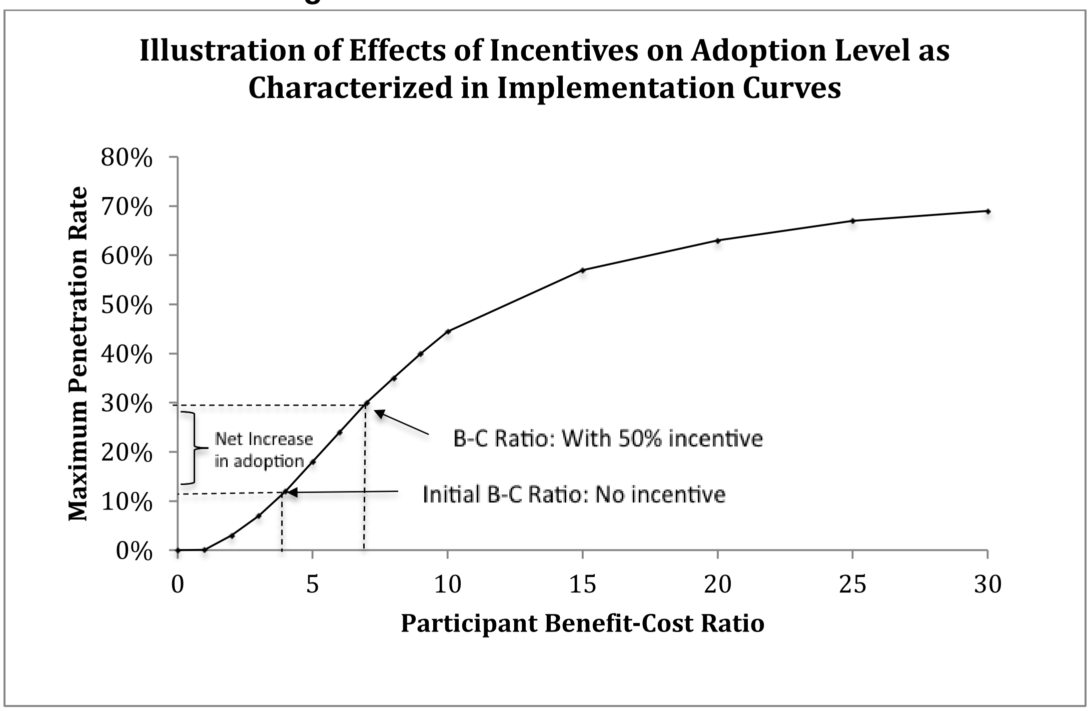


Table 4-1 presents results from intention surveys conducted to ascertain the fraction of program participants to have likely acquired the energy technology without additional financial incentives. Free-riders can be a significant portion of program participation, and the form of incentive offered can make a substantial difference.

[215] Rufo, Mike. *Direct Testimony & Exhibits RE: Commission Review of Numeric Conservation*, Florida Public Service Commission, June 1 2009, Exhibit MR 11 Page 7.

Table 4-1 Example Values for Free Ridership[216]

Type of Conservation Program	Range of Free-Rider Ratios (%)
Rebate Programs	
Gas Furnace	40-71
Heat Pump	40-60
Refrigerator	65-89
Air Conditioner	63-79
Loan Programs	22-70
Low Income Programs	6-45
Commercial and Industrial Audit Programs	12-61

The effects of free-riders can be taken into account in a number of ways. Market forecasting tools can be used to adjust the estimated savings from programs to exclude those adoptions that would have occurred anyway (naturally occurring). For example, conservation measures with relatively short payback periods could be excluded from cost-effectiveness tests based on the assumption that customers would be likely to adopt these measures even without an incentive. Some analysts of energy efficiency programs argue that free rider effects can be ignored because they are offset by spillovers.[217]

Spillovers – also called non-participating adopters or free-drivers – are customers who adopt an energy conservation measure because of an incentive program, but do not directly participate in the program.[218] For example, consumers may adopt the conservation measure after learning about it through program advertising or information passed by word-of-mouth., but may not be formal program participants for a variety of reasons. Such persons may fall into the category of "imitators" as described above.

4.3 2009 FEECA Goals Review

4.3.1 Preliminary Workshops

In preparation for setting goals in the most recent goal-setting proceeding, the FPSC held five workshops. Those workshops were:

1) November 29, 2007 to explore ways and means to promote additional energy conservation in Florida
2) April 25, 2008 to examine how cost-effectiveness should be evaluated
3) June 4 2008 to discuss the appropriate methods for conducting the required technical potential study[219]

[216] Lui et. al, 1990
[217] See, for example, Kushler *et al*. 2012
[218] Packey 1993
[219] Required by 2008 amendment to Section 366.82, F.S.

4) November 3, 2008 on the development of demand side and supply side conservation goals, including demand side renewable energy systems (solar PV, solar hot water, and geothermal energy)
5) December 15, 2008 for the presentation of the results of technical potential study.

In late June 2008, between the third and fourth workshops, seven dockets were opened for the FPSC's most recent proceeding to set numeric conservation goals pursuant to FEECA. Each FEECA utility's numeric conservation goals for the period 2010 through 2019 were adopted in FPSC order issued December 30, 2009.[220] The entire proceeding from the first workshop to the final order was just over two years in duration.

4.3.2 Methodologies Applied in the 2009 FEECA Goals Review [221]

A discussion of setting goals for DSM programs necessarily requires an understanding of the interactions of codes and standards with DSM programs, approaches to analyzing conservation potential, methods of forecasting market penetration, and customers who may be classified as free-riders and spillovers, as briefly summarized above. With those concepts in mind, this subsection focuses on the most recent cycle of goal setting proceedings conducted by the FPSC -- the 2009 FPSC goal-setting proceedings.

The FPSC set goals in those proceedings in a three-stage process.[222] The first stage was a technical potential study performed by a consulting group on behalf of a consortium of FEECA utilities.[223] The study covered the service territories of the FEECA regulated utilities and was a "bottom-up" design. The Southern Alliance for Clean Energy and the Natural Resources Defense Council served as participants in the consortium as project advisors.[224] The study separately addressed three types of energy conservation programs:

1) Energy Efficient Equipment and Building Envelopes
2) Demand Response Programs
3) Solar photovoltaic installations

Over 800 DSM technologies were reviewed and screened to identify 257 unique measures for evaluation, including 61 residential measures, 78 commercial measures, and

[220] Order No. PSC-09-0855-FOF-EG.
[221] After review of After review of Haney, John R. *Direct Testimony & Exhibits of Florida Power & Light Company's Petition for Approval of Numeric Conservation Goals*, Florida Public Service Commission, June 1 2009; Rufo, Mike. *Direct Testimony & Exhibits RE: Commission Review of Numeric Conservatio*n, Florida Public Service Commission, June 1 2009; Spellman, Richard F and Guidrey, Caroline. *Direct Testimony and Exhibits of GDS Representatives on Behalf of the Staff of the Florida Public Service Commission*, Florida Public Service Commission July 17, 2009.
[222] Order No. PSC-09-0855-FOF-EG.
[223] Itron et. al.
[224] Itron et. al. page 1-1.

118 industrial measures.[225] An "economic stacking" approach was employed to account for the interactions among the measures being evaluated. For a given end-use or sector, measures with the best payback were assumed to be done first, which then reduced the energy savings potential for the next best technology for that end-use or sector.

The second stage of the process involved an achievable potential analysis, which was conducted in three steps:

1) Initial cost-effectiveness screening without incentives
2) Screening with incentives
3) Scenario analysis

FPSC rules require that estimates of achievable potential and cost-effectiveness consider rebound effects, free riders, interactions with building codes and appliance standards, and the utility's latest measurement and evaluations of conservation programs and measures.[226]

The four larger investor-owned utilities (IOUs) performed their own achievable potential analysis and the consultant group that conducted the technical potential analysis performed the achievable potential analysis for FPUC, JEA, and OUC.[227] The achievable potential analysis study was performed separately for each FEECA utility. Results of that analysis were combined to allow comparison with the technical potential study. The achievable potential studies combined subjective estimations, cost, diffusion, and historical analogy methods for forecasting market penetration.

Initial cost-effectiveness screening was conducted by applying cost-effectiveness tests to each measure that passed the technical potential analysis, without incentives. Measures that had participant paybacks of less than 2 years were proposed for removal from consideration at this stage of the analysis as a means by which to minimize free-riders. The cost-effectiveness analyses performed pursuant to FEECA include a period of time longer than the expected useful life of most of the customer-installed equipment. Most, but not all, utilities assume that the equipment will be replaced by equipment that is at least as energy efficient. At least one company assumed that another round of purchase would be required. More consistent application of the FPSC's cost-effectiveness methodology than was seen in this round of goal-setting could result in better cost-effectiveness estimates.

[225] Sim, Steve R. *Direct Testimony & Exhibits of Florida Power & Light Company's Petition for Approval of Numeric Conservation Goals*, Florida Public Service Commission, June 1 2009.
[226] Rule 25-17.0021(3), F.A.C.
[227] ITRON et. al. 2009

The second stage in establishing achievable potential was to set incentive levels through an iterative process. Incentives were applied to measures that did not pass the PT, yet passed the E-RIM and E-TRC tests, finding the level at which each of these tests, plus the PT, were passed. The FEECA utilities' studies included scenarios in which the value of externalities (e.g., E-TRC or E-RIM) was included in the economic analyses of achievable potential. Scenarios that included the value of externalities resulted in each utility being able to increase the level of financial incentive that could be offered, and thus increased the level of achievable net savings. In some cases (such as solar PV) the level of incentive required to make the measure cost-effective for the participant caused it to fail either the E-RIM or E-TRC test.

The third stage in the achievable potential process required utilities to develop six scenarios for achievable potential, including low, medium, and high levels of incentive. No measures were found to pass the E-RIM test for FPUC, JEA, or OUC. No solar PV cases were found to pass economic screening for any of the FEECA utilities and were not included in achievable potential.

Implementation curves were used to: 1) model naturally occurring conservation measure adoption and 2) model the change in adoption as a result of additional financial incentives. Therefore, the study results excluded the naturally occurring adoption rates, thus addressing the free-rider issue. A number of different implementation curves were employed to reflect market barriers to the adoption of a specific measure, which in effect meant applying different customer discount rates to different technologies and market sectors. Selection of the appropriate curve was based on the review of a number of qualitative factors, such as performance uncertainty, product or service availability, hassle or transaction costs, and access to financing.

Six levels of financial incentive were employed in the exercise of the implementation curves, corresponding to RIM high, medium, and low levels of incentive, and TRC high, medium, and low levels of incentive. These had to be different for each utility due to their unique values for avoided energy and capacity. The market penetration studies were extended over 20 years and took into account capital equipment turnover rates. Finally, calibration was conducted in reviews with staff from each utility to incorporate past experience.

The fourth stage of the process involved each utility reviewing the achievable potential results and refining the market penetration forecasts with more detailed assessments of RIM and TRC values in order to propose goals. The goals proposed by each utility were based on the E-RIM Test, and excluded conservation measures with less than a two-year participant payback to further minimize free ridership.

4.3.3 FPSC Decisions

The FPSC did not agree with the utilities' proposed goals, and instead applied the results of the E-TRC economic test and included residential programs with participant paybacks of less than two years. In its December 2009 decision, the FPSC stated:

> The goals proposed by each utility rely upon the E-RIM Test. Our intention is to approve conservation goals for each utility that are more robust than what each utility proposed. Therefore, we approve goals based on the unconstrained E-TRC Test for FPL, PEF, TECO, Gulf [Power], and FPUC. The unconstrained E-TRC test is cost-effective, from a system basis, and does not limit the amount of energy efficiency based on resource reliability needs. The E-TRC test includes cost estimates for future greenhouse gas emissions, but does not include utility lost revenues or customer incentive payments. As such, the E-TRC values are higher than the utility proposed E-RIM values. In addition, we have included the saving estimates for the residential portion of the top ten measures that were shown to have a payback period of two years or less in the numeric goals for FPL, PEF, TECO, and Gulf [Power]. When submitting their programs for our approval, the utilities can consider the residential portion of the top ten measures, but they shall not be limited to those specific measures.
>
> OUC and JEA proposed goals of zero, yet committed to continue their current DSM program offerings. We are setting goals for OUC and JEA based on their current programs so as not to unduly increase rates. [228]

Separate goals for demand-side renewable energy systems were set, largely in response to the amendments made to FEECA in 2008. [229] FPL, FPUC, PEF and TECO were ordered to file plans for pilot programs focused on solar water heating and solar PV systems, limited to expenditures of not more than 10 percent of the average annual recovery through the ECCR from the previous five years.

The 2009 goal-setting order also contained decisions about utility application of rewards and penalties and establishment of supply side efficiency goals. A decision on the issue of providing rewards or penalties for utilities based on their performance in implementing DSM programs was deferred to a separate proceeding that will occur after a review of

[228] Order No. PSC-09-0855-FOF-EG, December 30, 2009.
[229] Section 366.82(2) F.S.

utilities' progress in meeting the DSM goals.[230] In regard to supply-side efficiency, the Commission pointed out in the December 2009 order that supply side efficiency improvements for generation, transmission, and distribution were continually reviewed through the utilities' planning processes and that there was no evidence that such improvements were not being made. Accordingly, the Commission did not set goals for supply side efficiency in that order. Investor-owned generating utilities in Florida currently have an incentive for operating efficiency through the Generation Performance Incentive Factor (GPIF) and the fuel adjustment charges.

[230] Order No. PSC-09-0855-FOF-EG, December 30, 2009.

5 Cost-Effectiveness Methodologies

As explained in Section 2, the cost-effectiveness of energy efficiency programs is evaluated using three basic tests: 1) the Participants Test (PT), 2) the Total Resource Cost (TRC) test, and 3) the Rate Impact Measure (RIM) test. These tests differ in terms of the questions they answer. This section explains these tests and their purposes. It begins with descriptions of the cost and benefit components and then explains how the different approaches combine these components. Subsection 5.2 presents a more detailed explanation of the benefits of energy efficiency.

5.1 General Description of the Components of Cost-effectiveness

Evaluating the cost-effectiveness of a given energy efficiency program involves assessing impacts, such as what consumers should be expected to pay. This process is based upon an accounting of the costs and benefits of a program, but the definition of these costs and benefits differ depending on the question addressed by the particular test. Each test, then, is relevant only for a particular purpose and assumes that only the parameters considered change. This subsection describes the cost and benefit components used to develop particular cost-effectiveness tests.

Program Performance and Cost Parameters. These inputs include the reductions in kW demand and kWh of consumption for a typical customer, the study period for the program, the economic life of the utility assets, in-service dates of utility assets, present value of the carrying charges of the utility assets, utility recurring and non-recurring costs related to utility assets and the program, customer equipment costs, recurring customer costs, and cost escalation rates.

Market Penetration. These inputs are used to quantify the degree to which the utility's customers participate in the program, a key variable for most DSM programs. They include the total number of participating customers; adjustments for free-riders − those customers who would have adopted the measure even in the absence of the program; and any change in the effectiveness of the kW or kWh savings of the program (either a degradation or increase) over time. These inputs represent the analyst's quantification of consumer reaction to and participation in the program. Market penetration is important because it has a material impact on cost-effectiveness, i.e., if customers do not participate in the program it cannot be cost-effective and neither the utility nor the regulator have direct control over customers' choices.

Avoided Utility Capacity Costs. These inputs express the changes in utility costs expected to result from the implementation of the program. They include avoided expenses related to providing capacity, transmission, distribution, and energy products. Avoided generating capacity costs include the year of the avoided generating unit for capacity planning purposes, the cost of the new capacity, any avoided carrying charges of those costs, and fixed operation and maintenance expenses. Avoided transmission and distribution capacity costs begin the year the avoided infrastructure was scheduled for installation, and include its construction costs, capital carrying charges, fixed operations and maintenance expenses, variable operating and maintenance expenses and the market value of any avoided emissions, which could be implicit in the cost of the avoided capacity.

Utility Program Fuel Savings and Net Generation Fuel Costs. Fuel costs are applied in cost-effectiveness tests in three ways – the fuel saved from conservation (program fuel cost savings), the fuel saved from the output of the avoided generation capacity, and the fuel used to replace the output from the avoided generation. Program fuel cost savings from customer conservation are based on the avoided marginal cost of fuel. For conservation measures that reduce peak demand, program fuel cost savings are usually higher than the average fuel costs that are included in the price of electricity on a customer's bill. Net fuel costs for avoided generation are the fuel costs for the megawatt hours (MWh) the generation facility would produce if it had been built, minus the cost of the fuel used to replace those MWh. Since new generation capacity is typically more efficient than older capacity, this is usually a negative number (or net cost).

Foregone Utility Revenues. These inputs reflect the reduced utility revenues estimated to result from the implementation of the program and are used only for the RIM test. While implementation of a DSM program may allow the utility to delay investment in expanding its infrastructure, the revenues a utility loses because the DSM program results in reduced sales can be greater than the avoided cost. Some portion of lost revenue is needed by the utility to cover infrastructure investments already made to serve existing electricity load. These investments often carry fixed costs that must be paid regardless of whether or not the asset is used to provide service. [231]

Non-Energy Costs and Benefits. Some benefits and costs are not energy related; therefore, they are not incorporated in standard cost-effectiveness tests. These include externalities, such as certain changes in air quality, greater energy security, and possibly improved aesthetics. [232] Energy efficiency could increase quality of service. Such

[231] Fixed costs may include the financing costs associated with the asset and some maintenance expenses.
[232] Environmental effects for which a market value exists are reflected in utility costs.

increases are also omitted from standard cost-effectiveness measures, but were included for the E-RIM and E-TRC tests applied during the 2009 FEECA goal proceedings.

5.2 Benefits of Energy Efficiency

This subsection describes some of the benefits of energy efficiency programs. As indicated in the text. These benefits are largely reflected in the cost-effectiveness tests or taken into consideration by customers when deciding on energy efficiency measures.

Indirect Benefits to DSM Participants. Possible indirect benefits for customers participating in FEECA's DSM programs, which can be internalized by participants if they have the proper information, include: improved financial security through reduced energy cost burden; more complete information for decision making about energy-efficiency investments; increased property values; improved comfort; and improved health. Some of the indirect benefits for program participants that accrue predominantly to commercial customers include: increased productivity, primarily due to improved comfort and health of employees; higher employee morale, reduced turnover and easier recruitment; rental property tenant satisfaction and retention; and creation of an environmentally-conscious workplace with the potential for spillovers of conservation and efficiency behavior. Each of these considerations is discussed in more detail below.

Energy bill savings for residential and small commercial DSM participants are directly related to energy consumption and are arguably the most tangible and valuable direct benefits of conservation and energy efficiency activities. If energy bill savings more than offset a customer's investment in conservation and efficiency measures, including those for equipment and operation and maintenance, over the useful life of a measure, the net benefit to participating customers will be positive. Such an effort would pass the Participants Test. Energy bill savings for customers translate to lost revenue to utilities. Appendix C Table 2 shows the amounts of forgone revenue for the currently-approved DSM portfolio of FEECA utilities. In 2010, nearly $25 million in energy bill savings was realized by customers who participated in DSM participating customers.

Utility bill savings are a central and obvious motivator for customers and an indirect result of these savings, for some program participants, is reduced energy cost burden. While all customers in a given customer class for a given utility are subject to the same rates, customers with relatively high energy consumption, all other things being equal, have greater incentives to participate in programs that save energy. Income levels also affect customers' interests and marginal benefit of energy savings. Low-income customers, even those with smaller homes, are typically more energy-cost burdened than other customers, meaning that their energy bills consume a larger share of their household income. This would mean that they are likely to experience a greater marginal benefit from energy savings and avoided energy costs than would higher income households. However, the economics of the energy-efficiency investment may still not work for the lower income household unless the payback period is short and/or the recurring energy savings are high and persistent.

Through outreach and education programs, DSM programs provide customers with information they need for effective decision making about energy conservation and efficiency opportunities. To properly evaluate such opportunities, customers need to know the amounts and timing of cost savings, initial investment, and other impacts. While it is impossible to accurately predict future energy costs, it is nonetheless important that have information on possible future prices to fully consider potential cost savings. Utility energy efficiency programs can provide customers with such critical projections and facts about energy use that assist customers in making informed long-term decisions. Property values of individual homes and businesses participating in DSM programs have not been evaluated explicitly, but there is evidence that the public values energy efficiency. For example, studies have documented increased values for properties certified as being energy-efficient through programs such as LEED or Energy Star.[233] CoStar Group Inc. (a real estate research company) surveyed 3,000 "green" office buildings and found that buyers comparing energy costs were willing to pay nearly a 30 percent premium rental rate for more efficient properties.[234] Furthermore, according to that report, occupancy rates nationally in the first quarter of 2009 averaged 90.3 percent in the "green" buildings versus 84.7 percent in comparable standard (or baseline efficiency) buildings.[235] This evidence suggests that people are willing to pay a premium for properties with energy-efficient equipment, systems, or attributes.

Improved occupant comfort will not result from all energy-efficiency improvements, but it is often a result of projects that improve the thermal efficiency of the building envelope, ventilation, and lighting and acoustic properties in the building. In homes, enhanced occupant comfort is seldom valued quantitatively, but it can be a real benefit to residents' everyday quality of life. In businesses, improving comfort can boost employee productivity, which is discussed later in this section.

Indoor air quality (IAQ) is measured inside building by the levels of pollutants that can cause or exacerbate physical health problems, including asthma and other respiratory illness, allergies, headaches, skin irritations, and even lung cancer from prolonged radon exposure. Extensive research over the last 20 to 30 years has established links between

[233] See Section 10.1 for a discussion of these programs.
[234] Gertha Coffee and Leon Stafford, Going Green Pays Off, The Atlanta Journal-Constitution, September 19, 2009, http://www.ajc.com/news/business/going-green-pays-off/nQS6t/, accessed December 4, 2012.
[235] *Ibid.*

these physical symptoms and poor IAQ. People in the U.S. spend on average approximately 90 percent of their time indoors, where the U.S. EPA reports that air quality is likely to be inferior to outdoor air.[236] Off-gassing from building materials, paints, furnishings and cleaning products are common sources of volatile organic compounds in indoor air. Biological pollutants include viruses and pathogenic bacteria. Allergens, particularly mold, pollen and dander can also contribute to asthma, allergies and other illnesses. Carbon monoxide, ozone, radon and particulates from incomplete combustion are also indoor air pollutants of concern.[237]

Controlling humidity to hinder mold growth and deter bacteria, cleaning HVAC air filters to remove particulates and providing adequate ventilation (all standards of practice for energy efficiency) are the most effective ways to improve IAQ. Inefficient, drafty buildings lead to suboptimal humidity levels and admit pollens or other potential irritants from outdoor air. Radon from the soil entering and concentrating in structures through cracks is a particular concern in parts of Florida where clay soils can have high radon levels. Energy efficiency measures that correct deficiencies in IAQ can, as a result, improve the health of building occupants. However, it is also possible to exacerbate health problems for occupants by sealing buildings (to address building envelope efficiencies) without also providing for adequate ventilation.

Energy efficiency and improved IAQ often go hand-in-hand when buildings have been properly designed and maintained. For example, energy-efficient buildings with tight building envelopes can have IAQ superior to that in 'leaky' buildings. Building standards have addressed IAQ since 1973 when ASHRAE published its Standard 62.1, Ventilation for Acceptable Indoor Air Quality for buildings other than low-rise residential and health care. Residential standards for IAQ (Standard 62.2) were added in 2003.[238] In buildings constructed before those dates, ventilation may not be adequate to ensure good IAQ. The standards continue to evolve as the relationships between IAQ and health are better understood.[239]

As with building construction and materials standards, equipment operation and maintenance practices are also important for ensuring adequate IAQ in buildings. The key to improving or maintaining IAQ in energy efficient buildings is to provide sufficient

[236] U.S. Environmental Protection Agency. May 2012. An introduction to indoor air quality (IAQ), http://www.epa.gov/iaq/ia-intro.html, accessed September 26, 2012.
[237] Daniel A. Gerardi, MD, FCCP, Building-Related Illnesses, American College of Chest Physicians, August 1, 2011, http://www.chestnet.org/accp/pccsu/building-related-illnesses?page=0,3, accessed December 4, 2012.
[238] See ASHRAE, "Standards, Research & Technology," http://www.ashrae.org/standards-research--technology/standards--guidelines, accessed December 4, 2012.
[239] ASHRAE Position Document on Indoor Air Quality, July 2011, www.ashrae.org/.../docLib/About%20Us/PositionDocuments/ASHRAE_PD_Indoor_Air_Quality_2011.pdf, accessed December 4, 2012.

fresh air ventilation and to control humidity within the range of 40-60 percent. In commercial buildings, practices such as delayed start-up and early shut-off of heating and air conditioning system can create IAQ problems if the set-back period is too long. However, continuing to operate fans may be enough to supply adequate ventilation.[240]

Advantages for business customers who utilize DSM measures may also be difficult to quantify, but many studies of buildings either built to higher energy efficiency standards or that have been retrofit for improved efficiency have shown measurable financial, health and productivity benefits to occupants (both perceived and self-reported).[241] Studies of employees' health and productivity have shown that a range of ailments can be caused or exacerbated by poor indoor environmental quality (IEQ), which includes a building's temperature, occupants' visual and sound comfort, and occupants' ease of control of building services. Poor IEQ can affect occupants' mental health as well as their physical health. Improper lighting, noise and uncomfortable indoor air temperatures increase occupant stress and can contribute to depression or simply less efficient work time. Employees affected by these conditions are less productive and use more sick leave than those working in buildings with relatively superior IEQ. Several studies demonstrating the links between energy-efficient buildings and financial and IEQ benefits are summarized below.

A 2003 report prepared for multiple state agencies in California examined costs and benefits of green buildings and found the potential exists for large financial gains from small increases in productivity, as average personnel costs were about 10 times larger than building costs. Green buildings were found to increase initial construction costs by about 2 percent.[242] The National Science and Technology Council Project, a part of the Lawrence Berkeley National Laboratory, maintains a database of hundreds of studies related to IEQ and worker health and productivity. A summary of their overall findings states that superior IEQ can increase employee performance in the range of a few percent up to possibly 10 percent.[243]

A study of employees whose offices moved from standard to 'green' buildings in Michigan in 2008-2009 showed reduced time lost to asthma, respiratory allergies, depression and stress. Productivity improved by 2.6 percent for all occupants, equating

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[240] US Environmental Protection Agency, Indoor Air Quality and Energy Efficiency, last updated July 12, 2012, http://www.epa.gov/iaq/largebldgs/i-beam/text/energy_efficiency.html, accessed December 4, 2012.
[241] Greg Kats, Capital E, *The Costs and Financial Benefits of Green Buildings*, October 2003, http://www.calrecycle.ca.gov/greenbuilding/design/costbenefit/report.pdf.
[242] *Ibid.*
[243] Lawrence Berkeley National Laboratory, Indoor Air Quality Scientific Findings Resource Bank, http://www.iaqscience.lbl.gov/performance-summary.html, accessed December 4, 2012.

to about 39 hours of additional work time per employee per year.[244] Another study of 33 office buildings and schools in 2007 estimated financial gains from improved productivity and health in green buildings to range from about $40 to $55 per square foot, up to 10 times as great as the energy cost savings in these buildings. The productivity increases were due to multiple reported causes, including less absenteeism, reductions in staff headaches, and higher retail sales.[245]

Double-paned windows and added ceiling and wall insulation can reduce noise levels inside buildings as well as improving energy efficiency. A meta-analysis by the Carnegie Mellon Center for Building Performance and Diagnostics reported 14 studies that connected quieter work environments with individual productivity gains, ranging from about 2 to 20 percent, and another quantified a 47 percent turnover reduction in quiet workplaces. In addition, twelve studies indicated that improved lighting was responsible for productivity gains ranging from 0.7 to 23 percent, due to improved reading comprehension, letter-processing speed and less time off work.[246] Optimum indoor temperatures increase productivity, but individual preferences mean that the greatest gains come from individual workstation controls.[247] In addition to productivity gains, other studies have reported improved occupant morale, reduced employee turnover and easier recruitment after moving from conventional buildings into buildings retrofit for energy efficiency.[248]

Environmental Benefits. As discussed in Section 5.3, the TRC and SCT cost-effectiveness tests include consideration and quantification of at least a portion of certain environmental benefits of energy efficiency (such as avoided greenhouse gas emissions and water resource savings). Costs for pollutants currently regulated and/or for which an economic market exists are reflected in utilities' operating costs, and therefore in the economic tests. However, many environmental and non-energy benefits of energy-efficiency policies are difficult to quantify with precision, and therefore are commonly excluded from calculations of DSM program cost-effectiveness.

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[244] A. Singh et al., *Effects of Green Buildings on Employee Health and Productivity*, American Journal of Public Health, September 2010, Vol. 100, No. 9, pp. 1665-1668, http://ajph.aphapublications.org/doi/abs/10.2105/AJPH.2009.180687.
[245] N. Miller et al., Measuring the Green Premium for Office Buildings, Does Green Pay Off?, Green Design Research Review, Vol 15. No.1, 2008, http://www.icsc.org/srch/rsrch/researchquarterly/current/rr2008151/Green%20Premium.pdf, accessed December 4, 2012.
[246] Gurtekin-Celik presentation, *Building Investment Decision Support*, Center for Building Performance and Diagnostics, Carnegie Mellon, 2003.
[247] Johnson Controls, Institute for Building Efficiency, Productivity Gains from Energy Efficiency, http://www.institutebe.com/Existing-Building-Retrofits/Productivity-Gains-from-Energy-Efficiency.aspx, accessed September 26, 2012.
[248] Scott R. Muldavin, Green Building Finance Consortium, Value Beyond Cost Savings, How to Underwrite Sustainable Properties, Expanded Chapter IV: Sustainable Property Performance, 2010, http://www.greenbuildingfc.com/Documents/expanded_chapter_IV.pdf, accessed December 4, 2012.

In 2009, electricity generation accounted for about 40 percent of the total U.S. carbon footprint and 33 percent of all greenhouse gasses emitted. Fossil fuels are the most common energy sources for thermoelectric power generation. Nationwide, coal accounts for 49 percent of electricity generation, natural gas for 22 percent, and petroleum for 2 percent, almost all energy efficiency results in some avoided greenhouse gas emissions and other air pollutants to the environment.[249] Although the amounts will vary by the specific generation fuel mix used by a utility and by base vs. peaking units, in most cases, energy and demand savings result in marginal reductions in CO_2, SO_2, NO_x, particulates and hydrocarbon emissions.

Fresh water is an important resource needed for electricity generation, and some authors believe it is overlooked in state energy policies[250] and utilities' integrated resource planning, particularly in the South.[251] Nationwide, the fastest growing consumer of water in the U.S. is the energy sector, and its consumption is expected to increase by 50 percent by 2030 (from 2005 levels) due to increasing energy demand, a rising fraction of that demand from domestic sources and increasing use of water intensive generation.[252] In Florida, about 10 percent of freshwater withdrawals are used for cooling electric power plants, about one-half gallon per kWh of electricity generated.[253] Brown et al. (2012) argue that "enhanced energy efficiency and renewable energy policies tend to reduce both water withdrawals and consumption."[254] To the extent that water prices do not properly reflect the opportunity costs of using water, utility water may be inefficient but no more so than water use by any other entity in the state.

5.3 Economic Tests

This subsection describes three tests used by FEECA utilities at the direction of the FPSC to determine the cost-effectiveness of the DSM programs prior to submitting those programs to the FPSC for approval. The tests are: 1) the Participants Test (PT), 2) the TRC, and 3) the RIM. The PT examines whether program participants benefit financially from their involvement. The TRC test compares overall program costs and benefits to

[249] US Environmental Protection Agency, Greenhouse Gas Emissions, updated June 14, 2012, http://www.epa.gov/climatechange/ghgemissions/gases/co2.html, accessed December 4, 2012.
[250] A. Belden et al., 2008, *Integrated Policy and Planning for Water and Energy,* Journal of Contemporary Water Research and Education, 142: 46-51.
[251] M.A. Brown, et al., 2012, *Myths and Facts about Electricity in the U.S. South,* Energy Policy 40: 231-241.
[252] Nicole T. Carter, Congressional Research Service, January 2011, Energy's Water Demand: Trends, Vulnerabilities, and Management, R41507, http://www.crs.gov, accessed December 4, 2012.
[253] World Resources Institute (WRI) and Southeast Energy Alliance (SEA), April 2009, Southeast Energy Opportunities, Water and Watts, www.wri.org/publication/southeast-energy-policy, accessed December 4, 2012.
[254] M.A. Brown, et al., 2012, *Myths and Facts about Electricity in the U.S. South,* Energy Policy 40: 231-241, p.239.

ascertain whether the total cost of providing energy services is reduced. The RIM test considers whether the general body of ratepayers would pay higher prices because of the program. A program that passes all three tests should benefit the program participants, result in lower costs of satisfying customers' energy needs, and not lead to higher energy prices for customers in general. A program that passes only the PT and TRC test would benefit participants and lower costs of serving customers' needs, but would still exert upward pressure on rates. In such a scenario, although overall utility costs might decline, savings would not be sufficient to offset forgone revenues needed to cover fixed utility costs resulting in a need to adjust prices. Test results are expressed as the ratio of benefits to costs, so a ratio less than one means the program being tested fails the test and a ratio of one or more means the program passes the test. Two other tests, not generally used in Florida, are included in this discussion because they are sometimes used in other states.

5.3.1 Participants Test

The PT addresses the question of whether participants in the program could benefit economically over the useful life of the program. The PT considers only the costs borne by the consumer who participates in the program, and the benefits that accrue to that consumer as a result of participation. Therefore, incentive payments, changes to the utility bill (through changes in consumption or rates), and the any tax credits or incentives all count as benefits under this test, weighed against the costs of equipment installation. The value of credits or incentives paid to the participant is recovered from other ratepayers and other taxpayers, so these costs are not addressed in this metric.

5.3.2 Rate Impact Measure Test

The RIM test addresses the question of whether utility rates could increase as a result of a program. Since all of the utility's customers are affected by changes in rates, this test measures the impact of the program on all customers, both participants and nonparticipants, Under the RIM test, the benefits that accrue from each program are any net operational costs that are avoided by the utility, as well as avoided capacity costs from investment in generation, transmission, and distribution facilities. [255] The costs that apply to the test are the utility's costs to administer and monitor the DSM program, installation, equipment and incentive costs, and lost utility revenue due to reduced electricity consumption.

[255] Net operational costs include program and generation net fuel savings as well as reduced variable operation and maintenance costs associated with the avoided capacity.

5.3.3 Total Resource Cost Test

The TRC test addresses the question of whether the total costs of energy within the utility's service territory could increase as a result of the program. This includes participants' costs for energy conservation measures (net of applicable financial incentives) and any other non-electric utility costs. It also includes utility costs to administer conservation programs, except for the cost of financial incentives (which reduce the participant's net cost, and are thus net out). This test is used to assess the effects of the program on all customers of the utility, regardless of whether they participate in the program. As a result, the benefits include everything that is addressed in the RIM test: that is, the avoided energy- and capacity-related costs of the utility. But in addition to these benefits, is the test also encompasses the value of additional resource savings, such as water and natural gas. The costs recognized under the TRC test include overhead and installation costs for the program, and any incremental costs of the program, regardless of whether or not these costs are paid by the utility or the customer.

The next two tests are not generally used in Florida, but are used in other states, so are mentioned here in the interest of completeness.

5.3.4 Utility Cost Test

The Utility Cost Test (UCT) sometimes generalized as the Program Administrator Cost Test addresses the question of whether utility bills could increase as a result of the program. It examines the costs and benefits of the program from the perspective of the entity that administers the program, which can be the utility or another organization. The costs evaluated are those associated with administration, marketing, and evaluation of the program, as well as any incentive costs. The benefits evaluated are the avoided energy costs of the utility, as well as the value of any avoided generating, transmission, and distribution capacity.

5.3.5 Societal Cost Test

The Societal Cost Test (SCT) addresses the question of whether society is better off as a whole as a result of the program. It includes all of the costs and benefits that are addressed in the TRC test, but also includes an assessment of the value of any environmental and non-energy benefits that are not currently valued in the market. These benefits could include impacts on public health from improvement in air and water quality, as well as any effects of greenhouse gas emissions for which a market does not currently exist. Because the scope of the 'society' that is considered can be broad, the

SCT may include costs and benefits that exist outside of the state, and may not be seen as the purview of the state regulator.

5.3.6 Discussion

All of the cost-effectiveness tests address questions of what consumers should pay for energy efficiency measures and seek to quantify the costs and benefits of the energy efficiency measure. But the definition of these costs and benefits changes, as well as the scope of the question with the test considered. The PT, UCT, and RIM test, for example, each address the question of whether a customer's electricity bill is likely to increase, but each approach the question differently. The PT considers only the participant's costs of the program, the UCT addresses only the utility's costs, and the RIM test addresses the non-participants. The use of any single test, then, limits the amount of information available about who is impacted by the efficiency program and the magnitude of the impact. Thus, the most comprehensive picture of the effectiveness of energy efficiency programs is gained by using multiple tests.

The RIM test has been called the "no-losers" test because programs passing this test should not result in non-participants paying higher prices because of the program benefits received by the participants. In contrast, programs passing the TRC test may result in both winners and losers. The winners would be program participants who presumably utilize electricity more efficiently. The potential losers would be other utility customers whose energy prices go up because of the costs of the energy efficiency program, if the program results in higher prices. That outcome is possible because the test does not include consideration of different types of utility customers. Any program that passes the RIM test should also pass the TRC test, which means that at least some programs passing the TRC test might not result in higher prices for non-participants. Said differently, a program that passes the TRC test, but not the RIM test, would result in overall lower utility costs, but not enough to offset the forgone revenue otherwise required for fixed costs, such as transmission and distribution, and therefore would require an adjustment of prices. A program that passes both tests would not contribute to potential rate increases.

Conflicts over which tests should be applied to DSM programs are really conflicts over objectives. When a policymaker or utility regulator chooses to approve programs that pass the RIM test, the choice is one for ensuring that one customer's energy efficiency choice has no negative impact on other customers' electricity rates. DSM resource expenditures have two potential effects on non-participating customers. First, non-participating customers could be allocated a portion of the utility's program costs. If the utility regulator concludes that DSM program costs were prudently incurred to defer capacity investments and avoid generation and other costs, the ratemaking process would include such costs in utility prices, possibly raising prices paid by non-participating customers higher than they would have been otherwise. However, if the utility's program is cost-effective overall, the result should be a decrease in utility costs, possibly resulting in lower general rate levels depending on how demand is affected relative to how costs are affected.

The second potential effect on non-participating customers could result from participating customers' reducing their electricity consumption. To the extent that reduced consumption reduces utility revenue more than it reduces variable costs. The loss of net revenue needed to cover fixed expenses must be recovered through other rates, possibly those paid by non-participating customers. [256]

Applying the RIM test might be appropriate if there is a policy concern about the overall level of energy prices. For example, after a period of unusually large increases in energy prices, such as in the 1970s, policymakers could conclude that energy efficiency programs should not further escalate prices for customers who cannot benefit from the programs. Applying the RIM test could also be appropriate from an equity viewpoint, if equity were viewed as permitting only those customer choices that do not adversely impact others. Such a viewpoint is common in questions of environmental impacts, where the notion often is that one person's consumption of electricity should not harm the living environments of other people, wildlife, etc. It is also consistent with a general ratemaking principle called the Pareto Improvement Criterion, which states that a rate change can be considered equitable if it makes at least one person better off without leaving anyone worse off.[257]

The TRC test focuses on a different objective than the RIM test, namely economizing on the cost of satisfying customers' energy demands, i.e., the value that customers place on the services they obtain from consuming electricity. Customers' energy demands can be satisfied by supplying energy and by providing improved methods for obtaining the valuable services that energy consumption provides, such as by adding insulation to a building to increase the productivity of electricity in providing a warm building environment. The TRC does this by comparing each program's costs to the projected costs of supplying the power that the program saves.

The FPSC has distinct processes for considering the appropriateness of utility costs for supply side and demand side approaches to serving customer needs. On the supply side,

[256] The same effect would have occurred if electricity prices exceeded marginal production costs and energy consumption declined, even without a DSM program.
[257] Bonbright et al. 1988.

the FPSC examines prudency of investments after they are incurred and permit only those investments that appear prudent to be recovered through customer rates. Also on the supply side, the FPSC engages in a determination of need process pursuant to the Power Plant Siting Act and requires utilities to bid generation construction against self-build options.

Many aspects of the 2009 FEECA goal review apply least-cost planning methodologies. To the extent that the avoided capacity and energy benefits considered for the TRC test are being compared to an otherwise prudent expansion plan, it can be concluded that a program that passes the TRC test is a lower cost option for meeting the same set of system requirements. The adjustment of rates for reduced sales is otherwise much akin to perturbations in utility revenues from weather and economic changes, where the FPSC takes these factors into account as a matter of course in regulating IOU's rate and spreads the impacts across various rate classes as appropriate.

Comparing the two objectives – protecting non-participants from higher electricity prices or improving overall efficiency – even if ratepayer impacts were considered more important than efficiency, over time a policy of choosing efficiency should result in customer costs for services that are lower than they would be otherwise, although not necessarily for electricity.

A discussion of the cost-effectiveness of the currently approved DSM programs in Florida follows in Section 6.

6 Florida Utilities' Currently Approved DSM Portfolio (2010-2019)

6.1 Program Descriptions

This section describes the DSM programs offered by each utility subject to FEECA (FEECA utilities). Using both qualitative information and quantitative data for these programs as documented by the FPSC and FEECA utilities, this section describes the aggregate portfolio of current DSM programs offered by FEECA utilities – the FEECA DSM portfolio. Individual programs are grouped for this description across utilities into common categories. This discussion does not attribute specific program data to individual FEECA utilities. Rather, an aggregate is used to illustrate and tabulate a suite of portfolio metrics for the FEECA utilities' projected 2010-2019 impacts. This approach permits characterization of the portfolio itself and also identification of representative types of FEECA DSM programs and their corresponding values for projected impacts (such as energy and demand savings). These representative programs and values were used to establish inputs for the cost-effectiveness model and sensitivity analysis described in Section 7.

Information and data used to characterize the FEECA DSM portfolio were obtained from the 2012 FEECA Annual Report,[258] FPSC cost-effectiveness forms submitted by FEECA utilities as part of their energy conservation cost recovery proceedings, and FEECA utilities' currently-approved DSM plans (for years 2010-2019).[259]

As mentioned above, a primary objective of assembling the FEECA DSM portfolio was to identify appropriate programs and measures for specific parameters used in the cost-effectiveness model. First, programs were grouped by their qualitative attributes into common types of programs, or categories. Section 6.1.1 describes the results of this categorical grouping exercise. Section 6.1.2 provides an overview of program design and delivery strategies. Section 6.1.3 explains the quantitative parameters of interest for the DSM program matrix. Section 6.1.4 describes the portfolio in terms of the DSM programs' demand[260] and energy[261] impacts for 2010-2019. Finally, Section 6.1.5

[258] Florida Public Service Commission. (2012). "Annual Report on Activities Pursuant to the Florida Energy Efficiency & Conservation Act*"*. February 2012.
[259] Appendix B Table 1 provides a complete list of source documents from which data and information were aggregated for the FEECA DSM portfolio. This database is referred to as the "DSM program matrix." Appendix B Table 2 provides a complete list of data fields and definitions for parameters included in the DSM program matrix; a "data dictionary." All figures and tables in this section were generated using data from the DSM program matrix. Appendix B Table 4 provides individual program data points for all DSM program matrix parameters discussed in this section.
[260] Measured in kW or MW.
[261] Measured in kWh or MWh.

describes the portfolio in terms of programs' avoided capacity factors (ACF), number of programs, and program penetration rates.

6.1.1 Qualitative DSM Program Data

Appendix 1 of the 2012 *FEECA Annual Report* provides a nearly complete list of DSM programs offered by FEECA utilities for years 2010-2019.[262] The utility name, customer class, program title, and brief program description for each FEECA DSM program all were obtained from that document and formed the foundation of the qualitative data for the DSM program matrix. Each DSM program was assigned to a program category and program subcategory. All programs listed in the DSM matrix were assigned to one of eleven program categories: [263]

- **HVAC**: Includes residential and commercial programs that offer financial incentives for repairing or replacing old heating, ventilation, and air conditioning (HVAC) systems in homes and businesses. These programs are intended to reduce the growth of peak demand and energy consumption.
- **Load Management**: Includes programs designed to reduce demand on the system during peak times using load control measures to reduce energy consumption. Load control measures include such things as residential and commercial customers running their own emergency generators and interactive energy management systems, which make it easier for customers to manage their electricity use.
- **Building Envelope**: Includes programs designed to reduce peak demand and energy consumption by offering financial incentives to make cost-effective improvements to residential and commercial buildings such as installing solar window film, ceiling and wall insulation, cool roofing materials, caulking, and weather stripping.
- **New Construction**: Includes programs that offer financial incentives for the design and construction of new residential and commercial buildings that incorporate building practices that meet or exceed the Florida Energy Efficiency Code for New Construction.[264] The purpose is to reduce peak demand and energy consumption.

[262] Florida Public Service Commission. "Annual Report on Activities Pursuant to the Florida Energy Efficiency & Conservation Act". February 2012.
[263] Program categories in the Appendix B are listed and defined in order of decreasing cumulative projected demand savings, as shown below in Figure 6-1.
[264] See Section 10.1 for a discussion of the Florida Building Code, Florida Energy Efficiency Code for New Construction, and current standards.

- **Lighting**: Includes residential and commercial programs designed to improve energy efficiency by offering financial incentives to invest in more efficient lighting systems through retrofits and installation of energy-efficient lighting technologies.
- **Whole Building Retrofit**: Includes programs designed to reduce demand for energy by offering financial incentives for comprehensive residential and commercial building energy retrofits, including HVAC systems, insulation, windows, lighting, water heaters, appliances, and cost-effective conservation measures.
- **Appliance**: Includes residential and commercial programs designed to reduce energy consumption by offering financial incentives for replacing or recycling old appliances and installing energy-efficient appliances, such as solar water heaters, refrigerators, freezers, clothes washers, and food service equipment.[265]
- **Education**: Includes residential and commercial programs designed to reduce energy consumption by increasing customers' awareness of energy use in their buildings and utility awareness of customer motivations through free or paid whole-building audits, surveys, and other outreach methods.
- **Non-Renewable Distributed Generation:** Includes programs designed to encourage commercial customers to generate energy on site using distributed energy systems (e.g., small scale generators) and energy and heat cogeneration.
- **Motor/Pump**: Includes residential and commercial programs designed to reduce energy consumption and growth of peak demand by offering financial incentives to install high or premium-efficiency HVAC motors or pumps, such as Electronically Commutated Motors (ECMs).
- **Solar PV:** Includes installation of solar PV panels on residential, commercial, and educational properties. These are pilot programs in the context of FEECA that are designed to reduce the growth of peak demand and energy consumption and to reduce consumption of scarce generation fuels. The solar pilot programs offered by the IOUs provide: 1) rebates for solar PV; 2) solar equipment for low-income customers; 3) solar equipment for schools; and 4) R&D on solar technologies.

Only programs employing specific energy-efficiency measures or technologies and/or implementation strategies that differentiate them from other individual programs were assigned a program subcategory. For example, several residential programs offered by the same utility might fall under an HVAC program category, but each may fall under a

[265] Solar water heater programs are included in the appliance program category, water heater program subcategory.

different program subcategory depending on the SEER rating of the equipment installed.[266]

6.1.2 Program Design and Delivery

This section describes general DSM program design and delivery strategies used by FEECA utilities. Both qualitative information and quantitative data from FEECA utilities' currently approved DSM plans were used to describe residential and commercial program offerings, with a focus on differences in program design and delivery as documented by the FPSC and FEECA utilities.[267] These differences were considered with regard to how they may impact the cost-effectiveness of the programs and affect the overall distribution of program benefits and costs across all customers. The aspects of program design and delivery described in this section include: 1) Eligibility, 2) Incentives, 3) Marketing, 4) Evaluation, Measurement and Verification and 5) Equipment Specification

Eligibility. Eligibility for residential programs is generally restricted to existing customers, including residents of single-family, multi-family and sometimes manufactured housing. Within the eligibility guidelines, certain FEECA programs are more targeted and/or restrictive. For instance, some programs target residents of single-family, detached housing while others are available more broadly to residential customers. In some cases, incentives for owners of multi-family housing units are grouped with commercial incentive programs. Commercial programs are generally available to any existing utility customer in the commercial or industrial customer classes.

While some conservation and energy-efficiency improvements can be installed by the customer, many FEECA programs (particularly those that require advanced technical skills and equipment), specify that installation must be performed by a pre-qualified contractor. Utilities pre-qualify contractors based on several criteria including licensure, bonding and insurance coverage, and service record. Pre-qualified contractors are often able to directly submit rebate applications for equipment with high purchase price. This mechanism allows the contractor to reduce the customer's purchase price by the amount of the rebate, thereby reducing the initial cash outlay necessary for participation.

[266] The efficiency of central air conditioning units is governed by U.S. law and regulated by the U.S. Department of Energy (DOE). Every air conditioning unit is assigned an efficiency rating known as its "seasonal energy efficiency ratio" (SEER). The SEER is defined as the total cooling output (in British thermal units or Btu) provided by the unit during its normal annual usage period divided by its total energy input (in watt-hours) during the same period.

[267] Appendix B Table 1 lists the DSM plans referenced for program design and delivery details described in this section.

Incentives. Customer incentives are determined by or for each utility as part of its planning process and are based on the utility's expectations of per-customer avoided energy and capacity benefits, implementation costs, incentive structure and effect on market penetration. Strategies for determining program per-customer incentives vary by utility and DSM program, but generally take one of the following forms:

1) Fixed price per installation
2) Incentive as a portion of total cost (with or without caps on total incentive)
3) Escalating incentives based on equipment sizing and efficiency

Fixed-price incentives are generally used for programs like appliance replacement or new construction, where upgrade costs are highly dependent upon customer preferences and may go beyond the energy-efficiency value of the unit. Proportional incentives are generally applied in programs where home size is the dominant factor affecting the overall cost of efficiency upgrades. Incentives for lighting, insulation and duct sealing programs generally use this proportional incentive mechanism. Escalating incentives are less common but are applied by some FEECA utilities in programs where marginal unit cost increases are more complex and/or variable.

Marketing. FEECA utilities market programs through internal communication channels, media, and strategic alliances with related trades. Internally, programs are promoted via the utility's website, mailings, and through interaction between staff and customers. Externally, some utilities promote programs using media outlets like newspapers or radio advertisements. Finally, some utilities promote their DSM programs by partnering with contractors, dealers, distributors, retail outlets, and trade associations.

Evaluation, Measurement and Verification. FEECA utilities' DSM program evaluation, measurement and verification strategies, much like incentive amounts, vary by utility and by program. While all utilities keep records of program participation, they differ in the degree to which onsite inspection strategies and measurement of program-related demand and energy savings, either physically or statistically, are employed. Some utilities and specific programs rely on *ex ante* assumptions concerning an installed measure's performance compared to that of the equipment replaced combined with data on achieved participation rates to update program status and projections. Others conduct or contract for onsite inspections, statistical billing analysis and/or metered field studies to generate *ex post* data to update assumptions and provide feedback on program cost-effectiveness.

Equipment Specification. Flexibility in equipment specification in programs varies as well. Some utilities detail acceptable equipment features while others address only performance standards in program eligibility criteria. For example, one FEECA utility provides incentives for replacement of residential heating and cooling equipment with ducted heat pump systems only in single-family, detached housing, while another offers incentives for a variety of equipment types in several residential dwelling types, specifying only the operational efficiency rating of the new equipment.

In addition, utilities have varying minimum qualifications for equipment. For example, some utilities offer incentives for replacing HVAC equipment starting at SEER 14, while others offer incentives only for equipment rated at SEER 15 and above.[268] Commercial programs are generally much less prescriptive in nature than are residential programs. Many times custom incentives are offered for commercial customers where efficiency upgrades are proposed and incentive levels are mutually agreed upon.

6.1.3 Quantitative DSM Program Data

Once qualitative FEECA DSM program data were assembled, specific quantitative parameters of interest for both the program characterizations (described in this section) and quantitative modeling and sensitivity analysis for the overall FEECA evaluation (described in 7 of this report) were then assembled. These quantitative parameters were obtained from the 2012 cost-effectiveness updates submitted by the five FEECA IOUs as part of their energy conservation cost recovery proceedings and from the FPSC cost-effectiveness forms submitted in 2010 by the two FEECA municipal utilities as part of their plan approval proceedings.[269] Specifically, assumptions for program savings and utility costs from FPSC Form CE 1.1 were used as the source of this information. Information was also obtained from the currently approved DSM plans when data and additional quantitative parameters, such as cumulative (2010-2019) program participation rates, were not available from cost-effectiveness forms.

Table 6-1 lists the quantitative DSM program parameters drawn from these sources, entered into the DSM program matrix, and detailed below. The parameters listed in this table do not include of all of the parameters used in the FEECA DSM portfolio cost-effectiveness modeling and sensitivity analysis.[270]

[268] The National Renewable Energy Laboratory (NREL) National Residential Efficiency Measures Database at http://www.nrel.gov/ap/retrofits/measures.cfm?gId=2&ctId=7 estimates minimal to no cost difference between new SEER 13 and SEER 14 HVAC units.
[269] The FEECA-covered IOUs are FPL, PEF, TECO, GPC and FPUC. JEA and OUC are the FEECA-covered municipal utilities.
[270] These parameters and program categories are also included in Appendix B Table 2, "DSM Program Matrix Data Dictionary."

Table 6-1 FEECA DSM Portfolio Matrix Quantitative Parameters and Units Reported in this Section[271]

DSM Program Parameter	Units
Generator kW Reduction per Customer	KW per Customer (Participant)
Generator kWh Reduction per Customer	KWh per Customer (Participant)
Avoided Capacity Factor	Percent
Number of Programs	Total Number for 2010-2019
Eligible Customers	Total Number in 2019
Program Participants	Cumulative Total for 2010-2019
Program Penetration Level	Cumulative Percentage for 2010-2019

6.1.4 FEECA DSM Portfolio Demand and Energy Characteristics

This section examines the different demand and energy characteristics of various DSM programs. It does so by presenting a series of figures that illustrate the energy and demand value of individual programs within the current FEECA portfolio without attribution to specific utilities. This section also includes a brief narrative for each figure and preliminary insights relative to the overall DSM portfolio characterization and evaluation. With the exception of Figure 6-7, the vertical (Y) axis on all figures in this section is categorical, by program category and customer class. In addition, for all figures with this categorical Y-axis, program categories are ordered by their cumulative (2010-2019) demand (MW) savings per program (shown in Figure 6-1), with the program category having the greatest cumulative demand savings shown first (at the top). This ordering provides visual consistency for the reader as well as graphical representation of the overall impact of the FEECA DSM portfolio by program category and customer class for various cost-effectiveness parameters.

Demand Savings. Figure 6-1 shows projected cumulative demand savings by program category and customer class for 2010-2019. Table 6-2 lists the cumulative demand savings in MW and as a percent of total demand savings by program category. Based on the portfolio categorization of individual DSM programs, the HVAC, Load Management, and Building Envelope programs are projected to result in the greatest total demand savings, namely 943 MW, 341 MW, and 304 MW in savings, respectively, during the period 2010-2019. Collectively, the FEECA DSM programs are projected to produce 1,956.5 MW of cumulative savings in this time period, also reflected in Table 6-2.

[271] A complete list of parameters in the FEECA DSM program matrix is provided in Appendix B Table 2, "DSM Program Matrix Data Dictionary."

Figure 6-1 FEECA DSM Portfolio Cumulative Demand Savings by Program Category, 2010-2019[272]

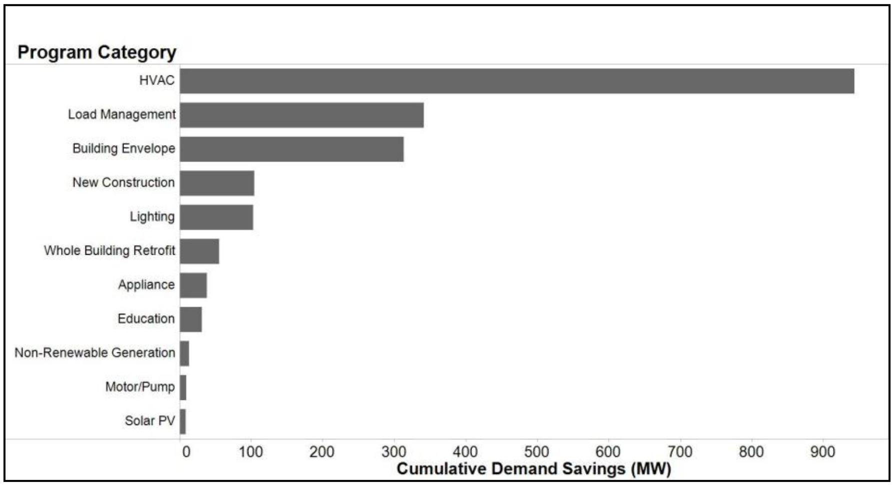


Table 6-2 FEECA DSM Portfolio Cumulative Demand Savings and Percent of Total by Program Category, 2010-2019[273]

Program Category	2010-2019 Cumulative Demand Savings (MW)	% of Total Cumulative Demand Savings
HVAC	943.4	48.2%
Load Management	341.4	17.4%
Building Envelope	303.9	16.0%
New Construction	104.9	5.4%
Lighting	96.6	4.9%
Whole Building Retrofit	55.5	2.8%
Appliance	38.2	2.0%
Education	31.4	1.6%
Non-Solar Renewable/Generation	13.1	0.7%
Motor/Pump	9.3	0.5%
Solar PV	8.8	0.4%
Total	**1956.5**	**100%**

Figure 6-2 displays projected demand savings, measured as cumulative MW, by customer class (residential, commercial/industrial, and solar pilot) and by program category. Residential programs provide the most demand savings in each category, with the exception of load management and program categories not available to residential customers (lighting and non-renewable generation). Commercial/industrial programs provide all of the lighting program demand impacts and a significant share of the load management program demand impacts. The data assembled for this study indicate that residential DSM programs represent over half the MW reductions in FEECA approved plans. Table 6-3 lists the values plotted in Figure 6-2.

272 All data are from FEECA DSM program matrix, described in this section and in Appendix B.
273 *Ibid.*

Figure 6-2 FEECA DSM Portfolio Cumulative Demand Savings by Customer Class and Program Category, 2010-2019[274]

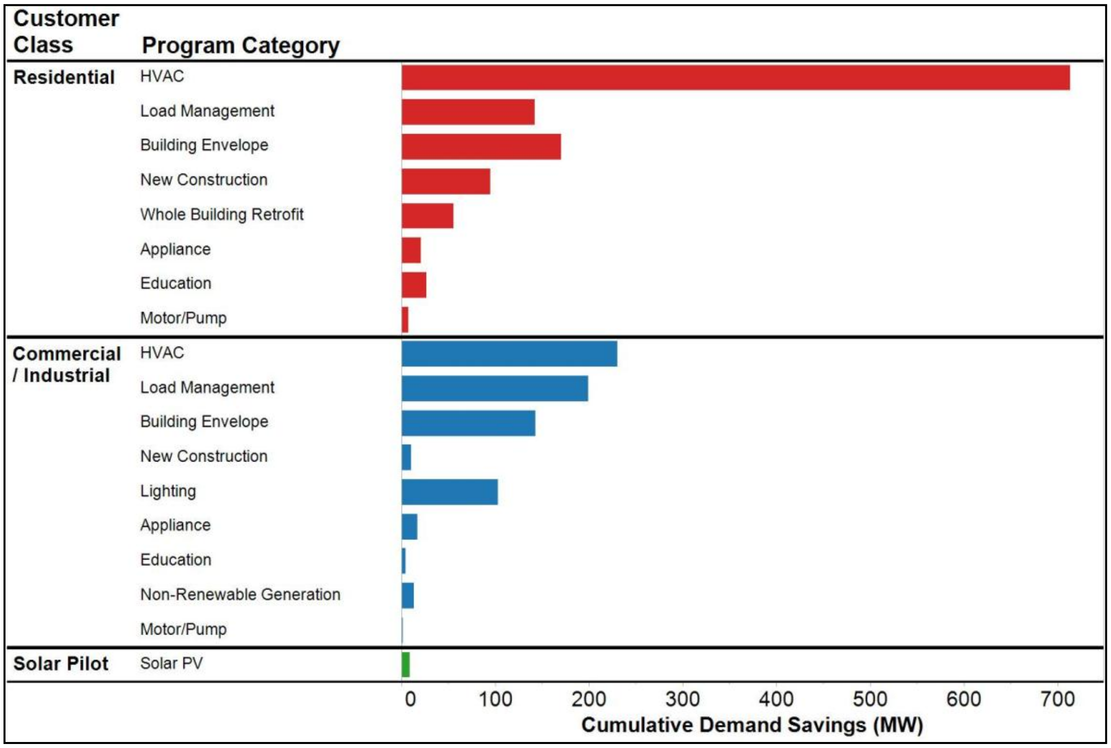


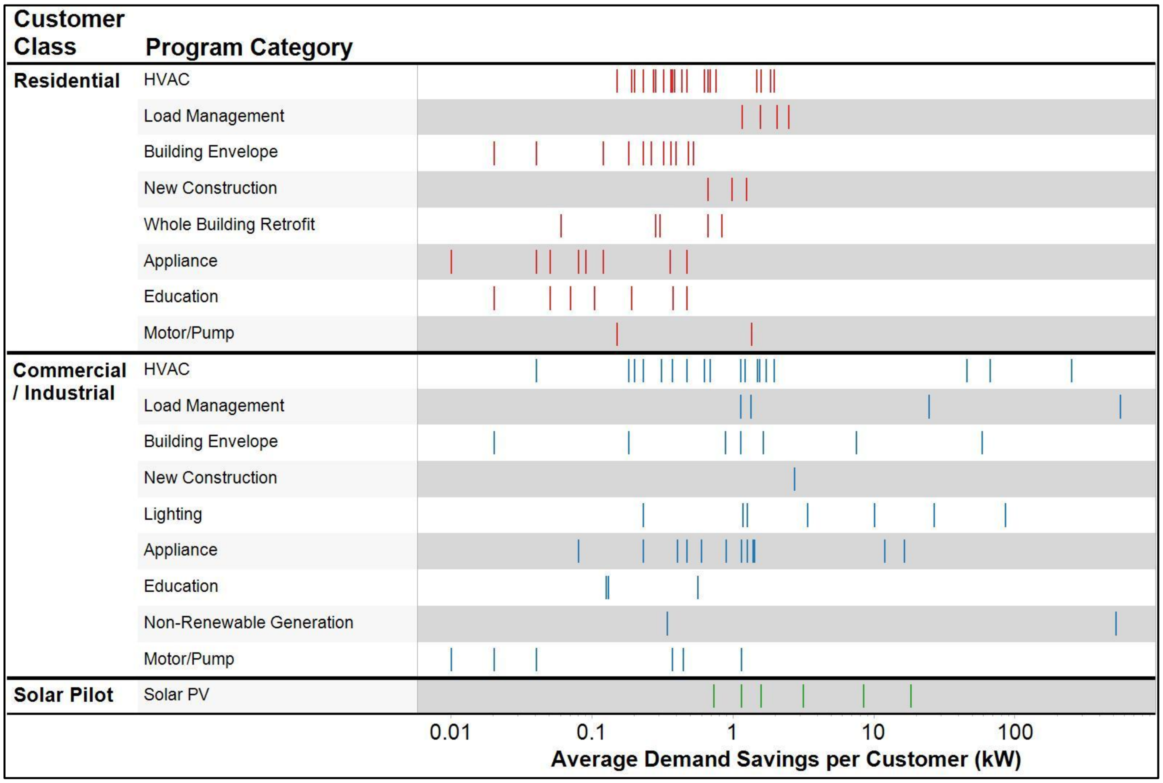
Figure 6-3 illustrates the variability in per-customer demand savings across individual FEECA DSM programs, plotting the average demand savings, measured in kW, per customer by program category and customer class. Each vertical line represents the demand savings per customer for one specific program in the relevant category. For example, all residential HVAC programs reduce demand per customer by more than 0.1 kW and less than 10 kW. The scale of the horizontal axis is logarithmic rather than uniform to allow all programs to appear on a single graph without clustering programs with lower per customer savings so tightly that they cannot be distinguished from one another. This representation distorts the visual variance of programs across the scale. For example, the difference between the lowest and highest impact for Motor/Pump for commercial/industrial customers appears on the graph to be about the same as that for Appliance for the same customer class. However, as Table 6-3 shows, the difference for Motor/Pump is only 1.1 kW, while the difference for Appliance is 16.1 kW.

While the specific energy-efficiency measures installed -- incentive levels, baseline energy consumption, and measurement and verification of demand savings estimates -- are expected to vary across individual programs and utilities, Figure 6-3 illustrates the diversity of the variations. For example, in general, per customer effects of residential

[274] All data are from FEECA DSM program matrix, described in this section and in Appendix B.

programs have less variance than commercial/industrial programs. This might be because businesses are more diverse than residential customers in their size, energy use, and economic potential for improving their energy efficiency. However, it is beyond the scope of this study to examine the reasons for these variances. Appendix B Table 4 lists the values plotted in Figure 6-3.

Figure 6-3 FEECA DSM Portfolio Programs' Average per Customer Demand Savings by Customer Class and Program Category, 2010-2019 [275]



Energy Savings. Demand savings and energy savings are related but, as Section 7 explains, different programs affect each form of savings differently. This subsection examines energy savings in the FEECA DSM portfolio by individual programs, program categories, and customer class. Figure 6-4 is a graph of energy savings, measured in cumulative MWh, by customer class and by program category. For residential customers, the HVAC programs, which include system and duct replacement and repair measures, are projected to account for the majority of cumulative energy savings over the 10-year period. For commercial/industrial customers, the programs with greatest

[275] All data are from FEECA DSM program matrix, described in this section and in Appendix B. The values for individual data points in this figure are listed in Appendix B Table 4.

projected cumulative energy savings are the HVAC, lighting, and building envelope programs. Table 6-3 lists the values plotted in Figure 6-4.

Figure 6-4 FEECA DSM Portfolio Cumulative Energy Savings by Customer Class and Program Category, 2010-2019[276]

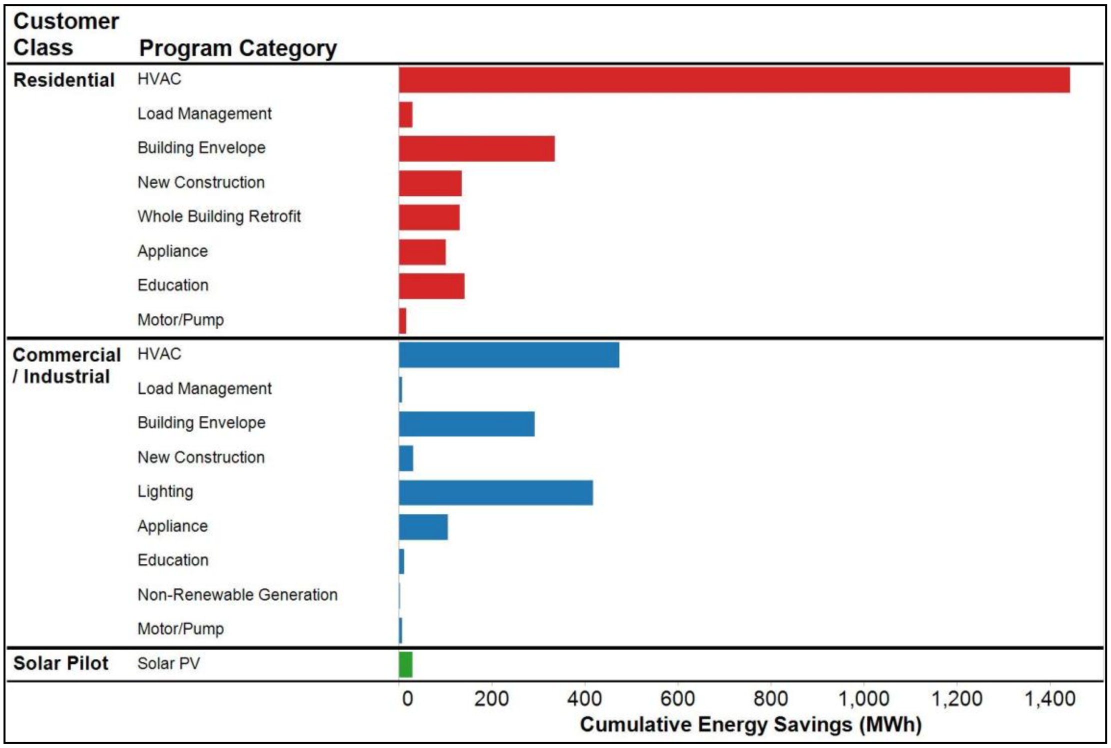


Figure 6-5 illustrates the variability in energy savings (kWh) per customer across individual FEECA DSM programs, plotting average energy savings per customer by program category and customer class. As in Figure 6-3, the scale of the horizontal axis in Figure 6-5 is logarithmic, i.e., intervals are not equal, for the same reasons provided in the description of Figure 6-3. Also, as with Figure 6-3, Figure 6-5 offers a visual representation of the magnitude of projected energy savings variability both across and within DSM program categories. As with demand savings per customer, the commercial programs exhibit wider variability within program categories than do the residential programs. The magnitude and spread of estimated per customer energy savings is similar across the Residential and Commercial/Industrial HVAC programs. Appendix B Table 4 lists the values plotted in Figure 6-5.

[276] All data are from FEECA DSM program matrix, described in this section and in Appendix B.

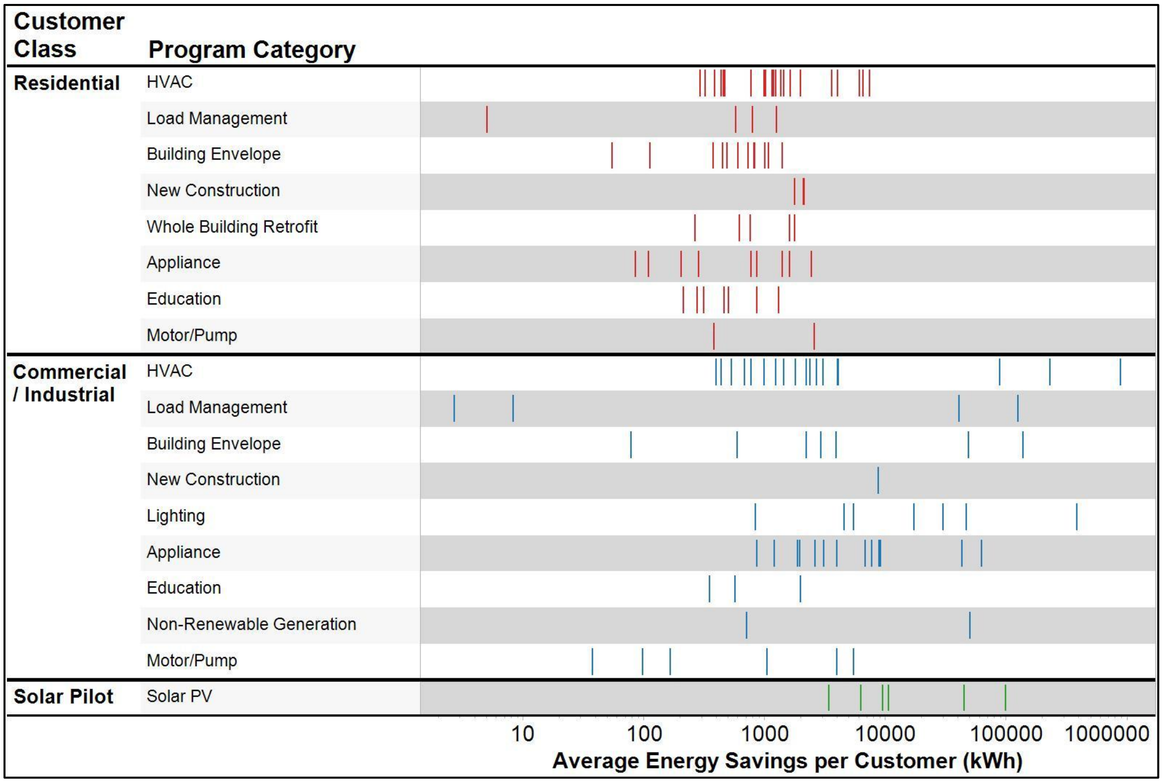
Table 6-3 FEECA DSM Portfolio Programs' Energy and Demand Savings by Program Category and Customer Class[277]

Customer Class	Program Category	Demand Savings: Cum. MW*	Demand Savings: Avg. kW per Cust.*	Demand Savings: Min. Avg. kW per Cust.	Demand Savings: Max. Avg. kW per Cust.	Demand Savings: Range Avg. kW per Cust.	Energy Savings: Cum. MWh*	Energy Savings: Avg. kWh per Cust.*	Energy Savings: Min. Avg. kWh per Cust.	Energy Savings: Max. Avg. kWh per Cust.	Energy Savings: Range Avg. kWh per Cust.
Residential	HVAC	713.5	0.6	0.15	1.95	1.80	1,442.2	1,978	288	7,307	7,019
	Load Management	142.2	1.8	1.15	2.45	1.30	30.0	646	5	1,228	1,223
	Building Envelope	170.7	0.3	0.02	0.52	0.50	336.4	649	54	1,371	1,317
	New Construction	94.8	1.0	0.66	1.23	0.57	136.4	1,968	1,746	2,104	358
	Whole Building Retrofit	55.5	0.4	0.06	0.83	0.77	131.8	991	260	1,749	1,489
	Appliance	20.9	0.2	0.01	0.47	0.46	101.1	923	84	2,417	2,333
	Education	27.0	0.2	0.02	0.47	0.45	142.0	553	208	1,287	1,079
	Motor/Pump	7.7	0.8	0.15	1.35	1.20	16.5	1,465	374	2,555	2,181
Commercial / Industrial	HVAC	229.9	3.6	0.04	249.80	249.76	471.9	7,080	391	874,440	874,049
	Load Management	199.2	145.1	1.13	553.58	552.45	7.5	40,699	3	122,977	122,974
	Building Envelope	143.2	9.8	0.02	57.62	57.60	291.9	27,526	78	135,386	135,308
	New Construction	10.1	2.7	2.72	2.72	0.00	32.0	8,580	8,580	8,580	0
	Lighting	96.6	6.2	0.23	84.29	84.06	386.9	15,426	820	378,630	377,810
	Appliance	17.3	2.8	0.08	16.19	16.11	106.0	11,626	843	61,558	60,715
	Education	4.4	0.3	0.13	0.56	0.43	12.1	953	346	1,949	1,603
	Non-Solar Renewable/Gen.	13.1	257.0	0.34	513.75	513.41	2.7	25,181	702	49,660	48,958
	Motor/Pump	1.6	0.3	0.01	1.14	1.13	7.0	1,766	37	5,393	5,356
Solar Pilot	Solar PV	8.8	4.9	0.73	18.20	17.47	29.9	24,850	3,371	97,148	93,777

*Individual programs for which the cumulative number of participants reported or for which the energy savings per participant was either zero or missing are not captured in the calculations for cumulative and average per-customer demand and energy savings. Individual program data are listed in Appendix B Table 4.

277 All data are from FEECA DSM program matrix, described in this section and in Appendix B.

Figure 6-5 FEECA DSM Portfolio Programs' Average per Customer Energy Savings by Customer Class and Program Category, 2010-2019[278]



6.1.5 FEECA DSM Portfolio Avoided Capacity Factors, Number of Programs, and Penetration Rates

Avoided Capacity Factors. The amount of energy consumed on peak and off peak to meet a specific end use makes a difference in the energy and demand savings associated with improvements to efficiency. This, in turn, makes a difference in the cost-effectiveness of a conservation program as measured by both RIM and TRC Tests. The metric commonly applied for consideration of this factor for utility system planning is called capacity factor on the supply side and load factor on the demand side. Since FEECA views DSM as the acquisition of energy and demand resources, these terms are sometimes applied interchangeably. As explained in more detail in Section 7, this research develops the concept of ACF for the evaluation of DSM programs. ACF is the ratio of the annual energy savings associated with a program divided by the product of the coincident demand reduction associated with that program and 8,760 hours in a year.

[278] All data are from FEECA DSM program matrix, described in this section and in Appendix B. The values for individual data points in this figure are listed in Appendix B Table 4.

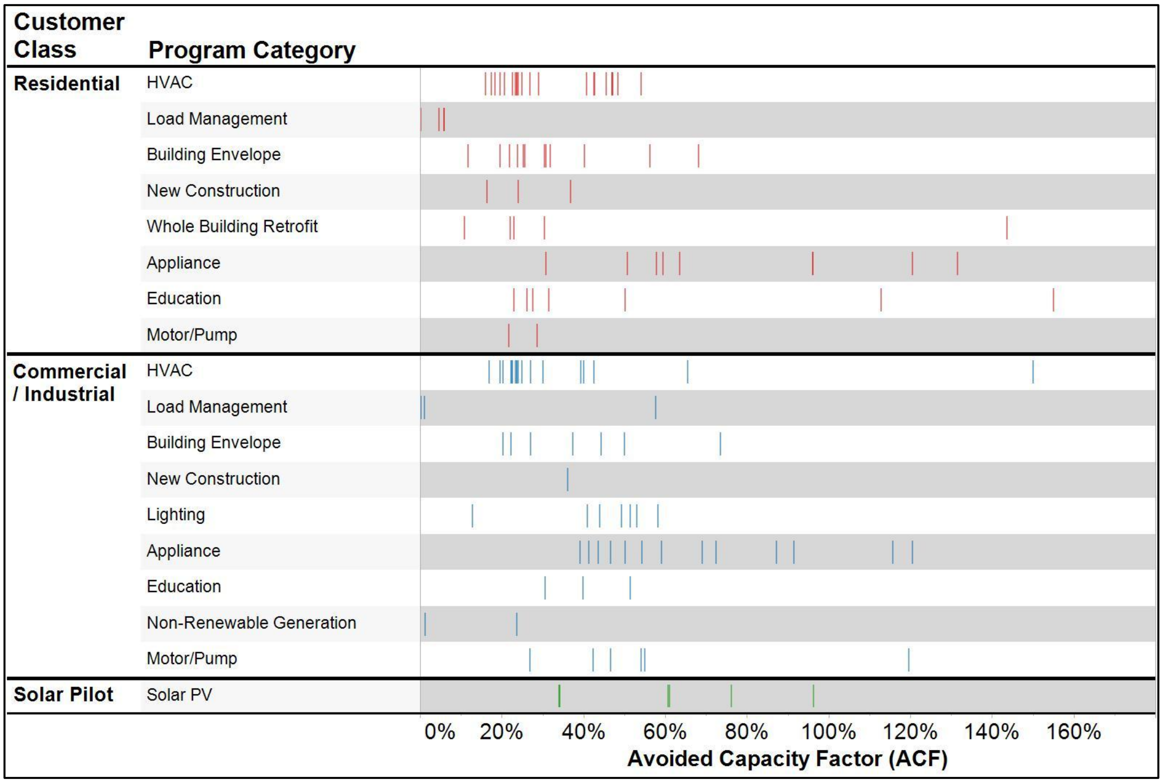
Unless energy is being shifted from on peak to off peak, or the DSM programs address strictly off peak energy use, the ACF should be between zero and one. A load management program is likely to have an ACF of less than 0.04, a residential air conditioning program would have an ACF of roughly 0.2, and commercial refrigeration programs may have an ACF as high as 0.8.

The RIM test selects for DSM programs that have relatively low energy savings per kW reduction due to the treatment of forgone energy sales revenues as a program cost. Furthermore, the cost-effectiveness methodology prescribed by the FPSC requires that the replacement fuel cost for the avoided unit also be taken into account. Differences between the ACF of the avoided unit and the ACF of the DSM program are reflected in differences between RIM and TRC tests.

Figure 6-6 plots the ACF for each individual DSM program by category and customer class. The prevalence of ACFs greater than 1.0 may be due, in part, to the loss-of-load probability (LOLP) methodology required by the FPSC's cost-effectiveness methodology, as discussed later in this section. ACFs vary across program categories and within categories. This variation could result from differences in load profiles for individual utilities, in customer characteristics, and other differences. Appendix B Table 4 lists the values plotted in Figure 6-6.

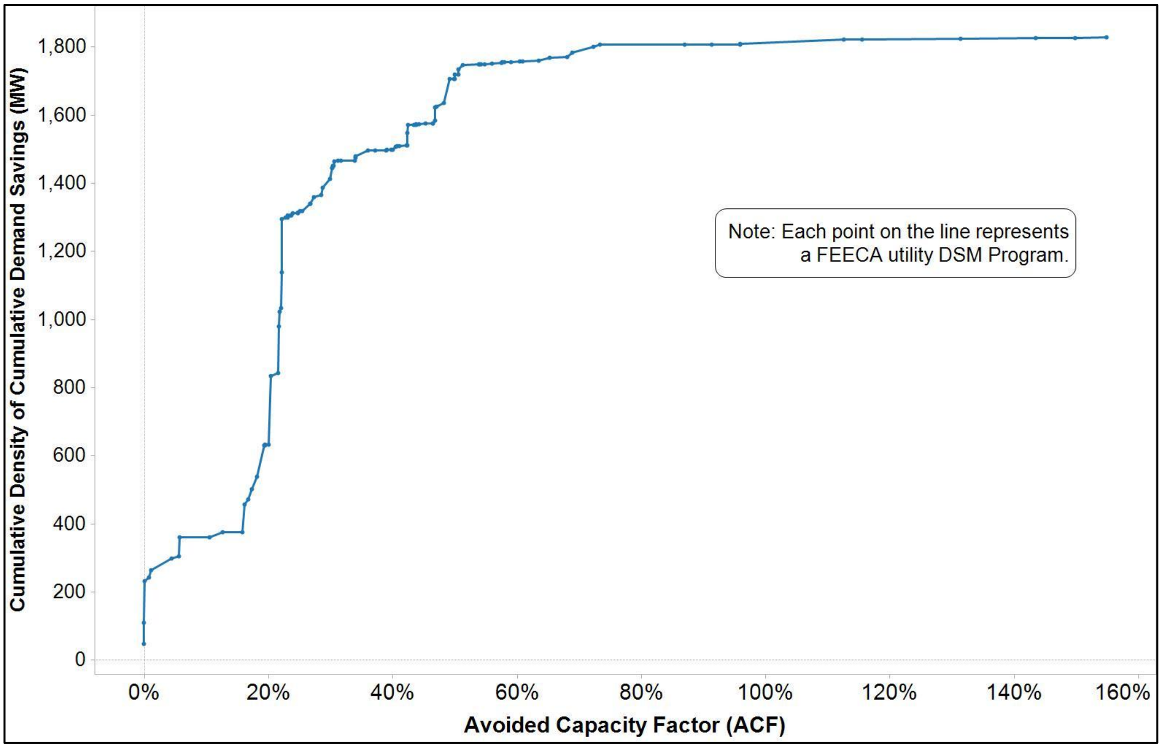
Figure 6-7 plots a cumulative density function for the cumulative energy savings of each program in the FEECA DSM portfolio, ordered by increasing ACF. The first data point plotted from left to right is the cumulative demand savings for the program with the lowest ACF. The second data point plotted is for the program with the second-lowest ACF, and its demand savings are added to the first program's savings, which represents the vertical distance from zero for this second point. The vertical distance between two horizontally adjacent points represents the incremental or marginal demand savings obtained by adding the next program (data point to the right on the graph) to the overall FEECA DSM portfolio. As shown in this graph, over 80 percent of the total demand savings are associated with FEECA DSM programs with an ACF of less than 35 percent. Appendix B Table 4 lists the incremental (i.e., individual program) values plotted as a cumulative density function in Figure 6-7.

Figure 6-6 FEECA DSM Portfolio Programs' Avoided Capacity Factors by Customer Class and Program Category, 2010-2019[279]



[279] All data are from FEECA DSM program matrix, described in this section and in Appendix B. The values for individual data points in this figure are listed in Appendix B Table 4.

Figure 6-7 Cumulative Density Function of FEECA DSM Portfolio Programs' Cumulative Demand Savings, 2010-2019, Ordered by Avoided Capacity Factor [280]



Programs and Participation. The number of DSM programs, customer participation numbers, and program penetration rates projected in the current FEECA DSM portfolio provide the portfolio's overall coverage and capture program savings potential. Figure 6-8 plots the number of DSM programs in the portfolio by customer class and program category. These data mirror the cumulative impact numbers for HVAC, building envelope, and appliance programs, which are popular for both residential and commercial/industrial customer classes, and for lighting programs, which are widely offered for the commercial/industrial customer class. Table 6-4 lists the values plotted in Figure 6-8.

[280] All data are from FEECA DSM program matrix, described in this section and in Appendix B. The values for individual data points in this figure are listed in Appendix B Table 4.

Figure 6-8 FEECA DSM Portfolio Number of Programs Offered by Customer Class and Program Category, 2010-2019 [281]

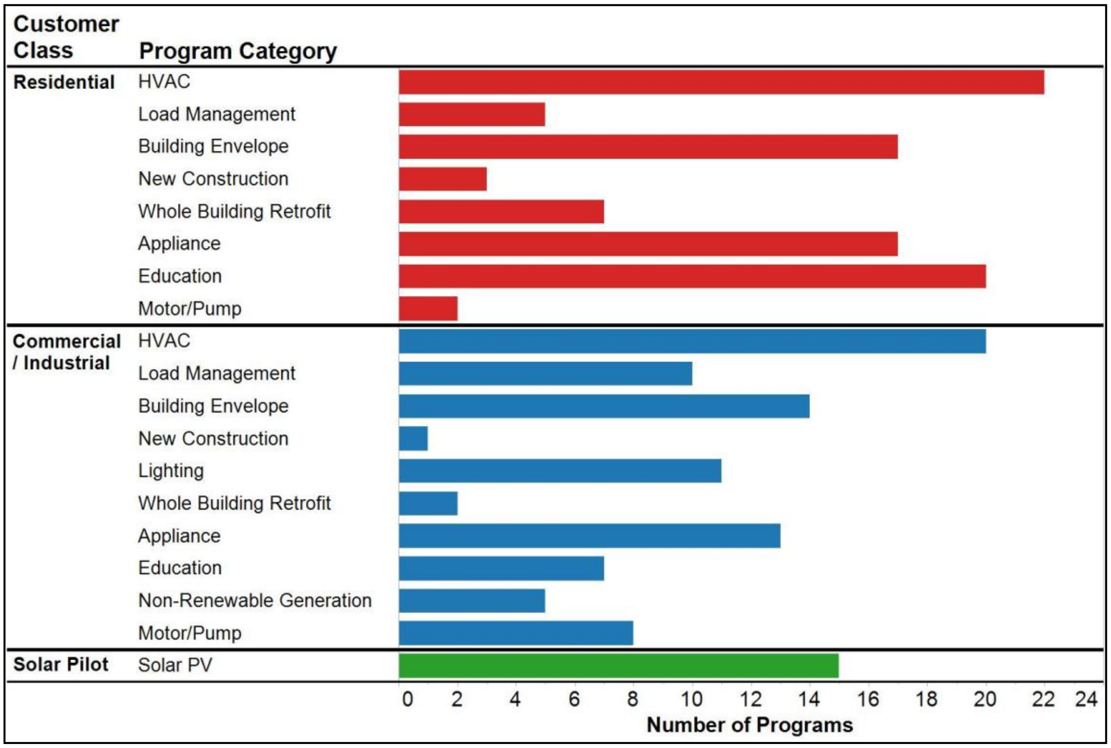


Figure 6-9 plots the cumulative number of participating customers by customer class and program category. As might be expected, greater numbers of programs lead to greater numbers of total participants in many cases, such as with HVAC. But in some instances, numbers of participants are low even with a relatively large number of programs. For example, there are more residential education programs than residential appliance programs; but the education programs have fewer total participants. This may be because customers already well informed are more interested in hardware remedies than information, or for other reasons. Also, the number of solar PV programs is greater than in most categories, but there are relatively few participants. This is likely because the solar PV programs are relatively new, pilot programs that target commercial, residential and education sectors separately. It is beyond the scope of this study to explain relationships between program characteristics and customer participation. Table 6-4 lists the values plotted in Figure 6-9.

[281] All data are from FEECA DSM program matrix, described in this section and in Appendix B.

Figure 6-9 FEECA DSM Portfolio Cumulative Number of Program Participants (2019) by Customer Class and Program Category, 2010-2019[282]

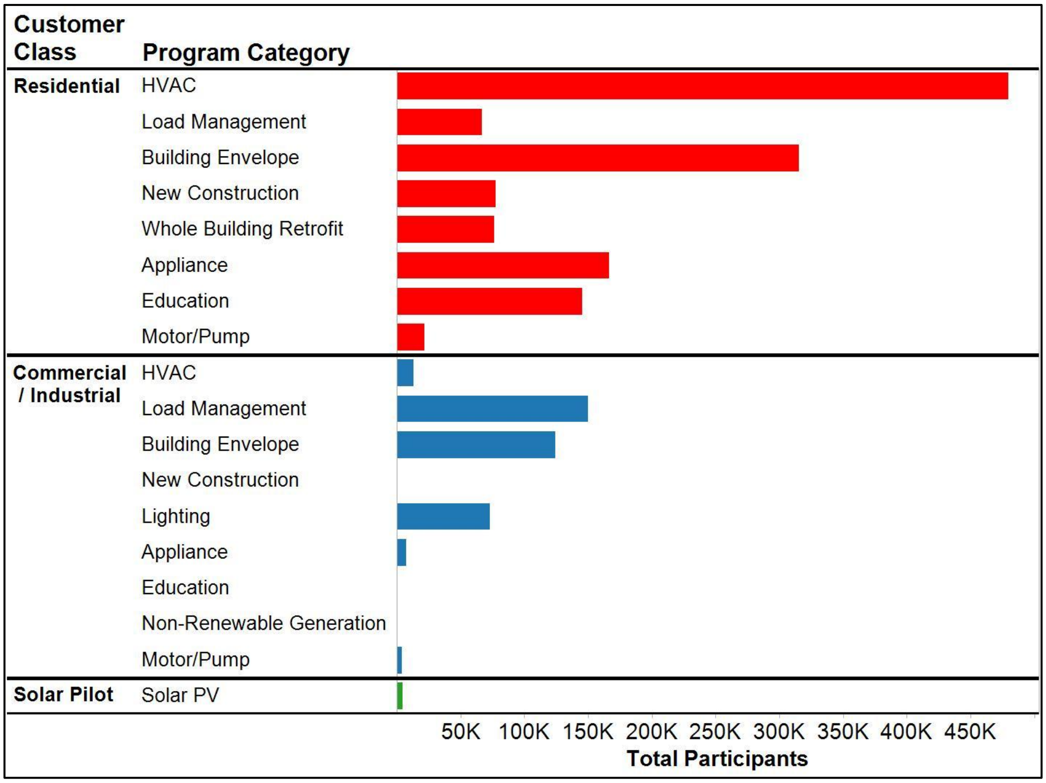
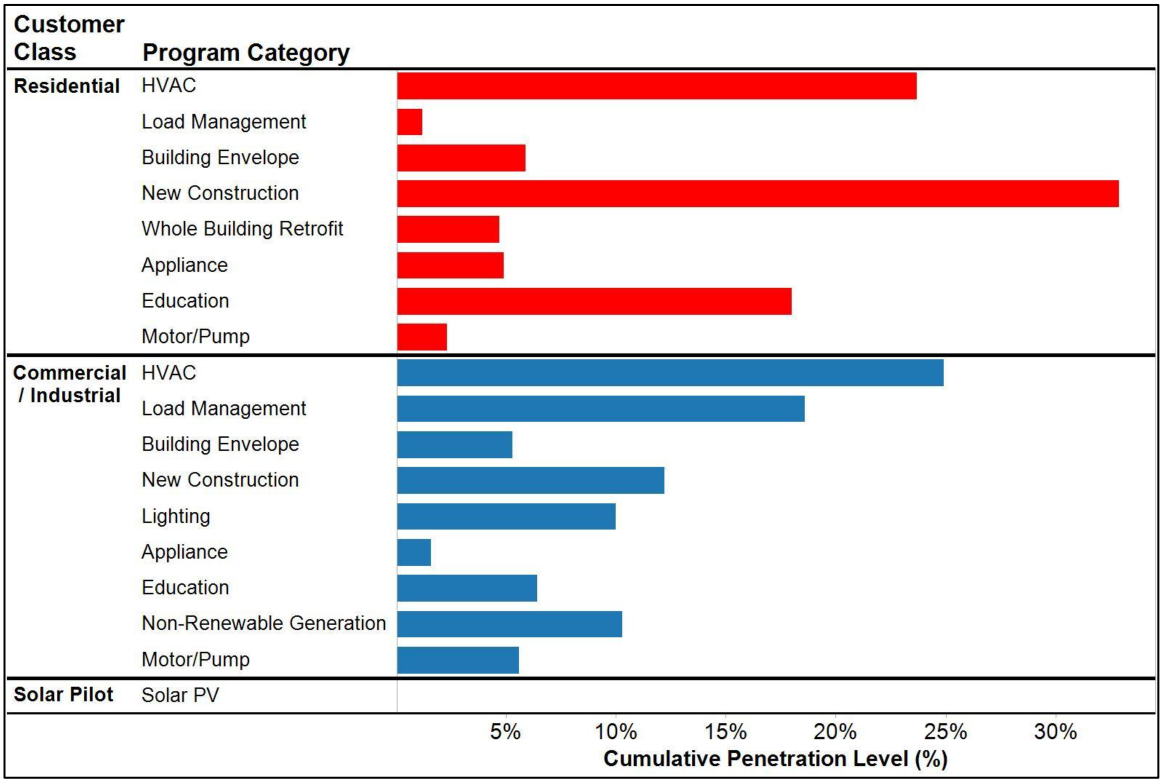


Figure 6-10 summarizes the extent to which each of the FEECA DSM portfolio program categories are projected to penetrate the population of eligible customers. It plots the average cumulative penetration level in 2019 expressed as a percentage of each customer class and program category's eligible population of customers. Projected penetration rates vary across program categories, perhaps reflecting value to customers and customer awareness. Table 6-4 lists the values plotted in Figure 6-10.

Figure 6-11 displays the same data shown in Figure 6-10 plotted at the individual program level to illustrate the variability of penetration rates across programs that fall in the same program category. There could be many reasons for this variability, including differences in program design, opportunities for customers to benefit, and customer awareness. The program and program participation data provide context for Section 10, which explores the relationships between FEECA utilities' DSM programs and building codes and appliance efficiency standards. Appendix B Table 4 lists the values plotted in Figure 6-11.

[282] All data are from FEECA DSM program matrix, described in this section and in Appendix B.

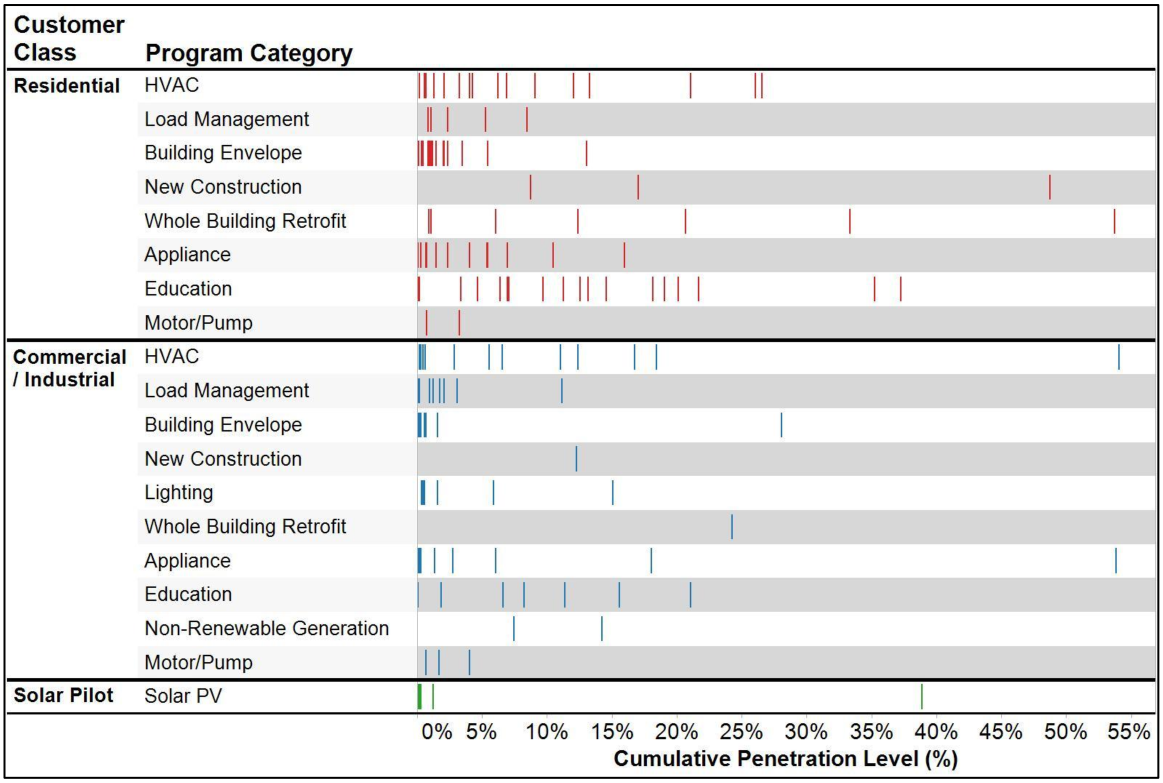
Figure 6-10 FEECA DSM Portfolio Average Cumulative Penetration Level (2019) by Customer Class and Program Category, 2010-2019[283]



Figures 6-8 through 6-11 illustrate variations in numbers of programs and program participants, and contrast these with the numbers of eligible participants. It is beyond the scope of this report to explain why theses variations exist and why some eligible customers choose not to participate in programs. The data do illustrate that some programs are clearly smaller in terms of participation and participation rates than others. Further study may identify reasons to modify programs, or to narrow or expand the number of programs offered.

[283] All data are from FEECA DSM program matrix, described in this section and in Appendix B.

Figure 6-11 FEECA DSM Portfolio Programs' Cumulative Penetration Level (2019) by Customer Class and Program Category, 2010-2019[284]



284 All data are from FEECA DSM program matrix, described in this section and in Appendix B. The values for individual data points in this figure are listed in Appendix B Table 4.

Table 6-4 FEECA DSM Portfolio Programs' Avoided Capacity Factors, Number of Programs, Participation, and Penetration Levels by Program Category and Customer Class[285]

Customer Class	Program Category	Avoided Capacity Factor (%) Avg.	Min.	Max.	Range	# of Programs Offered	Cum. # of Participants	Cumulative Penetration Level (%) Avg.	Min.	Max.	Range
Residential	HVAC	0.32	0.16	0.54	0.38	22	479,559	23.7	2.0	26.5	24.5
	Load Management	0.04	0.00	0.06	0.06	5	66,835	1.2	1.0	8.4	7.4
	Building Envelope	0.32	0.12	0.68	0.56	17	315,244	5.9	3.4	13	9.6
	New Construction	0.26	0.16	0.37	0.21	3	77,551	32.9	17.0	48.7	31.7
	Whole Building Retrofit	0.46	0.11	1.43	1.32	7	76,753	4.7	1.1	77.5	76.4
	Appliance	0.76	0.31	1.31	1	17	166,636	4.9	0.5	3.7	3.2
	Education	0.61	0.23	1.55	1.32	20	145,750	18	9.6	37.2	27.6
	Motor/Pump	0.25	0.22	0.28	0.06	2	21,878	2.3	1.2	5	3.8
Commercial / Industrial	HVAC	0.35	0.17	1.50	1.33	20	13,500	24.9	6.9	54	47.1
	Load Management	0.15	0.00	0.58	0.58	10	150,268	18.6	1.6	2.6	1.0
	Building Envelope	0.39	0.20	0.73	0.53	14	124,652	5.3	0.1	27.9	27.8
	New Construction	0.36	0.36	0.36	0	1	*	12.2	12.2	12.2	0.0
	Lighting	0.43	0.13	0.58	0.45	11	73,137	10	0.3	14.8	14.5
	Whole Building Retrofit	**	**	**	**	2	*	24.2	24.2	24.2	0.0
	Appliance	0.68	0.39	1.20	0.81	13	7,798	1.6	1.3	18	16.7
	Education	0.40	0.30	0.51	0.21	7	*	6.4	1.8	21	19.2
	Non-Renewable Generation	0.12	0.01	0.24	0.23	5	114	10.3	7.4	14.2	6.8
	Motor/Pump	0.57	0.27	1.20	0.93	8	4,270	5.6	0.6	109.1	108.5
Solar Pilot	Solar PV	0.57	0.34	0.96	0.62	15	4,731	0.03	0	78.2	78.20

*Denotes missing or illegible data. **Denotes insufficient individual program data to calculate ACF. Individual program data are listed in Appendix B Table 4.

[285] All data are from FEECA DSM program matrix, described in this section and in Appendix B.

6.2 FEECA Program Impacts and Cost-Effectiveness

This section contains a discussion of the relative magnitude of the projected costs and benefits of FEECA programs and the cost-effectiveness of the FEECA goals in the context of recent fuel prices and without factoring in the value of externalities. Subsection 6.2.1 addresses DSM program costs from the perspective of utilities and the effect of those programs on rates. Subsection 6.2.2 addresses the avoided energy and capacity benefits of DSM programs. Subsection 6.2.3 includes a discussion of the cost-effectiveness of the overall FEECA goals when treated as a single portfolio. Subsection 6.2.4 addresses benefits enjoyed by all Floridians.

6.2.1 DSM Program Costs and Rate Effects

FEECA program costs accrue to FEECA utilities, the participating customer, and in some cases, to the government (for example, from federal tax incentives). Costs borne by FEECA utilities include the administrative costs of program planning and design, reporting and regulatory compliance; information management; marketing and advertising; customer service operations; financial incentives delivered to the customer; and for some programs such as load management, equipment maintenance, replacement, and operation. Direct costs borne by participating customers include equipment purchase and installation, and ongoing operation and maintenance. Participants also incur costs that are more difficult to quantify, including research and shopping, applying for rebates, and waiting for tax credits and refunds. A recent study in Leon County, Florida comparing tax credits to interest free loans found that concern about high investment costs is among the top barriers for the adoption of energy efficient and renewable energy products, and that home owners are more inclined to a take tax credit than an interest-free loan as an incentive.[286] These unobservable costs and customer preferences contribute to lower DSM program participation than appears to be feasible based on technical and economic studies.[287] The costs borne by governmental entities include the administration and funding for rebates and tax credits, which are not included as costs in the FPSC methodology for cost-effectiveness.[288]

For the purpose of cost-effectiveness analysis, the FPSC requires costs to be separated into the following categories.

1) Utility non-recurring costs per customer

[286] Zhao et. al. 2012.
[287] Customer costs of decision making are not peculiar to DSM and so should not be distinctive to economic efficiency.
[288] Rule 25-17.008, F.A.C.

2) Utility recurring costs per customer
3) Utility cost escalation rates
4) Customer equipment costs
5) Customer equipment escalation rate
6) Customer operation and maintenance (O&M) cost
7) Customer O&M cost escalation rate

Utility financial incentive costs are specified separately from other non-recurring costs due to the different treatment they get under the RIM and TRC tests.

Subsection 6.1 describes data assembled in order to analyze and compare the numerous assumptions utilities used to evaluate over 210 different DSM programs proposed for 2010-2019. As noted previously, those data do not fully characterize all the programs due to the difficulties associated with finding and assembling the information. Analysis of program costs indicate that utility non-recurring costs, including financial incentives, and participant equipment costs, average roughly 70 percent of the total costs for a program, with utility expenditures making up the other 30 percent.

Investor-owned utilities covered by FEECA recover DSM program costs through an Energy Conservation Cost Recovery Charge (ECCR) applied to customers' utility bills.[289] This charge is set by the FPSC and only direct DSM program costs are recovered through that mechanism. Forgone revenue from reduced sales and net reductions in fuel costs are not included in the ECCR. However, forgone revenues are addressed through base rate proceedings, and fuel cost savings flow through to customers through fuel adjustment charges. The ECCR is collected by an amount added to the price of each unit of energy, applied to rate classes as appropriate to reflect the different allocation of expenditures.

The residential ECCR factors for 2012 are shown in Table 6-5. The ECCR generated $380 million in revenue in 2010.[290] That amount represented 1.9 percent of the $19.8 billion total retail electric revenue collected by investor-owned FEECA utilities in that year.[291]

[289] Since the FPSC does not have rate-making authority over municipal utilities, JEA and OUC do not utilize the ECCR procedure as a means of recovering costs of FEECA programs.
[290] FPSC 2012 "Annual Report" on FEECA.
[291] FPSC 2011 Statistics of the Florida Electric Utility Industry.

Table 6-5 Residential ECCR Factors Approved for 2012[292]

IOU FEECA Utility	Residential ECCR Factor (Cents/kWh)	Monthly Bill Impact (Based on 1,200 kWh)
FPL	0.287	$3.44
PEF	0.288	$3.46
TECO	0.302	$3.62
GULF	0.256	$3.07
FPUC	0.115	$1.38

Table 6-6 summarizes the level of DSM expenditures by all FEECA utilities for the years 2002 through 2019 and the average cents per kWh required to recover these costs across all retail rate classes. The levelized average equivalent ECCR projected for 2010-2019, corresponding to the period covered by the 2009 FEECA goals proceedings, is roughly 0.25 cents per kWh, or probably less than two percent of the price of electricity.[293]

6.2.2 Utility Avoided Energy and Capacity Costs and Forgone Revenues

The energy and capacity costs that utilities avoid by conducting DSM programs can be broken down into four components:

1) Fuel and non-fuel energy revenues
2) Production fuel costs
3) Avoided capacity
4) Effects on system production costs from not building the avoided unit

Utilities have developed software that allows the evaluation of these impacts pursuant to the cost-effectiveness methodology prescribed and required by the FPSC, which has been called the "FIRE" model. This is apparently an acronym for Florida Integrated Resource Evaluation, but the initial origin of the name is not documented. The following discussion adheres to the FPSC's prescribed methodology with one distinction: The methodology, and the FIRE software, provide for the evaluation of DSM programs that shift energy from on peak to off peak, which could be caused by load management, for example. Because the shift of energy in Florida utilities' currently approved plans is very small, this type of DSM program will not be addressed here.

[292] FPSC 2012 "Annual Report" on FEECA, page 8.
[293] Assuming a levelized average price of at least 12.75 cents per kwh.

Table 6-6 Historical and Projected DSM Expenditures and Average Cost per kWh[294] (notes in fn below)

Year	Actual/ Projected	Retail Sales GWh[a]	Total IOU ECCR[b]	Total Estimated FEECA Expenditures[c]	Cents Per kWh
2002	A	178,302	$248,037,512	$272,097,151	0.153
2003	A	175,207	$237,396,712	$260,424,193	0.149
2004	A	184,480	$230,110,832	$252,431,583	0.137
2005	A	190,071	$228,219,863	$250,357,190	0.132
2006	A	192,222	$229,866,254	$252,163,281	0.131
2007	A	194,580	$236,589,592	$259,538,782	0.133
2008	A	190,738	$284,392,455	$311,978,523	0.164
2009	A	188,556	$310,365,497	$340,470,950	0.181
2010	A	192,940	$355,847,434	$390,364,635	0.202
2011	A	189,026	$379,713,609	$416,545,829	0.220
2012	A/P	188,124	$397,989,006	$436,593,940	0.232
2013	P	190,327	$422,825,804	$463,839,907	0.244
2014	P[d]	193,759	$448,195,352	$491,670,301	0.254
2015	P[d]	197,979	$475,087,073	$521,170,519	0.263
2016	P[d]	201,141	$503,592,298	$552,440,751	0.275
2017	P[d]	203,970	$533,807,836	$585,587,196	0.287
2018	P[d]	206,698	$565,836,306	$620,722,427	0.300
2019	P[d]	209,599	$599,786,484	$657,965,773	0.314
NPV[e] 2002-2009			$1,480,391,036	$1,623,988,966	0.146 [f]
NPV[e] 2010-2019			$3,184,772,786	$3,493,695,746	0.254 [f]

Fuel and Non-Fuel Energy Revenues. Utilities use different types of meters for different classes of customers. One-part meters only measure cumulative energy (kWh). Two-part meters measure cumulative energy and the maximum rate of energy use, integrated over a period of time to yield a monthly "demand" imposed on the electric system (kWh and kW). There are other meters that measure energy during specifically designated time periods corresponding to electric system production costs (time-of-use meters) or continuous metering, which are often used for power factor penalties. Different types of meters affect the price signal a customer receives and are applied to various classes of customers based the approved tariff for that customer. Residential electrical consumption is usually measured with one-part energy meters, but many commercial customers have two-part or other types of meters. The FPSC cost-effectiveness methodology does not address metering with regard to revenue evaluation, but the FIRE model allows modeling of either one-part or two-part metering, depending

[294] Notes to Table 6-6: a. history and forecast of retail sales totaled for all FEECA covered utilities from 2012 Ten Year Site Plans. A indicates actual, *ex post*, values. P indicates projected, *ex ante* values. b. ECCR 2002-2010 from FPSC 2012 "Annual Report", 2011 through 2013 from FPSC Docket No. 120002 filings, c. Proportional to JEA and OUC electric energy sales, 9.7% of total FEECA utilities in 2011. d. 2014-2019 ECCR projected using 2010-2013 CAGR of 6.0%. e. 7% customer discount rate (weighted average cost of capital). Note that since program expenses are zero after 2019, this NPV value represents expenditures for the current set of approved FEECA programs through 2040. f. Levelized over period of net present value calculation.

on the target market. The simplifying assumption of one-part metering has been made in the statewide modeling presented in this report.

The effect of demand reduction by a customer does not necessarily translate into useful avoided capacity unless it is coincident with a system peak. Some electric utilities peak in the summer, and some alternate between summer and winter peaking. The FPSC methodology addresses this by expecting the winter and summer peak benefits be weighted by seasonal loss of load probabilities (LOLP).

Revenues from electric sales are designed to cover fuel costs, fixed embedded costs, and variable operating costs, called non-fuel energy costs. Fuel costs in Florida are recovered in electric rates based on system average fuel cost. Pursuant to PURPA, utilities' generation fuel costs are passed through to customers and do not affect utility earnings.[295] Florida has a generation performance incentive factor (GPIF) that creates an incentive for utilities to increase generation efficiency, but this is not recovered as a fuel cost.

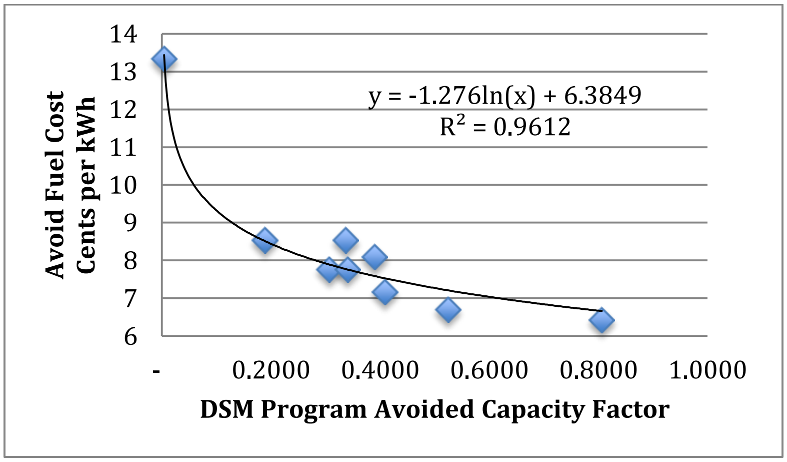
Non-fuel energy costs include: 1) constructing, operating, and maintaining the facilities, systems and staff required to generate, transmit, distribute, meter, and bill for electricity; and 2) providing customer and administrative services inherent in engaging in very technical, regulated, and financial sales to large numbers of customers. The portion of electric rates that recovers non-fuel energy costs also includes the margin needed to attract investments and ensure the financial integrity of the system.

Program Fuel Savings. The marginal cost to produce energy during on-peak periods may vary significantly from a system's average fuel cost, thus the value of energy avoided may be different than the average cost. Figure 6-12 illustrates this effect with data from FPL's DSM program cost-effectiveness filings.

The avoided cost of peak energy depends on the mix of generating units operated by the utility, and the ACF of the DSM program, as described in Section 6.1. For example, a utility such as FPUC, which does not generate its own electricity but purchases power under a two-part wholesale power contract (i.e., a demand charge and a system average energy charge), has avoided energy costs equal to forgone fuel revenues. The capacity factor of the DSM program does not make a difference for FPUC. FPUC's wholesale power provider, on the other hand, does benefit from an improved system load factor.

[295] Public Utility Regulatory Policy Act, initially enacted as part of the 1978 National Energy Act. See Section 2 for a discussion of federal energy law in the context of FEECA.

Figure 6-12 Avoided Marginal Fuel Cost as a Function of DSM Program ACF[296]



Avoided Capacity. The timing and characteristics of the capacity whose costs are avoided by a DSM program significantly affect cost-effectiveness results. Avoided capacity costs include generation, transmission, and distribution. Those costs vary among the FEECA utilities as summarized in Table 6-7, but are applied uniformly within a given utility across DSM programs. The capacity factor for the avoided unit, and its associated heat rate and fuel cost are also important aspects of the avoided generating unit. The costs of transmission and distribution associated with an avoided unit will also vary depending on the status of the anticipated site and the capacity of facilities serving it.

Effects on System Production Costs from Avoiding a New Unit. Because of advances in technology, especially with respect to combustion turbine and combined cycle technologies, a new generating unit avoided due to conservation and energy efficiency programs is likely to be more efficient and possibly cleaner than existing units. For example, large combined cycle units have capacity factors significantly greater than 50 percent, which is greater than the ACF of the entire state of Florida's DSM portfolio (which is about 36 percent). In addition, in recent years, low natural gas prices have resulted in lower cost per unit of electricity produced by large combined cycle generation facilities than for facilities fueled by coal. Therefore, avoiding some forms of generation also results in forgone fuel cost savings. The FPSC cost-effectiveness methodology includes this consideration, as does the FIRE model.

[296] FPL approved plan FPSC Docket No.100155-EG Appendix A.

Table 6-7 Values for Avoided Capacity Employed in 2009 FEECA proceedings[297] (table notes in footnote)

Capacity Element	Units	FPL	FPUC[c]	GPC	JEA	OUC	PEF	TECO
In-service yr. for avoided gen. unit	Year	2019	2011	2014	2022	2018	Note b	2012
In service year for avoided transmission and distribution	Year	2012	na	2011	Note a	2030	Note b	2012
Base yr. avoided gen. unit cost	$/kW	725	na	820	Note a	120	Note b	573
Base yr. avoided transmission cost	$/kW	186	na	249	Note a	0	Note b	27
Base yr. avoided distribution cost	$/kW	21	na	110	Note a	0	Note b	50
G, T & D cost escalation rate	%/yr.	3.0	na	1.7	Note a	0	Note b	2.3
Generator fixed operations and Maintenance (O&M) cost	$/kW-yr.	98	82	55	Note a	10.7	Note b	20
Generator fixed O&M cost esc. rate	%/yr.	2.5	2.5	.62	Note a	2.5	Note b	2.3
Transmission fixed O&M cost	$/kW-yr.	2.8	na	3.1	Note a	0	Note b	.72
Distribution fixed O&M cost	$/kW-yr.	1.01	na	2.8	Note a	0	Note b	2.8
T&D fixed O&M esc. rate	%/yr.	2.5	na	1.7	Note a	0	Note b	2.3
Gen. variable O&M cost	¢/kWh-yr.	0.11	na	0	Note a	0	Note b	.381
Gen. var. O&M esc. rate	%/yr.	2.5	na	0	Note a	2.5	Note b	2.3
Generator capacity factor	%	*	na	41	Note a	15	Note b	5.6
Avoided gen. fuel cost (in svc yr.)	¢ /kWh	8.2	6.4	8.3	Note a	3.4	Note b	8.2
Avoided gen. unit fuel cost esc.	%/yr.	4.7	2.5	2.7	Note a	2.5	Note b	3.8

[297] Compiled from utility filings in Dockets No. 080407-EG through No. 08041-EG.
Notes to Table: * indicates that the value varies every year. a) Reported as not quantifiable at this time. b) Complex incremental expansion plan not compatible with this table. c) Not applicable to a non-generating utility.

6.2.3 Cost-Effectiveness of Statewide FEECA Goals

The current FEECA process is focused on individual program cost-effectiveness by utility. As noted previously, this study examines the cost-effectiveness of the 2009 goals as a portfolio of programs. The lack of electronic filings, the quality of the scanned paper documents, the lack of detailed cost schedules, and the differences in reporting made it impossible to assemble data necessary for a comprehensive analysis. Therefore, a simplified approach was undertaken in which the total of FEECA annual utility goals was tested with FPSC's prescribed cost-effectiveness methodology, using projected DSM expenditures and a surrogate for the average value of avoided energy and capacity. Because of this approximation these results cannot be considered definitive, but they are illustrative. The estimated annual statewide FEECA DSM program expenses for utilities for 2010 through 2019 are presented in Table 6-6. The data compiled as described in Section 6.1 does not separate financial incentives from other utility program expenditures, and as a consequence, only a statewide RIM test evaluation was performed. The avoided generation and capacity values used were those contained in FPL's filings pursuant to the 2009 FEECA goals proceedings, adjusted for the ACF of the FEECA goals, current fuel prices and without values for environmental externalities.

Florida's DSM Portfolio. On December 30 2009, the FPSC assigned demand and energy conservation goals to each of the FEECA-covered utilities.[298] These goals were expressed as incremental MW and GWh savings to be obtained each year through 2019, and allocated specifically to residential and commercial customer classes. The unique goals assigned to each FEECA utility are summed and presented in Table 6-8. For the purposes of statewide modeling, an equal weight was applied to summer and winter capacity goals. The resulting DSM portfolio's cumulative trends and effective ACF are shown in Table 6-9.

The combined energy and demand goals adopted by the FPSC for all the FEECA utilities for the period 2010 through 2019 were 7842.5 GWh annually, 1936.7 MW of winter peak, and 3023.6 MW of summer peak. This represents 3.7 percent, 4.5 percent, and 7.0 percent, respectively, of the FEECA utilities' combined forecast for these demands for the as reported in their 2012 Ten-Year Site Plans.[299]

[298] Order No. PSC-09-0855-FOF-EG pursuant to Docket Nos. 080407-EG, 080408-EG, 080409-EG, 080410-EG, 080411-EG, 080412-EG, 080413-EG.
[299] Even with these goals, additional generation capacity will be needed in the state of Florida, as discussed in Section 3 of this report.

Table 6-8 Florida's 2009 DSM goals – Total Annual Increments[300]

Year	Summer (MW)	Winter (MW)	Annual (GWh)
2010	230.4	147.1	613.7
2011	270.9	166.6	725.8
2012	311.6	189.4	816.5
2013	331.0	202.1	862.1
2014	339.9	212.0	884.4
2015	337.1	214.3	884.6
2016	329.2	220.1	828.9
2017	313.1	213.5	782.9
2018	294.4	201.0	741.1
2019	265.7	171.2	702.9
Total	3023.6	1936.7	7842.5

Table 6-9 Florida DSM Portfolio Developed for Modeling Purposes[301]

Year	Cumulative GWh	Cumulative MW Reductions	Avoided Capacity Factor
2010	614	189	0.37
2011	1340	408	0.38
2012	2156	658	0.37
2013	3018	925	0.37
2014	3903	1201	0.37
2015	4787	1476	0.37
2016	5616	1751	0.37
2017	6399	2014	0.36
2018	7140	2262	0.36
2019	7843	2480	0.36
2020	7843	2480	0.36
2021-2039	No Change	No Change	No Change
2040	7843	2480	0.36

Statewide Energy and Capacity Costs for Portfolio Evaluation. It was beyond the scope of this study to assemble and appropriately weight the avoided fuel and capacity benefits of all the FEECA utilities. Since FPL is a low-cost provider in Florida and its sales represent nearly one-half of electricity sales in Florida, employing its values as the value of avoided energy and capacity is unlikely to overestimate the benefits of Florida's DSM portfolio. The empirical relationship shown in Figure 6-12 (above) was used to

300 Total of goals assigned to FEECA covered electric utilities by FPSC in Order No. PSC-09-0855-FOF-EG.
301 Annual goals from Table 6-8 converted to cumulative as required by FPSC cost-effectiveness methodology with 50% weighting of summer and winter goals.

model the spread between system average fuel cost and avoided marginal fuel cost as a function of the ACF of FEECA statewide goals.[302]

Statewide Results. The results of modeling the FEECA goals as a single DSM portfolio are provided in Appendix C, Table 2. The program costs are the NPV of expenditures for the period 2010-2040 and the program benefits are the NPV of utility avoided costs for the period 2010-2040. The substantial difference between RIM and TRC benefits is due to the net present value of forgone revenues. As shown in Table 6-10, the benefit to cost ratio was positive under the RIM test criteria, with a substantial margin for error. A cash flow analysis was also performed; comparing cumulative DSM benefits with cumulative DSM expenditures through 2019. The current rate of expenditure does not break even with RIM-based fuel and energy benefits on a nominal basis until 2022. This delay in payback suggests risks associated with the forecasts of capital costs, fuel costs, and the effects of appliance standards, building and housing codes and possibly equity issues related to the distribution of benefits through time, the overall long-term cost-effectiveness for utility ratepayers is positive under the RIM test.

Table 6-10 Illustrative Statewide FEECA Goals Cost-Effectiveness Results

Test	Program Benefits[303] (NPV x $Billion)	Program Costs[304] NPV x $Billion	Benefit/Cost Ratio
RIM	6.2	3.5	1.77
TRC	15.7	na	na

These results suggest that the overall FEECA goals are cost-effective, even including those DSM programs, such as the pilot solar rebate programs, that individually are not cost-effective. Since environmental externality costs as applied in the E-RIM and E-TRC

[302] This spread was forecast by FPL to diminish through time, an effect that was modeled by employing a shape vector. FIRE model results from FPL filings were then aggregated into a vector for each principal cost or benefit component as a function of the DSM program quantity that applied to a set of variables. For example, fuel costs were expressed as per unit of avoided energy; and capital costs were expressed as per unit of avoided capacity. The net fuel benefits from the avoided generating unit (avoided unit fuel and avoided unit replacement fuel) are not a function of the DSM program's avoided energy. Rather, they are a function of the capacity factor associated with the avoided unit. The 2009 fuel price forecast employed by FPL assumed a natural gas price of $8.29 in 2011 (Sims Testimony on behalf of FPL, June 1 2009), monotonically increasing thereafter at a 2.9 percent compound annual average growth rate between 2011 and 2043. Natural gas was the source of 63.2% of the electricity in Florida in 2011 and the delivered cost of natural gas was about one-half the forecast delivered price for natural gas. The fuel cost vectors in the principle component models were adjusted proportionately (a 30% reduction) to better represent current market conditions but with the same growth applied that FPL used. A discount factor of 7 percent was employed for NPV calculations, to represent customer weighted average costs of capital. Appendix C Table 1 contains the "per unit of energy of demand reduction" results of the principle component analysis.

[303] From Appendix C Table 2.

[304] Utility program expenditures from Table 6-6.

tests for the 2009 FEECA goals proceedings, were not included in this analysis, the overall DSM goals should be effective in reducing the long-term electric utility costs for all customers served by FEECA utilities, even if additional environmental externality costs are not imposed by new regulation.

7 Sensitivity to Planning Assumptions

7.1 Modeling Approach

The cost-effectiveness of energy efficiency, using the metrics discussed in Section 5, is assessed with computer models, which can vary among utilities, regulators, and interest groups. The utilities have prepared and submitted these models in their filings with the FPSC. This report also uses computer modeling to examine possible future impacts of FEECA under different scenarios. The intent in this report is not to re-create the particular models of any specific program administered by a particular utility, or to assess the cost-effectiveness of any particular utility program. Rather, the modeling for this report is to assess whether or not the FEECA remains in the public interest on a prospective basis, by assessing: 1) The effectiveness of generic programs, characterized by how they reduce electricity consumption and electricity demand for the state of Florida; and 2) the sensitivity of cost-effectiveness tests to changes in the electricity market in the wake of uncertainty.

Each energy efficiency program implemented by a utility has a different emphasis regarding the manner in which it reduces the consumption of and demand for electricity. Some programs, like direct load control programs, reduce the demand for electricity during critical peak times, but not overall consumption. Programs that promote use of energy efficient appliances, on the other hand, have the effect of reducing electricity consumption whenever that appliance is used, relative to electricity consumed by a less efficient appliance. However, because the consumer, and not the utility, operates the appliance and decides when to use it, programs promoting energy efficient appliances generally have the effect of reducing electricity consumption, but may not reduce peak electricity demand.

To better understand the effects of uncertainty affecting the electricity market, this study makes use of the avoided capacity factor (ACF) defined in Section 6.1.5 and applies that factor to generic programs. The ACF, which captures the relationship between the reduction in electricity consumption and the peak demand reduction, can be expressed as follows:

$$Avoided\ Capacity\ Factor = \frac{Customer\ kWh\ Reduction}{(Customer\ kW\ Reduction * 8760)}$$

The numerator of this factor reflects the decrease in electricity consumption that results from the generic program. The denominator measures the demand reduction of the program. The demand reduction, expressed in kWs, is multiplied by 8760, which is the number of hours in a year, to make the ratio unit free and to allow the ratio to be no greater than one As noted in Section 6.1.5, unless energy is being shifted from peak to off peak, or the DSM programs address strictly off-peak energy use, the ACF should be between zero and one. The ACF is commonly expressed as a percentage.

The analysis for this report models three ACFs: 1) The lowest is 4 percent, which approximates residential direct load control programs; 2) The middle factor is 23 percent, which approximates residential HVAC replacement programs; and 3) the highest is 51 percent, which approximates commercial lighting programs.

The model for this analysis examines the sensitivity of cost-effectiveness tests for each generic program to three changes: 1) utility capacity costs, 2) utility fuel and other operating costs, and 3) regulatory risk. For each analysis, a base case is chosen. Sensitivity to changes in costs and risks are examined by conducting cost-effectiveness tests with higher costs and risks than the base case, and with lower costs and risks than the base case. Each analysis is described in the following subsections.

7.2 Effects of Generation and Transmission Construction Costs

The principal benefits from engaging in energy efficiency are the ability to avoid (or delay) expending resources on the production of electricity or on the capacity to produce electricity. These costs are referred to as avoided utility capacity costs, and are defined in Section 5.

Because the process of constructing a generating unit takes years from planning to operation of the unit, there is uncertainty regarding the actual costs of the new capacity. Data from the EIA are used to determine variability in these costs. EIA uses information regarding the costs of generating capacity in analyses that it performs for the executive and legislative branches of the federal government, and publishes this information.[305] Along with the expected costs of new generation, the EIA also conducts sensitivity analyses, or scenarios, related to these costs. The range of uncertainty in these capacity costs varies with the technology. The assumptions for the costs of nuclear capacity, for example, deviate by 20 percent from the expected case. The deviations in the costs of natural gas capacity are 5 percent from the expected case. This report's analysis uses a conservative deviation of 20 percent from the base case for the high-capacity cost and low-capacity cost scenarios, as is used by the EIA for the construction of new nuclear units, Table 7-1 assesses the sensitivity of three cost-effectiveness tests – RIM, TRC, and

[305] U.S. Energy Information Administration, Assumptions to the Annual Energy Outlook. August 2012. http://www.eia.gov/forecasts/aeo/assumptions/index.cfm, accessed December 4, 2012.

PT– to changes in capacity costs under the three capacity cost scenarios and for the three types of ACFs (4%, 23%, and 51%). The results of this analysis are shown in Table 7-1.

Table 7-1 Cost-Effectiveness Measures under Capacity Cost Scenarios

Avoided Capacity Factor	Scenario	RIM	TRC	PT
51%	Base	0.77	3.73	8.66
	High Capacity Costs	0.79	3.82	8.66
	Low Capacity Costs	0.75	3.63	8.66
23%	Base	1.10	1.77	1.32
	High Capacity Costs	1.15	1.85	1.32
	Low Capacity Costs	1.05	1.68	1.32
4%	Base	1.32	4.95	NA[306]
	High Capacity Costs	1.44	5.41	NA
	Low Capacity Costs	1.20	4.50	NA

The effects of capacity cost uncertainty are smallest in programs that have greater impacts on reducing electricity consumption relative to reducing capacity, deviating by less than 3 percent on the RIM and TRC test. For a program that emphasizes reduction in electricity consumption, such as a commercial lighting program, it is reasonable to suggest that the cost-effectiveness of this type of program will remain fairly stable, even in the wake of uncertainty in construction costs. For programs that emphasize demand reduction, however, like a direct load control program with an avoided capacity factor of 4 percent, the effects of capacity cost uncertainty are expected to be much larger, with the effects on costs under the RIM and TRC Tests varying by approximately 9 percent. Thus, the metrics related to a program that emphasizes demand reduction rather than reduction of consumption will be more sensitive to uncertainty in construction costs.

7.3 Fuel Price Volatility and Operational Constraints

The uncertainty surrounding fuel prices and operational constraints faced by power plant operators is another source of risk in the electricity industry. The prices of fossil fuels are determined in global markets beyond the control of any single consumer. Changes in the availability of or the demand for these fuels can cause prices to deviate from expected levels. Further, operational constraints imposed by changes in environmental standards can cause operating costs to deviate from expectations over the life of a generating unit.

[306] We have assumed that there are no equipment costs borne by the participant under this program. Therefore, the Participant Test yields no defined ratio of benefits to costs. Presumably, there would be costs to comfort or convenience from such a program; but we have not attempted to assign a monetary value to those costs.

To quantify this uncertainty, we apply a deviation from the base case of 20 percent, the same percent as was applied to deviations in assessing the impact on capacity costs. The same ACFs and cost-effectiveness tests (RIM,TRC, PT) are used to assess the impact of uncertainty on fuel prices and operational constraints.as were applied to the capacity costs analysis in Section 7.2. The results of the analysis regarding fuel price volatility and operating costs are shown in Table 7-2.

Table 7-2 Cost-Effectiveness Measures under Operating Cost Scenarios

Avoided Capacity Factor	Scenario	RIM	TRC	PT
51%	Base	0.77	3.73	8.66
	High Operating Costs	0.81	4.33	9.72
	Low Operating Costs	0.73	3.13	7.60
23%	Base	1.10	1.77	1.32
	High Operating Costs	1.12	1.99	1.41
	Low Operating Costs	1.07	1.54	1.23
4%	Base	1.32	4.95	NA
	High Operating Costs	1.34	5.26	NA
	Low Operating Costs	1.30	4.64	NA

In a similar manner to Table 7-1, the effect of deviations in fuel prices and operating costs in Table 7-2 are more extensive for programs that emphasize reductions in electricity consumption over reductions in demand. However, the effects of uncertainty in operating costs on the RIM test overall are smaller. The deviation in RIM for the two scenarios is, at most, 5 percent, suggesting that the effect on fuel prices and operating costs under the RIM test is relatively stable in the face of this uncertainty. The effects under the TRC and PT tests are more pronounced, however. The deviation in impacts under the TRC test ranges from 6 percent for the program that emphasizes demand reduction to 16 percent in the program that emphasizes reduction in consumption. Under the PT, the effect of prices and costs varies by 12 percent in the program, such as commercial lighting, that emphasizes consumption and by 7 percent in a program that represents a mix of consumption and demand reduction, such as a residential HVAC replacement program.

7.4 Regulatory Risk

The uncertainty surrounding the costs of compliance with future environmental standards is another source of risk in the electricity industry. The market costs of future emissions of CO_2, for example, are an ongoing global debate. Some market areas, like the European Union, have developed policies to price CO_2 emissions. Florida has no carbon emissions pricing regime and neither does the U.S. federal government. Nonetheless, the issue of a carbon emissions pricing policy at the state and national level continues to be discussed which contributes to regulatory uncertainty. To address the effect of this uncertainty Table 7-3 assesses the impact of CO_2 emissions prices using the same metrics as in the two other analyses in Sections 7.2 and 7.3. The base case in Table 7-3 sets no price for CO_2 emissions. Two other scenarios are a $10/ton price for CO_2 emissions and a $50/ton emissions price.

Table 7-3 Cost-Effectiveness Measures under CO_2 Price Scenarios

Avoided Capacity Factor	Scenario	RIM	TRC	PT
51%	Base	0.77	3.73	8.66
	$10/ton CO_2 Prices	0.79	3.81	8.83
	$50/ton CO_2 Prices	0.86	4.16	9.53
23%	Base	1.10	1.77	1.32
	$10/ton CO_2 Prices	1.12	1.80	1.33
	$50/ton CO_2 Prices	1.19	1.91	1.39
4%	Base	1.32	4.95	NA
	$10/ton CO_2 Prices	1.33	4.98	NA
	$50/ton CO_2 Prices	1.36	5.11	NA

Because the value of emissions varies with the units of fuel consumed, which varies with the kWh produced, the programs with the greatest sensitivity to emissions prices are the programs that reduce electricity consumption the most. In our modeling, these are the programs with higher ACFs, such as the replacement of lighting. Energy efficiency programs that reduce overall consumption the least, such as direct load control programs, are least affected by uncertainty in policies governing CO_2 prices.

8 Stakeholder Perspectives

8.1 Introduction

Knowing whether or not FEECA remains in the public interest includes understanding how FEECA impacts different stakeholders financially, in terms of their energy security, and with respect to the environment. To understand how stakeholders perceive FEECA's impacts, the research team conducted three focus groups involving different stakeholders. These focus groups provided insights to how the stakeholder groups view the current impacts of FEECA, their priorities with respect to the goals of FEECA, and the future of FEECA. This section summarizes the findings from these focus groups. Appendix D provides methodological details and detailed results.

Four stakeholder groups were identified based on a review of public participation in energy-efficiency proceedings at the FPSC: 1) FEECA utilities, 2) commercial providers of energy efficiency solutions, 3) consumer interests, and 4) environmental groups. Each stakeholder group was invited to a workshop specified for it, except for the consumer and environmental interests. These two stakeholder groups were convened in a single focus group because of time constraints on the number of focus groups that could be conducted.

The first focus group combined electric IOUs, municipal utilities, and natural gas utilities subject to or potentially subject to FEECA. The intent was to elicit a wide range of thoughts and opinions from organizations with similar functional attributes (supply and distribution of energy), but different business models. Far from being a homogeneous group, these utilities have a range of cost profiles and business objectives. Their differences derive in part from the structural differences between IOUs and municipal utilities, and the competition for customers between electric and natural gas utilities. In this section, this focus group is called Utility Interests.

The second focus group was designed to combine the perspectives of individuals representing organizations clearly benefitting from mandatory DSM and renewable energy programs, such as solar manufacturers, energy service companies (ESCOs), and HVAC equipment businesses. This difference in fiduciary outlook was expected to stimulate meaningful dialog around FEECA policies. In this section, this focus group is called Commercial Interests.

The third focus group combined individuals representing organizations concerned with or engaged in protecting difficult-to-quantify common interests (such as environmental quality, natural resources, long-term energy supply) with individuals representing organizations concerned about more immediate and quantifiable consequences of FEECA policies. Utility customers ultimately bear the cost of approved utility DSM programs, yet have the opportunity to participate in these programs to reduce their consumption of or demand for energy, and potentially lowering their energy costs. Utility customers as a stakeholder group are heterogeneous. The inherent differences among the viewpoints of residential, commercial, industrial, and institutional utility customers are affected by their respective abilities to participate in utility DSM programs and their abilities to absorb increasing costs. These factors include the different accrual of costs and benefits between a property owner and the entity actually paying utility bills (landlord/renter); the portion of the customer base with fixed incomes; and the differences in metering technology and pricing structures between customers at different levels of consumption (e.g., customers subject to one-part, two-part, or time-of-use metering and pricing tariffs). In this section, this focus group is called Consumer and Environmental Interests.

It was beyond the resources available for this study to fully capture the perceptions and opinions of all potential stakeholders affected by the FEECA-mandated utility programs. In light of these constraints, a methodology was developed to capture at least a sense of the underlying values of key FEECA stakeholder groups and to explore the differing perspectives and areas of agreement across the groups. The technique employed is one common to marketing and political research, which is to assemble groups of individuals and elicit their ideas and opinions on a focused set of topics or issues.

Focus group results are not intended to provide quantitative or statistical measurement of the prevalence of any particular opinion or viewpoint. Rather, the results presented here are intended to provide qualitative insight into the range of stakeholder concerns and viewpoints and provide a preliminary assessment of areas of agreement and disagreement. The methodology utilized for the focus groups is described in Appendix D. The results for each focus group are summarized in this section, together with a summary of findings.

8.2 Methodology and Description of Focus Groups

8.2.1 Focus Group Participation

Focus group participation was solicited with several considerations in mind. Individuals with some degree of experience with FEECA issues and whose organizations are affected directly or indirectly by decisions about FEECA and its implementation were sought. Groups were sized with a small enough number of participants to allow for depth of discussion on specific FEECA issues, yet large enough to capture potentially divergent perspectives; an ideal focus group size is eight to 12 participants. A small focus group format allows for effective use of facilitation tools for broad discussion and debate, group decision-making to consolidate ideas, and focused individual responses to explicit questions about alternative future scenarios for FEECA and its implementation.

To solicit participants, a list of potentially interested utilities, companies, or organizations was created for each stakeholder group. A specific individual or point of contact for each group on each list was then identified. These individuals were contacted via e-mail or telephone and extended a personalized invitation to participate in the focus groups as representatives of the utility, company, or organization with which they are affiliated. The invitation letters included a brief explanation of the background and goals of this study as well as additional logistical details about the meetings. An example invitation letter is provided in Appendix D.

Utilities regulated under FEECA were contacted through their legislative affairs departments and asked to designate a representative. The utilities that participated in the Utility Interests focus group included FPL, PEF, Gulf Power, JEA, OUC, TECO, and FPUC. In addition, the Florida Natural Gas Association (representing natural gas utilities regulated under FEECA) and the Florida Municipal Electric Association also were represented. Some entities chose to designate more than one representative, and this resulted in a Utility Interests focus group of 15 participants.

Participants for the Commercial Interests and the Consumer and Environmental Interests focus groups were solicited in a number of ways. First, all named intervener parties to the most recent FPSC goal-setting docket were contacted and invited to participate. These parties also suggested participants. Second, the study team developed a list of target organizations to invite. The complete list of organizations contacted to solicit participation in these two focus groups is contained in Appendix D.

Participants in the Commercial Interests focus group included: 1) a renewable energy developer, 2) a large ESCO and commercial HVAC equipment manufacturer, 3) the Florida Solar Energy Industries Association, 4) the Florida Solar Energy Center (FSEC), 5) a large DSM services company, 6) a medium-sized HVAC contractor, 7) the Florida Retail Federation Association, 8) Enterprise Florida, 9) the Florida Home Builders Association, and 10) a medium-sized residential construction company owner. Each interest group designated one representative, and this resulted in ten participants in this group.

Participants in the Consumer and Environmental Interests focus group included: 1) a community conservation services consultant, 2) the Southern Alliance for Clean Energy (SACE), 3) the Sierra Club, 4) AARP (Florida Group), and 5) the Florida State Hispanic Chamber of Commerce Association. There were a number of unexpected "no shows" on the day scheduled to conduct this session. Each group designated one representative, and this resulted in five participants in this group.

8.2.2 Focus Group Preparation

Focus group participants were informed in advance and in writing that they were participating in one of three focus groups designed to gain insight about three broad themes:

1) How do stakeholder groups define the public's interests as related to energy supply and management in Florida?
2) What are the stakeholder groups' perceptions of how well FEECA policies and programs are helping to meet public interests?
3) What alternative approaches might otherwise meet the objectives of FEECA?

Participants were assured that the sessions would not be audio or video recorded and that notes and results would not be traceable to individual participants. In advance of their focus group session, each participant was also provided a PowerPoint presentation describing the purpose of the study and providing background on FEECA and the RIM, TRC, and Participants Tests, as well as a copy of the questionnaire to be administered. These advance materials were provided in response to some participants' concern that they accurately represent their organization's interests.

8.2.3 Focus Group Approach

The focus group sessions were designed to first focus the discussion on FEECA issues, followed by the application of both inductive and deductive research tools commonly applied in market and political research to glean specific ideas and assess their relative importance. The inductive tools used were brainstorming, an affinity sort, and multi-voting. The deductive tool used was a written questionnaire. Each focus group was a half-day afternoon session (3-3.5 hours) and followed the same agenda:

1) Introductions followed by a brief PowerPoint presentation during which participants were encouraged to ask questions.
2) Brainstorming the three broad FEECA themes listed above.
3) Recording each individual's specific opinions and suggestions on separate sticky post-its, which were then placed on a blank wall.
4) Working as a group to consolidate these ideas and alternatives into clusters of common themes, categories, or suggestions (i.e., an affinity sort).

5) Ranking the importance or value of proposed ideas and alternatives (i.e., multi-voting).
6) Completing written questionnaires.

The opening PowerPoint presentation and questionnaires are provided in Appendix D. The Utilities Interests focus group was held on August 20, 2012, and was attended by 15 participants and three members of the FEECA evaluation team. The Commercial Interest focus group was held on August 21, 2012, and included ten participants and two members of the FEECA evaluation team. The Consumer and Environmental Interest focus group meeting was held on August 22, 2012, and was attended by five participants and two members of the FEECA evaluation team.

Brainstorming. Brainstorming sessions were facilitated to ensure that no individual took too much time and that all participants were given the opportunity to participate. The primary intent of the brainstorming session was to spark ideas about FEECA and its implementation to be captured in the subsequent affinity sort and multi-voting exercises.

Affinity Sort. Each participant was provided with large post-it notes and instructed to write as many different suggestions or opinions about FEECA as they could in about 20 minutes, one per post-it. The three broad themes described above were projected on the screen during this exercise to help focus the participants. The facilitators placed the individual post-its on the wall along one side of the room in a deliberately random fashion as the suggestions and opinions were completed. The entire group was then asked to approach the wall and manually sort and group the individual notes into clusters of what seemed to be ideas and suggestions addressing a common topic. Any participant could move any post-it note but was not allowed to remove a post-it from the wall altogether. The result was a series of clusters representing different themes or subject areas. Once everyone was satisfied that all post-its that belonged together were clustered appropriately, larger post-its were used to write the core idea of each cluster. These thematic descriptions were arrived at through consensus of all the participants, with the knowledge that they would be "voting" for the importance of these ideas and needed to know what each cluster represented.

Multi-voting. Each participant was then given a number of stickers that would represent their "votes" of importance. The number of stickers given was deliberately fewer than the number of thematic clusters in order to force at least a minimum level of prioritization. Participants were instructed that they could use their votes any way they wanted, including putting all of their votes into one theme if so desired. Participants were also given the option to place their stickers either on the post-it representing the broad theme of a cluster or on a specific item included under that theme. The resulting information was photographed and the post-its removed in a manner to preserve the structure and integrity of the spatial relationships between post-its and stickers.

Complete results of the affinity sort and multi-voting are included in Appendix D, including the votes assigned to specific items in a thematic cluster. Only the broad thematic clusters will be described in this section. The number of items in each thematic cluster and the number of votes received by each thematic cluster provide insight into the thought processes of the participants.

Questionnaires. Although questionnaires had been provided in advance, participants were requested to fill in the questionnaires during the time allotted for this purpose at the end of each focus group session. There were two reasons for this: 1) to ensure confidentiality and 2) to reflect learning that may have occurred during the session. Each group received basically the same questionnaire, but with instructions tailored to that stakeholder group. The only differences in the questionnaires were that the Utility Interests questionnaire included a question related to the utility's competitive position and did not include a question related to stimulating the economy that the other groups were given. Note that only one questionnaire was allowed per utility represented. If more than one designee was present from a particular utility, they were asked to fill out the questionnaire collaboratively.

Each questionnaire had three major sections. The first section listed a number of possible impacts of the current slate of FEECA-mandated utility programs. These impacts were selected to represent a wide range of potential public interests and objectives related to FEECA outcomes. For each potential impact, participants were requested to score the type of impact on a scale of 1 to 5 (1= greatly decrease, 3=no impact, and 5=greatly increase). For three of the impact categories (electric prices, negative environmental impacts, and fuel used to produce electricity), a decrease, or score of less than 3, would be viewed as beneficial. For the other categories, any score greater than 3 would be viewed as beneficial. Participants were also requested to score the relative importance of each of the impact categories on a scale of 1 to 5 (1=not important, 3=somewhat important, 5=very important).

The second section of the questionnaire addressed alternatives to FEECA-mandated utility programs. These included:

1) A statewide, uniform public benefits charge to fund DSM programs (to eliminate competitive cost pressures).
2) Statewide rebates for energy-efficient HVAC appliances (to ensure uniformity across the state).

3) Statewide housing codes requiring minimum levels of energy efficiency (due to the existence of un-insulated structures throughout Florida).
4) More stringent energy standards for building codes.
5) State appliance standards potentially more stringent than federal standards.
6) Third-party performance contracts to implement conservation and efficiency programs.
7) Smart metering to improve price signals allowing, utilities to sell energy efficient appliances at a profit.
8) Allowing utilities to enter into new energy services to allow a Return on Investment (ROI) by leasing equipment located on a customer's premise.

Participants were requested to score each alternative policy on a scale of 1 to 5 for <u>potential</u> <u>effectiveness</u> in achieving the legislative objectives of FEECA as compared to current FEECA policies' effectiveness (1=much less effective, 3=about the same, and 5=much more effective). They were also asked to score each alternative on a scale of 1 to 5 for potential to be <u>cost-effective</u> compared to current FEECA-mandated utility programs (1=much less cost-effective, 3=about the same, and 5=much more cost-effective).

The third section of the questionnaire addressed how the participants expected utilities to respond if FEECA were to sunset. This section provided a means to explore the participants' underlying beliefs about utility motives and the acceptability of various aspects of FEECA policy. Potential utility actions in response to a FEECA sunset included retaining all aspects of currently approved plans, retaining information and education programs, retaining only programs that pass the RIM Test with or without externalities, investing in supply-side efficiency or renewable energy programs or measures, and getting out of the DSM business altogether. Participants were asked to score each potential utility response on a scale of 1 to 5 (1=strongly agree, 3=no opinion, and 5=strongly agree).

8.3 FEECA-Regulated Utility Focus Group Results

<u>The information provided in the following sections reflects the ideas and opinions provided by the focus group participants and should not be viewed as those of the researchers in this project.</u>

8.3.1 Brainstorming Exercise

Generally, participants were supportive of FEECA utility programs, thinking that it has been cost-effective over the years and has provided utilities with the opportunity to foster improved relations with their customers. Concerns were expressed over decisions in recent FEECA-related regulatory proceedings, such as selection of programs that do not meet the RIM test and the inclusion of hypothetical values for environmental emissions.[307] Participants believed that criteria for setting goals should have been established *a-priori*, and that the protracted time period over which the proceedings were conducted resulted in the perception that not all utilities were treated the same. The group was also concerned about perceived "myths"; for example, that DSM is not a resource considered in resource planning and that utilities don't (or do) engage in integrated resource planning. Local control and the need for plans to accommodate the unique aspect of each utility were more important than program standardization to members of the group. The group was skeptical about the validity of benchmarking energy-efficiency programs across states because authors of past benchmarking studies were perceived as selective in their choices of benchmarks and as having failed to adequately account for the unique aspects of Florida, such as climate, that would bias what seemed to be simple comparisons.

8.3.2 Affinity Sort and Multi-voting Results from the Utility Interests Group

Eighty-two separate ideas and suggestions were developed by the Utility Interest group participants. Then, these ideas and suggestions were sorted into 14 clusters. These clusters are listed below by priority rank order (i.e., those clusters that received the most votes are listed first). Appendix D contains all 82 ideas and suggestions and indicates which ones received individual votes (which are aggregated into the total for that cluster as shown below). In some cases, the description of each cluster has been expanded below to better convey the intent and meaning of the idea or suggestion.

1) Use RIM and Participant's tests as cost-effectiveness criteria 18 post-its, 26 votes
2) FEECA basically works 10 post-its, 13 votes
3) Low rates are customers' highest priority 3 post-its, 12 votes
4) Minimize free-ridership in setting goals 5 post-its, 10 votes
5) Local or company-specific control is important 2 post-its, 10 votes
6) Use Integrated Resource Plan optimization to set goals 11 post-its, 10 votes
7) Goals should be cumulative, not annual 3 post-its, 8 votes
8) Promote switching electric appliances to natural gas 1 post-it, 7 votes
9) Simplify, speed up the FEECA goal-setting process 5 post-its, 4 votes

[307] There was concern that using hypothetical values for environmental externalities double counted the value because they were implicit in the values used for calculating the benefits of avoided capacity.

10) Use caution with benchmarking 2 post-its, 3votes
11) Some alternative policies should *not* be considered 11 post-its, 3 votes
12) Service quality is important to customers 7 post-its, 1 vote
13) FPSC should establish goal criteria up front and stick to them 2 post-its, 1 vote
14) Include other agencies in the goal setting process 2 post-its, 0 votes

8.3.3 Questionnaire Results from the Utility Interests Group

Table 8-1 summarizes the results of the Utility Interests group questionnaires as mean scores and implicit ranks as appropriate. There were often ties in terms of rankings, and the implicit rank scores reflect this. The six most important considerations for FEECA as currently implemented were impacts on:

1) Electricity prices and customer satisfaction.
2) Utility employee satisfaction.
3) Public image of utility and the utility's competitive position.
4) Customer's ability to control cost and fuel diversity for generating electricity.
5) Alignment of regulation with utility objectives and attractiveness of utility to investors.
6) Environmental impacts.

In terms of impact, FEECA programs received scores indicating the perception that it would <u>increase</u> the use of renewable energy, customer satisfaction, and electricity prices. Perhaps at odds with the scores for customer satisfaction, FEECA programs were scored as having no impact on customer's ability to control costs. FEECA programs were perceived as <u>decreasing</u> the utility's competitive position, the amount of fuel used to produce electricity, the alignment of regulation with utilities' objectives, negative impacts on the environment, and the attractiveness of utilities to investors.

Regarding possible policies that might achieve the same objectives as FEECA, the top four alternatives scored as potentially more effective were:

1) More stringent statewide energy-efficiency building codes and a statewide energy housing code.
2) Smart metering that improves price signals to customers.
3) Statewide appliance efficiency standards (more stringent than current federal standards).
4) Statewide rebates on energy-efficient HVAC equipment.

Each of these four alternatives to meeting FEECA objectives was also rated as being potentially more cost-effective than the current FEECA policies and utility programs, except for the statewide efficient HVAC equipment rebates.

When asked what they would do if the Legislature elected to sunset FEECA, utilities responded with greatest degree of agreement that they would keep programs in place that pass the RIM Test calculated without externality benefits and that they would keep information and education programs. Other outcomes in response to a FEECA sunset were scored as unlikely to occur.

8.4 Commercial Interests Focus Group Results

The information provided in this subsection reflects the ideas and opinions provided by the focus group participants and should not be viewed as those of the researchers in this project.

8.4.1 Brainstorming Exercise

Overall, this group conveyed concern about the current economy and a resistance to any additional costs due to regulation, but understood the context that led to current FEECA policies; namely, the oil embargo and energy price volatility. The participants were also cognizant of what policies on climate change and carbon emission reduction could mean for Florida. Thinking about this broader context, one participant commented that "reliable and cheap today does not equal long-term public welfare." Observing that large energy consumers have the motivation and expertise to manage their energy consumption, participants emphasized the importance of harnessing market forces as opposed to command-and-control-based programs. The participants thought other states' programs offered useful ideas on consumer education, proper price signals, and opt-out provisions (a customer choice to not take advantage of DSM financial incentives in exchange for exclusion of DSM program costs in base rates).

Interest in distributed resources and renewable energy was also expressed by this group. There was no indication that FEECA utility programs were a mainstay of any particular service or industry sector. Most of the group participants were more concerned about price than cost, but the conversation was wide-ranging. At least some participants thought that the strong customer participation in state solar rebates indicated a pent-up

Table 8-1 Questionnaire Results From FEECA-Regulated Utilities Focus Group

Possible impacts of FEECA as currently implemented pursuant to the most recent goal proceedings	Type of Impact (1=Greatly Decreases; 5 = Greatly Increases) Mean Rating	Rank of Decrease	Rank of Increase	Importance to Utility(ies) I represent (1=Not Important; 5=Very Important) Mean Rating	Implicit Rank
Electricity prices ($/unit sale)	3.5	-	(3)	4.9	(1)
Customers' ability to control their costs	3.0	-	-	4.3	(4)
Amount of fuel used to produce electricity	2.4	(2)	-	3.5	(8)
Fuel **diversity** for generating electricity	2.9	(5)	-	4.3	(4)
Use of renewable energy	3.8	-	(1)	2.5	(9)
Negative impacts on the environment	2.5	(3)	-	4.0	(6)
Overall number of jobs in Florida	3.3	-	(5)	3.9	(7)
Customer satisfaction	3.6	-	(2)	4.9	(1)
Public image of utilities	3.4	-	(4)	4.4	(3)
Regulation alignment with utility objectives	2.4	(2)	-	4.1	(5)
Attractiveness of utilities to investors	2.5	(3)	-	4.1	(5)
Utility competitive position	2.0	(1)	-	4.4	(3)
Return on investment for utilities	2.8	(4)	-	4.1	(5)
Utility employee satisfaction	3.3	-	(5)	4.5	(2)

Possible policies to achieve legislative objectives of FEECA	Effectiveness in Achieving Objectives (1=Much Less; 5=Much More) Mean Rating	Implicit Rank	Cost Effectiveness (1=Much Less; 5=Much More) Mean Rating	Implicit Rank
Statewide public benefits charge (PBC)	2.7	(7)	2.4	(6)
Statewide rebate on energy-efficient HVAC	3.1	(4)	2.6	(5)
Statewide energy housing code	3.9	(1)	3.6	(1)
Statewide more energy-efficient building codes	3.9	(1)	3.6	(1)
Statewide appliance efficiency standards	3.3	(3)	3.1	(2)
3rd party performance contracts	3.0	(5)	2.8	(4)
Smart metering that improves price signals	3.6	(2)	3.1	(2)
Utilities earn returns on appliance sales	2.9	(6)	2.8	(4)
Utilities ROI on leasing customer premise equipment.	3.0	(5)	2.9	(3)

Table 8-1 Questionnaire Results From FEECA-Regulated Utilities Focus Group (cont.)

Possible utilities' response if FEECA were to sunset	Average Rating (1=Strongly Disagree; 5=Strongly Agree)	Implicit Rank
Keep the current programs in place as approved	2.8	(4)
Keep information/education programs	4.2	(2)
Keep programs that pass RIM test w/o externalities	4.4	(1)
Keep programs that pass RIM **& TRC** w/o externalities	2.9	(4)
Invest more in supply-side efficiency	2.9	(4)
Invest more in renewable energy	1.8	(6)
Completely rethink DSM program design	3.1	(3)
Get out of the DSM business altogether	1.4	(7)

demand.[308] The group also believed limited availability of capital is a key factor holding back energy-efficient investments. The group was highly motivated and engaged in considering the future and alternatives of FEECA. The overall theme of discussion was to use price signals and market forces combined with education to impact customers' energy use.

8.4.2 Commercial Interests Affinity Sort and Multi-voting Results

The Commercial Interests group generated 66 individual comments and suggestions, which were subsequently reduced to fourteen clusters. These are listed below by priority rank order (i.e., those that received the most votes are listed first).

1) Education and awareness — 11 post-its, 16 votes
2) Scale back regulations — 5 post-its, 16 votes
3) Opt-out provisions — 5 post-its, 16 votes
4) Use rate structures to drive conservation — 4 post-its, 13 votes
5) Offer loan programs — 5 post-its, 12 votes
6) Only do RIM Test — 4 post-its, 11 votes
7) Public Benefit Fund — 3 post its, 9 votes
8) Rethink objectives [of FEECA] — 8 post-its, 9 votes
9) More distributed generation and renewables — 4 post-its, 8 votes
10) Use TRC Test [do not limit to RIM Test] — 3 post-its, 8 votes
11) Voluntary, not mandates [for energy-efficiency programs] — 3 post-its, 7 vote
12) New program designs — 7 post-its, 5 votes

[308] This customer response more likely indicates that solar was economical considering the rebates and that customers believed there was a limited window of opportunity in which to receive the rebates.

13) FEECA does not create jobs 1 post-it, 1 vote
14) Voice at the table [all stakeholders should have] 1 post-it, 1 vote
15) FEECA does create jobs 2 post-its, 1 vote

8.4.3 Questionnaire Results from Commercial Interests Focus Group

Table 8-2 summarizes the results of the Commercial Interests group questionnaires. Ties sometimes occur in implicit rankings. The six most important considerations for FEECA as currently implemented were impacts on:

1) Customer ability to control their costs and stimulating the economy.
2) Electricity prices.
3) Job creation.
4) Amount of fuel used to produce electricity.
5) Customer satisfaction with their utilities.
6) Fuel diversity for generating electricity and use of renewable energy.

In terms of impact, scores indicate that FEECA programs are viewed as increasing the public image of utilities and their attractiveness to investors and as having no impact on stimulating Florida's economy.

Regarding possible policies that might achieve the same objectives as FEECA, the top four alternatives scored as potentially more effective were:

1) Smart metering that improves price signals to consumers.
2) Statewide rebates for energy-efficient HVAC equipment.
3) Statewide energy-efficiency requirements in the housing code.
4) More stringent energy-efficiency building code requirements and third-party performance contracts.

Each of these alternatives was seen as potentially being more cost-effective than FEECA-mandated utility programs. This group thought the three actions that utilities would most likely take if FEECA were to sunset are (in rank order):

1) Completely rethinking DSM program design.
2) Keeping information and education programs.
3) Keeping programs that pass the RIM Test without externalities and investing more in supply-side efficiency.

Table 8-2 Questionnaire Results From Commercial Interests Focus Group

Possible impacts of FEECA as currently implemented pursuant to the most recent goal proceedings	Type of Impact (1=Greatly Decreases; 5 = Greatly Increases) Mean Rating	(Rank of Decrease)	(Rank of Increase)	Importance to Organization(s) I represent (1=Not Important; 5=Very Important) Mean Rating	(Implicit Rank)
Electricity prices ($/unit sale)	3.3	-	(4)	4.3	(2)
Customers' ability to control their costs	3.2	-	(5)	4.5	(1)
Amount of fuel used to produce electricity	2.8	(1)	-	3.8	(4)
Fuel **diversity** for generating electricity	3.2	-	(5)	3.6	(6)
Use of renewable energy	3.3	-	(4)	3.6	(6)
Negative impacts on the environment	2.7	(2)	-	3.3	(7)
Overall number of jobs in Florida	3.2	-	(5)	4.2	(3)
Customer satisfaction with their utilities	3.4	-	(3)	3.7	(5)
Public image of utilities	3.6	-	(1)	3.0	(9)
Regulation alignment with utility objectives	3.3	-	(4)	3.1	(8)
Attractiveness of utilities to investors	3.5	-	(2)	3.0	(9)
Return on investment for utilities	3.4	-	(3)	2.4	(10)
Stimulating the economy	3.0	-	-	4.5	(1)

Table 8-2 Questionnaire Results From Commercial Interests Focus Group (cont.)

Possible policies to achieve legislative objectives of FEECA	Effectiveness in Achieving Objectives (1=Much Less; 5=Much More) Mean Rating	(Implicit Rank)	Cost Effectiveness (1=Much Less; 5=Much More) Mean Rating	(Implicit Rank)
Statewide public benefits charge (PBC)	3.0	(6)	2.3	(7)
Statewide rebate on energy-efficient HVAC	3.9	(2)	3.2	(3)
Statewide energy housing code	3.6	(3)	3.3	(2)
Statewide more energy-efficient building codes	3.5	(4)	3.1	(4)
Statewide appliance efficiency standards	3.4	(5)	2.9	(5)
3rd party performance contracts	3.5	(4)	3.3	(2)
Smart metering that improves price signals	4.0	(1)	3.6	(1)
Utilities earn returns on appliance sales	2.6	(7)	2.5	(6)
Utilities ROI on leasing customer premise equipment	2.4	(8)	2.3	(7)

Possible utilities' response if FEECA were to sunset:	Average Rating (1=Strongly Disagree; 5=Strongly Agree)	(Implicit Rank)
Keep the current programs in place as approved	2.5	(5)
Keep information/education programs	3.4	(2)
Keep programs that pass RIM test w/o externalities	3.3	(3)
Keep programs that pass RIM **& TRC** w/o externalities	1.9	(7)
Invest more in supply-side efficiency	3.3	(3)
Invest more in renewable energy	2.3	(6)
Completely rethink DSM program design	3.8	(1)
Get out of the DSM business altogether	2.9	(4)

8.5 Consumer and Environmental Interests Focus Group Results

The information provided in this subsection reflects the ideas and opinions provided by the focus group participants and should not be viewed as those of the researchers in this project.

8.5.1 Brainstorming Exercise

Generally, the group believed that the core objectives of FEECA remain relevant today, and that the public interest would continue to be served by efforts to meet these objectives. Participants believed that Florida has unique demographic attributes that should be considered in program design. Several believed that there is substantial potential for additional energy efficiency gains in Florida, and some expressed a desire for greater transparency from the FPSC and the utilities in the goal-setting process, believing that lack of transparency breeds cynicism. Equity in the distribution of costs and benefits of energy efficiency programs was a primary concern for this group. Participants believed it was important for every stakeholder group affected by energy-efficiency policies (e.g., retired persons, low-income households, persons on fixed incomes, and racial minorities) to have a voice at the table when energy-efficiency policies and DSM programs are being crafted and modified.

Some participants were of the opinion that there is too much emphasis on, and too many resources spent, to account for free-riders, while there is little to no emphasis on accounting for, or recognition of, energy-efficiency program "free-drivers."[309] They also expressed concern that the utilities' reporting processes lack uniformity and transparency. They argued that utilities should be required to disclose the evaluation, measurement and verification (EM&V) data and analyses that underpin their assumptions used in cost-effectiveness calculations. Furthermore, they expressed a desire for more careful scrutiny of utility data by the FPSC. Other issues considered included capital availability, incentivizing utilities to push DSM practices, and how different age cohorts see DSM investments in different ways.

[309] Free riders are people or organizations that would adopt energy efficiency practices without an incentive program, such as a rebate, but that receive the incentive anyway. This group labeled as free drivers includes those who take energy efficiency actions as the indirect result of a utility program and do not do not participate directly in the program or receive utility incentives. For example, if one household purchased energy efficient appliances because of an incentive program, neighbors may be incentivized by that to also procure energy efficient appliances without participating in the incentive program. Free-driver impacts are typically not measured in program impact evaluations.

8.5.2 Consumer and Environmental Interests Affinity Sort and Multi-voting Results

The Consumer and Environmental Interests group generated sixty-six ideas and suggestions that were then affinity sorted into twelve clusters of similar themes. The themes of these clusters are listed below by priority rank order (i.e., those that received the most votes are listed first).

1)	Restructure the FPSC	7 post-its, 7 votes
2)	Spread benefits to low-income customers more effectively	6 post-its, 7 votes
3)	Improve and increase transparency	4 post-its, 6 votes
4)	Improve utility disclosure and performance	8 post-its, 6 votes
5)	Improve price signals	6 post-its, 6 votes
6)	Inform consumers	7 post-its, 5 votes
7)	Use DSM to create jobs and other benefits	4 post-its, 4 votes
8)	Improve goal setting	10 post-its, 4 votes
9)	Give utilities financial incentives for DSM	3 post-its, 3 votes
10)	Improve building and housing codes	2 post-its, 2 votes
11)	Additional programs	6 post-its, 2 votes
12)	Fully integrate IRP process	3 post-its, 0 votes

8.5.3 Questionnaire Results from Consumer and Environmental Interests Focus Group

Table 8-3 summarizes the results of the Consumer and Environmental Interests group questionnaires. Ties sometimes occur in implicit rankings. The six most important considerations for FEECA as currently implemented were impacts on:

1) Customers' ability to control their costs.
2) Overall number of jobs in Florida.
3) Fuel diversity for generating electricity and environmental impacts.
4) Use of renewable energy and stimulating the economy.
5) Electricity prices, amount of fuel used to produce electricity, and alignment of regulation with utility objectives.
6) Customer satisfaction with their utilities, attractiveness of utilities to investors, and return on investment for utilities.

This group perceived FEECA as helping their top-rated priorities with three exceptions; they believed that FEECA: 1) increases the amount of fuel used to produce electricity, 2) increases electricity prices, and 3) has no impact on customer satisfaction with their utilities.

Regarding possible policies that might achieve the same objectives as FEECA, the top four scored as potentially most effective were:

1) Statewide rebates for energy-efficient HVAC equipment, a statewide energy housing code, and smart metering that improves price signals.
2) Statewide more stringent building codes.
3) Statewide appliance efficiency standards (more stringent than federal standards) and third-party performance contracts.
4) Letting utilities earn returns on efficient appliance sales.

All of the top-ranked alternatives to FEECA were scored as potentially being more cost-effective than the currently provided FEECA programs. This group thought the two actions that utilities would most likely take, if FEECA sunset, were (in rank order):

1) Keeping programs that pass the RIM Test without externalities and completely rethinking DSM program design.
2) Investing in more supply-side efficiency.

8.6 Focus Group Comparisons

The results of the affinity and multi-voting exercises (summarized in Table 8-4) differed in many ways among the three focus groups, but there were also areas of agreement. The FEECA-Regulated Utility group and the Consumer and Environmental group agreed that utility programs under FEECA are working. All the groups share concerns about transparency and believe that the effectiveness and efficiency of FEECA processes could be improved by addressing these concerns. The Utility group discussed transparency primarily within the context of the FPSC's goal-setting and plan approval processes. The Commercial group discussed transparency in the need scale back regulations, rethink FEECA objectives, and needing more of a voice at the table. The Consumer and Environmental group also shared concerns about transparency on the part of the FPSC, yet their concerns also included transparency of the utilities' procedures to determine cost-effectiveness of FEECA programs (including availability, accessibility and completeness of data and assumptions used to estimate program impacts.) Although ranked differently, both the Utility Interests and the Commercial Interests groups expressed a preference that only programs passing the RIM test be mandated. The Utility and Consumer and Environmental Interests groups both expressed preferences for the use of Integrated Resource Planning (IRP): the Utilities group in the context of using IRP optimization to set goals and the Consumer and Environmental Group with respect to use of fully-integrated IRP processes. These two groups also shared an interest in improving the FEECA goal-setting process. Education and awareness of all consumers is a priority shared by the Commercial and Consumer and Environmental groups. The Commercial group as a whole seemed more skeptical about command-and-control-based programs than either of the other two groups.

Table 8-3 Questionnaire Results From Consumer and Environmental Focus Group

Possible impacts of FEECA as currently implemented pursuant to the most recent goal proceedings	Type of Impact (1=Greatly Decreases; 5 = Greatly Increases) Mean Rating	(Rank of Decrease)	(Rank of Increase	Importance to Organization(s) I represent (1=Not Important; 5=Very Important) Mean Rating	(Implicit Rank)
Electricity prices ($/unit sale)	3.2	-	(4)	3.4	(5)
Customers' ability to control their costs	3.6	-	(1)	4.4	(1)
Amount of fuel used to produce electricity	3.6	-	(1)	3.4	(5)
Fuel **diversity** for generating electricity	3.4	-	(2)	3.8	(3)
Use of renewable energy	3.6	-	(1)	3.6	(4)
Negative impacts on the environment	2.6	(1)	-	3.8	(3)
Overall number of jobs in Florida	3.3	-	(3)	4.3	(2)
Customer satisfaction with their utilities	3.0	-	-	3.0	(6)
Public image of utilities	2.8	(2)		2.8	(7)
Regulation alignment with utility objectives	3.4	-	(2)	3.4	(5)
Attractiveness of utilities to investors	3.2	-	(4)	3.0	(6)
Return on investment for utilities	3.2	-	(4)	3.0	(6)
Stimulating the economy	3.2	-	(4)	3.6	(4)

Table 8-3 Questionnaire Results From Consumer and Environmental Focus Group (cont.)

Possible policies to achieve legislative objectives of FEECA	Effectiveness in Achieving Objectives (1=Much Less; 5=Much More) Mean Rating	(Implicit Rank)	Cost Effectiveness (1=Much Less; 5=Much More) Mean Rating	(Implicit Rank)
Statewide public benefits charge (PBC)	3.3	(5)	2.5	(5)
Statewide rebate on energy-efficient HVAC	4.4	(1)	3.8	(2)
Statewide energy housing code	4.4	(1)	3.6	(3)
Statewide more energy-efficient building codes	4.2	(2)	3.4	(4)
Statewide appliance efficiency standards	4.0	(3)	3.4	(4)
3rd party performance contracts	4.0	(3)	3.4	(4)
Smart metering that improves price signals	4.4	(1)	4.2	(1)
Utilities earn returns on appliance sales	3.8	(4)	3.4	(4)
Utilities ROI on leasing customer premise equipment	2.8	(6)	2.2	(6)

Possible utilities' response if FEECA were to sunset:	Average Rating (1=Strongly Disagree; 5=Strongly Agree)	(Implicit Rank)
Keep the current programs in place as approved	2.2	(5)
Keep information/education programs	2.4	(4)
Keep programs that pass RIM test w/o externalities	3.6	(1)
Keep programs that pass RIM **& TRC** w/o externalities	2.4	(4)
Invest more in supply-side efficiency	3.2	(2)
Invest more in renewable energy	1.8	(5)
Completely rethink DSM program design	3.6	(1)
Get out of the DSM business altogether	3.0	(3)

The results from the questionnaires, compared in Tables 8-5, 8-6, and 8-7, also illustrate differences in perspectives and areas of agreement. Differences in mean scores indicate differences in opinion, whereas similarity in scores suggests agreement. Italics and underlining indicate a difference in the minimum and maximum mean scores of 1.0 or greater across the three focus groups. Bold text indicates a difference of 0.5 or less, implying near agreement across the groups.[310]

[310] The group sizes were too small to provide valid statistical comparisons, so the choices of 1.0 and 0.5 as demarcations are, in some sense, arbitrary.

Table 8-4 Comparison of Focus Group Affinity Sort and Multi-vote Results

Rank Order (High to Low)	FEECA Utilities	Commercial Interests	Consumer and Environmental Interests
1	Use RIM and Participants' Tests as cost-effectiveness criteria	Education and awareness	Restructure the FPSC
2	FEECA basically works	Scale back regulations	Spread benefits to low-income customers more effectively
3	Low rates are customers' highest priority	Opt-out provisions	Improve and increase transparency
4	Minimized free-ridership in setting goals	Use rate structures to drive conservation	Improve utility disclosure and performance
5	Local or company-specific control is important	Offer loan programs	Improve price signals
6	Use IRP optimization to set goals	Only do RIM Test	Inform consumers
7	Goals should be cumulative, not annual	Public Benefit Fund	Use DSM to create jobs and other benefits
8	Promote switching electric appliances to natural gas	Rethink objectives [of FEECA]	Improve goal setting
9	Simplify, speed up the FEECA goal-setting process	More distributed generation and renewables	Give utilities financial incentives for DSM
10	Use caution with benchmarking	Use TRC Test [do not limit to RIM Test]	Improve building and housing codes
11	Some alternative policies should *not* be considered	Voluntary, not mandates [for energy-efficiency programs]	Additional programs
12	Service quality is important to customers	New program designs	Fully integrate IRP process
13	FPSC should establish goal criteria up front and stick to them	FEECA does not create jobs	
14	Include other agencies in the goal-setting process	Voice at the table [all stakeholders should have]	
15		FEECA does create jobs	

8.6.1 Importance of FEECA Impacts

Table 8-5 shows that the groups disagreed about the importance of FEECA impacts in five areas:

1) Electricity prices
2) Use of renewable energy
3) Customer satisfaction
4) Alignment of regulation with utility objectives
5) Return on investment for utilities

The Consumer and Environmental Interests group thought that impacts on electrical prices and customer satisfaction were less important than did the other two groups. The Utility Interests group believed that effects on renewable energy were less important and that customer satisfaction was more important than the other two groups. The Commercial Interest group deemed impacts on alignment between regulation and utility objectives and utility return on investment were less important than did the other two groups.

As also detailed in Table 8-5, there were also a number of areas of agreement across the focus groups related to the relative importance of various impacts of FEECA. These impacts, together with the range of scores assigned for relative importance, are:

1) Customer's ability to control costs (4.3-4.5)
2) Amount of fuel used to generate electricity (3.4-3.8)
3) Overall number of jobs in Florida (3.9-4.3)

8.6.2 Type of FEECA Impacts

As also shown in Table 8-5, the focus groups only had disagreements in two categories as to the impacts of the current FEECA programs: 1) fuel used to produce electricity, and 2) alignment between regulation and utility objectives.
There were four areas of agreement among the three groups on the effects of FEECA mandated utility programs:

1) Increasing electricity prices (3.2-3.5)
2) Increasing use of renewable energy (3.3-3.8)
3) Reducing negative impacts on the environment (2.5-2.7)
4) Increasing overall number of jobs in Florida (3.2-3.3)

The Consumer and Environmental Interest group considered FEECA to have a greater impact on reducing fuel use relative to the other groups. The Utility Interests group deemed FEECA as creating a misalignment between regulatory and utility objectives, while the other two groups deemed FEECA as increasing alignment.

Table 8-6 compares questionnaire results related to policy alternatives to achieve the legislative objectives of FEECA. There were areas of difference in opinion on the potential effectiveness of:

1) Statewide rebate on energy-efficient HVAC equipment
2) Third-party performance contracts
3) Allowing utilities to earn returns on appliance sales

Table 8-5 Focus Group Comparison of FEECA Utility Program Objectives: Impacts and Importance

Possible impacts of FEECA as currently implemented pursuant to the most recent goal proceedings	Mean Scores for Type of Impact (Scores above 3.0 imply an increase and scores below 3.0 imply a decrease.)			Mean Scores for Importance (Higher scores mean greater importance.)		
	FEECA Utilities	Commercial Interests	Consumer and Env. Interests	FEECA Utilities	Commercial Interests	Consumer and Env. Interests
Electricity prices ($/unit sale)	**3.5**	**3.3**	**3.2**	*4.9*	*4.3*	*3.4*
Customers' ability to control their costs	3.0	3.2	3.6	**4.3**	**4.5**	**4.4**
Amount of fuel used to produce electricity	*2.4*	*2.8*	*3.6*	**3.5**	**3.8**	**3.4**
Fuel diversity for generating electricity	**2.9**	**3.2**	**3.4**	4.3	3.6	3.8
Use of renewable energy	**3.8**	**3.3**	**3.6**	*2.5*	*3.6*	*3.6*
Negative impacts on the environment	**2.5**	**2.7**	**2.6**	4.0	3.3	3.8
Overall number of jobs in Florida	**3.3**	**3.2**	**3.3**	**3.9**	**4.2**	**4.3**
Customer satisfaction	3.6	3.4	3.0	*4.9*	*3.7*	*3.0*
Public image of utilities	3.4	3.6	2.8	4.4	3.0	2.8
Alignment of regulation with utility objectives	*2.4*	*3.3*	*3.4*	*4.1*	*3.1*	*3.4*
Attractiveness of utilities to investors	2.5	3.5	3.2	4.1	3.0	3.0
Utility competitive position	2.0	NA	NA	4.4	NA	NA
Return on investment for utilities	2.8	3.4	3.2	*4.1*	*2.4*	*3.0*
Utility employee satisfaction	3.3	NA	NA	4.5	NA	NA
Stimulating the economy	NA	**3.0**	**3.2**	NA	4.5	3.6

Italics indicate disagreements >= 1.0 in mean score. **Bold** indicates more agreement, <= 0.5 difference in mean scores

The Utility Interest group differed from the other two groups in its beliefs about the potential effectiveness of rebates and third-party performance contracts, considering them to be potentially less effective and less cost effective than existing programs. The other two groups deemed these alternative programs to be potentially both more effective and more cost effective than existing programs. The Utility Interest group was also more skeptical about the potential cost effectiveness of smart metering, a policy that the other two groups scored as highly effective in achieving the objectives of FEECA, indicating that it would be less cost effective than current programs.

As shown in Table 8-6, there were no alternatives to FEECA that met the criteria for agreement among the three focus groups, but there was agreement on the perceived potential cost effectiveness of some of the alternatives. These were:

1) State wide public benefits charge (2.3-2.5, not cost effective)
2) Statewide energy housing code (3.3-3.6)
3) Statewide more stringent building code (3.1-3.6)

Table 8-6 Focus Group Comparison of FEECA Utility Program Alternatives

Possible policies to achieve legislative objectives of FEECA	Effectiveness in Achieving Objectives (Higher scores mean greater effectiveness)			Cost Effectiveness (Higher scores mean greater effectiveness)		
	FEECA Utilities	Commercial Interests	Consumer and Env. Interests	FEECA Utilities	Commercial Interests	Consumer and Env. Interests
Statewide public benefits charge (PBC)	2.7	3.0	3.3	**2.4**	**2.3**	**2.5**
Statewide rebate on energy-efficient heating/cooling	*3.1*	*3.9*	*4.4*	*2.6*	*3.2*	*3.8*
Statewide housing code promoting energy efficiency	3.9	3.6	4.4	**3.6**	**3.3**	**3.6**
Statewide building code promoting energy efficiency	3.9	3.5	4.2	**3.6**	**3.1**	**3.4**
Statewide appliance efficiency standards	3.3	3.4	4.0	**3.1**	**2.9**	**3.4**
3rd party performance contracts	*3.0*	*3.5*	*4.0*	2.8	3.3	3.4
Smart metering that improves price signals	3.6	4.0	4.4	*3.1*	*3.6*	*4.2*
Utilities earn returns on appliance sales	*2.9*	*2.6*	*3.8*	2.8	2.5	3.4
Utilities earn returns on leasing customer premise equipment	3.0	2.4	2.8	2.9	2.3	2.2

Italics indicate disagreements >= 1.0 in mean score. **Bold** indicates more agreement, <= 0.5 difference in mean scores

Table 8-7 compares questionnaire results related to the actions utilities might take if FEECA were to sunset. Although the three groups are all in agreement, the Utility Interests group was more confident than the other two groups that utilities would 1) be likely to keep programs that pass the RIM Test without externalities, 2) not be likely to keep programs that pass RIM **and TRC** Tests without externalities, and 3) would not be likely get out of the DSM business altogether.

Table 8-7 Focus Group Comparison of Expected Utility Response to Sunset of FEECA Mandates

Possible utilities' response if FEECA were to sunset:	FEECA Utilities (Mean Score)	Commercial Interests (Mean Score)	Consumer and Env. Interests (Mean Score)
Keep the current programs in place as approved	2.8	2.5	2.2
Keep information/education programs	4.2	3.4	2.4
Keep programs that pass RIM test w/o externalities	*4.4*	*3.3*	*3.6*
Keep programs that pass RIM **&** **TRC** w/o externalities	*2.9*	*1.9*	*2.4*
Invest more in supply-side efficiency	2.9	3.3	3.2
Invest more in renewable energy	**1.8**	**2.3**	**1.8**
Completely rethink DSM program design	3.1	3.8	3.6
Get out of the DSM business altogether	*1.4*	*2.9*	*3.0*

Italics indicate disagreements >= 1.0 in mean score. **Bold** indicates more agreement, <= 0.5 difference in mean scores.

8.7 Summary of Findings

The following areas of agreement among key stakeholder groups were found:

1) Utilities' roles in promoting energy efficiency are appropriate.
2) Cost effectiveness is an acceptable criterion, with disagreement over RIM vs. TRC Tests.
3) Transparency of the process should be improved.
4) Rate designs and metering improve consumer decision making.
5) Creating jobs and stimulating the economy are important.

The following differences in perspective among the stakeholder groups were found:

1) Utilities and commercial interests value low rates more than total resource costs and are supportive of using the RIM Test as the criterion for goal setting. Consumer representatives in the Consumer and Environmental group also shared this perspective.

2) Environmental representatives in the Consumer and Environmental group value resource costs more than low rates and are supportive of using the TRC Test as the criterion for goal setting.
3) Utilities rank the alignment between FEECA regulations and utility objectives and utility competitive positions as very important but as being adversely affected by FEECA, a concern not shared by the other groups.

Utilities would appreciate consideration of the following changes to the FEECA process:

1) Establish and clearly communicate the criteria for setting goals upon the initiation of the goal setting process.
2) Limit goals to programs that pass the RIM Test and have greater than a two-year payback for residential DSM participants.
3) Improve the alignment between FEECA regulations and utility interests.

Commercial group representatives would appreciate consideration of the following changes to the FEECA process:

1) Limiting programs to those that pass the RIM Test.
2) Provide an opt-out provision.

Consumer and environmental interests would appreciate consideration of the following changes to the FEECA process:

1) Emphasize participation by low income, fixed income, and tenant occupied properties.
2) Standardize reporting to allow scrutiny of the data and assumptions employed.
3) Base program achievements and cost recovery on measurement and verification and not only on activity accounting.

9 Comparisons to Other States

9.1 PROGRAM COMPARISONS

9.1.1 Purpose of State Comparisons

The purpose for comparing other states' energy efficiency and conservation programs is to illustrate the approaches used in setting state-level, goal-oriented policies. In this brief analysis, the focus is on overarching institutional features that these state programs tend to share: 1) multi-year goals for reduced demand to be achieved by energy conservation and efficiency efforts developed and adopted pursuant to state-level authority (statute, rule/regulation, or regulatory order); 2) cost recovery processes for program administrators; 3) reporting, evaluation and verification of results; and 4) in most states, an incentive system to encourage progress toward the specified goals.

The purpose of this discussion is not to compare performance among state programs in reducing energy consumption, although this has been done elsewhere such as in the series of assessments and comparisons by the American Council for an Energy Efficient Economy (ACEEE).[311] Resources for the Future (RFF) has also examined state energy efficiency programs.

Many factors contribute to making comparisons difficult. Electricity market structures differ from one state to another. Some have been restructured while others, like Florida's, are vertically integrated. In some states, utilities are required to offer energy conservation and efficiency programs, while in others, these services are provided by state agencies or other entities. The cost recovery, spending requirements, types of utilities covered, incentive mechanisms, and evaluation and verification efforts all differ among states. Some programs have been in place for a number of years, while others were created more recently. As noted in the discussion of FEECA in Section 2, utility-based energy efficiency and conservation programs do not exist in a vacuum. Other types of programs aimed at reducing energy consumption may affect the energy savings realized by a state's program for setting utility-based energy conservation goals. For example, some states coordinate energy efficiency and renewable resource programs with residential weatherization, Low Income Home Energy Assistance Program, subsidized loan programs, and other energy consumption reduction initiatives.

[311] A discussion of the six scorecards published by ACEEE to date and the methodological differences among those scorecards can be found in York *et al*., 2012.

9.1.2 Energy Efficiency Resource Standards and the Bigger Picture

The policy framework for energy efficiency and conservation efforts is set by both state and federal law. The latter establishes overall policy for energy conservation, including for national and some regional emergencies. In addition, the federal programs encourage energy efficiency by establishing standards for energy efficient products and public buildings, including public housing. Some federal programs also provide funding for state conservation and efficiency and related programs.[312]

States have addressed energy efficiency and conservation, both through utility-based programs similar to those established pursuant to FEECA and as stand-alone programs that provide direct assistance or tax incentives to individuals and businesses. State efforts to encourage energy efficiency generally have the same objectives as those articulated in FEECA: 1) reducing peak demand, 2) reducing overall energy consumption, and 3) reducing use of expensive resources. In some states, other objectives are addressed such as preservation or improvement of air and water quality and meeting the needs of low income residents. In addition, like Florida, other states have broad approaches to energy efficiency that include building codes, appliance efficiency standards and even transportation-related energy efficiency standards.

This report focuses on one means of achieving energy efficiency and conservation goals, demand side management (DSM). The North American Electric Reliability Corporation (NERC) recognizes two aspects of DSM as:

> ...energy efficiency (EE) and demand response (DR). EE is designed to reduce electricity consumption during all hours of the year, attempting to permanently reduce the demand for energy in interval [*sic*] ranging from seasons to years and concentrates on end-use energy solutions. DR is designed to change onsite demand for energy in intervals from minutes to hours and associated timing of electric demand/energy use (*i.e.* lowering during peak periods) by transmitting changes in prices, load control signals or incentives to end-users reflecting production and delivery costs.[313]

[312] See, for example, the federal Energy Policy Act of 2005 (42 U.S.C. 15801, *et seq.*); National Energy Conservation Policy Act (42 U.S.C. 8201, *et seq.*); and 42 U.S.C. 17381, *et seq.* regarding modernization of the electricity transmission and distribution system.
[313] NERC 2007

On the demand-response side of DSM programs, smart grid programs are sometimes included among the technologies that may be utilized. Such authorization is found in Ohio law.[314]

States differ somewhat in their definitions of DSM, but most include the elements found in the Arizona electric energy efficiency standards:

> 'DSM measure' means any material, device, technology, educational program, pricing option, practice, or facility alteration designed to result in reduced peak demand, increased energy efficiency, or shifting of electricity consumption to off-peak periods and includes CHP [using a primary energy source to simultaneously produce electrical energy and useful process heat] to displace space heating, water heating, or another load 'DSM program' means one or more DSM measures provided as part of a single offering to customers.[315]

Missouri's definition specifies that DSM programs are conducted by utilities on the "retail customer's side of the electric meter": 'Demand-side program' [is] any program conducted by the utility to modify the net consumption of electricity on the retail customer's side of the electric meter, including but not limited to energy efficiency measures, load management, demand response, and interruptible or curtailable load." [316]

State goals for energy efficiency may be expressed in a law, regulation, regulatory order, or a combination of those authorities and may or may not specify the means by which those goals might be achieved. In many states, energy efficiency goals and implementation are found in a mix of policy instruments. For example, FEECA provides a general framework, delegating implementation decision making to the FPSC which adopts rules that apply to all covered utilities. The FPSC's orders apply those rules to specific utilities. Other states rely on orders within broad public service commission authority.[317]

Goals thus established are generally referred to as Energy Efficiency Resource Standards (EERS), or in some cases Energy Efficiency Portfolio Standards (EEPS). For this report, the term EERS will be used in most cases. Broadly, an EERS establishes an annual energy efficiency target for a relatively long period of time requiring an absolute amount or percentage reduction in energy use realized through energy efficiency measures.

[314] O.R.C. Ann. 4928.66(A)(2)(d)(2012)
[315] Arizona Administrative Code, R14-2-2401 (13,14)
[316] 393.1075 (2)(3), R.S. Mo.
[317] See, for example, Arkansas Public Service Commission, APSC Sustainable Energy Resources (SER) Action Guide, Docket No. 08-144-U, December 2010.

Energy savings are commonly achieved by end-user participation in energy efficiency programs, such as rebates and other incentives. EERS are analogous to Renewable Portfolio Standards (RPS) adopted in many states, which require a certain amount of electricity sold in the state be generated from renewable resources. The distinction between an RPS and an EERS or EEPS is well stated in a 2012 Hawaii Public Utilities Commission order: "An EEPS is similar in concept to a renewable portfolio standard ("RPS"), which requires electric utilities to acquire increasing levels of energy from renewable resources by set periods. Stated differently, EEPS targets the demand or consumption of electricity, while RPS focuses on the supply or generation of electricity."[318] Florida has not adopted an RPS.

DSM programs, such as those approved by the FPSC and discussed in this report, are among the means of meeting an EERS. However, other methods may be combined with DSM to achieve goals articulated in an EERS. Thus, in Ohio, "Programs implemented by a utility may include demand-response programs, smart grid investment programs, provided that such programs are demonstrated to be cost-beneficial, customer-sited programs, including waste energy recovery and combined heat and power systems, and transmission and distribution infrastructure improvements that reduce line losses."[319] FEECA does not explicitly address smart grid.

EERS may also include requirements to utilize renewable resources used to generate energy. For example, FEECA authorizes demand-side renewable sources to be applied toward meeting the conservation goals established by the FPSC.[320] Another example of the interplay of conservation and renewable energy goals is seen in Hawaii, where the RPS and the EEPS programs will be combined until 2015. Beginning in 2015 "renewable displacement or off-set technologies, including solar water heating and sea-water air-conditioning district cooling systems" will be applied toward the state's EEPS rather than the RPS.[321] Pennsylvania's definition of "energy efficiency and conservation measures" includes solar or solar photovoltaic panels.[322]

Since the all-encompassing EERS includes DSM and has been commonly used in state policy analyses in recent years, we will use that broad policy perspective as a departure point for discussing state energy efficiency policy. Other elements of EERS policies include program funding, administrative structure of the programs, and the utilities included in any mandatory EERS program.

[318] Hawaii Public Utilities Commission, Order No. 30089, issued Jan. 3, 2012.
[319] O.R.C. Ann. 4928.66(A)(2)(d)(2012)
[320] Section 366.82(1)(b),F.S.
[321] H.R.S. §269-96 (e)
[322] 66 Pa. C.S. §.2806.1(m)(2)

9.1.3 States with EERS Programs

Analyses of state energy efficiency programs reach different conclusions about how to categorize those programs. One study identified, based on a survey, 44 states and the District of Columbia (D.C.) as having some type of ratepayer funded energy efficiency program.[323] In those jurisdictions, utilities may recover costs from ratepayers for prudently incurred expenditures related to DSM and other energy efficiency efforts. The programs included in the survey do not necessarily have legally binding goals for energy use reduction, however. Another study of state energy efficiency policies identified 20 states as having an EERS in 2011.[324] For that study, EERS was defined as "a legally binding numeric target for energy use reduction stated in either percentage or quantity terms."[325]

The Database of State Incentives for Renewables and Efficiency (DSIRE) includes a variety of information about state and federal energy efficiency and renewable energy policies.[326] As categorized by DSIRE, 27 states have an EERS policy. The discussion below focuses on those 27 states identified by DSIRE as having EERS policies included either in statute, regulation or regulatory commission order. These states include: Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Hawaii, Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Mexico, New York, Ohio, Pennsylvania, Rhode Island, Texas, Vermont, Virginia, Washington, and Wisconsin.[327]

Enacted in 1980, FEECA is the oldest policy categorized by DSIRE and Palmer *et al.* as an EERS. Of the 20 EERS policies examined by Palmer *et al*., 18 were established since 2004. While FEECA has been in place longer than the other states' EERS policies, the standards, in the form of utilities' goals, are updated during FPSC goal-setting proceedings, so are reflected in some studies as dating from the most recent such proceeding in 2009.[328]

[323] Kushler, et al 2012.
[324] Palmer et al. 2012.
[325] Palmer, et al. 2012, p. 3.
[326] Established in 1995, DSIRE is an ongoing project of the North Carolina Solar Center and the Interstate Renewable Energy Council (IREC), Inc. It is funded by the U.S. Department of Energy's (DOE) Office of Energy Efficiency and Renewable Energy (EERE), primarily through the Office of Planning, Budget and Analysis (PBA). The site is administered by the National Renewable Energy Laboratory (NREL), which is operated for DOE by the Alliance for Sustainable Energy, LLC., http://www.dsireusa.org/about/, accessed September 15, 2012.
[327] See DSIRE, map of Energy Efficiency Resource Standards, (July 2012), http://www.dsireusa.org/documents/summarymaps/EERS_map.pdf, accessed September 15, 2012.
[328] See, for example, Sciortino *et al*., 2011.

Some states authorize DSM programs only for electric utilities while others include both electric and natural gas. As explained previously, FEECA addresses both electricity and natural gas, but goal setting requirements apply only to electric utilities, so in terms of EERS categories, Florida is an "electricity only" state. Other "electricity only" states identified in the DSIRE database include: Connecticut, Hawaii, Indiana, Maryland, Missouri, Ohio, Pennsylvania, Texas Vermont Virginia, and Washington. States that include both natural gas and electricity in EERS policies include: Arizona, Arkansas, California, Colorado, Delaware, Illinois, Iowa Maine, Massachusetts, Michigan, Minnesota, New Mexico, New York, Rhode Island, and Wisconsin.

9.1.4 Types of Electric Utilities Covered

Some states, including Iowa, Hawaii, Indiana, Maryland, New York, and Rhode Island, require all electric utilities to have energy efficiency programs.[329] Other states, such as Florida, Illinois, Arizona, and Pennsylvania, limit coverage to the largest utilities. In Florida, the limit is based on annual sales, which essentially excludes all but two of the largest municipal utilities and rural electric cooperatives. In Illinois and Pennsylvania, the limit is based on the number of customers. In Arizona, the full obligation is based on annual revenues and for large cooperative utilities, the portion of the state's customers served. Several states apply coverage only to investor-owned utilities. A compilation of information from DSIRE regarding the covered electric sectors and states' EERS goals is displayed in Table 9-1.

Table 9-1 State EERS Goals and Electric Sector Covered[330]

State	Electric Sector	Standard
AZ	IOU, Rural Electric Cooperative	Electric sales reduction: 22% cumulative savings by 2020
AR	IOU	Electric sales reduction: 2011 reductions: 0.25% 2012 reductions: 0.50% 2013 reductions: 0.75%
CA	IOU	2011-2014: Net annual electric energy savings of 1,816,320,000 kWh

Table 9-1 State EERS Goals and Electric Sector Covered (cont.)

[329] Palmer *et al*. Table 4, p. 9 and DSIRE, 2012.
[330] Compiled from United States Department of Energy, "Database of State Incentives for Renewables & Efficiency," http://www.dsireusa.org/incentives/index.cfm?EE=1&RE=1&SPV=0&ST=0&searchtype=EERS&sh=1, accessed December 4, 2012.

State	Electric Sector	Standard
CO	IOU	Electric sales reduction: and Peak demand reduction: 5% of 2006 electricity sales by 2018.
CT	Municipal Utility, IOU, Retail Supplier	Electric sales reduction: 4% of retail load must be met with Class III Resources by 2010
DE	Municipal Utility, IOU y, Rural Electric Cooperative	Electric sales reduction: equivalent to 15% of 2007 electricity consumption by 2015. Peak demand reduction: equivalent to 15% of 2007 peak electric demand by 2015
FL	Utility, IOU, Rural Electric Cooperative, All Utilities with >2,000 GWh annual sales[331]	Electric sales reduction: 7,842 GWh cumulative reductions from 2010-2019 [332]
HI	IOU, Rural Electric Cooperative	Electric sales reduction: 4,300 GWh reduction in electricity use by 2030 (equal to about 40% of 2007 electricity)
IL	IOU, Retail Supplier, Illinois DCEO	Electric sales reduction: 0.2% of energy delivered in EY 2009, increasing to 2% of energy delivered in EY 2016 and thereafter. Peak demand reduction: 0.1% reduction in peak demand each year for 10 years (EY 2009-2019).
IN	IOU, Retail Supplier	Electric sales reduction: 0.3% GWh reduction of 2009 energy sales for 2010. Annual requirements increase to 2.0% reduction of prior year's energy sales by 2019
IA	Utility, Municipal Utility, IOU, Rural Electric Cooperative, Retail Supplier	Electric sales reduction: Utility-specific standards set by IUB

[331] Note that the DSIRE program overview includes a clarifying statement in the summary: "Utilities whose annual sales amounted to less than 2,000 GWh as of July 1, 1993 are not subject to FEECA. This leaves all five Florida investor-owned utilities (Florida Power & Light Company, Progress Energy Florida Inc., Tampa Electric Company, Gulf Power Company, Florida Public Utilities Company) and two municipal utilities (Orlando Utilities Commission and Jacksonville Electric Authority) under the authority of the law." http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=FL25R&re=1&ee=1

[332] Sciortino *et al*., in Energy Efficiency resource Standards: A Progress Report on State Experience, equate the Florida quantity reduction target set in 2009 to 3.5% energy savings over 10 years. Palmer *et al*. (2012) equate the requirement to 3.2% statewide and 3.8% for covered utilities, 2011.

Table 9-1 State EERS Goals and Electric Sector Covered (cont.)

State	Electric Sector	Standard
ME	Utility	Electric sales reduction: 30% reduction by 2020. 100 MW reduction by 2020.
MD	Utility, (Statewide Goal)	Electric sales reduction: 15% reduction in per capita consumption by 2015, compared to 2007 (includes 5% portion to be achieved independent of 10% utility obligation). Peak demand reduction: 15% reduction in per capita demand by 2015, compared to 2007.
MA	Utility, IOU, Cape Light Compact	Electric sales reduction: Reduce 1,103 GWh electricity in 2012
MI	IOU, Retail Supplier	Electric sales reduction: 1.0% annual reduction of previous year retail electricity sales (MWh) by 2012
MN	IOU, Retail Supplier	Electric sales reduction: 1.5% reduction of average retail sales beginning in 2010
MO	Utility, IOU	Electric sales reduction: Annual benchmarks beginning in 2012. Cumulative savings of 9.9% by 2020, increasing by 1.9% each year thereafter. Peak demand reduction: Annual benchmarks beginning in 2012 Cumulative reduction of 9% by 2020, increasing by 1% each year thereafter
NM	IOU	Electric sales reduction: 5% of 2005 total retail kilowatt-hour sales by 2014; 10% of 2005 total retail kilowatt-hour sales by 2020
NY	IOU	Electric sales reduction: 15% reduction relative to projected electricity use in 2015
OH	IOU, Retail Supplier	Electric sales reduction: Annual reductions leading to 22% cumulative reduction in retail electricity sales by the end 2025. Peak demand reduction: 1% reduction in peak demand in 2009 0.75% reduction in peak demand each year thru 2018
PA	IOU, With 100,000 Customers or More	Electric sales reduction: Electricity savings equivalent to 3% of projected June 2009 - May 2010 electricity consumption by May 31, 2013. Peak demand reduction: Electricity savings equivalent to 4.5% of measured June 2007 - May 2008 peak demand by May 31, 2013

Table 9-1 State EERS Goals and Electric Sector Covered (cont.)

State	Electric Sector	Standard
RI	Utility, IOU	Electric sales reduction: Varies annually. Peak demand reduction: Varies annually for winter and summer.
TX	IOU	Peak demand reduction: 20% reduction in annual growth in demand 2010 and 2011; 25% reduction in annual growth in demand 2012; 30% reduction in annual growth in demand 2013 and beyond
VT	Municipal Utility, IOU, Rural Electric Cooperative	Electric sales reduction: 320,000 MWh (three-year goal for 2012, 2013, 2014). Peak demand reduction: Summer peak kW savings: 60,800 (three-year goal for 2012, 2013, 2014) Winter peak kW savings: n/a
VA	IOU	Electric sales reduction: 10% electricity savings by 2022 relative to 2006 base sales
WA	Municipal Utility, IOU, and Rural Electric Cooperatives that serve more than 25,000 customers	Electric sales reduction and peak demand reduction both vary.
WI	Utility, IOU	Electric sales reduction: 2011-2014: Net annual electric energy savings of 1,816,320,000 kWh

9.1.5 Context and Purposes for DSM Programs

States instituted energy efficiency and conservation programs for a number of reasons, including reducing costs for utility customers; reducing the need for construction of expensive generating facilities; protecting customers and utilities from volatility of fuel prices; and achieving economic and environmental goals less directly tied to the energy industry (York *et al*. 2012). In addition to providing a means by which an EERS goal may be achieved, DSM is commonly a part of a formal Integrated Resource Plan (IRP) requirement for utilities (California, Delaware, Hawaii, Indiana, Minnesota and Ohio) as well as being part of an EERS. DSM may be part of an IRP even in states that do not have an EERS, such as North Carolina and New Hampshire. In either case, the reduced demand can serve as a means for ensuring efficient resource use. Its inclusion in an IRP makes the demand reduction an element in the determination of the need for proposed new and expanded generation and/or transmission facilities. IRPs may incorporate least-cost planning that involves utilizing a mix of demand reduction and supply expansion options to meet a utility's load forecast. Florida's process for determining need for new power plants includes consideration of demand impacts of energy efficiency and conservation programs.[333]

NERC recognized in its 2007 *Long-term Reliability Assessment* that DSM may meet both reliability and environmental goals. "Demand response is increasingly viewed as an important option to meet the growing electricity requirements in North America, while at the same time addressing greenhouse gas and CO_2 legislation. Demand response supports operational and long-term planning margins".[334]

Some states apply DSM techniques to reduce air-polluting emissions. Examples include CAIR-related emission reduction in Ohio, Pennsylvania, Massachusetts, and Maine. The Colorado Legislature added DSM to techniques utilized for protecting the state's environment when it declared in 2007 that "cost-effective natural gas and electricity demand-side management programs will save money for consumers and utilities and protect Colorado's environment."[335] The New Mexico Efficient Use of Energy Act states that, "cost-effective energy efficiency and load management programs undertaken by public utilities can provide significant reductions in greenhouse gas emissions, regulated air emissions, water consumption and natural resource depletion, and can avoid or delay the need for more expensive generation, transmission and distribution infrastructure."[336]

9.1.6 Administration of EERS Efforts

In several restructured states, such as New Jersey, Maine, Massachusetts, New York, Delaware, and Oregon, energy conservation and efficiency programs are administered by third-party entities, typically through a contractual arrangement, or by public service commission order. For example, the Efficiency Maine Trust was statutorily established in 2009 to provide "uniform, integrated planning, program design and administration of programs" related to energy efficiency and alternative energy.[337] Delaware's Sustainable Energy Utility (SEU) also was established in statute. The SEU is required to "combine public funding sources and consumer savings with private sector funds and management skills to provide all Delaware energy users with assistance for all their energy efficiency and renewable energy needs."[338] Although Delaware's statute creating an EERS provided the framework for the policy, the statute charged a workgroup with furnishing the details

[333] Section 403.519 F.S.
[334] NERC, 2007, Long-term Reliability Assessment, p. 2.
[335] L.2007, Ch. 253 Sec. 2, codified at C.R.S. 40-3.2-101.
[336] N.M. Stat. Sec. 62-17-2 G.
[337] Efficiency Maine Trust, "Triennial Plan of the Efficiency Maine Trust," http://www.efficiencymaine.com/docs/other/EMT_Final_Tri_Plan.pdf, accessed December 4, 2012.
[338] 26 Del. C. §1500 (b) (6).

for implementation.[339] While not a restructured state, Vermont also uses a third party entity to administer its DSM programs. Efficiency Vermont is a ratepayer-funded entity charged with providing energy efficiency services statewide. Efficiency Vermont was not established in statute, but the Vermont Public Service Board was statutorily authorized to establish such an entity by contract or order to provide energy efficiency service in lieu of electric utilities.[340]

Another approach to energy efficiency service delivery is found in the non-restructured state of Wisconsin where utilities are required to contract with a third-party or third parties for statewide energy efficiency and renewable resources programs.[341] The Public Service Commission of Wisconsin must approve the contracts. Wisconsin's programs are funded by a 1.2-percent tax on a utility's annual operating revenues, but funding for the third-party ("Focus on Energy") programs are subject to legislative appropriation. In addition, utilities may administer or fund their own energy efficiency programs subject to Commission (Wisconsin) approval. Utilities are statutorily ensured cost recovery for statewide programs administered by the contracted party or parties.[342]

9.1.7 Target Reduction Measures

An overarching objective of EERS policies and goals is to reduce energy consumption. In designing their EERS policies, states must first decide what should be measured before determining whether savings goals have been achieved. EERS policies and goals aim to realize energy savings through required reductions, which can be expressed as either the percentage of energy saved or the quantity saved as measured in sales. For example, Florida's policy requires an annual quantity of new energy to be saved by a target year. States with similar requirements include: California, Colorado, Hawaii, Massachusetts, Rhode Island, and Vermont.[343]

Most state policies require a percentage of energy to be saved by a target year. Energy savings may be required in terms of new energy saved annually or cumulative energy

[339] For the workgroup's report, see "State of Delaware Energy Efficiency Resource Standards Workgroup Report," June 2011, http://www.dnrec.delaware.gov/energy/information/Documents/EERS/Final%20EERS%20Workgroup%20Report.pdf, accessed December 4, 2012.

[340] 30 V.S.A. § 209 (d) (2) states that" Except with regard to a transmission company, the board may specify that the appointment of an energy efficiency utility to deliver services within an electric utility's service territory satisfies that electric utility's corresponding obligations, in whole or in part, under section 218c of this title and under any prior orders of the board." With the exception of Burlington Electric Department, Efficiency Vermont is the statewide energy efficiency service provider. For more details about the program, see Efficiency Vermont, "Information and Reports," http://www.efficiencyvermont.com/about_us/information_reports.aspx, accessed December 4, 2012.

[341] Wis. Stat. § 196.374 (2)(a)(1).

[342] For more details about the program, see Focus on Energy, "About Us Overview," http://www.focusonenergy.com/About-Us/, accessed December 4, 2012.

[343] See Palmer *et al*. (2012) Table 2.

saved through a given year. States' policies that use percentage reductions as a basis for determining energy savings must determine the baseline against which new energy savings will be measured. Policies either use a fixed basis which has a single reference period against which a percentage of new savings can be measured; or, states may elect a cumulative percentage which reflects the aggregate amount of reduce energy in a given year stemming from reductions in prior years.[344]

9.1.8 Utility Cost Recovery and Spending Thresholds

Regardless of the methodology used to calculate energy savings, utilities in the United States are, in general, allowed an opportunity to receive a fair return on their investments.[345] In general, utilities are authorized to recover prudently incurred costs for EERS-related activities such as implementing energy efficiency programs and measures and evaluating their effectiveness. Absent an opportunity to recover such costs, utilities would arguably have a disincentive to invest in energy efficiency programs. Utilities can recover costs through expensing or amortizing costs. The former is the most common treatment for cost recovery in most states.[346]

Cost recovery is generally authorized through riders, often with true-up provisions that reconcile projected and actual costs. Such is the case in Florida, where prudently incurred costs are recoverable through annual energy conservation cost recovery proceedings subject to reconciliation of both estimated and actual costs and revenues. These costs are commonly referred to as "true-ups."[347]

In some cases, utilities can recover costs in rate cases as well as in an expedited manner through riders. For example, Indiana's administrative code gives utilities considerable flexibility by allowing a utility to recover costs that are incurred through rate bases, riders, amortized capital costs, non-capitalized costs otherwise not recovered through rate bases and riders, and through cost recovery mechanisms proposed by the utility, Commission (Indiana) or other parties.[348] In Florida, a utility's performance in meeting FEECA requirements must also be "considered" in rate-making proceedings, but there does not appear to be a statutory requirement for the FPSC to take action.

Not only is the financing mechanism for cost recovery important, but so is the means of computing the charge to recover a utility's energy efficiency costs. In Florida, cost recovery is based on an annual quantity of energy saved in sales of electricity. Florida's

[344] See the discussion of methodologies in Palmer *et al*., pp. 5-8, 2012.
[345] Bonbright et al. 1988, p. 200.
[346] York et al. p. 29.
[347] 25-17.015, F.A.C.
[348] 170 IAC 4-8-5(a).

Commission annually determines during energy conservation cost recovery proceedings an ECCR factor that is applied to the energy portion of each customer's bill during the next calendar year. The factor is based on the utility's projected costs and the true-up for actual costs and revenues that were under-recovered or over-recovered in the previous year. Therefore, the factor will vary by utility.[349] Florida law does not require that a certain percentage of a utility's revenue be spent for energy conservation or efficiency measures. Utilities subject to FEECA can spend what they want for that purpose, but the FPSC determines the amounts that can be recovered from ratepayers. Other states have more specific requirements for resources that must be committed. For example, an electric utility in Minnesota is required to spend and invest 1.5 percent of its gross operating revenues from service provided in the state for energy conservation. The percentage is higher (2.0 percent) for utilities operating nuclear plants in the state.[350] In Pennsylvania, the total cost of an electric distribution company's energy efficiency and conservation plan is limited to 2 percent of its total annual revenue. That cap does not apply to the cost-of-usage reduction programs for low-income customers.[351]

Like many states which have not restructured their electricity markets, Florida's utility's costs for energy conservation and efficiency programs are included in the companies' revenue requirements and paid by customers through their monthly bills. In restructured states, monies for such programs, however, are typically generated through some type of public benefits fee collected as a per-kilowatt hour charge imposed on the electric distribution service. These charges are generally established in statute and they vary in amount among states. For example, Maine's energy efficiency and conservation program requires a base assessment of 0.145 cents per kWh on transmission and distribution utility customers to fund electric conservation programs.[352] Massachusetts requires the imposition of a mandatory 2.5 mills per kWh system benefits charge, in addition to revenues generated from a variety of other sources, including: the forward capacity market administered by Independent System Operator-New England; cap-and-trade pollution control programs; an energy efficiency surcharge; and through other funding sources.[353] Connecticut finances its energy efficiency programs through a $0.003/kWh charge assessed on all end-use electric customers.[354] Delaware's charge is on a per kilowatt-hour basis but may not exceed an average charge of $0.58 per month per residential electric customer.[355] Another source of funding for fulfilling Delaware's targeted energy efficiency goals is from the issuance of Energy Efficiency Revenue Bonds by the Sustainable Energy Utility. Monies from these bonds pay for energy

[349] 25-17.015, F.A.C.
[350] Minn. Stat. § 216B.241 Subd. 1a (a).
[351] 66 Pa.C.S.§ 2806.1(g).
[352] 35-A M.R.S. § 10110(4.)
[353] Department of Public Utilities, D.P.U.09-116 through D.P.U. 09-120.
[354] Conn. Gen. Stat. §16-245m (a)(1).
[355] 26 Del. Code § 1505 (d).

retrofits and renewable energy projects for public buildings, universities, schools, and hospitals. Bonds will be repaid through revenues from guaranteed energy savings agreements.

9.1.9 Evaluation of Energy Efficiency Efforts

Because an overarching objective of an EERS is to reduce energy consumption below the amount that would have been consumed in the absence of the standard, states have developed evaluation methods to measure progress toward meeting their policy goals. Reliable and accurate measurement of the reduction of energy consumption is critical to ensuring that obligations are being met and that actual reductions are being achieved. Palmer *et al.* described three types of evaluation, measurement, and verification utilized for EERS programs: "impact evaluation, process evaluation, and market effects evaluation. Impact evaluations are primarily meant to verify the installation of energy efficiency programs and measure the energy savings attributable to the programs. Process evaluations study the efficacy of efficiency program administration, and market effects evaluations assess how energy efficiency programs influence markets for energy and energy-efficient products." [356]

Kushler *et al*. used survey results to examine the policies and practices used in the 44 states and D.C. that have ratepayer-funded energy efficiency programs. Of the 27 EERS states, including Florida, they found that in addition to impact, those programs also are evaluated to determine shareholder performance incentives, penalties, and/or the amount of revenue lost due to program implementation.[357] Florida appears to use evaluations for all of those purposes.

For a number of reasons discussed below, comparisons of evaluation results across states is difficult. The comparison challenge was documented in a 2007 California Public Service Commission proceeding in the context of incentive designs, but the findings arguably apply to other facets of evaluating performance. The Commission critiqued the Division of Ratepayer Advocates' effort to compare the energy efficiency standards of nine states to that of California and suggested nine reasons why such a comparison may be problematic, specifically among states with energy efficiency programs. These reasons include:

1) Differences in savings goals and the entities that established them
2) Differences in utility retail sales.

[356] Palmer, et al. (2012), p. 16.
[357] Kushler, et al. (2012).

3) Differences in budgets and authorized spending levels for energy efficiency investments.
4) Available options for utilities to invest in supply-side resources.
5) Nature of verification efforts (when were they conducted and by whom?).
6) Inclusion or exclusion of financial penalties as part of incentive mechanisms.
7) Characteristics of utilities and service areas.
8) Economic determinants of the power supply and energy efficiency markets.
9) Whether a state is restructured or not.[358]

Despite the differences among states in regard to administration, scope and content of evaluations, Kushler *et al*. argued that "it would be a serious error for policymakers or others to conclude that we don't have sufficient evaluation data to make a judgment about the cost-effectiveness of energy efficiency programs."[359] As in Florida, cost-effectiveness in other states is not determined by interstate comparisons.

In 18 of the 27 EERS states, energy efficiency program evaluations are undertaken by the utilities themselves, but sometimes in conjunction with another entity, which in most cases is the respective state's public service commission. In Florida, and seven of the other 26 states with an EERS, utilities administer program evaluations alone.[360] In five EERS states, public utility commissions alone administer evaluations.[361] In ten EERS states, evaluations are conducted by both the utilities and either the public service commission (six states) or another governmental agency (four states).[362]

The variety of evaluation methods administrators generally employ is a reflection of the different ways in which energy efficiency programs are implemented. In Illinois, for example, the evaluation is administered by utilities and the state's Department of Commerce and Economic Opportunity (DCEO). That split responsibility reflects the administration of the program itself in which utilities are responsible for approximately 75 percent of energy efficiency savings target and the DCEO is responsible for approximately 25 percent of the savings financed through the Energy Efficiency Portfolio Standards Fund. Illinois utilities collect and transfer to the DCEO funds for measures implemented by the agency.

[358] California Public Utilities Commission, "Order Instituting Rulemaking to Examine the Commission's Post-2005 Energy Efficiency Policies, Programs, Evaluation, Measurement, and Verification, and Related Issues, "Interim Opinion on Phase 1 Issues: Shareholder Risk/Reward Incentive Mechanism for Energy Efficiency Programs," September 25, 2007.
[359] Kushler, et al., (2012), p. 25.
[360] Those states are Arizona, Colorado, Iowa, Michigan, Rhode Island, Texas and Washington.
[361] The PUC alone administers evaluations in Arkansas, Hawaii, New Mexico, Pennsylvania and Virginia.
[362] Those 10 states are California, Illinois, Indiana, Maryland, Massachusetts, Minnesota, Missouri, New York, Ohio, and Wisconsin.

The legal framework for evaluations also differs significantly from one state to the next. Survey results obtained by Kushler *et al*. show that in addition to Florida, only the EERS states of Illinois, Iowa, Maryland, Massachusetts, Pennsylvania, Texas, and Wisconsin conduct the evaluations under a framework established both in statute and regulation.[363] As discussed above, differences in administrative structure and requirements for evaluations of EERS programs make it difficult, if not impossible, to have meaningful comparisons across states. However, Kushler *et al*. conclude that "...it is usually helpful to have some statutory authority in place for regulators to require program evaluations and define the parameters of those activities." [364] They support a legal framework that provides regulators with the necessary flexibility to establish the details of evaluation rules and procedures and to make necessary changes to improve evaluation processes over time.

In addition to differences in the administration of evaluations, states differ in the scope of evaluations. For example, survey results analyzed by Kushler *et a*l. show that, in Arizona, Florida, Michigan, Texas and Washington, utilities evaluate energy efficiency efforts for each utility. Utilities in Colorado, Massachusetts, and Rhode Island administer evaluations that are statewide in scope. In Iowa, utilities administer the evaluations both on individual utility basis and on a statewide basis.

The scope of evaluations in terms of the basis for estimating savings that result from energy efficiency programs also differs among the EERS states. Utilities in 12 states, including Florida, report net savings; eight report gross savings; and seven report both.[365] In terms of coverage of energy efficiency program evaluations, survey results obtained by Kushler *et al.* revealed other differences among the states. Seventeen EERS states that utilize net savings, including Florida, adjust estimated savings calculations to account for free-riders (including two that adjust for free-riders "partial/sometimes."). Only nine of the 27 EERS states adjust for the effects of free-drivers/spillover.[366] Florida is not one of these nine states. Kushler *et al*. argue that states that net out free- riders, should likewise net out free-drivers/spillovers as they are "two sides of the same 'net' coin." [367] They also note the ongoing debate over whether to use net or gross savings as a measure of energy

[363] Kushler et al., 2012.
[364] Kushler, et al, p. 35.
[365] Kushler *et al*. (2012) did not specify in the survey of states a definition of net or gross savings, but allowed respondents to categorize the approach (fn 17, p.33). The report noted that "in general terms, 'gross' savings are the total savings resulting from the implementation of energy efficiency measures or actions by program participants. 'Net' savings are the amount of savings felt to be specifically attributable to the energy efficiency program." (fn 16, p.33).
[366] Palmer *et al*. (2012) describes "spillover" as the "impact of an energy efficiency program beyond the impact on direct beneficiaries. For example, if a neighbor of a program participant saw the energy savings from the participant's high-efficiency air conditioner and decided to purchase one not supported by the program, those spillover energy savings could be attributed to the program" (p. 17).
[367] Kushler, et al., p.38, 2012. However, if the objective is to accurately reflect the impact of the EERS programs, the focus should be on including all material adjustments, not simply a plus for every minus.

efficiency program achievement; offering their observation that either is appropriate as long as it fits the purpose to which the evaluation is applied, and as long as states make their methodologies and assumptions clear.

Administration and scope of evaluation activities dictate, to some extent, the purpose for which evaluation results can be used. Kushler *et al*. reported that all 44 states with rate funded energy efficiency programs use evaluation results for general oversight. However, they note the importance of "process evaluation" − examining the effectiveness of the administration of the efficiency program − saying that it "... can be very important in improving program performance and helping to ensure that energy efficiency programs are effective." [368] They advocate for process evaluation to be conducted early in the life of an energy efficiency program, noting that an early evaluation of that type would avoid wasting resources to measure the impact of an improperly implemented program.

As part of its overall responsibilities, the FPSC staff routinely examines the effectiveness and efficiency of utility operations and programs through the use of management audits. The FPSC staff is currently conducting a management audit of the administrative efficiency of DSM programs of the five investor-owned electric utilities subject to FEECA. The audit is currently scheduled to be completed by March 2013.

9.1.10 Cost Effectiveness Measures

Regardless of other elements of EERS policies, energy efficiency and conservation efforts must generally be cost effective. States differ in the degree of specificity with which they define "cost-effective" in this context. Illinois and New Mexico tie the definition of "cost-effectiveness" to a specific test used to measure costs relative to benefits. States typically consider other requirements for energy efficiency programs and several, including California and Delaware, require energy efficiency and conservation to be given priority over traditional energy supply expansion options.

[368] Kushler, et al., p.35, 2012.

Cost effectiveness of energy efficiency programs is a nearly universal element of EERS policies. A few examples of the definition are included in Table 9-2. Cost-benefit tests are typically used to determine cost-effectiveness. As discussed in Section 5, one or a combination of five tests is typically used: RIM Test, TRC Test, Participants Test, Societal Cost, and Utility Cost Test. FEECA requires energy efficiency and conservation programs to be cost effective, but the specific test used to determine cost effectiveness is not dictated by the Act. FEECA states that cost effectiveness goals should be based on:

1) The costs and benefits to customers participating in the measure.
2) The costs and benefits to the general body of ratepayers as a whole, including utility incentives and participant contributions.
3) (c) The need for incentives to promote both customer-owned and utility-owned energy efficiency and demand-side renewable energy systems.
4) The costs imposed by state and federal regulations on the emission of greenhouse gases.[369]

[369] Section 366.82(3).

Table 9-2 Definition of "Cost-Effective" by State

STATE	DEFINITION
Florida	Section 366.81, F.S. "The Legislature finds and declares that it is critical to utilize the most efficient and **cost-effective** demand-side renewable energy systems and conservation systems in order to protect the health, prosperity, and general welfare of the state and its citizens." The term "cost-effective" also is used in the context of considerations required of the Commission in needs determination proceedings subject to Section 403.509, F.S.
Arizona	R14-2-2403 (A). Goals and Objectives An affected utility shall design each DSM program: 1. To be **cost-effective**, and 2. To accomplish at least one of the following: a. Energy efficiency, b. Load management, or c. Demand response
California	California Public Utilities Code §9615. (a) Each local publicly owned electric utility, in procuring energy to serve the load of its retail end-use customers, shall first acquire all available energy efficiency and demand reduction resources that are **cost effective**, reliable, and feasible.
Delaware	Title 26 § 1500 (b). The General Assembly finds and declares that: (1) **Cost effective** energy efficiency shall be considered as an energy supply source before any increase or expansion of traditional energy supplies
Hawaii	Order 30089 (2010). Measures must be **cost-effective** but that alone is not sufficient. Measures must have a persistence of savings
Illinois	220 ILCS 5/8-104 (a) and (b). Requires delivery of "cost-effective energy efficiency measures." **"Cost-effective"** "means that the measures satisfy the total resource cost test which, for purposes of this Section, means a standard that is met if, for an investment in energy efficiency, the benefit-cost ratio is greater than one."
New Mexico	62-17-4 C. **"cost-effective"** means that the energy efficiency or load management program meets the total resource cost test
Maryland	Public Utilities.§7–211 (f) (1): require each gas company and electric company to establish any program or service that the Commission deems appropriate and **cost effective** to encourage and promote the efficient use and conservation of energy
Vermont	30 V.S.A. § 209 (e) (13) "The Public Service Board shall: Ensure that any energy efficiency program approved by the board shall be reasonable and **cost-effective**."

States vary in how they apply cost-benefits tests. In their national survey of ratepayer-funded energy efficiency programs, Kushler *et al.* found that most states applied them at the portfolio level and the program level.[370] Many of the respondent states reported applying the tests to both portfolios and programs. Only 13 states applied cost-benefit tests at the level of measures. Florida reported applying the tests at the program level and California, Illinois, Pennsylvania, Wisconsin, and Wyoming only at the portfolio level. There was no way of knowing whether the respondents to the survey had the same understanding of "portfolio" and "program."

9.1.11 Incentives for Good Performance in Meeting or Exceeding Goals and Penalties for Suboptimal or Poor Performance

Just as it is difficult to compare overall EERS programs across states, it is also difficult to assess the comparative effectiveness of state incentive systems for utility performance in implementing the programs. Notwithstanding that challenge, incentives are a common element of EERS policies. As shown in Table 9-3, at least 20 of the 27 states with EERS programs and goal setting requirements authorize positive incentives to encourage utilities to meet or exceed their energy conservation. Positive performance incentives may be statutorily authorized but the details are commonly set forth in regulatory commission orders. An argument for positive performance incentives combined with goal setting is that electric utilities are more likely to aggressively commit to meeting specified goals if such incentives are provided.[371] In fact, performance incentives are triggered in many states prior to a utility's attainment of its aggregate savings goals. Available incentives are also often capped.[372]

States have provided utilities with incentives for energy conservation for several years, but until Chu and Sappington, little work had been done with formal economic models to guide the design of such incentives.[373] Chu and Sappington explained that a utility regulator cannot readily observe how much care a utility takes in designing programs nor how much diligence the utility puts forth to properly implement an energy conservation program. This points to a need for an incentive structure that could improve performance. To that end, Chu and Sappington developed a gain sharing arrangement that would motivate an energy supplier to promote conservation while ensuring that a substantial

[370] Kushler, et al, 2012.
[371] See findings in Carley (2011).
[372] See Hayes *et al.* (2011), Table 1. This report analyzes the benefits provided in 18 states including six without EERS programs but with energy efficiency programs. Florida is not included in this analysis.
[373] Chu and Sappington (2012).

Table 9-3 EERS States – Incentives and Penalties[374]

STATE	OPPORTUNITY FOR POSITIVE PERFORMANCE INCENTIVES	AUTHORIZED PERFORMANCE-RELATED PENALTIES
Arizona	X	
Arkansas	X	
California	X	X
Colorado	X	
Connecticut	X	
Delaware		
Florida	X	X
Hawaii	X	X
Illinois		X
Indiana	X	
Iowa		
Maine		
Maryland		
Massachusetts	X	
Michigan	X	
Minnesota	X	
Missouri	X	
New Mexico	X	
New York	X	
Ohio		X
Pennsylvania		X
Rhode Island	X	
Texas	X	
Vermont	X (Administrator)	
Virginia	X	
Washington	X	X
Wisconsin	X (Administrator)	

portion of the benefits from conservation went to consumers.[375] The plan specified an amount of the gain that the regulator will award to the firm. Customers will receive the remainder. Chu and Sappington concluded that an optimal gain sharing plan should subject the energy supplier to substantial downside risk, perhaps through a penalty, and provide substantial rewards without affording the utility excessive profits. They also found that regulators should allow an energy supplier to choose one plan from a menu of plans that provide different levels of risks and rewards. Finally they concluded that program design should reflect industry and political conditions, and that the regulator should offer larger rewards if the regulator is unable to impose penalties. The benefits to

[374] Source: Expanded and modified version of Palmer et al. (2012), Table 8. Note that a Commission or other entity may be authorized to grant incentives or impose penalties but incentives may not necessarily be provided or penalties imposed.

[375] "Gain sharing attempts to motivate a supplier of energy conservation services to promote conservation while securing for energy consumers a substantial portion of the resulting benefits. Gain sharing pursues this goal by specifying in advance how the realized benefits of an energy conservation program will be divided between the supplier and energy consumers." (Chu and Sappington, 2012, p.1)

customers are lower if the regulator cannot impose penalties, but the authors found that even modest gains are preferable to no gains. Chu and Sappington observed that, although formal economic analysis has been lacking, utility regulators have previously adopted at least some of the incentive features that they proposed.[376]

In an earlier examination, Hayes *et al*. categorized three types of shareholder incentives and analyzed the benefits available in 18 profile states: Shared benefits, performance targets, and rate of return.[377] While not included in the analysis by Hayes *et al*. , Florida is among the states that authorize performance incentives. Florida's performance incentive appears to take the form of both shared benefits and rate of return. In terms of shared benefits, the FPSC is authorized to allow jurisdictional electric utilities that exceed their goals to receive financial rewards in the form of shared cost savings for generation, transmission, and distribution services related to energy conservation, energy efficiency and the addition of DSM and renewable energy systems. The FPSC may also provide other types of financial incentives.[378] The Commission is authorized to allow an IOU an additional return on equity of up to 50 basis points if it exceeds 20 percent of its annual load-growth through energy efficiency and conservation measures. The additional return on equity must be established by the FPSC through a limited proceeding.[379] In Florida, as in other states, authorization to grant such incentives does not mean that they will necessarily be provided.

Other states' policies take a somewhat different approach. In Colorado for example, the Commission is statutorily required to consider at least four types of incentive mechanisms for electric utilities that surpass their goals: 1) a higher rate of return on DSM investments, 2) accelerated depreciation or amortization, 3) retention of a portion of net economic benefits for shareholders, and 4) collection of DSM program costs through an adjustment clause.[380] Indiana also authorizes the use of shareholder incentives "to encourage participation in and promotion of a demand-side management program." Incentives include, but are not limited to, a percentage share of net benefits, a greater than normal return on equity, and an adjustment to overall return on equity based on performance results of quantitative or qualitative DSM program evaluations.[381]

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376 Chu and Sappington (2012) noted that Dixon et al. (2010) reviewed the history of energy conservation and efficiency policies in the United States. Tanaka (2011) summarized policies in other countries.

377 Hayes, et al.,(2011). The report defines each incentive as follows: Shared benefit is based on a share of the benefits programs. Performance targets are based on a utility's achievement of pre-established energy savings targets or performance goals. Rate of return incentives provide an increased rate of return based on savings or spending for energy efficiency programs. The most common form of incentive in the profile of 18 is the shared benefit incentive.

378 Section 366.82 (8) F.S.

379 Section 366.82(9) F.S.

380 C.R.S. 40-3.2-104 (5).

381 170 I.A.C. 4-8-7 (a).

Incentive systems with performance targets are typically found in states that have a restructured energy system, although they may be designed differently. For example, a multi-factor performance target was created by an order issued by the Massachusetts Department of Public Utilities. In Massachusetts approximately 5 percent of the budget for EERS may be used for incentives. The incentives are described as follows:

> (1) a savings mechanism, which provides an incentive for Program Administrators to pursue energy efficiency programs that maximize total benefits; (2) a value mechanism, which provides an incentive for Program Administrators to pursue energy efficiency programs that maximize net benefits; and (3) performance metrics, which provide an incentive for Program Administrators to undertake specific efforts that are expected to provide benefits beyond those captured in the savings and value components.[382]

New York provides another example of a restructured state's approach to performance incentives. In an order issued by the New York Public Service Commission in March 2012, performance targets were addressed using a two-tiered system for the four-year period 2012-2015. The performance incentive will be provided only at the end of 2015. A pool of money was designated to fund the incentives. For the first tier, each utility is afforded the opportunity to earn a financial incentive if it attains its aggregate goal over the four-year period. For the second tier, each utility will have the opportunity of earning an incentive if the statewide goal is reached.[383]

Two states that have taken yet another approach toward designing positive incentives are Michigan, which has a restructured electricity market, and Minnesota, which does not. In Michigan, electric utilities whose rates are regulated by the Commission are required to have energy optimization plans and they can also receive energy optimization credits. One credit is granted for each megawatt hour of annual savings realized through energy optimization plan implementation. Michigan authorizes the use of financial incentives for utilities that exceed energy optimization performance standards. Incentives must be approved by the Commission but cannot exceed the lesser of the following amounts: 25 percent of the net cost reductions realized by the utility's customers due to implementation of the energy optimization plan or 15 percent of the utility's actual expenditures for energy efficiency programs for the year.[384] In addition to those incentive provisions above, utilities may carry optimization credits forward unless the prior incentives had been taken. In a similar vein, Minnesota's utilities are also permitted to

[382] D.P.U. 09-116-120, January 28, 2010.
[383] Order Establishing Utility Financial Incentives, Case 07-M-0548.
[384] M.C.L.S. 460.1075.

carry forward savings exceeding an annual savings goal for up to three years. For electric utility infrastructure projects savings can be carried forward for up to five years. Utilities can carry forward savings in an amount exceeding 1.5 percent of gross annual retail energy sales.[385]

Fewer states appear to impose penalties on utilities that do not meet or exceed performance goals than provide positive incentives for meeting or exceeding such goals (see Table 9-3). In fact, New York's Public Service Commission decided to remove penalties in a recent order establishing incentives.[386] Even though formulaic penalties for poor performance have been eliminated, New York's utilities may still be subject to sanctions in rate cases or other proceedings. Moreover, the authorized funding pool available for positive performance incentives was reduced in that goal-setting cycle because the financial risk to utilities was also reduced through the elimination of penalties. The FPSC may impose financial penalties on electric utilities not meeting FEECA goals.[387] However, no utility has been penalized for that purpose to date.
Financial penalties might take the form of either adjustments to future cost recovery, such as in the case of Iowa (not a restructured state), or specified fines as in the case of many restructured states. One restructured state in particular, Illinois, took the approach that if an electric utility failed to meet efficiency standards after two years, it would be required to make a contribution to the Low-Income Home Energy Assistance Program. The combined total liability would be $1 million. After three years, the Illinois Power Agency would be authorized to take control of the program.[388]

9.1.12 Targeting EERS Programs to Certain Populations

Consumer participation can be encouraged by including features in programs to target populations that might disproportionately benefit from such programs or that otherwise might not take advantage of them. In many states, low-income customers are of special concern. Requirements for electric utilities to offer low-income programs in those states may be tied to some specified portion of their revenue stream. For example, Illinois utilities are required to include in their energy efficiency and demand response plans energy efficiency programs that are targeted to households with incomes at, or below, 80 percent of area median income. The amount to be used would be "proportionate to the share of total annual utility revenues in Illinois from households at or below 150 percent of the poverty level."[389] Those programs are exempt from meeting the TRC Test required

[385] Minn. Stat. 216B.241 Subd. 1c(b). We note that the concept of carrying forward savings either as credits or savings is discussed further in Palmer *et al*., 2012.
[386] State of New York Public Service Commission, Order Establishing Utility Financial Incentives, Case 07-M-0548, administering programs." (pp.4-5).
[387] Section 366.82(8), F.S.
[388] 220 I.L.C.S. 5/8-103 (i).
[389] 220 I.L.C.S. 5/8-103 (f) (4).

by statute to determine cost-effectiveness.[390] In New Mexico, for example, the TRC test must be adjusted for low-income programs.[391] In Minnesota, the required amount targeted to low-income programs must be at least 0.1-percent of gross operating revenue from residential customers in the state.[392]

Maine's approach also includes small businesses as a targeted customer group. Specifically, 20 percent of projects financed through systems benefit charges must be targeted to residential customers and 20 percent to small business consumers.[393] Proceeds from the systems benefit charge, combined with other revenue sources, finance the operations of the third-party administrator, Efficiency Maine.

In Maryland and Iowa, utility EERS plans are required to address low-income populations. Maryland's statute is more expansive in its scope and refers to "low-income communities" and "low-to-moderate income communities"[394] Iowa's statute refers to "low-income person" and encourages coordination with community action agencies.[395] FEECA does not require separate or special treatment of any particular group of customers for energy efficiency or conservation programs.

9.1.13 Conclusions Regarding Program Comparisons

Of the 27 states profiled in this brief analysis, all states have developed frameworks for energy efficiency goal setting processes. The policy frameworks are set forth in statute, regulation and commission orders, as well as in workgroup reports. All states with EERS have instituted evaluation procedures to assess progress toward stated goals. Most have authorized incentive systems to encourage realization of those goals. However, the nature of the evaluation process and the design of the incentive systems vary among the profile states. Standards vary, as do the type of utilities required to meet them (see Attachment 1). Because the parameters for goal settings in many states, like Florida, are revisited over a specified period of years and are subject to change in commission orders, comparisons among states are a bit like trying to hit a moving target.

Comparing states is also a difficult endeavor because the institutional frameworks are very different, as well as a host of other factors discussed above. A few states with restructured electricity markets have shifted the programmatic responsibilities to other entities. Evaluation responsibility also is treated differently in the various states but in

[390] 220 I.L.C.S. 5/8-103 (f) (5)).
[391] N.M.S.A. 62-17-4 (J).
[392] Minn. Stat. 216B.241, Subd. 7 (a).
[393] 35-A M.R.S. §10110 (2)(B).
[394] Md. Public Utilities Companies Code Ann. §7–211 (h)(5)(ii)).
[395] Iowa Code § 476.6 (16) (a).

most of the 27 states, utilities are involved in administration of the evaluation process. Low-income populations are sometimes, but not always singled out for more targeted treatment**.**

9.2 Benchmarking Results

This subsection compares the results of energy efficiency programs across states using data on utility DSM programs collected annually by the Energy Information Administration (EIA) at the DOE. DSM program managers are required to submit the data which include avoided energy use and peak load reductions resulting from energy efficiency and load management programs, and the costs[396] required to administer these programs. Utilities report[397] both incremental and annual effects on total electricity usage and on peak demand. Incremental effects are defined as the annualized effects (both energy use and peak-load) of new participants in existing programs, or all participants in new programs. Because these numbers are annualized, they do not represent realized savings from either shifts in demand from peak-load to off-peak or energy use reductions. Instead, annualized numbers reflect the company's assessment of the savings that would have occurred if these programs had been in effect throughout the year. Annual effects are defined as the realized effects (from reductions in both energy use and peak-load demand) of all participants in all programs.

Analysis of these numbers can be problematic for a number of reasons. As a result, there are a number of caveats that must accompany any discussion in this section. First, there may be diversity in the way utilities report cost and energy savings data. The DOE provides guidelines for reporting these numbers, but no clear direction on the relevant Federal Energy Regulatory Commission (FERC) accounting standards that must be included in any particular cost category.[398] Second, the process used by individual utilities to annualize their incremental data is not transparent. Nonetheless, the data reported to EIA reflect the best available information regarding expenditures and avoided consumption for energy efficiency programs, and our analysis is an attempt to recognize the challenges of this data gathering process.[399]

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[396] Costs are classified as direct costs, attributable to a particular program, incentive payments provided to customers to participate in programs, and indirect costs that are not included in any other category, such as administrative, marketing, or monitoring costs.

[397] Prior to 2010, the Department of Energy did not require any utility with annual sales of less than 150,000 MWh to report annual avoided energy or capacity figures, so these utilities have been excluded from our analysis.

[398] The Federal Energy Regulatory Commission (FERC) requires each electric utility in the United States to follow a uniform system of accounts.

[399] Other cross-state comparisons use data mined from state regulatory agencies. See, for example, Friedrich et al. 2009 and Plunkett et al., 2012. , Katherine Friedrich, Maggie Eldridge, Dan York, Patti Witte, and Marty Kushler, 2009, "Saving Energy Cost-Effectively: A National Review of the Cost of Energy Saved through Utility-Sector Energy Efficiency Programs," American Council for an Energy-Efficient Economy,

First, the analysis in this section considers aggregate program effects over multiple years. Expenditures on equipment for DSM programs, like investment in supply-side resources, are assets with useful lives of more than one year. Thus, investment in any given year will have effects on energy use and peak-load in future years as well. Second, the analysis will combine the energy savings, peak load reduction, and cost data from energy efficiency and load management programs as reported to EIA. This approach will correct for any diversity in the manner in which these costs and benefits are reported by the various utilities. Third, the analysis will consider annual effects which take into account all participants in all DSM programs as opposed to incremental effects. Because annual effects represent actual reductions in energy usage or peak-load demand, we have chosen to make them the basis of our analysis. To recognize the persistence of the effects of these expenditures, we have computed the present value[400] of the annual energy savings, annual peak load reduction, and annual expenditures over the past ten years.

9.2.1 Percent Energy Reduction and Cost per Unit Savings

From 2001 to 2010, the utilities in the sample spent[401] an average of 3.8 cents per kWh to reduce electricity consumption by approximately 1.7 percent. Those same expenditures also served to reduce peak demand by approximately 4 percent at an average cost of $92 per kW. Since the available data do not allow the differentiation between expenditures targeting peak load reduction and expenditures targeting electricity consumption, the numerator of both unit cost metrics is the same. Therefore, possible biases in the two metrics exist, if a focus on reduction in peak demand comes at the expense of a focus on reducing electricity consumption and vice versa. So, if the policies of a particular state favored reduction in consumption over a reduction in peak demand, we would see a greater effect in one denominator than in the other. This would lead the state to perform relatively well in one metric and relatively poorly in the other. This trade-off effect is not apparent from the available data.

The correlation between each state's costs per avoided kWh and costs per avoided kW during the period 2001 to 2010 was approximately 0.38,[402] suggesting that states that

Washington, D.C.; and John Plunkett, Theodore Love, and Francis Wyatt, (undated) "An Empirical Model for Predicting Electric Energy Efficiency Resource Acquisition Costs in North America: Analysis and Application," Green Energy Economics Group. The latter study also used data from the energy Information Administration. Data from state regulatory commissions also suffer from lack of uniformity and may not be validated.

[400] The analysis is shown with a discount rate of 7%, consistent with discount rates employed by the utilities. The results of the analysis do not change materially with discount rates ranging from 3% to 9%.

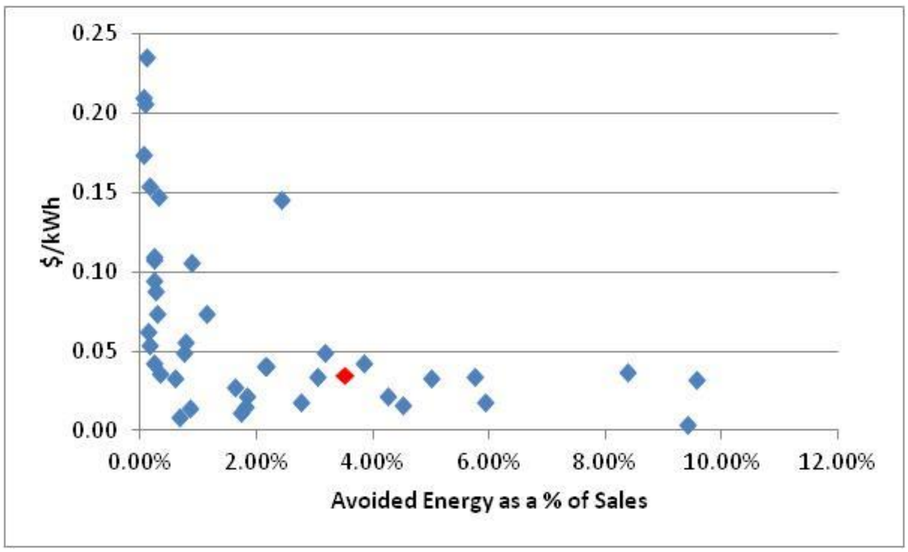
[401] These values are expressed on a net present value basis.

[402] Correlation is a descriptive statistic, ranging from +1 to -1, of the way in which changes in one variable are related to changes in a different variable. If the correlation between two variables is positive, then a

exhibit lower unit costs in one metric will tend to exhibit lower unit costs in the other. Likewise, if we look at avoided kWh consumption as a percent of total sales and avoided kW demand as a percent of peak demand, the correlation between these metrics is 0.48, suggesting that utilities, at the state-level, do not focus on reduction in demand at the expense of consumption. This national trend is evident in Florida, where utilities in the state have reduced both electricity consumption and peak load at a greater rate than the national average, at costs below the national average in each case.

Figure 9-1 shows what utilities,[403] aggregated by state, have spent on a kWh basis for reduction in electricity consumption as a percentage of sales. This normalizes the reductions in consumption across states, while allowing comparison in realized costs. The data point representing Florida is highlighted in red.

Figure 9-1 Cost vs. Scope of State Programs to Reduce Electricity Consumption 2001-2010[404]



Florida utilities have avoided approximately 3.5 percent of their kWh sales during the period 2001-2010 at a cost of approximately 3.5 cents per kWh. The other states that have avoided roughly the same percentage of their sales are the smaller states of Iowa, Hawaii, and New Hampshire[405], and all of which have spent roughly the same per kWh

relatively high value in one variable tends to imply a relatively high value in the other. If it is negative, then a relatively high value in one variable tends to imply a relatively low value in the other. If the correlation is zero, then changes in the variables are not related. Correlation should not be treated as, nor does it imply, any causal relationship between the two variables.

[403] Sample includes utilities that completed Schedule 6 of the EIA Form 861 and had annual sales exceeding 150,000 MWh.

[404] EIA 861 Schedule 6. For readability purposes, the 8 states with costs exceeding $0.25 per kWh have been omitted from this graph.

[405] The three data points closest to Florida

of avoided energy as Florida. The states whose utilities have reported the same level of electricity sales as Florida over the last ten years are California, which has spent roughly 3.7 cents per kWh, and Texas, which has spent approximately 3.3 cents per kWh. But the scope of those programs is on the opposite ends of the spectrum when the avoided percentage of sales is considered. California has avoided approximately 8.4 percent of its kWh sales over the 2001-201- and Texas less than one percent.

Figure 9-2 shows the relative cost of reduction in peak load, measured in dollars per kW, and this reduction in peak-load as a percentage of the utilities' aggregate peak. Again, the data point for Florida is highlighted in red, at $61 per kW. The states with much larger reductions in peak demand resulting from energy efficiency are Minnesota and North Dakota.[406] These are states that, like Florida, have to manage extreme temperatures that drive demand for electricity. In the case of these states however, that demand is driven by demand for heating rather than cooling. The states that have reduced peak demand by about 10 percent, the same amount as Florida, are California, Iowa, Rhode Island, and Wisconsin. All but Wisconsin spent more per kW than Florida to achieve these savings. Two additional states, Nebraska and South Dakota, have reduced by approximately 9 percent peak demand which occurs in the winter. Overall, in terms of reduction from peak demand, Florida behaves similarly to states that manage peak demand in colder weather, rather than in warmer weather.

As described in Section 9.1.6, some states rely on third party administrators for their energy efficiency programs. Figures 9.3 and 9.4 show the cost and scope of these programs for both energy and capacity reduction in relation to the state of Florida.

None of the states has the same capacity reduction results as Florida's, but none of the states has climate that is comparable to that of Florida, either. Similarly, only Massachusetts avoids a greater percentage of its kWh sales than does Florida, and avoids these sales at a cost that is approximately equal to Florida's. Overall, states that utilize third party administrators realize smaller reductions in energy and capacity than does Florida.

[406] Minnesota has an EERS but North Dakota does not. The Minnesota Legislature enacted the Next Generation Act 2007, which required each electric, and natural gas investor-owned utility to establish energy savings goals of 1.5 percent of average retail sales beginning in 2010. The electric utilities were authorized to petition for a lower savings goal based on certain criteria. Legislation enacted in 2009 established an interim savings goal of 0.75 percent during the period 2010-2012 for eligible natural gas utilities.

Figure 9-2 Cost vs. Scope of State Programs to Reduce Peak Demand 2001-2010[407]

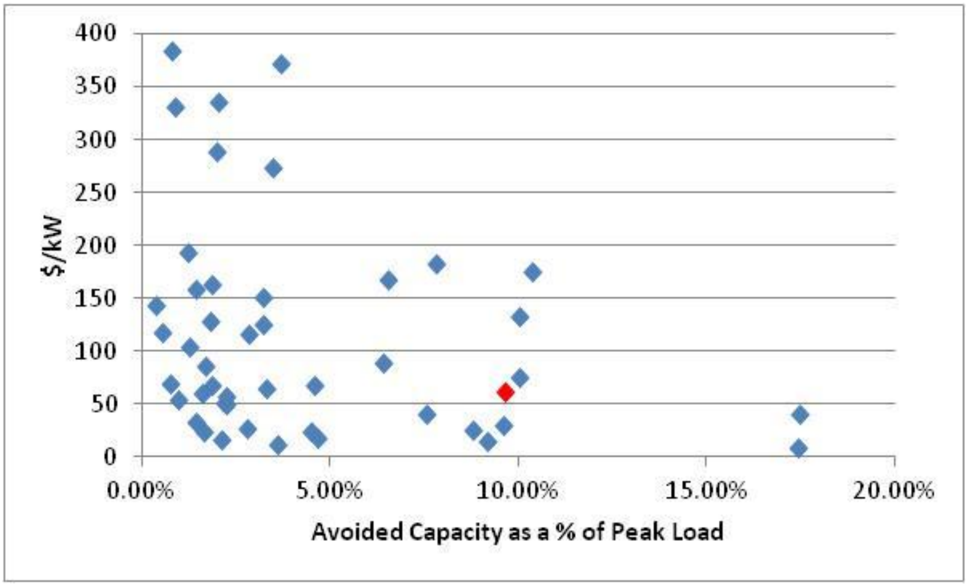
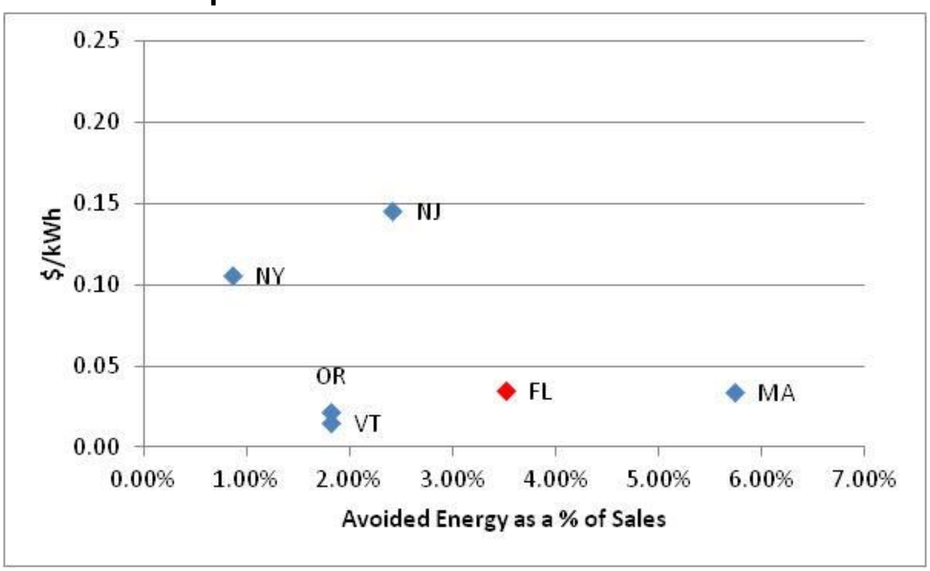
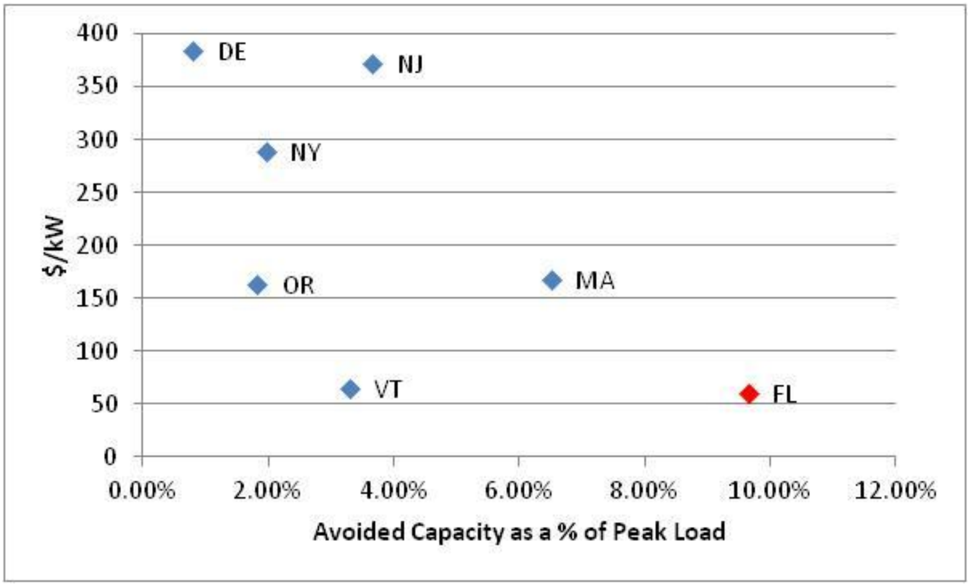


Figure 9-3 Cost vs. Scope of State Programs to Reduce Electricity Consumption 2001-2010[408]



[407] EIA 861 Schedule 6. For readability purposes, the 4 states with costs exceeding $400 per kW have been omitted from this graph.
[408] Data from EIA 861 Schedule 6. For readability purposes, Delaware, which has avoided 0.04% of its sales at a cost of $2.37/kWh, has been omitted from this graph.

Figure 9-4 Cost vs. Scope of State Programs to Reduce Peak Demand 2001-2010[374]



9.2.2 Economic Tests Being Used

Figures 9-1 and 9-2 showed that there is diversity in the scope of the energy efficiency initiatives, and this section will show that there is also diversity in the manner of how the cost effectiveness of energy efficiency initiatives are evaluated. State regulatory agencies are in broad agreement in that they use the tests outlined in the *California Standard Practice Manual*, [409] but the exact tests used and the weights given to their results vary. In addition, some states expand the scope of the costs and benefits recognized under the TRC Test to include the costs and benefits from environmental externalities. This test is often referred to as the E-TRC, and is not distinguished from the TRC test in Table 9-4. Table 9-4 shows the five tests described in the *California Standard Practice Manual*, as well as the states that utilize those tests in their evaluation of energy efficiency programs.

[409] California Energy Commission. 2011. *California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects.*

Table 9-4 Survey of the Cost-Effectiveness Tests Used by Various States[410]

PT	UCT	RIM	TRC	SCT
AR, FL, HI, IA, ID, KS, MD, NC, OK, SD, UT, VA, WY	AR, CA, CT, HI, IA, ID, KS, MD, MI, NC, OK, OR, SD, TN, TX, UT, VA, WY	AR, FL, GA, HI, IA, KS, MD, NC, ND, OK, SD, TN, UT, VA, WY	AR, CA, CT, FL, GA, HI, ID, IL, KS, LA, MA, MO, NC, NE, NH, NJ, NM, NV, NY, OH, OK, PA, RI, SD, TN, UT, VA, WA, WI, WY	AZ, DC, GA, HI, IA, KS, MD, ME, MN, MT, NJ, OK, OR, SD, VT, WY

Table 9-4 shows that the TRC test is the most widely-implemented test, and that the remaining four tests are roughly equal in their implementation. However, when states were asked which results tend to weigh heavier in the decision on whether to implement their programs, the TRC and RIM tests are given a higher weight. Diversity still exists in the manner in which these tests are implemented, however. For example, Colorado expressly includes an allowance for non-energy benefits determined by the Commission (Colorado). The state of Washington, to cite another example, applies a 10 percent surcharge to all costs when considering the effectiveness of the program.

[410] Regulatory Assistance Project, 2010, "RAP State Energy Efficiency Policy Inventory for Southeastern States Updated Through 2010," http://www.raponline.org/document/download/id/4742, accessed December 4, 2012

10 Building and Housing Codes, Appliance Efficiency Standards

This section addresses building and housing codes and appliance efficiency standards that provide the framework for energy efficiency policy in Florida. The potential for building and housing codes to affect electrical consumption is heavily dependent on the characteristics of Florida's housing stock. Section 10.1 discusses Florida's statewide building and energy codes; Section 10.2 addresses efficiency in existing housing, including housing codes; Section 10.3 discusses appliance efficiency standards; Section 10.4 characterizes Florida's housing stock; Section 10.5 summarizes findings.

10.1 Energy Efficiency in Florida Building Codes

Section 2.2 provides a brief legislative history behind energy efficiency in Florida's building codes.[411] This subsection provides addition details and summarizes the technical development of the code, as compared to codes in other states, how compliance is enforced, and voluntary programs that certify efficiency beyond the minimum requirements of the code.

10.1.1 The Florida Energy Efficiency Code for Building Construction: History and Current Standards

In response to the federal EPAct of 1975,[412] the 1977 Florida Legislature passed two laws that required local governments to adopt energy efficient building standards. In effect, these precipitated the local adoption of an energy code for certain categories of building for which building permits were issued after March 15, 1979. The two laws enacted by the Florida Legislature were the "Florida Thermal Efficiency Code"[413] and the "Florida Lighting Efficiency Code".[414] In 1980, the same year that FEECA was enacted, these two statewide efficiency codes were combined to form the Florida Model Energy Efficiency Code for Building Construction. In 1981, the Legislature established the Florida Energy Efficiency Code for Building Construction (the Florida Energy Code) as the statewide uniform standard for energy efficiency in the thermal design and operation of all buildings in the State of Florida (with certain exemptions).[415] The Florida Energy Code may not be made more stringent or lenient by local governments. The Florida Building Commission is required to adopt the Florida Energy Code within the Florida Building Code.

[411] Section 553.886, F.S. enacted as s.19, Ch. 2008-191, L.O.F.
[412] The Energy Policy and Conservation Act (P.L. 94-163, 42 U.S.C. 6201), described in Section 2.2.
[413] Section 533.900, F.S.
[414] Section 533.908, F.S.
[415] Chapter 81-226 L.O.F. and Chapter 553, Part VII, F.S.

Energy Code Performance Targets. The International Energy Conservation Code (IECC) is the current national model standard for energy-efficient construction recognized by federal law.[416] On June 17, 2008, Florida's Governor signed H.B. 697, which outlined the Legislature's mandate to select the most current version of the IECC as a foundation for the Florida Energy Code.[417,418] This mandate required the use of the 2009 IECC as the base code for the 2010 Florida Building Code, Energy Conservation, which is the most recent version of the Florida Energy Code. The law directed the Florida Building Commission to include Florida-specific efficiencies in the 2010 edition of the Florida Energy Code for building construction and to improve the energy performance of new buildings by at least 20 percent as compared to the energy efficiency provisions of the 2007 Florida Building Code. Additional percentage thresholds, no longer on the books today, required more stringent energy performance of new buildings by at least 20 percent in 2010, 30 percent in 2013, 40 percent by 2016, and 50 percent by 2019.[419] The statute imposing those requirements was repealed in 2011. The 2010 20 percent threshold increase was achieved through implementation of Executive Order 2007-127, effectively increasing the efficiency of new buildings by 15 percent via the 2009 Supplement to the 2007 Florida Energy Code, and by an additional 5 percent via the 2010 Florida Energy Code requirements.[420]

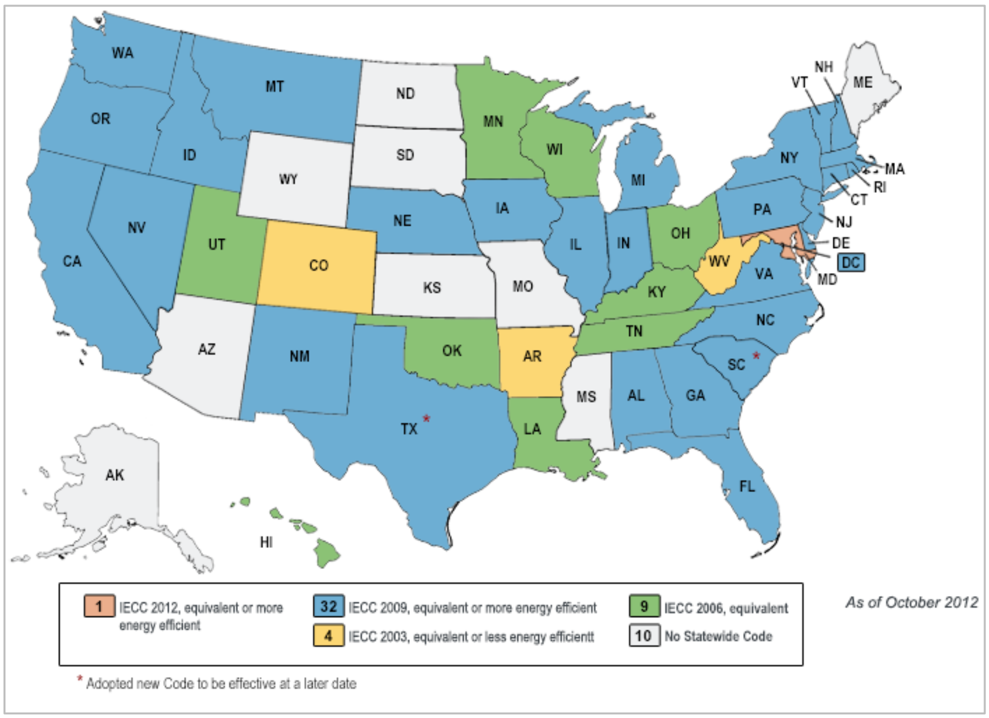
Figure 10-1 illustrates how Florida's Energy Code standards compare to those of other states. Florida is one of 32 states and U.S. territories with statewide codes equivalent to or more efficient than the 2009 IECC. Note that this figure does not differentiate between states with energy codes *equivalent* to the 2009 IECC and those that exceed the 2009 IECC in stringency (such as Florida). Ten states have no statewide energy code, and only one, Maryland, has already adopted a statewide code equivalent to or exceeding IECC 2012 standards.

Commercial Energy Efficiency Standards. The Commercial Energy Efficiency Code, Chapter 5 of the Florida Building Code, Energy Efficiency,[421] applies to commercial buildings or portions of commercial buildings and to multiple-family residential buildings greater than three stories. New commercial building construction or additions shall

[416] International Code Council, "Codes, Standards & Guidelines," http://www.iccsafe.org/CS/Pages/default.aspx, accessed December 4, 2012.
[417] Ch. 2008-191. L.O.F.
[418] Fairey and Swami. Preliminary Report on Integration of Florida's Code Energy Efficiencies using the 2009 IEC as the Foundation Code, FSEC-CR-1807-09, July 2009, http://www.fsec.ucf.edu/en/publications/pdf/FSEC-CR-1807-09.pdf, accessed December 4, 2012.
[419] Thresholds were to be measured relative to 2007 Florida Building Code provisions.
[420] Sec. 33, Ch. 2011-22, L.O.F.
[421] FDBPR, 2010 Florida Building Code – Energy Conservation, Chapter 5 – Commercial Energy Efficiency, http://www.ecodes.biz/ecodes_support/free_resources/2010Florida/Energy/PDFs/Chapter%205%20-%20Commercial%20Energy%20Efficiency.pdf, accessed December 4, 2012.

comply with total building performance requirements provided that applicable prescriptive and/or mandatory provision of the building envelope, mechanical systems, water heating and electrical power and lighting systems are met. Commercial building shell, renovations, alterations and lighting and equipment change-outs shall comply with the appropriate prescriptive requirements. The standard reference design features included in the Florida Commercial Energy Code are based on Chapter 11 of the 2004 ASHRAE Standard 90.1 and are adjusted by a 0.80 multiplier to make the code 20 percent more stringent than the standard features.[422] Analysis by the Florida Solar Energy Center shows that ASHRAE 90.1-2007 is four percent to nine percent more stringent than that of ASHRAE 90.1-2004.[423]

Figure 10-1 Current Residential Building Energy Code Adoption Status[424]



The Florida Building Commission notified the U.S. Department of Energy on August 15, 2012 that Chapter 5 Commercial Energy Efficiency of the 2010 Florida Building Code, Energy Conservation, exceeds the 2007 edition of The Energy Standard for Building,

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[422] Florida Building Commission, 2010 Changes to the Florida Energy Code Effective March 15, 2012, http://www.floridabuilding.org/fbc/thecode/2010_Florida_Building_Code/CHANGES_TO_THE_FLORIDA_ENERGY_CODE_2010.pdf, accessed December 4, 2012.

[423] Fairey and Swami. Preliminary Report on Integration of Florida's Code Energy Efficiencies using the 2009 IEC as the Foundation Code, FSEC-CR-1807-09, July 2009, http://www.fsec.ucf.edu/en/publications/pdf/FSEC-CR-1807-09.pdf, accessed December 4, 2012.

[424] United States Department of Energy, "Status of State Energy Code Adoption, National Status At-A-Glance," http://www.energycodes.gov/adoption/states, accessed October 29, 2012.

Except Low-Rise Residential Buildings, ASHRAE Illuminating Engineering Society of North America (IESNA) Standard 90.1 by 11 percent to 16 percent.

Climate Considerations in the Florida Energy Code. Originally, the Florida Energy Code referenced minimum standards for construction to meet or exceed national standards such as those of the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE 90-75). However, nationally recognized energy codes or standards are designed primarily for climates where heating dominates the energy demand profile. Therefore, the Florida Energy Code was modified to be relevant within the context of Florida's cooling-dominant climate. The Florida Model Energy Efficiency Code for Building Construction was developed to be climate-specific for Florida and used three primary climate regions within the state: North, Central, and South with nine climate zones within these three regions. These climate regions were modified with a 2009 code amendment that implemented Executive Order 2007-127.[425,426] This Order was a directive to increase building efficiency requirements by 15 percent relative to those of the Florida 2007 Building Code. As a result, the climate regions were modified to be consistent with the thermal criteria specific to the two Florida IECC climate zones.[427]

10.1.2 Florida Energy Code Compliance Methods

Compliance with the Florida Energy Code requires one level (or standard) of energy performance, which can be achieved through either the prescriptive or simulated performance method.[428] Both compliance methods apply standard reference design component efficiency criteria to determine a given building's energy-efficiency performance requirement, yet the two methods differ in how the standard reference design criteria are applied. The simulated performance compliance path allows tradeoffs between individual component efficiencies as long as the overall performance target is achieved, while the prescriptive method does not allow for such tradeoffs. This section explains the two Florida Energy Code compliance methods, outlines details of the standard reference design component efficiency criteria specified in recent versions of the Florida Energy Code, and discusses the current (2010) Florida Energy Code departures from the 2009 version of the IECC.

425 FSEC, Florida's New 2001 Energy Code – Whole-Building Performance-based Compliance, http://energygauge.com/flares/new_code.htm, accessed December 4, 2012.
426 Also see State of Florida Office of the Governor, "Executive Order Number 07-127 Establishing Immediate Actions to Reduce Greenhouse Gas Emissions within Florida," http://www.flclimatechange.us/ewebeditpro/items/O12F15074.pdf, accessed December 4, 2012.
427 For a map of Florida counties by IECC Climate Zones, see http://energycode.pnl.gov/EnergyCodeReqs/?state=Florida.
428 Florida Building Commission, 2010 Changes to the Florida Energy Code Effective March 15, 2012, http://www.floridabuilding.org/fbc/thecode/2010_Florida_Building_Code/CHANGES_TO_THE_FLORIDA_ENERGY_CODE_2010.pdf, accessed December 4, 2012.

Simulated Performance Compliance Method. The simulated performance compliance method applies standard reference design ("baseline") component features to model and determine the overall efficiency performance target for a specific building. This option establishes an energy budget specific to the building being built by using a computer program that simulates hourly energy use. It allows tradeoffs between the efficiencies of different building components as long as the overall energy budget is met – as modeled – for the whole building. For instance, a building can have a greater amount of glass area for windows or doors than the area specified in the overall energy budget calculation by installing a higher efficiency air conditioner.

Prescriptive Compliance Method. Prescriptive compliance standards are a list of minimum building component efficiencies derived by applying the simulated performance method to a "typical" Florida building given the required level or standard of energy performance. For the individual building being built, each of the minimum component efficiencies on this "checklist" must be met or exceeded (i.e., more efficient) to comply with the Florida Energy Code. Unlike the simulated performance method, the prescriptive compliance method allows no tradeoffs between the minimum efficiency levels prescribed by the model for each building component. Efficiency levels can be better, but those prescribed by the method are the absolute minimums allowed for each component of the building being built.

The prescriptive method is the simpler of the two Florida Energy Code compliance paths because building and equipment efficiencies are prescribed and no tradeoffs are needed. However, in Florida, contractors have used the performance compliance method for more than 90 percent of residential buildings.[429] In effect, this means that for the vast majority of new homes built in Florida, efficiency performance/compliance is modeled on a whole-house basis and individual building components themselves may not all meet baseline component efficiency standards. A 2010 report prepared by Pacific Northwest National Laboratory for the U.S. DOE Building Technologies Program[430] provides recommended processes developed to assist states in measuring compliance with building energy codes. A number of states are developing plans to achieve a 90 percent rate of compliance within eight years and for an annual measurement of the rate of compliance.

Standard Reference Design Criteria. The Florida Energy Code specifies standard reference design (i.e., baseline) component efficiencies for both building envelope and

[429] EnergyGauge, *Florida's New 2001 Energy Code – Whole-Building Performance-based Compliance,* http://energygauge.com/flares/new_code.htm.
[430] Pacific Northwest National Laboratory, Measuring State Energy Code Compliance, March 2010, http://www.energycodes.gov/sites/default/files/documents/MeasuringStateCompliance.pdf, accessed December 4, 2012.

equipment and systems used in residential and commercial buildings. As discussed previously, these baseline component efficiencies are applied in both the simulated performance and prescriptive code compliance methods. For the building envelope, baseline efficiencies for walls, ceilings, windows, floors, and other building components are measured by the insulating materials' resistance to heat flows (or R-values). Window efficiency is reflected in the window performance, Solar Heat Gain Coefficients (SHGC) and U-factors, and the percent of glass-to-floor area. The SHGC is the fraction of incident solar radiation admitted through a window, both directly transmitted and absorbed and subsequently released inward. The rate-of-heat loss is indicated in terms of the U-factor (U-value) of a window assembly. These efficiency measurements are important in selecting the appropriate window efficiencies. The efficiency of residential-sized air conditioners is rated by the SEER, which is defined as the "total heat removed from the conditioned space during the annual cooling season, expressed in Btus, divided by the total electrical energy consumed by the air conditioner or heat pump during the same season, expressed in watt-hours."[431] The coefficient of performance (COP) of a heat pump is the ratio of the change in heat at the "output" (the heat reservoir of interest) to the supplied work. The COP was created to compare heat pumps according to their energy efficiency. The Heating Seasonal Performance Factor (HSPF) is specifically used to measure the efficiency of residential-sized air source heat pumps and is a ratio of Btu heat output over the heating season to watt-hours of electricity used. A higher HSPF value implies a higher (better) efficiency. The efficiency rating of water heaters is its Energy Factor (EF), which is based on several factors: recovery, standby losses, and cycling losses. Minimum EFs are set by the Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy. In April 2010, new standards for residential water heaters were set by the U.S. Department of Energy but will not become effective until April 15, 2016.[432]

Baseline component efficiencies for cooling, heating, and water heating have changed over code cycles. Table 10-1 below lists these baseline component efficiencies for code years 1986, 1991, 2001, 2007 and 2010 (present) for a residential building built in Central Florida. These baseline component efficiencies are used in the simulated energy performance analysis for code compliance and to model "typical" whole-building performance for determining minimum efficiencies via the prescriptive compliance path. Ceiling baseline efficiency requirements have fluctuated over time to meet state and federal requirements in place at the time. Current standard reference design for ceiling

[431] ANSI/AHRI, 2008 Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment", October 2011, p.2, http://www.ahrinet.org/App_Content/ahri/files/standards%20pdfs/ANSI%20standards%20pdfs/ANSI.AHRI%20Standard%20210.240%20with%20Addenda%201%20and%202.pdf, accessed December 4, 2012.
[432] University of Florida/PREC, *Energy Efficient Building Construction in Florida, 7th Edition*, March 2012, http://buildgreen.ufl.edu/publication.htm.

insulation is R-30 and R-13 for exterior walls. Over the years, SEER ratings have increased considerably, which were, in large part, driven by federal efficiency standards.[433] HVAC systems' minimum efficiency requirements have increased to SEER 13.0/HSPF 7.7, and water heater requirements are now set at EF .92. According to FSEC, efficiency requirements for residential energy codes increased by more than 65 percent from 1979-2009, cumulatively saving Floridians more than 39 billion kWh of electricity and an estimated $4.7 billion in cost savings.[434]

Florida Energy Code Departures from 2009 IECC. Departures from the 2009 IECC in the current (2010) Florida Energy Code include differences based on Florida law for renovations, historic buildings, buildings systems, replacement equipment, exempt buildings,[435] and the climatic differences of the nationally recognized energy codes (IECC) and standards (ASHRAE 90.1). These departures added design criteria addressing insulation installation and protection, materials testing and thermal properties, calculations procedures, and various assumptions.

Prescriptive compliance requirements for residential, low-rise buildings: 1) limit window area percentage; 2) prevent electric resistance space heating and air handlers in attics; and 3) require the air handler and air distribution system to be in conditioned space and to be tested to more stringent levels than the IECC. The requirements of Florida's prescriptive compliance method reflect a building that would minimally comply with Florida's performance base code. According to the Florida Building Commission, "Florida equipment "Standard Reference Design" (baselines) did not go to "same as Proposed Design" as in the IECC.[436] Florida follows federal law, which requires state energy code baselines to have equipment efficiencies at federal minimums. The simulated performance compliance method gives credit for HVAC and water heating equipment efficiency beyond federal minimums and sets ceiling insulation minimums per Florida law.

[433] See Section 11.3, "Appliance Efficiency Standards."
[434] Florida Solar Energy Center, Effectiveness of Florida's Residential Energy Code; 1979-2009 (Revision of 1979-2007 Report), FSEC-CR-1806-09, July 2009, http://www.fsec.ucf.edu/en/publications/pdf/_baks/FSEC-CR-1806.pdf.0001.8b12.bak, accessed December 4, 2012.
[435] Florida Building Commission, Energy Technical Advisory Committee, Florida Departures from the IECC, March 2012, http://www.floridabuilding.org/fbc/commission/FBC_0312/Energy_TAC/MAJOR_DEPARTURES.htm, accessed December 4, 2012.
[436] Florida Building Commission, 2010 Changes to the Florida Energy Code Effective March 15, 2012, slide #12, http://www.floridabuilding.org/fbc/thecode/2010_Florida_Building_Code/CHANGES_TO_THE_FLORIDA_ENERGY_CODE_2010.pdf, accessed December 4, 2012.

Table 10-1 Residential Standard Reference Design ("Baseline") Component Efficiencies for Central Florida[437]

Component		1986	1991	2001	2007	2010[438]
Ceiling		R-30	R-30	R-30	R-30	R-30
Wall		R-19	R-19	R-11	R-13	R-13
Floors		SOG[439] R-3.5	Slab R-3.5	Slab R-0	Slab R-0	Slab R-0
Glass	Type	Dbl Clear	Dbl Glass	Dbl Glass	Dbl Glass	Dbl Glass
	SHGC	.66	.66	.40	.40	.40
	% Area	15	15	18	18	18
AC Ducts	Insulation	R-4.2	R-6	R-6	R-6	R-6
	Leaks	N.A.	10%	8%	5%	5%
AC System	Cooling	SEER 8.9	SEER 8.9	SEER 10.0	SEER 13.0	SEER 13.0
	Heating	COP 1	COP 1	HSPF 6.8	HSPF 7.7	HSPF 7.7
Water Heater		EF .88	EF .88	EF .88	EF .92	EF .92

Florida Energy Code also has specific provisions addressing swimming pool equipment efficiencies and filtration pump criteria. In commercial and high-rise residential buildings, Florida has specific building cavity air flow criteria based on Florida research and specific provisions addressing duct insulation values, duct sealing criteria, air distribution system testing, adjusting, and balancing. Specific dehumidification and HVAC design provisions are also included.[440]

10.1.3 Beyond-Code Incentives for New Buildings

Constructing new buildings that are energy efficient may be easier and more cost effective than retrofitting existing buildings. There are several well-established energy efficiency programs for new residential construction in Florida that require qualifying houses to be built to standards above code. Well-known programs include the Florida

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[437] FSEC, Effectiveness of Florida's Residential Energy Code; 1979-2009 (Revision of 1979-2007 Report), FSEC-CR-1806-09, July 2009, http://www.fsec.ucf.edu/en/publications/pdf/_baks/FSEC-CR-1806.pdf.0001.8b12.bak, accessed December 4, 2012.

[438] *2010 Florida Building Code: Energy Conservation, Chapter 3 – Design Criteria* (for Climate Zone 2).

[439] "SOG" is notation for slab-on-grade foundation.

[440] There are additional administrative, residential and commercial departures from the IECC that are not detailed in this section as they are beyond the scope of this study.

Green Building Coalition (FGBC) Green Homes,[441] U.S. Green Building Council (USGBC) LEED for Homes,[442] and the National Association of Home Builders (NAHB) National Green Building Standard (NGBS) Certification Program.[443] However, the best known and most widely adopted program is the U.S. EPA Energy Star Certified New Home program[444] (Energy Star) that was launched in 1996. At the time that it began, the program was unique in that it required and still requires third-party certification. It is also performance based (modeled) rather than prescriptive (checklist). The performance requirements, a blower door test and ductwork testing (added later), were instrumental in promoting recognition of the importance of tight building envelopes and ducts to building energy efficient houses, even among builders not participating in the program. The first Energy Star home in Florida was built in 1997 in Gainesville. Since that time, the program has grown steadily with more than a million certified homes nationwide and has been adopted by an increasing number of builders, including many national tract builders. Energy Star homes are readily available in Florida, with modeled energy savings of up to 30 percent relative to comparable conventionally built homes.[445]

Federal building energy codes establish the baselines for the "energy budget" used in determining home energy ratings for energy performance certification programs. To carry the Energy Star label, for example, the EPA Energy Star for Buildings program requires efficiencies exceeding federal standards. The 2006 Mortgage Industry National Home Energy Rating Standards (HERS, the RESNET Standards) is used in determining compliance with the Energy Star program.[446] In Florida, Energy Star program Version 3.1 (Rev. 004) requirements have been modified to reflect the Florida Energy Code. Thus, Florida Energy Star homes are designed to reduce energy use by 15 percent relative to new Florida homes' baseline efficiencies. Through RESNET, the home energy rating system industry has promulgated national consensus standards that include the efficiency of other devices in whole-house energy performance analysis. These efficiency ratings are used in meeting many green building certifications, such as the U.S. Green Building

[441] Florida Green Building Coalition, "Florida Green Home Certification Standard," http://www.floridagreenbuilding.org/homes, accessed December 4, 2012.
[442] U.S. Green Building Council, "LEED for Homes," https://new.usgbc.org/leed/rating-systems/homes, accessed December 4, 2012.
[443] National Green Building Program, "It's Time to Build Green," http://www.nahbgreen.org/, accessed December 4, 2012.
[444] United States Department of Environmental Protection, "Energy Star," http://www.energystar.gov/index.cfm?c=new_homes.hm_index, accessed December 4, 2012.
[445] *Ibid.*
[446] RESNET, Mortgage Industry National Home Energy Rating Standard, 2006, http://resnet.us/, accessed December 4, 2012.

Council Leadership in Energy and Environmental Design (LEED) homes[447] and FGBC standards.[448]

Various utilities have supported the Energy Star program (and other green building certification programs) directly with incentives, such as subsidized performance testing (HERS scoring) and rebates for equipment upgrades above code minimum. When the Energy Star program first launched, these incentives may have been necessary to encourage builders to give the program a try, driving the market for new home energy-efficiency programs that certify performance beyond code minimum standards. Today, the Energy Star New Homes program in Florida is fully functional and not dependent on supplemental incentives through utilities' DSM programs.

10.2 Energy Efficiency Opportunities in Housing Codes

While energy efficiency provisions in the Florida Building Code and new home energy-efficiency certification standards capture the bulk of the market for efficiency gains in new construction, Florida's housing codes represent a potential opportunity for additional energy efficiency gains among existing homes. As discussed above, millions of Florida's residential units were built in the last several decades in compliance with practices that were relatively energy inefficient in comparison to current standards. Furthermore, new advances in HVAC, water heating, and other building technologies offer even greater efficiencies than currently required by code. Nevertheless relatively few households proactively upgrade equipment. Instead, most households continue to use older, possibly under-performing equipment as long as it continues to function. On any given day, air conditioning units, water heaters, appliances, and other components fail in thousands of Florida homes, requiring homeowners to make replacement decisions.

In most cases, the Florida Energy Code does not offer guidance for replacements and simple retrofits of residential energy systems, equipment, and building envelope components. Federal appliance standards (described in Section 11.3 set minimum equipment performance standards, such as SEER 13 for air conditioning systems.

The average useful (properly functioning) life of new HVAC and water heating equipment is generally estimated to be 14 and 13 years, respectively.[449] Based on the age distribution of Florida's housing stock, it appears that a very large number of homes will

[447] U.S. Green Building Council, "LEED is an Internationally Recognized Green Building Program," https://new.usgbc.org/leed, accessed December 4, 2012.
[448] Florida Green Building Coalition, "Home," http://www.floridagreenbuilding.org/, accessed December 4, 2012.
[449] National Renewable Energy Laboratory (NREL), National Residential Efficiency Measures Database, http://www.nrel.gov/ap/retrofits/group_listing.cfm, accessed December 4, 2012.

be replacing their HVAC and water heating equipment over the next decade. Utility DSM programs have the potential to impact community energy efficiency standards. By targeting this retrofit market with educational resources and/or housing code standards, homeowners and contractors may also be targeted through incentive programs. In the absence of widely accepted certification programs like Energy Star, utility DSM programs could offer a reasonable alternative for engaging the public in how they make energy efficiency decisions. Furthermore, utility DSM programs promote newer energy-efficiency technologies such as ductless mini-split HVAC systems, encouraging local contractors to sell and service higher efficiency models.

10.2.1 Housing Codes

The Florida constitution allows municipalities "home rule power" to govern its citizenry without state intervention. Among these powers is the ability to enact and enforce home repair standards and ordinances. Accordingly, home repair violations are enforced by each municipality.[450] In enacting a housing standard, municipalities can either adopt the 1994 Standard Housing Code[451] by reference or develop their own set of housing codes and standards. The purpose of a standard housing code is to set minimum standards for the occupancy of residential dwellings.[452] The code applies to all structures located on residential property used for human habitation and to structures used for the storage of materials associated with human habitation (i.e. sheds, detached garages, etc.). The code also sets forth minimum standards for the alteration, repair, removal, maintenance, and /or demolition of existing buildings, but does not contain minimum criteria for energy efficiency.

10.2.2 Landlord/Tenant Law

Florida's Landlord/Tenant Law[453] outlines the responsibilities of the landlord and tenant for complying with applicable building, housing and health codes for maintaining the health and safety of the structure and its occupants. The lack of housing code standards, and the lack of financial incentives, results in relatively low levels of energy efficiency in older, tenant occupied structures.

[450] Legal Services of North Florida (LSNF) Brochure, Housing Code Compliance Guide for Homeowners, http://www.lsnf.org/brochures/hcc.pdf, accessed December 4, 2012.
[451] Southern Building Code Congress International, Inc. (SBCCI), Standard Housing Code 1994 Edition, http://www.ecodes.biz/ecodes_support/Free_Resources/1994_Standard_Housing_Code/94_Std_Housing.html, accessed December 4, 2012.
[452] Legal Services of North Florida (LSNF) Brochure, Housing Code Compliance Guide for Homeowners, http://www.lsnf.org/brochures/hcc.pdf, accessed December 4, 2012.
[453] Chapter 83, Part II Florida Statutes.

10.2.3 International Property Maintenance Code

Although housing codes are not the same as building codes and are administered by local jurisdictions, the International Code Council (ICC) does publish an International Property Maintenance Code (IPMC) that provides some guidance for energy efficiency in existing housing stock. The IPMC along with the International Building Code (IBC), the International Residential Code (IRC) and the International Existing Building Code (IEBC) are target codes for changes by the National Center for Health Housing Healthy Homes Initiatives.[454] The changes address health and safety, energy and indoor environmental quality. Florida has not adopted the IPMC as a base code but it may be adopted by local jurisdictions as a base housing code.

10.3 Appliance Efficiency Standards

State appliance standards have existed for decades, starting with California's enforcement of minimum efficiency requirements for refrigerators and several other products in 1979 and resulting in federal preemption by the National Appliance Energy Conservation Act (NAECA) and subsequent federal legislation referenced in Section 2.2. Minimum energy efficiency standards for many major appliances were established by the U.S. Congress in Part B of Title III of the Energy Policy and Conservation Act (EPCA)[455], as amended by the NECPA[456]; by the National Appliance Energy Conservation Act (NAECA)[457]; by the National Appliance Energy Conservation Amendments of 1988[458]; by the EPAct of 1992[459]; and by the EPAct of 2005.[460] The National Appliance Energy Conservation Act (NAECA) initially covered 12 products. The EPACT92, EPACT2005, and EISA2007 added additional residential and commercial products to the 12 products originally specified under NAECA. Many different state appliance standards still exist today, however. A key point of NAECA was to enforce federal preemption of any state appliance standard. The preemption clause allows states to continue to mandate standards for products not covered by federal law and to enforce standards that might have existed before federal coverage, up to the date of federal enforcement. Because most major appliances are covered by federal law, the majority of state standards target less energy-intensive products. Furthermore, most of the state standards for products will be preempted by Federal standards within the next decade. For example, the California standard for general-service lighting will be preempted in 2012 by the federal standard

[454] These initiatives are part of the U.S. Department of Housing and Urban Development (HUD) Healthy Homes Program, http://portal.hud.gov/hudportal/HUD?src=/program_offices/healthy_homes/hhi.
[455] Public Law 94-163.
[456] Public Law 95-619.
[457] Public Law 100-12.
[458] Public Law 100-357.
[459] Public Law 102-486.
[460] Public Law 109-58.

for general-service lighting required in the Energy Independence and Security Act of 2007. States can petition DOE for a waiver to continue to enforce their own standards, as opposed to adhering to a less strict federal standard. To date, however, no waivers have been granted.[461]

Appliances covered by federal standards include refrigerators, refrigerator-freezers, freezers, room air conditioners, fluorescent lamp ballasts, incandescent reflector lamps, clothes dryers, clothes washers, dishwashers, kitchen ranges and ovens, pool heaters, and water heaters. Standards for some fluorescent and incandescent reflector lamps, plumbing products, electric motors, and commercial water heaters, and heating, ventilation, and air conditioning (HVAC) systems were added in the EPAct of 1992,[462] which also allowed for the future development of standards for many other products. The American Recovery and Reinvestment Act of 2009 extended many consumer tax incentives originally introduced in the EPAct of 2005 and amended in the Emergency Economic Stabilization Act of 2008.[463]

Minimum appliance efficiency standards were codified in Florida law in 1987 but have not been updated since 1993.[464] Until legislation was enacted in 2011, the Department of Community Affairs was charged with adopting and modifying ~~the~~ standards for new refrigerators, showerheads and lighting fixtures sold in Florida, all of which are preempted by federal law.[465] That responsibility is now that of the Department of Business & Professional Regulation and the Florida Building Commission.[466] As the FPSC noted in its 2012 FEECA "Annual Report':

> "The enhanced efficiency standards for appliances established by the [U.S.] Department of Energy also effectively reduce energy consumption. For example, in 2010, the efficiency of air conditioning equipment, typically a residential customer's most energy intensive device, was increased by 30 percent through DOE's new standards. The DOE is currently considering additional amendments to energy efficiency standards."[467]

In general, Florida's Building Energy Code considers only heating, cooling, hot water and lighting energy uses in new construction and does not address other home energy

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[461] United States Department of Energy, Energy Information Administration, "State Appliance Standards," http://www.eia.gov/oiaf/aeo/otheranalysis/aeo_2009analysispapers/sas.html, accessed December 4, 2012.
[462] Public Law 102-486.
[463] Public Law 110-343.
[464] Section 553.963, F.S..
[465] Ch. 2011-142, L.O.F.
[466] Section 553.912, F.S..
[467] FPSC, *2012 FEECA "*Annual Report".

uses, such as appliances and electronics. In 1979, these "other" home energy uses constituted a fraction (28 percent) of a typical Florida home's total energy use. However by 2009, the share of "other" home energy uses nearly doubled, accounting for more than 55 percent of the total home energy use.[468] Many of these "other" energy uses (refrigerators, dishwashers, clothes washer, ceiling fans, and electronic equipment) are now rated for energy performance, either through national appliance labeling programs of the Federal Trade Commission or through the Environmental Protection Agency (EPA).[469] Appliances receiving the Energy Star qualified ratings are 10 to 50 percent or more energy efficient than the minimum federal efficiency standards.[470] The percentage by which an appliance must exceed the minimum federal standard to qualify for Energy Star is different for each product rated and depends on available technology.

A recent (2012) Appliance Standards Awareness Project (ASAP)[471] and the ACEEE analysis of the benefits of appliance efficiency standards projected nationwide savings through 2035 from existing (adopted 1987 to current) federal and state standards and from potential new standards adopted within the next four years. The report concluded that existing standards alone are projected to capture $1.1 trillion of cumulative net savings and 720 terrawatt hours (TWh) of electricity savings and 240 GW of peak electric demand savings in year 2035. With the adoption of additional potential state and federal standards, the annual savings in 2035 are projected to include an additional $165 billion, 310 TWh, and 67 GW.[472] ASAP also estimated state-level benefits from potential (i.e., not yet adopted and/or implemented) national appliance efficiency standards. These projected annual savings from potential national standards in 2035 for Florida include over 18 TWh of electricity, nearly 8 GW of summer peak demand savings and over $2.4 billion in energy bill savings.[473]

A review of the appliances covered as part of this study indicates that Florida is effectively blocked from making substantial changes in appliance efficiency standards that would materially achieve FEECA's objectives.

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[468] FSEC, Effectiveness of Florida's Residential Energy Code; 1979-2009 (Revision of 1979-2007 Report), FSEC-CR-1806-09, July 2009, http://www.fsec.ucf.edu/en/publications/pdf/_baks/FSEC-CR-1806.pdf.0001.8b12.bak, accessed December 4, 2012.
[469] *Ibid*. p.4.
[470] *Ibid.*
[471] ASAP is a coalition of organizations that advocate for advancing appliance efficiency standards at the federal and state levels. It was founded in 1999 by ACEEE, the Alliance to Save Energy, the Energy Foundation, and the Natural Resources Defense Council (NRDC). See Alliance Standards Awareness Project, "Mission and History," http://www.appliance-standards.org/content/mission-and-history, accessed December 4, 2012.
[472] Lowenberger, et al, The Efficiency Boom: Cashing In on the Savings from Appliance Standards, Research Report ASAP-8/ACEEE-A123, March 2012, http://www.aceee.org/research-report/a123, accessed December 4, 2012.
[473] ASAP, Summary of State-Level Benefits from Potential National Appliance Standards – Florida, http://www.appliance-standards.org/sites/default/files/fedappl_fl.pdf, accessed December 4, 2012.

10.4 Florida's Housing Stock

As described in Section 3.3, the residential customer class accounted for the majority of FEECA utility energy sales in 2010, approximately 30 percent more total sales than those for the commercial customers. Furthermore, Section 6.1 shows that the majority of programs in the FEECA DSM portfolio are targeted to residential customers. Because of the central role that residential customers play in implementing and achieving the objectives of FEECA, this section details characteristics of Florida's housing stock and discusses potential opportunities for additional energy and demand savings (i.e., furthering FEECA objectives) via residential energy efficiency. The Florida Housing Data Clearinghouse estimates that there are 8,863,057 residential housing units in Florida, of which 5,337,287 (60 percent) are single family, 2,649,094 (30 percent) are multi-family and 864,762 (10 percent) are mobile homes.[474] Compared to the U.S. as a whole, Florida's population and housing stock have grown rapidly in the last 70 years.[475] One result of this rapid growth is that housing stock in Florida (and other Sunbelt states) is relatively new. As shown in Figure 10-2, which plots the number of Florida's housing units by decade from pre-1940 through 2000, only 5 percent of Florida's homes were built before 1950. During the 1960s and 1970s, the number of residential units in Florida more than quadrupled and increased by more than a million houses every decade since.

It is also noteworthy that home size has increased since the 1970s, with a median house size increasing by 35 percent between 1970 and 2009: from 1736 square feet to 2344 square feet.[476] As a result of this growth in both the number and size of Florida's homes, the residential demand for energy services has also increased. According to FSEC, cost "take-backs" due to the median house size increase represents a 20 percent impact on whole-house energy use if the house size had remained at the 1970 median sizes.[477,478]

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[474] University of Florida Shimberg Center, *Florida Housing Data Clearinghouse*, http://flhousingdata.shimberg.ufl.edu.

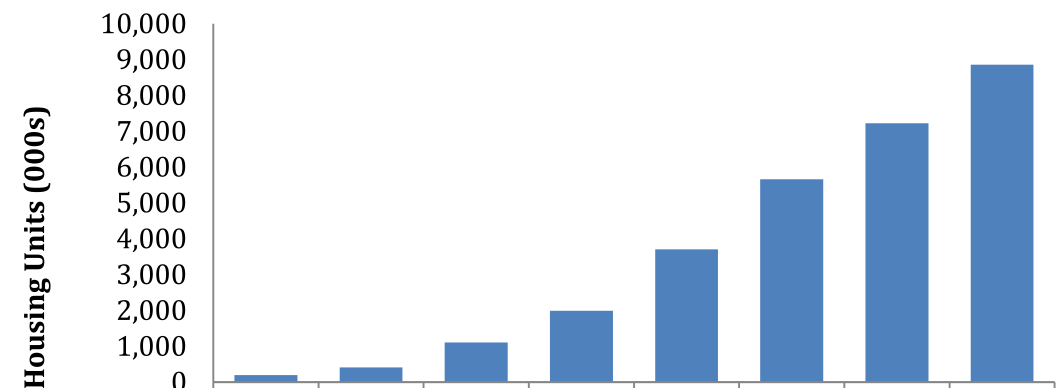
[475] Smith, S.K., University of Florida Bureau of Economic and Business Research, *Florida Population Growth: Past, Present and Future*, June 2005, http://www.bebr.ufl.edu/sites/default/files/FloridaPop2005_0.pdf, accessed December 4, 2012.

[476] FSEC, Effectiveness of Florida's Residential Energy Code; 1979-2009 (Revision of 1979-2007 Report), FSEC-CR-1806-09, July 2009, p.2, http://www.fsec.ucf.edu/en/publications/pdf/_baks/FSEC-CR-1806.pdf.0001.8b12.bak, accessed December 4, 2012.

[477] *Ibid.*

[478] The concept of "take-backs" is analogous to that of the "rebound effect". In this example, it means that of the overall increase in Florida residential buildings' energy efficiency during this time period, 20% was offset by increased demand for energy services related to increases in home size.

Figure 10-2 Residential Units Built in Florida, by Decade[479]



	<1940	1940	1950	1960	1970	1980	1990	2000
Total Homes	199	413	1,105	1,995	3,704	5,661	7,226	8,863
Total %	2%	5%	12%	23%	42%	64%	82%	100%
Decade %	2%	2%	8%	10%	19%	22%	18%	18%

In contrast to Florida's history of steady, rapid growth from the 1950s to the beginning of the 21st century, construction of new residential units has declined in recent years. Figure 10-3 shows that annual building permits issued in Florida for new residential units peaked at approximately 287,000 in 2005. By 2009, the number of permits dropped eight-fold to approximately 35,000, after which they began to slowly increase, reaching approximately 42,000 in 2011.[480] As a consequence of this recent downturn in the state's housing construction, the proportion of older residential units in Florida's housing stock is increasing relative to new (and recently constructed) units. This trend is likely to continue unless there is a significant resurgence in new home construction.

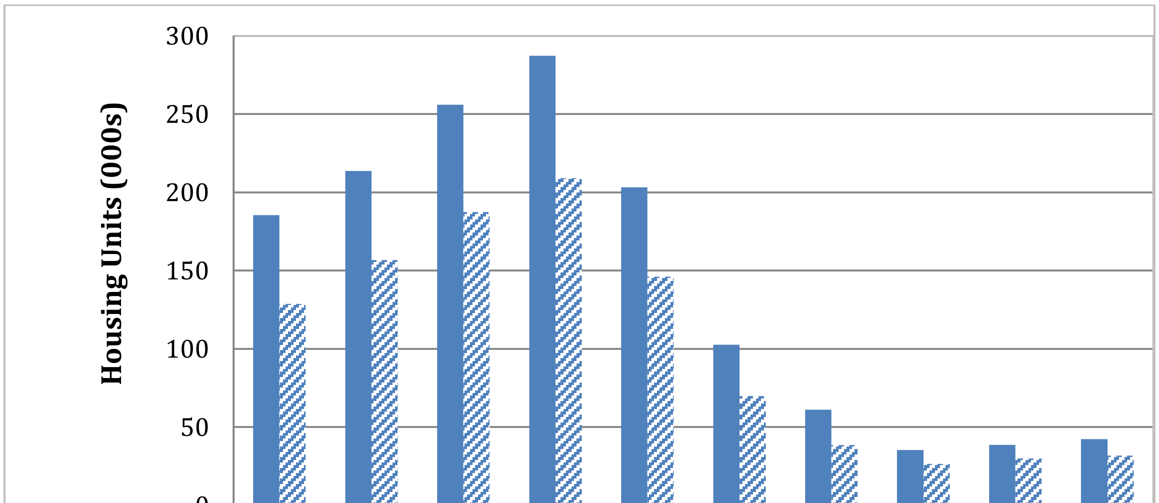
In spite of this recent trend, Florida's residential housing units still are not as old, on average, as housing in other parts of the country.[481] This suggests that Florida's more recently constructed housing stock should have benefited from more current, improved building technologies and should tend to be relatively more energy efficient than the older housing stock elsewhere in the U.S. However, this may not be the case. Most houses in the U.S. are in heating dominated climates, and nationally, the largest single component of household energy consumption is heating, as shown in Figure 10-4. Historically, Florida's mild winters did not require adoption of construction methods to keep homes heated. Through the 1950s, it was not uncommon for houses built in Florida

[479] Data source: University of Florida Shimberg Center, *Florida Housing Data Clearinghouse*, http://flhousingdata.shimberg.ufl.edu/.
[480] FSEC, Effectiveness of Florida's Residential Energy Code; 1979-2009 (Revision of 1979-2007 Report), FSEC-CR-1806-09, July 2009, p.2, http://www.fsec.ucf.edu/en/publications/pdf/_baks/FSEC-CR-1806.pdf.0001.8b12.bak, accessed December 4, 2012.
[481] U.S. Census Bureau, Building Permits Survey: Historic Annual Permits by State, http://www.census.gov/construction/bps/pdf/annualhistorybystate.pdf, accessed December 4, 2012.

to have no insulation in their attics (or walls) and to have relatively leaky building envelopes (with components such as jalousie windows that could not be closed tightly).

In the 1960s, with the rapid advent of central air conditioning as a standard feature in Florida's houses, insulation gained acceptance as a standard residential construction practice. Tighter building envelopes also gained acceptance, but much more slowly, finally getting traction in the late 1990s. As described previously, this process was pushed forward by the adoption and evolution of Florida's Energy Codes. Since becoming a standard feature, air conditioning has become the single largest driver of household energy consumption in Florida's homes (Figure 10-5), estimated to range from an average of 25 percent in North Florida to 40 percent in South Florida.[482] Figures 10-4 and 10-5 illustrate the differences in energy end use profiles for a typical U.S. home compared to a typical Florida home, with air conditioning and "other appliances and lighting" accounting for much larger shares of total energy end use in Florida homes.

Figure 10-3 Total and Single Family Residential Unit Building Permits (Thousands) Issued Annually In Florida, 2002-2011[483]



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total	185	214	256	287	203	103	61	35	39	42
Single Family	129	157	187	209	146	70	39	27	30	32

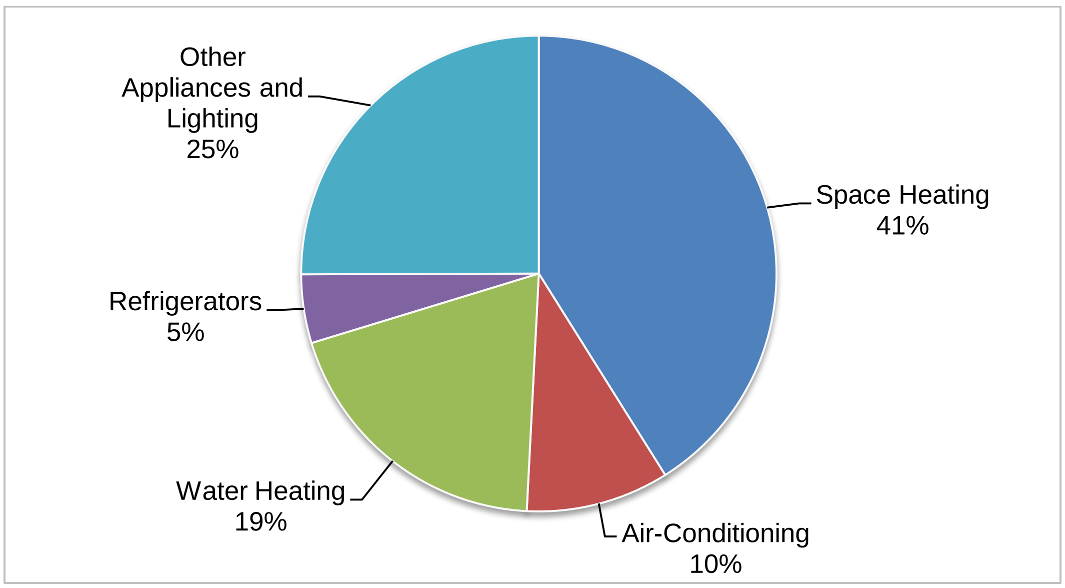
A total of 3,704,411 residential units (42 percent of Florida's current housing stock) were built prior to 1980 when the original Florida Energy Code was still in the process of

[482] Florida Solar Energy Center, Home Energy Ratings: Typical Residential Building Energy Performance, 2007, http://www.fsec.ucf.edu/en/consumer/buildings/homes/ratings/improve.htm, accessed October 1, 2012.

[483] *Ibid.*

being implemented, and 7,225,762 (82 percent) were built before 2000.[484] Thus, most of the state's housing supply was constructed prior to 2006, when the national minimum energy efficiency standard for air conditioning equipment was set at SEER-13. With the 2006 Supplement to the 2004 Florida Building Code, all central air conditioner and central air condition heat pump systems installed on or after December 8, 2006, had to meet the SEER-13 minimum requirements. Essentially, a very large number of Florida's current housing units were built to standards that are less energy efficient than current energy standards. This observation, in combination with the drop in new construction in recent years, suggests that an opportunity for improving the overall energy efficiency of Florida's housing stock resides with energy-efficiency retrofits of existing buildings.

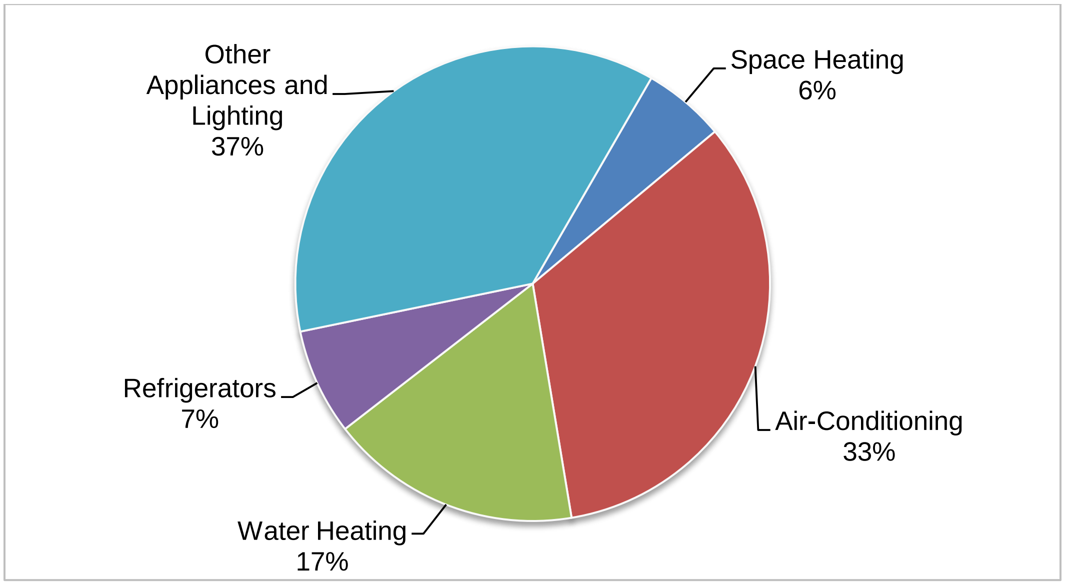
Figure 10-4 U.S. Estimated Average Residential Energy Consumption by End Use – 2005[485]



[484] Data source: University of Florida Shimberg Center, *Florida Housing Data Clearinghouse*, http://flhousingdata.shimberg.ufl.edu/.

[485] Data source: U.S. EIA, *2005 Residential Energy Consumption Survey (RECS) – Table US14: Average Consumption by Energy End Uses, 2005 Million British Thermal Units (Btu) per Household*, http://www.eia.gov/consumption/residential/data/2005/index.cfm?view=consumption#summary.

Figure 10-5 Florida Estimated Average Residential Energy Consumption by End Use – 2005[486]



10.5 Summary of Findings

1) Florida established its own energy efficiency code for buildings in 1979 because existing federal codes were not directly applicable to buildings in Florida's cooling-dominant climate. Florida Law now specifies that the Florida Building Code use the International Energy Conservation Code (IECC) as the foundation for the standards of the Florida Energy Code. Current law requires that the 2010 Florida Energy Code provide 20 percent greater energy savings compared to the 2007 Florida Energy Code.

2) The Florida Energy Code for residential buildings considers only heating, cooling, and hot water uses. The share of "other" home energy uses not addressed in the Florida Energy Code has increased significantly since FEECA was enacted, now accounting for more than 55% of a "typical" Florida home's total energy use. There exists potential to address these "other" energy uses in both the Florida Energy Code and Standard Housing Code.

[486] Data source: U.S. EIA, *2005 Residential Energy Consumption Survey (RECS) - Table US14: Average Consumption by Energy End Uses, 2005 Million British Thermal Units (Btu) per Household*, http://www.eia.gov/consumption/residential/data/2005/index.cfm?view=consumption#summary.

3) Retrofits/upgrades of existing homes are a possible niche for utility DSM programs with respect to achieving the goals of FEECA. In addition, utility programs can impact community standards of practice for efficiency in the absence of other statewide mandates or incentives.

4) The market for superior energy performance in new home construction grew rapidly in the late 1990s and into the early 2000s. Florida's market for "green" certification programs for new home construction has been advanced by FEECA utilities' DSM programs.

5) State appliance efficiency standards are pre-empted by federal standards, which effectively drive the baseline efficiencies of components in the Florida Energy Code.

6) The greatest potential gains in energy and demand savings in Florida are likely to be achieved in the residential sector's existing housing stock. FEECA utility DSM programs play an important and logical role in advancing the energy efficiency of existing housing stock.

7) Florida's housing codes could not only address health and safety issues but also incorporate energy-efficiency provisions for residential buildings.

11 Electric Rate Designs and Metering Technology

The problem of serving electricity load involves the question of dispatching system resources to meet the electricity needs of consumers. Because this need for electricity varies throughout the day, periods of higher usage often necessitate the dispatch of generating units with higher marginal costs, due to the fuel that they employ or the thermal efficiency of the generating unit. If consumers pay the average cost to produce this electricity through their rates, the price paid for electricity at a particular time of day may not be equal to the costs necessary to produce it. Any time the price of a good is not aligned with the costs necessary to produce it an economically inefficient allocation of resources can result. The use of time differentiated rates can better align the prices paid for electricity with the costs necessary to produce it. Time differentiated pricing strategies can be used to vary the price paid for electricity by season, by the time of the day, and by the individual hour. Each approach has its own associated strengths and weaknesses.

Seasonal pricing is the simplest implementation of time differentiated pricing. It is also the only form that can be implemented with conventional one and two part meters. With seasonal rates, electricity prices can vary by the months of the year, but cannot vary with the time of day. This makes them easier for customers to understand. If the marginal costs to serve electric load during certain months is greater than during other months, then seasonal rates may be a way to better align prices with costs. Seasonal rates for both residential and commercial customers are currently employed throughout the country in such states as Colorado, Georgia, New York, North Carolina, South Carolina, Tennessee, Oregon, and Wisconsin.

Time of Use (TOU) peak pricing allows for explicit rate differentials between designated on-peak and off-peak time periods. This type of rate can be implemented when the marginal costs to serve electricity load are higher at certain times of the day, i.e. between 2 p.m. and 7 p.m. These rates are still relatively easy to understand, and the rate differential is known, but this rate structure requires more expensive metering technology to implement. Critical peak pricing is a refinement of this type of rate structure, where an additional, critical peak block can be defined within the on-peak block. This critical peak block represents the time when the capacity of the system is under unusual stress, and electricity consumed during this time period is at a much higher rate than the usual on-peak rate. This critical peak period is not always known in advance, so additional communication protocols are necessary for customers to respond to the price signals.

Real time pricing represents the best alignment of marginal costs and prices, but also imposes the greatest burden among the pricing schemes on utilities and customers. Real time pricing requires meters that record electricity consumption on an hourly or half-hourly basis and that can communicate price signals to consumers. Consumers must respond to these price signals on very short notice, by monitoring the price of electricity and their own usage. Real time prices are not predictable, and they can be difficult to understand for many customers. If customers do not, or cannot, respond to the price signals, the benefit of real time pricing is lost.

As shown in Table 11-1, FEECA utilities are currently implementing a wide range of electric rate designs intended to encourage the efficient use of utility services, although not uniformly across the state. The rate designs that rely on conventional one- or two-part metering or continuous recording meters, include increasing block rates, load management, load factor rates, and curtailable or interruptible rates. There are applications among FEECA utilities of rate designs that rely on more advanced metering and possibly real time communication protocols, including time of use rates, critical period pricing, and real time pricing.

The type of customer has much to do with what rate designs are appropriate. Probably the most extreme example is Gulf Power Company's real time pricing program, which exposes a customer to all the hourly and daily volatility introduced by changes in dispatch, load, and spot fuel prices. Only a relatively sophisticated organization, with fuel switching options and the ability to defer load, is likely to optimize its costs under real time pricing. Critical period pricing is a much simplified form of real time pricing, potentially applicable to even residential customers. Real time communications and display devices are needed to alert the customer to substantially increased prices. For example, in FPL's pilot program, the increment for critical period pricing can be as much as 21.82 cents per kilowatt-hour, but not for more than 88 hours per year.

TOU rates require the use of meters with microprocessors that can accumulate energy and demand data into different registers based on an internal clock and calendar. This form of rate is much less volatile than real time or critical period pricing, and can capture the long term tends of production cost by season and time of day.

The introduction of two-part, or demand metering, is a step down in complexity compared to real time, critical period pricing, and TOU metering, but can be a powerful tool to guide customer awareness. Even within a single demand metered rate class, customers with higher load factors wind up paying significantly lower prices for the energy they consume. The knowledge that a one-time peak per month will set the cost is a good reason to carefully schedule loads. Two-part metering also enables the use of load factor rates, which further encourages careful planning of equipment schedules.

Table 11-1 Electric Rate Structures Employed by FEECA Utilities[487]

Customer Class/Tariff	Utility FPL	FPUC	GULF	JEA	OUC	PEF	TECO
Residential							
Block Rate Structure	Increasing	Flat	Flat	Flat	Increasing	Increasing	Increasing
Load Management	Voluntary	No	No	No	No	Voluntary	No
Time-of-Use Rate	Voluntary	Voluntary	Voluntary	Voluntary	No	Closed	Voluntary
Critical Period Pricing	Voluntary	No	Voluntary	No	No	No	Voluntary
General Service Non-Demand							
Block Structure	Flat	Flat	Flat	Flat	Flat	Flat	Flat
Load Factor Rate	Voluntary	No	No	No	No	Voluntary	No
Load Management	Voluntary	No	No	No	No	No	No
Time-of-Use	Voluntary	Pilot	No	Voluntary	No	Voluntary	Voluntary
Critical Period Pricing	No	No	No	No	No	No	No
Curtailable Rate	No	No	No	No	No	No	No
General Service Demand							
Size Threshold	20 kW	25 kW	25 kW	75 kW	50 kW	24,000 kWh/yr	9,000 kWh/mn
Load Factor Rate	Voluntary	No	Voluntary	Voluntary	No	No	No
Load Management	Voluntary	No	No	No	No	Voluntary	No
Time-of-Use	Voluntary	No	Voluntary	Voluntary	Voluntary	Voluntary	Voluntary
Critical Period Pricing	No	No	Voluntary	No	No	No	No
Curtailable/Interuptable Rate	No	No	Voluntary	No	Voluntary	No	Closed
Large Power							
Size Threshold	500 kW	500 kW	500 kW	1000 kW	1000 kW	na	na
Load Factor Rate	No	No	Voluntary	Voluntary	No	No	No
Load Management	Voluntary	No	No	No	No	No	No
Time-of-Use	Voluntary	No	Voluntary	Voluntary	Voluntary	Voluntary	Voluntary
Real Time Pricing	No	No	Voluntary	No	No	No	No
Critical Period Pricing	No	No	Voluntary	No	Voluntary	No	No
Curtailable/Interruptable Rate	Voluntary	No	Voluntary	Voluntary	Voluntary	Vol. >500kW	Closed

The threshold at which two-part metering and demand rates are applied varies widely among the FEECA utilities. At one end is PEF, with a criterion of 24,000 kWh per year. Assuming an annual capacity factor of 50 percent this is equivalent to a monthly peak demand of only 5.5 kW. The other extreme is JEA, with a 75 kW threshold. None of the FEECA utilities apply two-part metering and demand rates to residential customers, but there are certainly many residential and smaller commercial customers in Florida, to which PEF's threshold would apply, with possibly beneficial changes in behavior as a result. Among other things, two-part metering encourages thermal and energy storage, or distributed generation, to reduce peak demand.

FEECA utilities only offer time-differentiated rates (real time, critical period, and TOU) on a voluntary, or optional, basis. As result, participation rates are low for residential and most commercial customers as demonstrated by Table 11-2, which shows the customer participation in time of use pricing for FPL and PEF. The participation rate is much higher for large users of electricity. A customer who would wind up paying more under these rates is not likely to enlist. If a customer subscribes to that rate and subsequently decides to opt out, that customer may still impose

[487] Data from review of FEECA utilities electric tariffs as found on their web sites.

an incremental cost upon the utility that may exceed (for that individual) the revenue recovered by the utility. On the other hand, customers who are presented with the option of taking service under time differentiated rates probably have an additional incentive to reduce costs by considering thermal and energy storage, or distributed generation.

Table 11-2 Time of Use Participation for FPL and PEF

	FPL	PEF
Residential		
All Customers	4,081,541	1,397,248
TOU Customers	163	28
TOU % Participation	0.004%	0.002%
General Service Non-Demand		
All Customers	414,409	115,556
TOU Customers	582	220
TOU % Participation	0.141%	0.190%
General Service Demand		
All Customers	102,815	46,842
TOU Customers	2,276	9,806
TOU % Participation	2.214%	20.934%
Large Power		
All Customers	2,560	
TOU Customers	1,137	
TOU % Participation	44.419%	

While TOU and other rate designs have the potential to improve price signals and thus promote more efficient use of utility resources, two criteria would have to be met. These alternative rate designs would have to be made mandatory, and appropriate metering would have to be deployed.

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13 Appendix A – Florida Energy Efficiency and Conservation Act [488]

366.80 Short title.—Sections 366.80-366.85 and 403.519 shall be known and may be cited as the "Florida Energy Efficiency and Conservation Act."

History.—s. 5, ch. 80-65; s. 2, ch. 81-318; ss. 20, 22, ch. 89-292; s. 4, ch. 91-429.

366.81 Legislative findings and intent.—The Legislature finds and declares that it is critical to utilize the most efficient and cost-effective demand-side renewable energy systems and conservation systems in order to protect the health, prosperity, and general welfare of the state and its citizens. Reduction in, and control of, the growth rates of electric consumption and of weather-sensitive peak demand are of particular importance. The Legislature further finds that the Florida Public Service Commission is the appropriate agency to adopt goals and approve plans related to the promotion of demand-side renewable energy systems and the conservation of electric energy and natural gas usage. The Legislature directs the commission to develop and adopt overall goals and authorizes the commission to require each utility to develop plans and implement programs for increasing energy efficiency and conservation and demand-side renewable energy systems within its service area, subject to the approval of the commission. Since solutions to our energy problems are complex, the Legislature intends that the use of solar energy, renewable energy sources, highly efficient systems, cogeneration, and load-control systems be encouraged. Accordingly, in exercising its jurisdiction, the commission shall not approve any rate or rate structure which discriminates against any class of customers on account of the use of such facilities, systems, or devices. This expression of legislative intent shall not be construed to preclude experimental rates, rate structures, or programs. The Legislature further finds and declares that ss. 366.80-366.85 and 403.519 are to be liberally construed in order to meet the complex problems of reducing and controlling the growth rates of electric consumption and reducing the growth rates of weather-sensitive peak demand; increasing the overall efficiency and cost-effectiveness of electricity and natural gas production and use; encouraging further development of demand-side renewable energy systems; and conserving expensive resources, particularly petroleum fuels.

History.—s. 5, ch. 80-65; s. 2, ch. 81-318; ss. 14, 20, 22, ch. 89-292; s. 4, ch. 91-429; s. 38, ch. 2008-227.

[488] The 2012 Florida Statutes, http://www.leg.state.fl.us/statutes/index.cfm?App_mode=Display_Statute&URL=0300-0399/0366/0366ContentsIndex.html&StatuteYear=2012&Title=-%3E2012-%3EChapter%20366, accessed November 17, 2012.

366.82 Definition; goals; plans; programs; annual reports; energy audits.—

(1) For the purposes of ss. 366.80-366.85 and 403.519:

(a) "Utility" means any person or entity of whatever form which provides electricity or natural gas at retail to the public, specifically including municipalities or instrumentalities thereof and cooperatives organized under the Rural Electric Cooperative Law and specifically excluding any municipality or instrumentality thereof, any cooperative organized under the Rural Electric Cooperative Law, or any other person or entity providing natural gas at retail to the public whose annual sales volume is less than 100 million therms or any municipality or instrumentality thereof and any cooperative organized under the Rural Electric Cooperative Law providing electricity at retail to the public whose annual sales as of July 1, 1993, to end-use customers is less than 2,000 GWh.

(b) "Demand-side renewable energy" means a system located on a customer's premises generating thermal or electric energy using Florida renewable energy resources and primarily intended to offset all or part of the customer's electricity requirements provided such system does not exceed 2 megawatts.

(2) The commission shall adopt appropriate goals for increasing the efficiency of energy consumption and increasing the development of demand-side renewable energy systems, specifically including goals designed to increase the conservation of expensive resources, such as petroleum fuels, to reduce and control the growth rates of electric consumption, to reduce the growth rates of weather-sensitive peak demand, and to encourage development of demand-side renewable energy resources. The commission may allow efficiency investments across generation, transmission, and distribution as well as efficiencies within the user base.

(3) In developing the goals, the commission shall evaluate the full technical potential of all available demand-side and supply-side conservation and efficiency measures, including demand-side renewable energy systems. In establishing the goals, the commission shall take into consideration:

(a) The costs and benefits to customers participating in the measure.

(b) The costs and benefits to the general body of ratepayers as a whole, including utility incentives and participant contributions.

(c) The need for incentives to promote both customer-owned and utility-owned energy efficiency and demand-side renewable energy systems.

(d) The costs imposed by state and federal regulations on the emission of greenhouse gases.

(4) Subject to specific appropriation, the commission may expend up to $250,000 from the Florida Public Service Regulatory Trust Fund to obtain needed technical consulting assistance.

(5) The Department of Agriculture and Consumer Services shall be a party in the proceedings to adopt goals and shall file with the commission comments on the proposed goals, including, but not limited to:

(a) An evaluation of utility load forecasts, including an assessment of alternative supply-side and demand-side resource options.

(b) An analysis of various policy options that can be implemented to achieve a least-cost strategy, including nonutility programs targeted at reducing and controlling the per capita use of electricity in the state.

(c) An analysis of the impact of state and local building codes and appliance efficiency standards on the need for utility-sponsored conservation and energy efficiency measures and programs.

(6) The commission may change the goals for reasonable cause. The time period to review the goals, however, shall not exceed 5 years. After the programs and plans to meet those goals are completed, the commission shall determine what further goals, programs, or plans are warranted and adopt them.

(7) Following adoption of goals pursuant to subsections (2) and (3), the commission shall require each utility to develop plans and programs to meet the overall goals within its service area. The commission may require modifications or additions to a utility's plans and programs at any time it is in the public interest consistent with this act. In approving plans and programs for cost recovery, the commission shall have the flexibility to modify or deny plans or programs that would have an undue impact on the costs passed on to customers. If any plan or program includes loans, collection of loans, or similar banking functions by a utility and the plan is approved by the commission, the utility shall perform such functions, notwithstanding any other provision of the law. However, no utility shall be required to loan its funds for the purpose of purchasing or otherwise acquiring conservation measures or devices, but nothing herein shall prohibit or impair the administration or implementation of a utility plan as submitted by a utility and approved by the commission under this subsection. If the commission disapproves a plan, it shall specify the reasons for disapproval, and the utility whose plan is disapproved shall resubmit its modified plan within 30 days. Prior approval by the commission shall be required to modify or discontinue a plan, or part thereof, which has been approved. If any utility has not implemented its programs and is not substantially in compliance with the provisions of its approved plan at any time, the commission shall adopt programs required for that utility to achieve the overall goals. Utility programs may include variations in rate design, load control, cogeneration, residential energy conservation subsidy, or any

other measure within the jurisdiction of the commission which the commission finds likely to be effective; this provision shall not be construed to preclude these measures in any plan or program.

(8) The commission may authorize financial rewards for those utilities over which it has ratesetting authority that exceed their goals and may authorize financial penalties for those utilities that fail to meet their goals, including, but not limited to, the sharing of generation, transmission, and distribution cost savings associated with conservation, energy efficiency, and demand-side renewable energy systems additions.

(9) The commission is authorized to allow an investor-owned electric utility an additional return on equity of up to 50 basis points for exceeding 20 percent of their annual load-growth through energy efficiency and conservation measures. The additional return on equity shall be established by the commission through a limited proceeding.

(10) The commission shall require periodic reports from each utility and shall provide the Legislature and the Governor with an annual report by March 1 of the goals it has adopted and its progress toward meeting those goals. The commission shall also consider the performance of each utility pursuant to ss. 366.80-366.85 and 403.519 when establishing rates for those utilities over which the commission has ratesetting authority.

(11) The commission shall require each utility to offer, or to contract to offer, energy audits to its residential customers. This requirement need not be uniform, but may be based on such factors as level of usage, geographic location, or any other reasonable criterion, so long as all eligible customers are notified. The commission may extend this requirement to some or all commercial customers. The commission shall set the charge for audits by rule, not to exceed the actual cost, and may describe by rule the general form and content of an audit. In the event one utility contracts with another utility to perform audits for it, the utility for which the audits are performed shall pay the contracting utility the reasonable cost of performing the audits. Each utility over which the commission has ratesetting authority shall estimate its costs and revenues for audits, conservation programs, and implementation of its plan for the immediately following 6-month period. Reasonable and prudent unreimbursed costs projected to be incurred, or any portion of such costs, may be added to the rates which would otherwise be charged by a utility upon approval by the commission, provided that the commission shall not allow the recovery of the cost of any company image-enhancing advertising or of any advertising not directly related to an approved conservation program. Following each 6-month period, each utility shall report the actual results for that period to the commission, and the difference, if any, between actual and projected results shall be taken into account in succeeding periods. The state plan as submitted for consideration under the National Energy Conservation Policy Act shall not be in conflict with any state law or regulation.

(12) Notwithstanding the provisions of s. 377.703, the commission shall be the responsible state agency for performing, coordinating, implementing, or administering the functions of the state plan submitted for consideration under the National Energy Conservation Policy Act and any acts amendatory thereof or supplemental thereto and for performing, coordinating, implementing, or administering the functions of any future federal program delegated to the state which relates to consumption, utilization, or conservation of electricity or natural gas; and the commission shall have exclusive responsibility for preparing all reports, information, analyses, recommendations, and materials related to consumption, utilization, or conservation of electrical energy which are required or authorized by s. 377.703.

(13) The commission shall establish all minimum requirements for energy auditors used by each utility. The commission is authorized to contract with any public agency or other person to provide any training, testing, evaluation, or other step necessary to fulfill the provisions of this subsection.

> History.—s. 5, ch. 80-65; s. 2, ch. 81-131; s. 2, ch. 81-318; ss. 5, 15, ch. 82-25; ss. 15, 20, 22, ch. 89-292; s. 4, ch. 91-429; s. 81, ch. 96-321; s. 39, ch. 2008-227; s. 503, ch. 2011-142.

366.825 Clean Air Act compliance; definitions; goals; plans.—

(1) For the purposes of this section, reference to the "Clean Air Act" means 42 U.S.C. ss. 7401 et seq. as the same may hereinafter be amended and any related state or local legislation.

(2) Each public utility which owns or operates at least one electric generating unit affected by s. 404 or s. 405 of the Clean Air Act may submit, for commission approval, a plan to bring generating units into compliance with the Clean Air Act. A plan to implement compliance submitted by public utilities must include, at a minimum:

(a) The number and identity of affected generating units;

(b) A description of the proposed action, and alternative actions considered by the public utility, to reduce sulfur dioxide emissions to levels required by the Clean Air Act at each affected unit;

(c) A description of the proposed action, and alternative actions considered by the public utility, to comply with nitrogen oxide emission rates required by the Clean Air Act at each affected unit;

(d) Estimated effects of the public utility's proposed plan on the following:

1. Requirements for construction and operation of proposed or alternative facilities;

2. Achievable emissions reductions and methods for monitoring emissions;

3. The public utility's proposed schedule for implements of compliance activities;

4. The estimated cost of implementation of the public utility's compliance plan to the utility's customers;

5. The public utility's present and potential future sources of fuel; and

6. A statement of why the public utility's proposed compliance plan is reasonable and in the public interest.

(e) A description of the proposed actions to comply with federal, state, and local requirements to implement the Clean Air Act.

(3) The commission shall review a plan to implement the Clean Air Act compliance submitted by public utilities pursuant to this section in order to determine whether such plans, the costs necessarily incurred in implementing such plans, and any effect on rates resulting from such implementation are in the public interest. The commission shall by order approve or disapprove plans to implement compliance submitted by public utilities within 8 months after the date of filing. Approval of a plan submitted by a public utility shall establish that the utility's plan to implement compliance is prudent and the commission shall retain jurisdiction to determine in a subsequent proceeding that the actual costs of implementing the compliance plan are reasonable; provided, however, that nothing in this section shall be construed to interfere with the authority of the Department of Environmental Protection to determine whether a public utility is in compliance with ss. 403.087 and 403.0872 or the State Air Implementation Plan for the Clean Air Act.

History.—s. 22, ch. 92-132; s. 182, ch. 94-356.

366.8255 Environmental cost recovery.—

(1) As used in this section, the term:

(a) "Electric utility" or "utility" means any investor-owned electric utility that owns, maintains, or operates an electric generation, transmission, or distribution system within the State of Florida and that is regulated under this chapter.

(b) "Commission" means the Florida Public Service Commission.

(c) "Environmental laws or regulations" includes all federal, state, or local statutes, administrative regulations, orders, ordinances, resolutions, or other requirements that apply to electric utilities and are designed to protect the environment.

(d) "Environmental compliance costs" includes all costs or expenses incurred by an electric utility in complying with environmental laws or regulations, including, but not limited to:

1. Inservice capital investments, including the electric utility's last authorized rate of return on equity thereon.

2. Operation and maintenance expenses.

3. Fuel procurement costs.

4. Purchased power costs.

5. Emission allowance costs.

6. Direct taxes on environmental equipment.

7. Costs or expenses prudently incurred by an electric utility pursuant to an agreement entered into on or after the effective date of this act and prior to October 1, 2002, between the electric utility and the Florida Department of Environmental Protection or the United States Environmental Protection Agency for the exclusive purpose of ensuring compliance with ozone ambient air quality standards by an electrical generating facility owned by the electric utility.

8. Costs or expenses prudently incurred for scientific research and geological assessments of carbon capture and storage conducted in this state for the purpose of reducing an electric utility's greenhouse gas emissions when such costs or expenses are incurred in joint research projects with Florida state government agencies and Florida state universities.

(2) An electric utility may submit to the commission a petition describing the utility's proposed environmental compliance activities and projected environmental compliance costs in addition to any Clean Air Act compliance activities and costs shown in a utility's filing under s. 366.825. If approved, the commission shall allow recovery of the utility's prudently incurred environmental compliance costs, including the costs incurred in compliance with the Clean Air Act, and any amendments thereto or any change in the application or enforcement thereof, through an environmental compliance cost-recovery factor that is separate and apart from the utility's base rates. An adjustment for the level of costs currently being recovered through base rates or other rate-adjustment clauses must be included in the filing.

(3) The environmental compliance cost-recovery factor must be set periodically, but at least annually, based on projections of the utility's environmental compliance costs during the forthcoming recovery period, and must be adjusted for variations in line losses. The environmental compliance cost-recovery factor must provide for periodic true-up of the utility's actual

environmental compliance costs with the projections on which past factors have been set, and must further require that any refund or collection made as part of the true-up process include interest.

(4) Environmental compliance costs recovered through the environmental cost-recovery factor shall be allocated to the customer classes using the criteria set out in s. 366.06(1), taking into account the manner in which similar types of investment or expense were allocated in the company's last rate case.

(5) Recovery of environmental compliance costs under this section does not preclude inclusion of such costs in base rates in subsequent rate proceedings, if that inclusion is necessary and appropriate; however, any costs recovered in base rates may not also be recovered in the environmental cost-recovery clause.

History.—s. 7, ch. 93-35; s. 1, ch. 2002-276; s. 40, ch. 2008-227; s. 2, ch. 2012-89.

366.8260 Storm-recovery financing.— [*Text omitted. Statute not discussed in this report.*]

366.83 Certain laws not applicable; saving clause.— No utility shall be held liable for the acts or omissions of any person in implementing or attempting to implement those measures found cost-effective by, or recommended as a result of, an energy audit. The findings and recommendations of an energy audit shall not be construed to be a warranty or guarantee of any kind, nor shall such findings or recommendations subject the utility to liability of any kind. Nothing in ss. 366.80-366.85 and 403.519 shall preempt or affect litigation pending on June 5, 1980, nor shall ss. 366.80-366.86 and 403.519 preempt federal law unless such preemption is expressly authorized by federal statute.

History.—s. 5, ch. 80-65; s. 2, ch. 81-318; ss. 20, 22, ch. 89-292; s. 4, ch. 91-429.

403.519 Exclusive forum for determination of need.—

(1) On request by an applicant or on its own motion, the commission shall begin a proceeding to determine the need for an electrical power plant subject to the Florida Electrical Power Plant Siting Act.

(2) The applicant shall publish a notice of the proceeding in a newspaper of general circulation in each county in which the proposed electrical power plant will be located. The notice shall be at least one-quarter of a page and published at least 21 days prior to the scheduled date for the

proceeding. The commission shall publish notice of the proceeding in the manner specified by chapter 120 at least 21 days prior to the scheduled date for the proceeding.

(3) The commission shall be the sole forum for the determination of this matter, which accordingly shall not be raised in any other forum or in the review of proceedings in such other forum. In making its determination, the commission shall take into account the need for electric system reliability and integrity, the need for adequate electricity at a reasonable cost, the need for fuel diversity and supply reliability, whether the proposed plant is the most cost-effective alternative available, and whether renewable energy sources and technologies, as well as conservation measures, are utilized to the extent reasonably available. The commission shall also expressly consider the conservation measures taken by or reasonably available to the applicant or its members which might mitigate the need for the proposed plant and other matters within its jurisdiction which it deems relevant. The commission's determination of need for an electrical power plant shall create a presumption of public need and necessity and shall serve as the commission's report required by s. 403.507(4). An order entered pursuant to this section constitutes final agency action.

(4) In making its determination on a proposed electrical power plant using nuclear materials or synthesis gas produced by integrated gasification combined cycle power plant as fuel, the commission shall hold a hearing within 90 days after the filing of the petition to determine need and shall issue an order granting or denying the petition within 135 days after the date of the filing of the petition. The commission shall be the sole forum for the determination of this matter and the issues addressed in the petition, which accordingly shall not be reviewed in any other forum, or in the review of proceedings in such other forum. In making its determination to either grant or deny the petition, the commission shall consider the need for electric system reliability and integrity, including fuel diversity, the need for base-load generating capacity, the need for adequate electricity at a reasonable cost, and whether renewable energy sources and technologies, as well as conservation measures, are utilized to the extent reasonably available.

(a) The applicant's petition shall include:

1. A description of the need for the generation capacity.

2. A description of how the proposed nuclear or integrated gasification combined cycle power plant will enhance the reliability of electric power production within the state by improving the balance of power plant fuel diversity and reducing Florida's dependence on fuel oil and natural gas.

3. A description of and a nonbinding estimate of the cost of the nuclear or integrated gasification combined cycle power plant, including any costs associated with new, expanded, or relocated

electrical transmission lines or facilities of any size that are necessary to serve the nuclear power plant.

4. The annualized base revenue requirement for the first 12 months of operation of the nuclear or integrated gasification combined cycle power plant.

5. Information on whether there were any discussions with any electric utilities regarding ownership of a portion of the nuclear or integrated gasification combined cycle power plant by such electric utilities.

(b) In making its determination, the commission shall take into account matters within its jurisdiction, which it deems relevant, including whether the nuclear or integrated gasification combined cycle power plant will:

1. Provide needed base-load capacity.

2. Enhance the reliability of electric power production within the state by improving the balance of power plant fuel diversity and reducing Florida's dependence on fuel oil and natural gas.

3. Provide the most cost-effective source of power, taking into account the need to improve the balance of fuel diversity, reduce Florida's dependence on fuel oil and natural gas, reduce air emission compliance costs, and contribute to the long-term stability and reliability of the electric grid.

(c) No provision of rule 25-22.082, Florida Administrative Code, shall be applicable to a nuclear or integrated gasification combined cycle power plant sited under this act, including provisions for cost recovery, and an applicant shall not otherwise be required to secure competitive proposals for power supply prior to making application under this act or receiving a determination of need from the commission.

(d) The commission's determination of need for a nuclear or integrated gasification combined cycle power plant shall create a presumption of public need and necessity and shall serve as the commission's report required by s. 403.507(4)(a). An order entered pursuant to this section constitutes final agency action. Any petition for reconsideration of a final order on a petition for need determination shall be filed within 5 days after the date of such order. The commission's final order, including any order on reconsideration, shall be reviewable on appeal in the Florida Supreme Court. Inasmuch as delay in the determination of need will delay siting of a nuclear or integrated gasification combined cycle power plant or diminish the opportunity for savings to customers under the federal EPAct2005, the Supreme Court shall proceed to hear and determine the action as expeditiously as practicable and give the action precedence over matters not accorded similar precedence by law.

(e) After a petition for determination of need for a nuclear or integrated gasification combined cycle power plant has been granted, the right of a utility to recover any costs incurred prior to commercial operation, including, but not limited to, costs associated with the siting, design, licensing, or construction of the plant and new, expanded, or relocated electrical transmission lines or facilities of any size that are necessary to serve the nuclear power plant, shall not be subject to challenge unless and only to the extent the commission finds, based on a preponderance of the evidence adduced at a hearing before the commission under s. 120.57, that certain costs were imprudently incurred. Proceeding with the construction of the nuclear or integrated gasification combined cycle power plant following an order by the commission approving the need for the nuclear or integrated gasification combined cycle power plant under this act shall not constitute or be evidence of imprudence. Imprudence shall not include any cost increases due to events beyond the utility's control. Further, a utility's right to recover costs associated with a nuclear or integrated gasification combined cycle power plant may not be raised in any other forum or in the review of proceedings in such other forum. Costs incurred prior to commercial operation shall be recovered pursuant to chapter 366.

History.—s. 5, ch. 80-65; s. 24, ch. 90-331; s. 43, ch. 2006-230; s. 3, ch. 2007-117; s. 85, ch. 2008-227.

14 Appendix B

Table 1 DSM Program Matrix Data Sources

Tier	Document Title	FPSC Docket Number	Date
1) General Program Descriptions			
	2012 Annual Report on Activities Pursuant to FEECA	n/a	February 2012
2) Program Cost-Effectiveness Assumptions – 2012 Updates for ECCR			
	FPL re: Energy Conservation Cost Recovery Clause (PDF File; 85 pages)	#120002-EG	June 28, 2012
	PEF re: Energy Conservation Cost Recovery (Excel File; 42 worksheets)	#120002-EG	June 28, 2012
	TECO: re: Environmental Cost Recovery Factors (PDF File; 113 pages)	#120002-EG	June 28, 2012
	GPC re: Docket No. 120002-EG (PDF File; 186 pages)	#120002-EG	June 27, 2012
	FPUC re: Energy Conservation Cost Recovery Clause (PDF File; 14 pages)	#120002-EG	June 28, 2012
3) Currently Approved DSM Plans (2010-2019)			
	01987-11: FPL Modified DSM Plan	#100155-EG	March 25, 2011
	09616-10: PEF Modified DSM Plan	#100160-EG	November 29, 2010
	09301-10: TECO Revised Pages in Modified DSM Plan	#100159-EG	November 12, 2010
	09151-10: TECO Modified DSM Plan	#100159-EG	November 3, 2010
	02305-10: TECO DSM Plan	#100159-EG	March 30, 2010
	09308-10: GPC Modified DSM Plan	#100154-EG	November 11, 2012
	02261-10: GPC DSM Plan	#100154-EG	March 30, 2010
	08130-10: FPUC Modified DSM Plan	#100158-EG	September 29, 2010
	02304-10: FPUC DSM Plan	#100158-EG	March 30, 2010
	02303-10: JEA DSM Plan	#100157-EG	March 30, 2010
	02308-10: OUC DSM Plan	#100161-EG	March 30, 2010

Table 2 DSM Program Matrix Data Dictionary

Data Field / Column	Description / Definition	Reference*
Utility	FEECA utility offering DSM program: FPL; FPU; GPC; JEA; OUC; PE; TECO.	1
Customer Class	Customer class of DSM program: Residential; Commercial/Industrial; Research and Development and Pilot; Solar Pilot.	1
Program Category	Created field for DSM program category: Appliance; Building Envelope; Customer Incentive; Education; HVAC; Innovation Incentive; Lighting; Load Management; Motor/Pump; New Construction; Non-Solar Renewable/Generation; Research & Development (R&D); Solar Photovoltaic (PV); Whole Building Retrofit.	4
Program Sub-Category	Created field for DSM program sub-category: Audit; Building Envelope; Commercial; Conservation; Conservation Demonstration; Custom; Demonstration; Duct; Education; Energy Education; Exit Signs; General; Generation; HVAC Repair; HVAC Replacement; Indoor; Insulation; Landlord/Renter; Load Control; Low Income; Motor; New Construction; Outdoor; Pump; Reduction; Refrigeration; Renewable; Residential; Roof; Schools; Survey; Thermostat; Time of Use; Water Heater; Weatherization; Window.	4
Program Title	DSM program title.	1
Description	Description of program.	1
Total Number of Customers	Total number of utility's customers in program customer class in 2019.	3
Total Number of Eligible Customers	Total number of utility's customers in program customer class in 2019 eligible for one or more DSM program measures.	3
Cumulative Number of Participants 2019	The cumulative total participating customers without regard as to whether they would have adopted the conservation measure in the absence of a utility sponsored program (2010-2019).	2
Cumulative Penetration Level Percentage 2019	This field is the "Cumulative Number of Participants 2019" divided by the "Total Number of Eligible Customers"	2
Customer kW Reduction at the Meter (KW/CUST)	This is the maximum load reduction in kilowatts at the customer's meter.	2
Generator kW Reduction per Customer	This input is developed by taking into account such factors as reliability, line losses and customer diversity. A crude, but acceptable, method of calculating the KW reduction is to use the following formula: KW Red=[DSw(WLOLP) + DSs(SLOLP)] / [(ALOLP)(1-FOR)(1-DL)] where: DSw is the demand saving at winter peak; DSs is the demand saving at summer peak; WLOLP is the winter seasonal LOLP; SLOLP is the summer seasonal LOLP; ALOLP is the annual LOLP; FOR is the forced outage rate; DL is the kw line loss factor; and (WLOLP + SLOLP) / ALOLP = 1	2
kW Line Loss Percentage	This is the percentage reduction in kW from the generator to the customer.	2
Generator kWh Reduction per Customer	This is the annual kWh reduction given by the following formula: KWH Red = KWHm / (1 - EL) where: KWHm is the KWH reduction at the customer's meter; EL is the energy line loss factor to account for losses from the generator to the customer location.	2
kWh Line Loss Percentage	This is the percentage reduction in KWH from the generator to the customer	2
Group Line Loss Multiplier	This is a factor used to take into account the fact that various groups of customers receive service at different voltage levels. It is used to adjust the fuel cost calculation for participating customers.	2

* 1 = FPSC, *Annual Report on Activities Pursuant to the Florida Energy Efficiency & Conservation Act*, February, 2012.
2 = FPSC, *Cost Effectiveness Manual for Demand Side Management Programs and Self Service Wheeling Proposals*, July 1991.
3 = Utilities' Currently Approved DSM Plans (Various Dates; See Appendix B Table 1).
4 = Created variable.
5 = Calculated variable.

Table 2 DSM Program Matrix Data Dictionary (cont.)

Data Field / Column	Description / Definition	Reference*
Customer kWh Program Increase at Meter	For conservation programs, this input would normally be zero. But, for other programs such as thermal storage, there may be an increase in KWH during off-peak periods.	2
Customer kWh Reduction at Meter	This is the maximum energy savings in kilowatt-hours at the customer's meter.	2
Study Period for Conservation Program (Years)	This is the economic life of the conservation program, and will generally be less than or equal to the life of the unit to be avoided.	2
Generator Economic Life (Years)	This is the economic life of the avoided generating unit.	2
T&D Economic Life (Years)	This is the economic life of the avoided transmission and distribution facilities.	2
K Factor for Generation	This is the present value of carrying charges for a $1 investment over the life of the generating unit. PSC FORM CE 1.1A must be filed showing in detail the calculation of this factor.	2
K Factor for T&D	This is the present value of carrying charges for a $1 investment over the life of the avoided transmission and distribution facilities. PSC FORM CE 1.1A must be filed showing in detail the calculation of this factor.	2
Utility Nonrecurring Cost per Customer	This represents nonrecurring costs in the base year that would be incurred by the utility, such as a one-time customer rebate.	2
Utility Recurring Cost per Customer	This represents recurring costs in the base year that would be incurred by the utility, such as O&M costs associated with the installed equipment.	2
Utility Cost Escalation Rate (Percentage)	This rate is used to escalate the costs identified in "Utility Recurring Cost per Customer" field. Normally, this rate would be close to the rate at which the Consumer Price Index is projected to increase.	2
Customer Equipment Cost	This is the base year cost for equipment incurred by each customer when the program is selected.	2
Customer Equipment Cost Escalation Rate (Percentage)	This rate is used to escalate the costs identified in "Customer Equipment Cost" field. Normally, this rate would be close to the rate at which the Consumer Price Index is projected to increase.	2
Customer O & M Cost	This is the base year cost for O&M incurred by each participating customer.	2
Customer O & M Escalation Rate (Percentage)	This rate is used to escalate the costs identified in "Customer O&M Cost" field. Normally, this rate would be close to the rate at which the Consumer Price Index is projected to increase.	2
Customer Tax Credit per Installation	n/a	2
Customer Tax Credit Escalation Rate (Percentage)	n/a	2
Utility Discount Rate	Discount rate for the utility.	2
Utility AFUDC Rate	Allowance for Funds Used During Construction (AFUDC) rate for the utility.	
Savings Capacity Factor (CF)	Calculated as "Generator kWh Reduction per Customer" divided by ("Generator KW Reduction per Customer" multiplied by 8760).	5
Cumulative Energy Savings (MWh)	Calculated as "Generator kWh Reduction per Customer" multiplied by "Cumulative Number of Participants 2019" divided by 1000.	5
Cumulative Demand Savings (MW)	Calculated as "Generator kW Reduction per Customer" multiplied by "Cumulative Number of Participants 2010" divided by 1000.	5

* 1 = *Annual Report on Activities Pursuant to the Florida Energy Efficiency & Conservation Act*, February, 2012.
2 = FPSC, *Cost Effectiveness Manual for Demand Side Management Programs and Self Service Wheeling Proposals*, July 1991.
3 = Utilities' Currently Approved DSM Plans (Various Dates; See Appendix B Table 1).
4 = Created variable.
5 = Calculated variable.

Table 3 DSM Program Categories and Subcategories

Customer Class	Program Category	Program Sub-Category
Residential	HVAC	Duct
		HVAC Repair
		HVAC Replace
	Load Management	Load Control
		Time of Use
	Building Envelope	Building Envelope
		Insulation
		Roof
		Window
	New Construction	New Construction
	Whole Building Retrofit	General
		Low Income
	Appliance	General
		Refrigeration
		Water Heater
	Education	Audit
		Education
		Energy Education
		Survey
		Weatherization
	Motor/Pump	Motor
		Pump
Commercial / Industrial	HVAC	Duct
		HVAC Repair
		HVAC Replace
	Load Management	Load Control
		Load Reduction
	Building Envelope	Building Envelope
		Insulation
		Roof
		Window
	New Construction	New Construction
	Lighting	Indoor
		Outdoor
	Whole Building Retrofit	General
	Appliance	General
		Refrigeration
		Water Heater
	Education	Audit
	Non-Renewable Generation	Backup Generation
		Combined Heat & Power
	Motor/Pump	Motor
Solar Pilot	Solar PV	Commercial
		Residential
		Schools

Table 4 DSM Program Matrix Data Points Plotted in Figures 6-3, 6-5, 6-6, 6-7 and 6-11

Customer Class	Program Category	Average Demand Savings per Customer (kW)	Average Energy Savings per Customer (kWh)	Avoided Capacity Factor (ACF)	Cumulative Penetration Level (Percentage 2019)
Residential	HVAC	0.15	378.0	29%	12.0%
		0.19	288.0	17%	26.5%
		0.20	432.9	25%	6.8%
		0.23	318.4	16%	1.2%
		0.27	460.3	19%	26.0%
		0.28	446.7	18%	2.0%
		0.32	1136.0	41%	3.2%
		0.36	1338.0	42%	13.2%
		0.37	761.7	24%	*
		0.38	1606.0	48%	3.2%
		0.38	1416.0	43%	9.0%
		0.43	1006.0	27%	4.0%
		0.47	969.8	24%	*
		0.47	1937.0	47%	0.5%
		0.62	1215.4	22%	*
		0.66	1175.1	20%	21.0%
		0.68	1423.5	24%	*
		0.75	3541.0	54%	0.1%
		1.46	5998.0	47%	4.2%
		1.56	6396.0	47%	0.6%
		1.84	7307.0	45%	0.1%
		1.95	3957.3	23%	6.1%
	Load Management	1.15	570.0	6%	0.8%
		1.55	5.0	0%	1.0%
		2.03	781.0	4%	2.3%
		2.45	1228.0	6%	5.2%
		*	*	*	8.4%
	Building Envelope	0.00	26.0	*	0.3%
		0.02	53.5	31%	0.1%
		0.04	111.0	32%	0.8%
		0.12	589.0	56%	1.0%
		0.18	477.6	30%	5.4%
		0.23	807.0	40%	0.4%
		0.23	1371.0	68%	2.3%
		0.26	443.0	19%	0.9%
		0.32	715.0	26%	1.9%
		0.36	367.0	12%	*
		0.39	811.7	24%	0.9%
		0.48	1054.0	25%	1.1%
		0.52	982.3	22%	13.0%
		*	*	*	0.0%
		*	*	*	1.4%
		*	*	*	2.0%
		*	*	*	3.4%
	New Construction	0.66	2104.0	37%	8.7%
		0.98	2053.0	24%	48.7%
		1.23	1745.9	16%	17.0%
	Whole Building Retrofit	0.06	754.0	143%	12.3%
		0.28	260.1	11%	0.8%
		0.30	604.5	23%	1.0%
		0.66	1749.1	30%	53.7%
		0.83	1588.3	22%	6.0%
		*	*	*	20.6%
		*	*	*	33.3%

***Denotes missing or illegible data.**

Table 4 DSM Program Matrix Data Points Plotted in Figures 6-3, 6-5, 6-6, 6-7 and 6-11 (cont.)

Customer Class	Program Category	Average Demand Savings per Customer (kW)	Average Energy Savings per Customer (kWh)	Avoided Capacity Factor (ACF)	Cumulative Penetration Level (Percentage 2019)
Residential	Appliance	0.01	84.0	96%	1.4%
		0.04	202.0	58%	10.4%
		0.04	107.4	31%	4.0%
		0.05	278.0	63%	6.9%
		0.08	843.2	120%	5.3%
		0.09	756.0	96%	5.4%
		0.12	1381.0	131%	2.3%
		0.36	1580.6	51%	*
		0.36	1580.6	51%	0.0%
		0.47	2417.2	59%	0.6%
		0.41	2466.0	*	15.9%
		1.73	*	*	0.7%
		*	*	*	0.2%
		*	*	*	*
		*	*	*	*
		*	*	*	*
		*	*	*	*
	Education	0.00	56.0	*	*
		0.00	104.1	*	4.6%
		0.00	104.1	*	6.3%
		0.00	136.3	*	13.1%
		0.00	136.3	*	18.1%
		0.00	208.1	*	7.0%
		0.00	273.7	*	20.0%
		0.02	271.3	155%	12.5%
		0.05	493.3	113%	19.0%
		0.07	307.0	50%	21.6%
		0.10	208.0	23%	6.9%
		0.19	455.0	27%	37.2%
		0.37	850.5	26%	11.2%
		0.47	1287.3	31%	9.6%
		*	*	*	35.2%
		*	*	*	0.0%
		*	*	*	0.1%
		*	*	*	3.3%
		*	*	*	14.5%
		*	*	*	*
	Motor/Pump	0.15	374.0	28%	3.2 %
		1.35	2555.0	22%	0.7 %

***Denotes missing or illegible data.**

Table 4 DSM Program Matrix Data Points Plotted in Figures 6-3, 6-5, 6-6, 6-7 and 6-11 (cont.)

Customer Class	Program Category	Average Demand Savings per Customer (kW)	Average Energy Savings per Customer (kWh)	Avoided Capacity Factor (ACF)	Cumulative Penetration Level (Percentage 2019)
Commercial / Industrial	HVAC	0.04	525.0	150%	*
		0.18	668.0	42%	*
		0.20	432.9	25%	11.0%
		0.23	391.3	19%	0.5%
		0.31	1773.0	65%	16.7%
		0.37	761.7	24%	*
		0.47	969.8	24%	*
		0.62	1215.4	22%	*
		0.68	1423.5	24%	*
		1.12	2635.0	27%	*
		1.21	2348.8	22%	54.0%
		1.48	2168.0	17%	6.5%
		1.53	4017.0	30%	18.4%
		1.71	3004.0	20%	0.4%
		1.95	3957.3	23%	12.4%
		45.05	86988.0	22%	2.8%
		66.17	226819.9	39%	0.1%
		249.80	874440.0	40%	0.2%
		*	*	*	2.8%
		*	*	*	5.5%
	Load Management	1.13	2.7	0%	2.0%
		1.33	8.1	0%	3.0%
		11.84	0.0	*	0.0%
		24.39	122977.0	58%	1.2%
		95.13	0.0	*	0.0%
		250.27	*	*	0.9%
		329.05	*	*	1.7%
		553.58	39809.0	1%	0.1%
		*	*	*	11.1%
		*	*	*	*
	Building Envelope	0.00	1.0	*	*
		0.00	3.0	*	*
		0.00	11.0	*	*
		0.02	77.5	44%	0.2%
		0.18	586.9	37%	0.5%
		0.88	3844.1	50%	1.5%
		1.13	2184.0	22%	28.0%
		1.63	2885.0	20%	*
		7.42	47721.0	73%	0.6%
		57.62	135385.5	27%	*
		*	*	*	0.0%
		*	*	*	0.0%
		*	*	*	0.1%
		*	*	*	0.5%
	New Construction	2.72	8580.3	36%	12.2 %

***Denotes missing or illegible data.**

Table 4 DSM Program Matrix Data Points Plotted in Figures 6-3, 6-5, 6-6, 6-7 and 6-11 (cont.)

Customer Class	Program Category	Average Demand Savings per Customer (kW)	Average Energy Savings per Customer (kWh)	Avoided Capacity Factor (ACF)	Cumulative Penetration Level (Percentage 2019)
Commercial / Industrial	Lighting	0.23	820.0	41%	*
		1.17	4488.0	44%	*
		1.17	4488.0	44%	*
		1.25	5396.8	49%	15.0%
		3.35	17030.5	58%	1.5%
		9.99	46325.0	53%	*
		26.46	29437.0	13%	0.4%
		84.29	378629.6	51%	0.4%
		*	*	*	0.3%
		*	*	*	0.5%
		*	*	*	5.8%
	Whole Building Retrofit	*	*	*	24.2%
		*	*	*	*
	Appliance	0.08	843.0	120%	53.8%
		0.23	1189.0	59%	0.1%
		0.23	1841.0	91%	0.2%
		0.40	3049.0	87%	2.7%
		0.47	1915.0	47%	0.1%
		0.59	2585.0	50%	0.0%
		0.89	9008.0	116%	1.3%
		1.14	3898.9	39%	0.0%
		1.25	7549.6	69%	6.0%
		1.38	8751.3	72%	18.0%
		1.41	6695.0	54%	0.2%
		11.74	42255.0	41%	0.0%
		16.19	61558.0	43%	0.0%
	Education	0.13	562.1	51%	8.2%
		0.13	346.1	30%	1.8%
		0.56	1949.3	40%	6.6%
		*	*	*	11.3%
		*	*	*	21.0%
		*	*	*	0.0%
		*	*	*	15.5%
	Non-Renewable Generation	0.34	702.0	24%	*
		425.08	*	*	14.2%
		513.75	49660.0	1%	7.4%
		*	*	*	*
		*	*	*	*
	Motor Pump	0.01	37.0	42%	*
		0.02	96.0	55%	*
		0.04	163.0	47%	*
		0.37	3875.0	120%	*
		0.44	1031.0	27%	0.6%
		1.14	5393.4	54%	4.0%
		*	*	*	1.6%
		*	*	*	109.1%

***Denotes missing or illegible data.**

Table 4 DSM Program Matrix Data Points Plotted in Figures 6-3, 6-5, 6-6, 6-7 and 6-11 (cont.)

Customer Class	Program Category	Average Demand Savings per Customer (kW)	Average Energy Savings per Customer (kWh)	Avoided Capacity Factor (ACF)	Cumulative Penetration Level (Percentage 2019)
Solar Pilot	Solar PV	0.73	6141.9	96%	0.1%
		0.84	*	*	0.0%
		1.13	3370.9	34%	0.0%
		1.14	3370.9	34%	0.0%
		1.56	10410.0	76%	0.2%
		3.14	9347.8	34%	0.0%
		8.33	44158.0	61%	1.2%
		18.20	97148.0	61%	38.8%
		*	*	*	0.0%
		*	*	*	0.1%
		*	*	*	0.1%
		*	*	*	1.2%
		*	*	*	*
		*	*	*	*
		*	*	*	*

***Denotes missing or illegible data.**

15 Appendix C

Table 1 Unitized Costs and Benefits for FEECA Goals Cost Effectiveness Evaluation

Year	Capital and O&M Benefits $(000)/MW	Utility System Average Fuel Cost (c/kWh)	Program's Avoided Marginal Fuel Cost (c/kWh)	Avoided Gen Fuel Cost $(000)/MW Avoided	Avoided Gen Replacement Fuel Cost $(000)/MW Avoided	Forgone kWh Revenues No Demand Meter c/kWh
2010	0	4.49	5.73	0.00	0.0	4.03
2011	88	4.45	5.39	0.00	0.0	6.09
2012	88	4.50	5.38	0.00	0.0	7.23
2013	90	4.94	5.34	0.00	0.0	7.97
2014	90	5.27	5.50	0.00	0.0	8.77
2015	90	5.68	6.11	0.00	0.0	9.40
2016	90	6.30	7.35	0.00	0.0	9.76
2017	90	6.83	8.09	0.00	0.0	10.26
2018	89	7.36	8.60	0.00	0.0	10.57
2019	633	8.05	9.71	221.46	280.2	11.45
2020	592	8.46	10.11	326.29	397.5	11.32
2021	569	8.80	10.52	340.44	416.3	11.50
2022	563	9.14	10.92	360.32	432.8	11.80
2023	570	9.37	10.94	378.82	445.3	12.17
2024	573	9.77	11.35	400.17	462.0	12.72
2025	570	10.08	11.62	427.57	487.3	13.20
2026	571	10.29	11.65	456.91	513.3	13.81
2027	573	10.59	11.81	482.28	535.3	14.63
2028	568	10.92	12.05	495.08	546.8	15.27
2029	579	11.21	12.00	515.93	561.2	16.04
2030	577	11.56	12.25	540.08	583.7	16.91
2031	571	11.96	12.63	551.21	594.2	17.74
2032	585	12.25	12.45	570.68	606.5	18.96
2033	581	12.79	12.93	627.93	663.2	20.89
2034	604	13.11	12.71	653.59	678.9	21.25
2035	611	13.70	13.55	668.46	689.4	22.06
2036	604	14.28	14.20	688.43	709.8	23.80
2037	614	14.78	14.53	704.07	720.0	25.19
2038	597	15.41	15.12	721.64	742.0	26.29
2039	587	15.95	15.51	736.48	759.0	27.57
2040	609	16.51	15.84	753.44	767.7	28.93

Table 2 FEECA Goals Portfolio Avoided Energy and Capacity Values

Year	Cum. GWH Saved	Cum. MW Saved	DSM ACF	B Capital and O&M Benefits $(000)	C Program Average Fuel Cost $(000)	D Program's Avoided Marginal Fuel Cost $(000)	E Avoided Generation Fuel Cost $(000)	F Generation Replacement Fuel Cost $(000)	G Forgone Revenues $(000)
2010	614	189	0.36	-	27,537	35,195	0	0	24,747
2011	1340	408	0.35	35,895	59,541	72,260	0	0	81,642
2012	2156	658	0.35	57,936	97,042	116,035	0	0	155,796
2013	3018	925	0.34	83,643	149,155	161,102	0	0	240,634
2014	3903	1201	0.34	108,355	205,701	214,704	0	0	342,093
2015	4787	1476	0.34	133,130	271,764	292,334	0	0	449,957
2016	5616	1751	0.34	157,785	353,808	412,676	0	0	548,288
2017	6399	2014	0.34	181,079	436,725	517,387	0	0	656,716
2018	7140	2262	0.34	202,390	525,790	613,756	0	0	754,930
2019	7843	2480	0.34	1,568,997	631,353	761,168	549,292	694,938	897,897
2020	7843	2480	0.34	1,467,617	663,196	792,801	809,288	985,933	887,892
2021	7843	2480	0.34	1,410,830	690,097	825,423	844,383	1,032,663	901,892
2022	7843	2480	0.34	1,397,516	716,998	856,562	893,700	1,073,535	925,101
2023	7843	2480	0.34	1,413,186	735,115	858,044	939,580	1,104,420	954,683
2024	7843	2480	0.34	1,421,099	765,859	890,172	992,531	1,145,860	997,892
2025	7843	2480	0.34	1,413,207	790,564	911,425	1,060,499	1,208,666	1,034,902
2026	7843	2480	0.34	1,416,169	807,034	913,896	1,133,275	1,273,216	1,083,056
2027	7843	2480	0.34	1,420,503	830,642	926,253	1,196,198	1,327,739	1,147,651
2028	7843	2480	0.34	1,409,166	856,445	945,035	1,227,948	1,356,345	1,197,693
2029	7843	2480	0.34	1,436,298	879,503	941,081	1,279,657	1,392,004	1,257,848
2030	7843	2480	0.34	1,430,551	906,953	960,851	1,339,566	1,447,662	1,326,053
2031	7843	2480	0.34	1,415,656	937,697	990,507	1,367,171	1,473,916	1,390,990
2032	7843	2480	0.34	1,450,231	960,755	976,668	1,415,470	1,504,193	1,487,008
2033	7843	2480	0.34	1,442,181	1,003,028	1,014,232	1,557,463	1,644,823	1,638,689
2034	7843	2480	0.34	1,498,256	1,028,283	996,933	1,621,097	1,683,816	1,666,667
2035	7843	2480	0.34	1,514,722	1,074,399	1,062,670	1,657,991	1,709,802	1,729,790
2036	7843	2480	0.34	1,498,099	1,119,966	1,113,579	1,707,502	1,760,519	1,866,979
2037	7843	2480	0.34	1,524,028	1,158,945	1,139,281	1,746,311	1,785,842	1,975,885
2038	7843	2480	0.34	1,481,424	1,208,905	1,186,236	1,789,879	1,840,321	2,062,079
2039	7843	2480	0.34	1,455,224	1,250,629	1,216,387	1,826,685	1,882,574	2,162,395
2040	7843	2480	0.34	1,510,755	1,295,098	1,242,583	1,868,751	1,904,087	2,269,058
			NPV	9,341,940	$6,448,106	$7,128,925	$6,956,104	$7,729,600	$9,492,989

Discount Rate	Utility RIM Benefits (NPV)	B+D+E-F-G	$6,204,379
7.0%	Utility TRC Benefits (NPV)	B+D+E-F	$15,697,369

Table 3 Ten-Year Site Plans for FEECA Covered Utilities, 2012

	Year	Retail Sales GWh	Winter Peak Retail Demand MW	Summer Peak Retail Demand MW
Historical	2002	178,302	33,865	34,744
	2003	175,207	38,527	34,287
	2004	184,480	29,103	35,710
	2005	190,071	34,209	38,887
	2006	192,222	36,193	38,129
	2007	194,580	31,928	39,199
	2008	190,738	34,499	37,270
	2009	188,556	37,990	38,833
	2010	192,940	44,918	37,904
	2011	189,026	38,511	36,790
Projected	2012	188,124	38,909	39,127
	2013	190,327	39,152	39,062
	2014	193,759	39,710	40,418
	2015	197,979	40,863	41,161
	2016	201,141	41,298	41,706
	2017	203,970	41,488	42,167
	2018	206,698	41,836	42,417
	2019	209,599	42,507	43,206
	2020	213,526	43,023	43,886
	2021	217,686	43,522	44,478
CAGR 2012-2021		1.63%	1.25%	1.43%

16 Appendix D – Focus Groups

Section 8 (Stakeholder Perspectives) Supporting Materials

This appendix contains the following attachments in support of Section 8, "Stakeholder Perspectives":

1) Example invitation letter (e-mail) to prospective focus group participants
2) Example confirmation letter (e-mail) to focus group participants
3) List of all focus group invitees (utilities, companies, and organizations)
4) Example opening PowerPoint presentation
5) Blank Questionnaires for each focus group
6) Affinity Sort/Multi-vote results for each focus group (tabulated, unedited feedback)

Attachment 1: Example Invitation Letter (E-mail) to Prospective Focus Group Participants

[Date]

Dear [Stakeholder Name]:

Earlier this year, the Florida Legislature called for an independent study on whether or not Florida's Energy Efficiency and Conservation Act (FEECA) legislation and regulations will continue to serve the public's interests going forward through time. The study needs to be prepared in time for the 2013 legislative session.

The UF Public Utility Research Center (PURC) together with the UF-IFAS Program for Resource Efficient Communities (PREC), and the National Regulatory Research Institute (NRRI- previously affiliated with NARUC) were recently awarded the contract to do this study, and I am currently managing the project.

Part of the study is to gain stakeholder's perspectives on three broad themes:

How would they define the public's interests as related to energy supply and energy efficiency?
What are the Stakeholder groups' perceptions of how well FEECA programs are helping meet public interests?
What alternative methods might otherwise meet the objectives of FEECA?

This will be accomplished by holding three focus groups: one for FEECA regulated utilities (Monday, August 20 in Gainesville); one for commercial interests affected by FEECA programs (Tuesday, August 21 in Gainesville), and one for consumer and environmental interests (Wednesday, August 22 in Gainesville). The focus groups are for invitees only.

We are seeking the correct individual(s) to represent your company or organization in the August 21 focus group, and your name has emerged as a potential invitee. If you can either accept this invitation, cannot attend, or feel another person would be better suited for this responsibility – please inform the following person ASAP:

Chris Swanson
cswanson@ufl.edu
(352) 392-5684

We apologize for this extremely short notice, but we feel that your company's input is essential in providing a robust review of the FEECA legislation. Thank you for consideration!

Ed Regan P.E.
Strategic Utility Management LLC
10003 SW 67th Drive
Gainesville, Florida 32608
edregan@gator.net
352/538-4301

Attachment 2: Example Confirmation Letter (E-mail) to Focus Group Participants

[Date]

Dear [Stakeholder Name]:

Thank you for participating in the independent study on Florida's Energy Efficiency and Conservation
Act (FEECA). The UF Public Utility Research Center (PURC), UF-IFAS Program for Resource Efficient Communities (PREC), and the National Regulatory Research Institute (NRRI) are grateful for you taking the time to contribute to the study.

You will be asked to share your perspectives on three broad themes:

a. How would you define the public's interests as related to energy supply and energy efficiency?
b. What are your perceptions of how well FEECA programs are helping meet public interests?
c. What alternative methods might otherwise meet the objectives of

FEECA? Your assigned focus group will meet on:

Commercial Interests Affected by FEECA Programs
Tuesday, August 21
1:00 p.m. to 4:30 p.m.
Straughn Building, University of Florida, Gainesville

Please be reminded that the focus groups are for invitees only. A map with driving directions and parking instructions is included on attached .pdf. If you have any questions, changes or concerns, please call or email:

Christine Swanson
Program for Resource Efficient Communities University of Florida
352-392-5684 cswanson@ufl.edu

We are looking forward to your

input. Sincerely,

Christine Swanson

Christine Swanson
Program Assistant
Program for Resource Efficient Communities IFAS University of Florida
352-392-5684 cswanson@ufl.edu buildgreen.ufl.edu

Attachment 3: List of All Focus Group Invitees (Utilities, Companies, and Organizations)

Utilities; (Focus Group #1: August 20, 2012)	
1	Florida Municipal Electric Association (FMEA)
2	Florida Natural Gas Association (FNGA)
3	Florida Power & Light Company (FPL)
4	Florida Public Utilities Company (FPUC)
5	Gulf Power Company
6	JEA
7	Orlando Utilities Commission (OUC)
8	Progress Energy Florida (PEF)
9	Tampa Electric Company (TECO)
Commercial Interests; (Focus Group #2: August 21, 2012)	
1	Associated Industries of Florida (AIF)
2	Bob Price Jr. Builder, Inc.
3	Darden Restaurants
4	Energy Systems Air Conditioning and Heating
5	EnerVision, Inc.
6	Enterprise Florida
7	Florida Home Builders Association (FHBA)
8	Florida Propane Gas Association (FPGA)
9	Florida Solar Coalition (FSC)
10	Florida Solar Energy Center (FSEC)
11	Florida Solar Energy Industry Association (FlaSEIA)
12	Indiantown Non-Profit Housing, Inc. (INPHI)
13	NTE Energy, LLC
14	Renewable Energy Strategies
15	SunEdison
16	TRANE
Consumer and Environmental; (Focus Group #3: August 22, 2012)	
1	AARP Florida
2	Florida Conservation Coalition (FCC)
3	Florida Energy Commission
4	Florida Farm Bureau
5	Florida Industrial Power Users Group (FIPUG)
6	Florida League of Cities, Inc.
7	Florida Public Counsel
8	Florida Retail Federation
9	Florida State Hispanic Chamber of Commerce (FSHCC)
10	Gainesville Neighborhood Housing and Development Corporation (GNHDC)
11	Northwest Support Services
12	Southern Alliance for Clean Energy
13	Sierra Club

Attachment 4: Example Opening PowerPoint Presentation

(On following pages)

WELCOME TO THE
UTILITY INTERESTS
FOCUS GROUP

August 20, 2012

FEECA Project Team
The UF Public Utility Research Center (PURC)
UF-IFAS Program for Resource Efficient Communities (PREC),
and the
National Regulatory Research Institute (NRRI)

Today's Agenda

• Introduction And Housekeeping	10 Min
• Framing Session	20 Min
• Brainstorming Discussion	45 Min
• Break	20 Min
• Affinity Sort	30 Min
• Consolidation/Grouping	20 Min
• Multi-voting	15 Min
• Survey Completion	10 Min
• Discussion/Closing Comments	10 Min
Total Time:	**3 Hours**

Here's Who We Are

- **PURC** - Public Utility Research Center, Warrington School of Business, University of Florida
  - Ed Regan, P.E. – Senior Fellow
- **PREC** - Program for Resource Efficient Communities, Institute of Food and Agricultural Sciences, University of Florida
  - Jennison Kipp – Resource Economist
- **NRRI** - National Regulatory Research Institute

Please Introduce Yourself

Housekeeping

- Tough on Issues, Soft on People
- Heavy on Policy, Light on Technology

Framing Session

(Please Ask Questions As We Go)

- What Is The Florida Energy Efficiency and Conservation Act (FEECA)?
- What is the Florida Legislature Asking?
- How does the Florida Public Service Commission (FPSC) Set Goals?
- Cost-Effectiveness Tests Required by The FPSC
- Our Study Approach

The Florida Energy Efficiency and Conservation Act (FEECA)

- Sections 366.80-366.85 and 403.519 Florida Statutes contains "The Florida Energy Efficiency and Conservation Act" also known as FEECA
- Enacted in 1980 with subsequent amendments
- Currently requires the FPSC to establish goals and mandate utility programs to:
  - Reduce growth rates of weather sensitive peak demand
  - Reduce growth rates of electricity consumption
  - Reduce consumption of scarce resources such as petroleum fuels
  - Consider customer supplied renewable energy
  - Consider generation and transmission efficiencies

What Is The Florida Legislature Asking?

- Chapter 2012-117, Florida Statutes requires the FPSC, in consultation with the Florida Department of Agriculture and Consumer Services, to contract for an independent evaluation to determine if FEECA remains in the public interest.
- The Legislation states that the study is to consider:
  - The costs to ratepayers,
  - The incentives and disincentives associated with the provisions in FEECA,
  - Whether the programs create benefits without undue burden on the customer, and
  - The models and methods used to determine conservation goals.

Why Is This Question Being Asked?

- Critical factors have changed since 1980, potentially affecting the need for FEECA – For Example:
  - Utility Costs
  - Technology
  - Economic Environment
  - Regulatory Environment
  - Consumer Awareness

- Other states use different approaches – how do their results compare to FEECA's achievements?

Fundamental Questions To Answer

- Under what scenarios of the future are FEECA goals cost effective?
- Who bears the costs and who receives the benefits?
- What factors of public health, safety and welfare are the public's benefits from FEECA?
- In a changing environment, what are the risk-mitigation values FEECA might provide?
- Can FEECA's implementation be improved?
- Are there better ways to meet the same objectives?

Some Things To Remember About Conserving Electricity

- The price of a kilowatt-hour recovers a utility's costs for
  - Fuel
  - Everything else (non-fuel revenue)
- Not all kilowatt-hours are equal
- Un-recovered, non-fuel revenue could affect rates

How Does the FPSC Set Goals?

(A Very Simplified Overview)

- Utilities perform studies of the kW and KWh savings potential, costs, and benefits of many energy conservation measures
- FPSC sets kW and kWh goals for each utility based on these studies and cost effectiveness from various perspectives
  - Program Participants
  - Utility Ratepayers
  - Society
- Utilities then develop and submit conservation programs for FPSC Approval

Let's use our time today to focus on policy, not technology

Short-Hand Labels For The Major Types Of Cost-Effectiveness Tests

- Participants Test
- Rate Impact Measure Test (RIM Test)
- Total Resource Cost Test (TRC Test)
- E- Tests

Our Study Approach

- Establish factors for appropriate benchmarking
- Model cost effectiveness under a wide range of future scenarios
- Benchmark FEECA's state-wide achievements with other states
- Benchmark FEECA against policies in other states
- Learn about stakeholder perspectives and ideas

Thanks for participating!

Any Questions or Comments Before We Begin Brainstorming?

Fundamental Questions To Answer

- Under what scenarios of the future are FEECA goals cost effective?
- Who bears the costs and who receives the benefits?
- What factors of public health, safety and welfare are the public's benefits from FEECA?
- In a changing environment, what are the risk-mitigation values FEECA might provide?
- Can FEECA’s implementation be improved?
- Are there better ways to meet the same objectives?

Attachment 5: Blank Questionnaires for Each Focus Group

(On following pages)

UTILITY QUESTIONNAIRE FOR AUG 20 FEECA FOCUS GROUP

INSTRUCTIONS: To the best of your ability answer the following questions for the utility(ies) you represent.

For questions 1-14, check one box under 'Type of Impact' and one box under 'Importance to Utility(ies) I Represent'. For example, FEECA may not help attract investors, but attracting investors might still be important.

Possible impacts of FEECA as currently implemented pursuant to the most recent goals proceedings:		Type of Impact						Importance to Utility(ies) I Represent				
		Greatly Decreases		No Impact		Greatly Increases		Not Important		Somewhat Important		Very important
1	Electricity prices ($/unit sale)	1	2	3	4	5		1	2	3	4	5
2	Customers' ability to control their costs	1	2	3	4	5		1	2	3	4	5
3	Fuel used to produce electricity	1	2	3	4	5		1	2	3	4	5
4	Fuel **diversity** for generating electricity	1	2	3	4	5		1	2	3	4	5
5	Use of renewable energy	1	2	3	4	5		1	2	3	4	5
6	Negative impacts on the environment	1	2	3	4	5		1	2	3	4	5
7	Overall number of jobs in Florida	1	2	3	4	5		1	2	3	4	5
8	Customer satisfaction	1	2	3	4	5		1	2	3	4	5
9	Public image of utilities	1	2	3	4	5		1	2	3	4	5
10	Alignment of regulation with utility objectives	1	2	3	4	5		1	2	3	4	5
11	Attractiveness of utilities to investors	1	2	3	4	5		1	2	3	4	5
12	Utility competitive position	1	2	3	4	5		1	2	3	4	5
13	Return on investment for utilities	1	2	3	4	5		1	2	3	4	5
14	Utility employee satisfaction	1	2	3	4	5		1	2	3	4	5

For questions 15-23, indicate how, in your opinion, the following policies would compare to current practices under FEECA. Note that 'Effectiveness in Achieving Legislative Objectives' and 'Cost-Effectiveness' are separate considerations.

Possible policies to achieve legislative objectives of FEECA:		Effectiveness in Achieving Legislative Objectives						Cost-Effectiveness				
		Much Less Effective		About the Same		Much More Effective		Much Less Cost Effective		About the Same		Much More Cost Effective
15	State-wide public benefits charge (PBC)	1	2	3	4	5		1	2	3	4	5
16	State-wide rebate on energy efficient heating/cooling	1	2	3	4	5		1	2	3	4	5
17	State-wide housing code promoting energy efficiency	1	2	3	4	5		1	2	3	4	5
18	State-wide building code promoting energy efficiency	1	2	3	4	5		1	2	3	4	5
19	State-wide appliance efficiency standards	1	2	3	4	5		1	2	3	4	5
20	3rd party performance contracts	1	2	3	4	5		1	2	3	4	5
21	Smart metering that improves price signals	1	2	3	4	5		1	2	3	4	5
22	Utilities earn returns on appliance sales	1	2	3	4	5		1	2	3	4	5
23	Utilities earn returns on leasing customer premise equipment	1	2	3	4	5		1	2	3	4	5

UTILITY QUESTIONNAIRE FOR AUG 20 FEECA FOCUS GROUP (cont.)

For questions 24-31, indicate the extent to which you agree or disagree that utilities might respond in the following ways if the Legislature were to allow FEECA to sunset:

Possible utilities' response if FEECA were to sunset:		Strongly Disagree		No Opinion		Strongly Agree
24	Keep the current programs in place as approved	1	2	3	4	5
25	Keep information/education programs	1	2	3	4	5
26	Keep programs that pass RIM test w/o externalities	1	2	3	4	5
27	Keep programs that pass RIM **& TRC** w/o externalities	1	2	3	4	5
28	Invest more in supply side efficiency	1	2	3	4	5
29	Invest more in renewable energy	1	2	3	4	5
30	Completely rethink DSM program design	1	2	3	4	5
31	Get out of the DSM business altogether	1	2	3	4	5

COMMERCIAL INTEREST QUESTIONNAIRE FOR AUG 21 FEECA FOCUS GROUP

INSTRUCTIONS: To the best of your ability answer the following questions for the organization(s) you represent.

For questions 1-13, check one box under 'Type of Impact' and one box under 'Importance to Organization(s) I Represent'. For example, FEECA may not create jobs, but job creation might still be important.

		Type of Impact						Importance to Organization(s) I Represent				
Possible impacts of FEECA as currently implemented pursuant to the most recent goals proceedings:		Greatly Decreases		No Impact		Greatly Increases		Not Important		Somewhat Important		Very important
1	Electricity prices ($/unit sale)	1	2	3	4	5		1	2	3	4	5
2	Customers' ability to control their costs	1	2	3	4	5		1	2	3	4	5
3	Fuel used to produce electricity	1	2	3	4	5		1	2	3	4	5
4	Fuel **diversity** for generating electricity	1	2	3	4	5		1	2	3	4	5
5	Use of renewable energy	1	2	3	4	5		1	2	3	4	5
6	Negative impacts on the environment	1	2	3	4	5		1	2	3	4	5
7	Overall number of jobs in Florida	1	2	3	4	5		1	2	3	4	5
8	Customer satisfaction with their utilities	1	2	3	4	5		1	2	3	4	5
9	Public image of utilities	1	2	3	4	5		1	2	3	4	5
10	Alignment of regulation with utility objectives	1	2	3	4	5		1	2	3	4	5
11	Attractiveness of utilities to investors	1	2	3	4	5		1	2	3	4	5
12	Return on investment for utilities	1	2	3	4	5		1	2	3	4	5
13	Stimulating the economy	1	2	3	4	5		1	2	3	4	5

For questions 14-22, indicate how, in your opinion, the following policies would compare to current practices under FEECA. Note that 'Effectiveness in Achieving Legislative Objectives' and 'Cost-Effectiveness' are separate considerations.

		Effectiveness in Achieving Legislative Objectives						Cost-Effectiveness				
Possible policies to achieve legislative objectives of FEECA:		Much Less Effective		About the Same		Much More Effective		Much Less Cost Effective		About the Same		Much More Cost Effective
14	State-wide public benefits charge (PBC)	1	2	3	4	5		1	2	3	4	5
15	State-wide rebate on energy efficient heating/cooling	1	2	3	4	5		1	2	3	4	5
16	State-wide housing code promoting energy efficiency	1	2	3	4	5		1	2	3	4	5
17	State-wide building code promoting energy efficiency	1	2	3	4	5		1	2	3	4	5
18	State-wide appliance efficiency standards	1	2	3	4	5		1	2	3	4	5
19	3rd party performance contracts	1	2	3	4	5		1	2	3	4	5
20	Smart metering that improves price signals	1	2	3	4	5		1	2	3	4	5
21	Utlity appliance sales	1	2	3	4	5		1	2	3	4	5
22	Utilities install, own and operate customer premise equipment	1	2	3	4	5		1	2	3	4	5

COMMERCIAL INTEREST QUESTIONNAIRE FOR AUG 21 FEECA FOCUS GROUP (cont.)

For questions 23-30, indicate the extent to which you agree or disagree that utilities might respond in the following ways if the Legislature were to allow FEECA to sunset:

Possible utilities' response if FEECA were to sunset:		Strongly Disagree		No Opinion		Strongly Agree
23	Keep the current programs in place as approved	1	2	3	4	5
24	Keep information/education programs	1	2	3	4	5
25	Keep programs that pass RIM test w/o externalities	1	2	3	4	5
26	Keep programs that pass RIM **& TRC** w/o externalities	1	2	3	4	5
27	Invest more in supply side efficiency	1	2	3	4	5
28	Invest more in renewable energy	1	2	3	4	5
29	Completely rethink DSM program design	1	2	3	4	5
30	Get out of the DSM business altogether	1	2	3	4	5

CONSUMER & ENVIRONMENTAL INTEREST QUESTIONNAIRE FOR AUG 22 FEECA FOCUS GROUP

INSTRUCTIONS: To the best of your ability answer the following questions for the organization(s) you represent.

For questions 1-13, check one box under 'Type of Impact' and one box under 'Importance to Organization(s) I Represent'. For example, FEECA may not create jobs, but job creation might still be important.

		Type of Impact						Importance to Organization(s) I Represent				
Possible impacts of FEECA as currently implemented pursuant to the most recent goals proceedings:		Greatly Decreases		No Impact		Greatly Increases		Not Important		Somewhat Important		Very important
1	Electricity prices ($/unit sale)	1	2	3	4	5		1	2	3	4	5
2	Customers' ability to control their costs	1	2	3	4	5		1	2	3	4	5
3	Fuel used to produce electricity	1	2	3	4	5		1	2	3	4	5
4	Fuel **diversity** for generating electricity	1	2	3	4	5		1	2	3	4	5
5	Use of renewable energy	1	2	3	4	5		1	2	3	4	5
6	Negative impacts on the environment	1	2	3	4	5		1	2	3	4	5
7	Overall number of jobs in Florida	1	2	3	4	5		1	2	3	4	5
8	Customer satisfaction with their utilities	1	2	3	4	5		1	2	3	4	5
9	Public image of utilities	1	2	3	4	5		1	2	3	4	5
10	Alignment of regulation with utility objectives	1	2	3	4	5		1	2	3	4	5
11	Attractiveness of utilities to investors	1	2	3	4	5		1	2	3	4	5
12	Return on investment for utilities	1	2	3	4	5		1	2	3	4	5
13	Stimulating the economy	1	2	3	4	5		1	2	3	4	5

For questions 14-22, indicate how, in your opinion, the following policies would compare to current practices under FEECA. Note that 'Effectiveness in Achieving Legislative Objectives' and 'Cost-Effectiveness' are separate considerations.

		Effectiveness in Achieving Legislative Objectives						Cost-Effectiveness				
Possible policies to achieve legislative objectives of FEECA:		Much Less Effective		About the Same		Much More Effective		Much Less Cost Effective		About the Same		Much More Cost Effective
14	State-wide public benefits charge (PBC)	1	2	3	4	5		1	2	3	4	5
15	State-wide rebate on energy efficient heating/cooling	1	2	3	4	5		1	2	3	4	5
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17	State-wide building code promoting energy efficiency	1	2	3	4	5		1	2	3	4	5
18	State-wide appliance efficiency standards	1	2	3	4	5		1	2	3	4	5
19	3rd party performance contracts	1	2	3	4	5		1	2	3	4	5
20	Smart metering that improves price signals	1	2	3	4	5		1	2	3	4	5
21	Utlity appliance sales	1	2	3	4	5		1	2	3	4	5
22	Utilities install, own and operate customer premise equipment	1	2	3	4	5		1	2	3	4	5

CONSUMER & ENVIRONMENTAL INTEREST QUESTIONNAIRE FOR AUG 22 FEECA FOCUS GROUP (cont.)

For questions 23-30, indicate the extent to which you agree or disagree that utilities might respond in the following ways if the Legislature were to allow FEECA to sunset:

Possible utilities' response if FEECA were to sunset:	Strongly Disagree		No Opinion		Strongly Agree
23 Keep the current programs in place as approved	1	2	3	4	5
24 Keep information/education programs	1	2	3	4	5
25 Keep programs that pass RIM test w/o externalities	1	2	3	4	5
26 Keep programs that pass RIM **& TRC** w/o externalities	1	2	3	4	5
27 Invest more in supply side efficiency	1	2	3	4	5
28 Invest more in renewable energy	1	2	3	4	5
29 Completely rethink DSM program design	1	2	3	4	5
30 Get out of the DSM business altogether	1	2	3	4	5

Attachment 6: Affinity Sort/Multi-vote Results for Each Focus Group (Tabulated, Unedited Feedback)

A. Utilities' Affinity Sort/Multi-vote Results

Category	Idea	Individual Votes	Total Votes
Use caution with benchmarking		**3**	**3**
	Challenges with data used for this study since the data are reported by the utilities and may not be consistent from one to the next		
	Benchmarking must identify and measure appropriately		
Promote natural gas		**7**	**7**
	Natural gas EC programs		
	- Current rebate programs are working		
	- Programs have to pass RIM and PARTS test before approval		
	- Benefit to customer by using natural gas- natural gas is a fuel that reduces growth rates of electricity and other fuels as outlined in FEECA goals. It is also clean, reliable and efficient		
	- Benefit to overall body of ratepayers:		
	- programs currently designed to retain and convert customers to natural gas		
	- Adding or retaining customers spreads fixed costs over a broader base of customers		
FEECA basically works		**7**	**13**
	FEECA provides transparency		
	DSM programs under FEECA have met the public interest without undue ratepayer impact		
	FEECA: a repeatable and transparent process for FPSC to ensure all available cost effective EE; DR resources are implemented		
	Saturation levels and participant numbers show positive interest in FEECA programs		
	FEECA has proven over decades to be a successful way to implement DSM. Only needs tweaks-not overhaul	**6**	
	FEECA needs remodeled - not removed. Include existing building upgrades- permitting, resale, requirements		
	FEECA is not broken- it simply needs rate discretion applied to its application		
	FEECA results are useful in PPSA "need for power" determination		
	Future FEECA needs to recognize environmental influences		
	Public interests have been met under FEECA		
	- Deferred power plants		
	- Reduced energy consumption (energy bills)		
Customers want service		**1**	**1**
	Seek additional ways to educate consumers and build awareness of utility conservation programs to increase participation		
	Reliability and affordability are key expectations		
	Public wants availability to efficiency services via an assortment of channels (not one size fits all)		
	Public expects utility to provide energy info specific to their promise to support energy savings decisions (biggest bang for the buck)		
	Public wants a wide variety of DSM program options across all segments		
	Public has a growing interest in pricing options		
	Enhance delivery options for participation in utility conservation programs		
Alternative policies not to consider		**1**	**3**
	Alternatives	**2**	
	- existing construction improvements upon sale		
	- Austin TX - multi-family		
	If opportunity to integrate program across the state, consider issuing joint RFPs		

A. Utilities' Affinity Sort/Multi-vote Results (cont.)

Category	Idea	Individual Votes	Total Votes
Alternative policies not to consider (cont.)			
	Manufacturing standards - Energy Star - efficiency standards		
	National energy policy carbon tax		
	Utility sponsored electric and gas. "Florida Energy House". All electric and gas rebates apply to both new and existing housing		
	Utilities are most efficient program implementers - closest to the customer - can do these programs on the "margin"		
	Tax and spend (i.e. PBC) - FEECA - plan, spend, review, recover		
	No state-level appliance standards		
	Impose uniform statewide tax (fee) on every KWH and centralize all DSM programs through a statewide agency		
	A "public benefits fund" funded through KWH tax would cross-subsidize with benefits to high income		
	Do not consider PBC for DSM - that is socialization of non-cost-effective measures		
Customers want low rates		**10**	**12**
	Customers say… - 1. Cost (price) - 2. Reliability - 3. Customer service - 7. Energy efficiency programs	1	
	Customers value low rates more than anything else	1	
	Public is interested in a clean energy supply at a reasonable cost		
Minimize free-ridership		**9**	**10**
	Exclude free-ridership based on 4 year payback criterion. (Anything less than 2 years-customer should do anyway w/o utility incentives)	1	
	Avoid market distortion		
	Cross subsidies and free ridership are real and significant problems which raise costs for all ratepayers, and benefit those with means and unnecessarily raise costs for the poor		
	Do not add ancillary externalities unrelated to electricity production/ delivery- or are only "quantifiable" subjectively		
	Mitigate free ridership through elimination of quick payback measures assigned to goals and plans		
Local control		**10**	**10**
	MUNI local control		
	Local control of EE/DR investment levels for municipalities		
Enhance the goals process		**2**	**4**
	Don't include externalities until actual costs are known	1	
	DSM goal planning process should not take 2 years		
	Shorten DSM goals/program cycles w/more flexible implementation dates		
	FEECA meets unique Florida considerations and meets goal of balance between affordability and reliability		
	Goal setting- only set 1 goal for MW (either winter or summer depending on the company's weather-sensitive peak) i.e. don't set 2 for each company	1	

A. Utilities' Affinity Sort/Multi-vote Results (cont.)

Category	Idea	Individual Votes	Total Votes
Include other agencies		**0**	**0**
	Explore ways to partner with local agencies to optimize code standards		
	The genius of the "and" vs. the tyranny of the "or" - Jim Collins- built to last - DOE efficiency standards AND Building codes AND existing building codes AND utility incentives		
Establish process and goals up front and stick to them		**1**	**1**
	PSC not following state requirements		
	FEECA improvement: determine criteria early in goals process - RIM/TRC - free rider- two year payback - annual cumulative		
Goals should be cumulative, not annual		**8**	**8**
	Set goals on a cumulative basis (instead of annual incremental)		
	Goals: annual vs. cumulative		
	Hold utility accountable on a cumulative basis		
Tie goals to IRP analytics		**6**	**10**
	PSC should only determine goals based on sound analytics- not subjective and/or political objectives	**1**	
	Set goals at company level instead of sector level (this has been promulgated by FAC, not FEECA)	**2**	
	Utilize an analytical process throughout the goals and plan development process		
	DSM market driven/based (law of economics will continue as major driver)		
	Externalities are already built into the cost of electricity with environmental regulation. The place to apply these costs is in the political arena and not at the PSC		
	Set goals no higher than company's resource needs (as determined through IRP)		
	Bottom up- approach best for goal setting in FL	**1**	
	PSC has encouraged the use of an IRP process to ensure all customers are benefiting from the DSM programs		
	Dispel notion of percentage of sales requirements		
	IF TRC is used, set rate impact limits prior to establishing numerical goals		
	DSM goals set on total company basis- not specific to sectors		
Use RIM as C/E criterion and participants test		**15**	**26**
	Peak demand reduction is important in Florida	**2**	
	Focus on equity/fairness to all customers - codify use of RIM and Participant tests	**3**	
	All roads lead to rates		
	RIM - ties to generation planning - eliminates cross-subsidies - meets expectations (lower cost) - no losers	**3**	
	PSC's role in energy efficiency should be limited to RIM based programs. Other bodies (e.g. Legislature, code authorities) should address other energy efficiency efforts on a life-cycle cost basis		
	Use of E-costs when not established		
	RIM test assures that all customers benefit from utility-sponsored conservation programs, so the RIM test is consistent with the Commission's role of prescribing non-discriminatory rates		
	Rim test for DSM goals and plans	**1**	
	RIM based goals create an environment for win/win - answers "why" should utilities be involved in conservation		

A. Utilities' Affinity Sort/Multi-vote Results (cont.)

Category	Idea	Individual Votes	Total Votes
Use RIM as C/E criterion and participants test (cont.)			
	"It's about the price, stupid."		
	Utility goals should be based on ECMs that pass TRC and RIM		
	Eliminating cross-subsidy is important component of meeting public interest		
	Utility accountability for FEECA objectives should be limited to RIM passing activities	**1**	
	Cost-effectiveness is utility-specific	**1**	
	Incent utilities to maximize cost-effectiveness or set a minimum c/e score threshold to ensure highest impact for cost		
	Avoid cross-subsidization		
	RIM		
	FEECA regulated utilities should be required to implement only programs that pass RIM. Programs that fail RIM should be funded through general tax revenues		

B. Commercial Interests' Affinity Sort/Multi-vote Results

Category	Idea	Individual Votes	Total votes
Education and awareness		**16**	**16**
	Fund a state-wide consumer and business educational campaign (targeted to each) by an independent 3rd party (non-utility)		
	Real-time customer knowledge of demand use		
	Understandable state energy policy		
	Break out cost to customer		
	Top priority: consumer education		
	Power company energy audits educate consumer		
	Transparency of all utility charges		
	Educate customers: new and existing		
	Educate!!!		
	Educate consumer: building trends and codes and gov't		
	Local gov't must also buy into global perspective		
FEECA does not create jobs		**1**	**1**
	FEECA may hurt economic recovery		
Offer loan programs		**12**	**12**
	Public low/no interest fund to finance/drive new technologies		
	PACE [property-assessed clean energy] good	**1**	
	Encourage utilities to operate loan programs for cost-effective energy and solar improvements with high initial costs (but that pays for themselves during their lifetime)		
	Affordable financing availability		
	Establish low interest loan programs (revolving)		
FEECA creates jobs		**0**	**0**
	Job creation		
	Job creation factor		
Opt-out provisions		**14**	**14**
	Allow C/I customers to opt out		
	Business opt-out		
	Opt out		
	Opt in opt out provisions		
	Whatever you do...need flexibility		
Use rate structures to drive conservation		**13**	**13**
	Real time feedback -"smart grid"		
	Use rate structures to change behavior		
	Time of use pricing incentives		
	Pull change don't push a technology		
Voluntary, not mandates		**7**	**7**
	Voluntary good, mandate bad		
	Don't make mandatory, may drive consumers into unlicensed activity		
	Question need for mandate under FEECA		
More distributed generation and renewables		**8**	**8**
	Incentives for more distributed generation		
	Should focus on decentralized energy production incentives		
	Increase the utility contribution to renewable DSM		
	Amend current DSM program for renewables		
Public Benefit Fund		**9**	**9**
	Implement a public benefit fund that replaces the energy conservation cost recovery fund, is administered by a 3rd party and accessible by all utilities as well as state energy office and other non-profits		
	Establish public benefit fund to pay for renewables		
	Public benefit funds seem to work		

B. Commercial Interests' Affinity Sort/Multi-vote Results (cont.)

Category	Idea	Individual Votes	Total Votes
Use TRC test		**8**	**8**
	We should be capturing total cost of fossil fuels		
	Do away with RIM test for measures that should be encouraged and pass the other cost effectiveness tests		
	Keep TRC and E tests		
Only do RIM test		**11**	**11**
	Cost/benefit economic impact		
	Get rid of e-test (carbon cost)		
	Go easy on environmental drives		
	RIM test only		
Rethink objectives		**9**	**9**
	Competitiveness w/ SE states (bring rates more in line w/other states)		
	Incorporate an RPS goal into FEECA		
	Need state energy policy as a guide		
	Public interest should include fuel diversity		
	Review % of renewables in utilities' portfolios to reflect current economic and technology environment		
	Need better state energy policy		
	Do we need FEECA		
	Need to re-assess FEECA objectives		
Voice at the table		**1**	**1**
	Be able to give more input		
New programs		**5**	**5**
	Third parties to administer programs		
	Pass on a penalty to inefficient energy users		
	Consider true marketing advertising on wide spread basis as part of pull. Don't forget and don't drop it		
	Need programs for tenants that don't own buildings		
	Incentive to manufacturer of equipment that drives reduction, not end user		
	Buy more geothermal!		
	Other policy incentives such as third party PPA permission		
Scale back regulations		**16**	**16**
	Get rid of duplicate regulation		
	Energy code is stringent enough will continue progress at national level so FL will not be left behind		
	Define "spheres of influence" so local and state government aren't trying to do same thing in different ways		
	Regulate everyone or regulate no one. Uneven implementation of any measure hurts marketplace costs		
	Process is just as important as product and result. Bad process can negate calculated good result		

C. Consumer & Environmental Interests' Affinity Sort/Multi-vote Results

Category	Idea	Individual Votes	Total votes
Additional programs		**0**	**0**
	Incentives for renewable energy efficiency advancements should be available to appliance producers, not just IOUs		
	Encourage builders/developers to allow public to harvest trees for replanting before land is cleared		
	Look at incentivizing: - irrigation system retrofits - power plant and transmission efficiencies (such as transformation equipment) - installation of low flow showers, faucets, toilets (h2O and $)		
	Promote efficiency across the grid as much as the home - more efficiency for entire body of rate-payers		
	PSC provides page on website for exchange of recycled fans, appliances, etc.		
	Require owners of rental properties to disclose average annual/monthly utility costs for units and/or to retrofit units to minimum standards for insulation, HVAC, etc. (Deal with rental disconnect)		
Restructure PSC		**7**	**7**
	Have PSC authority transferred to FDACS		
	Have PSC commission elected, not appointed		
	Figure out how to minimize utility influence on the PSC and legislature. (Ha!)		
	Take politics out of decision/policy making		
	Take profit-making out of public utilities		
	Statutorily strengthen consumer voice		
	PSC commissioners cannot work in the utility industry for 10 years after term		
Improve price signals		**5**	**6**
	Incentivize energy saving. Better rate for less usage		
	Encourage use of rate designs (such as inverted block rates) that encourage citizens to use less energy		
	Focus on near-term rates will lead to higher costs in the future		
	Standardize rate determination		
	Fully consider externalities of energy production - EE captures demand with no GHG or other emissions		
	Bill amounts more important than rates	**1**	
Fully integrate IRP process		**0**	**0**
	Fully integrate resource planning IRP (combine FEECA, 10-yr site plan need determination)		
	Protect customers from excessive costs of supply alternating vs. EE costs		
	Consider EE as a resource just as are supply resources (new power plants)		
Use DSM to create jobs, other benefits		**4**	**4**
	Consider impact of EE on economic development- least-cost service		
	Have office of economic development pursue federal grants for improvements to support state investment		
	More local jobs from EE expansion versus supply increase		
	Require looking at benefits that accrue from: - cleaner air and water - more money in consumer's wallets that gets spent in the economy - putting people to work in HVAC, insulation, similar industries		

C. Consumer & Environmental Interests' Affinity Sort/Multi-vote Results (cont.)

Category	Idea	Individual Votes	Total Votes
Spread benefits to low-income customers more effectively		**5**	**7**
	Encourage or require financing programs to help pay for energy efficiency measures for people who don't have available cash	**1**	
	- on-bill financing		
	- property assessed clean energy (PACE) programs		
	-low interest loans		
	-100% grants		
	Require low-income program for those under poverty line		
	- terrible economy		
	- very much needed to help reduce electric bill		
	- weatherization example provided by AARP		
	Provide mechanism for PSC or OPC to control rate impacts. E.g. promote energy efficiency while protecting economically fragile- need balance		
	Share costs savings with customers		
	Require that a significant percentage of conservation incentives available go to:		
	- lower income customers		
	- owners of rental properties		
	Require utilities to provide broad-based and meaningful conservation programs for lower income customers and those on fixed incomes	**1**	
Improve codes		**2**	**2**
	Have builder's incentives for efficiency improvements offset with tax credit		
	Improve housing code to provide more energy savings (ventilation vs. A/C)		
Improve and increase transparency		**6**	**6**
	More transparency and scrutiny of alternatives		
	Demand transparency in decision/policy-making		
	Program evaluation, measurement and verification is under-developed or not shared with public		
	Involve the public in more decision making		
Give utilities financial incentives		**2**	**3**
	Compensate utilities for loss of profit for conservation		
	Utilities need financial incentive for EE leadership ("investment")	**1**	
	Figure out how to reward utilities for achieving energy conservation benchmarks. Make it in their own best interest		
Improve goal setting		**4**	**4**
	Many EE measures discounted/neglected in goal-setting and program proposals		
	2-year payback doesn't reflect good program design		
	Consider econ. Sectors separately in FEECA process (Res., Comm., Ind.) in rolling 3-year cycle		
	Multiple scenarios or alternatives should be considered via risk analysis (a 'la NWPCC) compare DSM to other alternatives		
	Determination of "achievable" in goal-setting should be in accord with EE industry best practices		
	RIM is not an economic test for ID of least-cost resource to meet demand		
	Look at places that are doing energy conservation effectively (Gainesville, Tallahassee, Austin, TX, Sacramento etc.) and see what is working and why, what it costs, etc., and then take the best ideas statewide		

C. Consumer & Environmental Interests' Affinity Sort/Multi-vote Results (cont.)

Category	Idea	Individual Votes	Total Votes
Improve goal setting (cont.)			
	FLA. IOUs not delivering energy savings near levels realized in many other states		
	Question why conservation measures must be "justified" using RIM, TRC, etc., but other similar magnitude expenditures (employee pay, benefits, incentives; advertising and lobbying; fleet vehicles, etc.) do not…		
	Require utilities to offer incentives for measures that have shorter (2 year) paybacks, and also to educate citizens on them		
Improve utility disclosure and performance		**6**	**6**
	NO PSC process serves need for cost analysis/comparison to peers/best practice		
	Programs need review by a process for program improvement and cost control		
	Require utilities to reveal customer participants from past 5 years to reveal trends/success stories for future programs		
	Require annual disclosures of important utility benchmarks: amount of energy use/capita; amount of money spent on conservation measures/residential customer, amount (%) of renewable energy in portfolio, etc.		
	Require utility to reveal "best bang for the buck" and not just "least-cost strategy" - least impact very important - just in addition: best bang for the buck		
	PSC overlooks poor program design		
	Reduce administrative overhead and streamline structure		
	Regulate PSC to consolidate and post all incentive programs for efficiency and conservation		
Inform Consumers		**5**	**5**
	Utility should sponsor science fair and competition for efficiency and conservation		
	Enhance consumer participation through deployment of smart meters/grids and consumer education/outreach		
	Require utilities to partner with trusted "third parties" to deploy conservation programs: neighborhood groups, schools, religious organizations, social clubs etc. (cities and counties as well)		
	Implement energy education in all schools at all levels		
	Strategic pathways to education and outreach on: - DSM programs - Cost/benefits of program - New technologies - Payback periods		
	Legislature mandate utilities create education program for schools		
	Partner with education/research for newest technologies		

17 Appendix E – The Research Team

The work for this report was a joint effort of members from the University of Florida's Public Utility Research Center, the University of Florida's Program for Resource Efficient Communities, and the National Regulatory Research Institute.

University of Florida's Public Utility Research Center

Mark Jamison, Ph.D.
Theodore Kury
Edward Regan, P.E.
Lynne Holt, Ph.D.
Mary Galligan

University of Florida's Program for Resource Efficient Communities

Pierce Jones, Ph.D.
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Mark Jamison, Ph.D., Principal Investigator

Dr. Mark Jamison is the director of PURC. He has published research on foundations for utility regulation in the US, development of and essential features of regulatory institutions internationally, and impacts of electricity prices. Dr. Jamison was the initial principal investigator on PURC's hurricane hardening research. Dr. Jamison served as president of the Transportation and Public Utilities Group, an association of economists working on utility issues. Previously, Dr. Jamison head of research for the Iowa Utilities Board and communications economist for the Kansas Corporation Commission. He has served as chairperson of the National Association of Regulatory Utility Commissioners (NARUC) Staff Subcommittee on Communications, chairperson of the State Staff for the Federal/State Joint Conference on Open Network Architecture, and member of the State Staff for the Federal/State Joint Board on Separations. Dr. Jamison serves on the editorial board of Utilities Policy. He is also a referee/reviewer for the International Journal of Industrial Organization and Utilities Policy.

Ted Kury, Co-Principal Investigator

Mr. Kury is PURC Director of Energy Studies, where he has primary responsibility for all energy-related initiatives. He has over 15 years of experience in the energy sector, during which he analyzed energy markets and market risk. He served as co-principal investigator with Julie Harrington at FSU in a study of the effects on electricity generation of a Florida executive order on carbon caps. He was co-author of a recent report to the Florida Governor's Energy Office on the advantages and disadvantages of various energy policy initiatives. He teaches on energy efficiency and renewable energy topics, and conducts research on energy markets.

Ed Regan, Project Manager

Ed Regan is a registered professional engineer with over 32 years of extensive engineering and executive management experience in a wide range of electric, water, wastewater and telecommunication utility operations and regulatory environments. His areas of responsibility have included: integrated resource planning (IRP); generation dispatch and power marketing; financial and asset risk management; utility rate design; and project development and permitting. His career includes DSM program planning and design, training of conservation specialists, and the considerations for diligent forecasting, economic evaluation, and IRP decision-making. He has visited many facilities and is familiar with the wide range of electrical generation technologies and storage systems currently deployed throughout the USA and Europe. For over twenty years he served as Assistant General Manager of Strategic Planning for Gainesville Regional Utilities, a double A rated municipal utility with the lowest electrical use per residential customer in the state and among the most aggressive conservation and carbon reduction goals in the US. He was past president of the Florida Municipal Electric Association; he has also served on the Solar Electric Power Association's board of directors and on the Settlement and Operating Committee of The Energy AuthorityTM, a municipally owned power marketing company managing in excess of 25,000 megawatts of generating capacity throughout the US.

Lynne Holt, Ph.D., Policy Analyst

Dr. Lynne Holt is a policy analyst with PURC, where she researches and writes papers and reports on a variety of regulatory policy issues. She has 30 years of experience in public policy formulation and research. At PURC, she has collaborated on numerous energy projects. She has authored or co-authored papers on utility investment risks, consumer attitudes towards energy conservation, PURC's Florida energy roundtable. Before coming to the University of Florida, Dr. Holt worked for almost 18 years in the Kansas Legislative Research Department as a principal analyst, research analyst, and fiscal analyst. She prepared a wide variety of utility-related and economic development reports. Prior to this position, she served as an energy research analyst at the Kansas Corporation Commission.

Mary Galligan, PURC Senior Fellow

Mary Galligan is an independent policy consultant and a Senior Fellow with PURC. She served as a policy analyst for the Kansas Legislature from 1982-2009. Her assignments included providing research staff support to the Kansas Electric Transmission Authority, the House Utilities Committee, and the Joint Committee on Energy and Environmental Policy. She prepared research memoranda and reports related to federal and state energy and environmental policy and related topics. She has been affiliated with PURC since 2010.

Pierce Jones, Ph.D., Program Director, PREC

Dr. Pierce Jones directs applied research and outreach on water, energy, and land use efficiency in Florida. He has managed a series of twelve Florida Building Commission contracts ($1,120,900) to develop and deliver educational training materials supporting Florida's transition to a unified statewide building code; delivered more than 300 continuing education programs in 38 counties to more than 10,000 licensed contractors from 2001 through present. He directed the publication of Energy Efficient Building Construction in Florida, a Construction Industry Licensing Board designated reference text for individuals taking the exam required to become licensed building contractors. From its initial release in 1999 through present, more than 40,000 copies of five editions have been sold. He directed development of Build Green & Profit, a 14-hour continuing education course for licensed building contractors. Since its first presentation in 1996 the course has been conducted annually (>300 times) to more than 6,000 participants.

Nicholas Taylor, Energy Analyst, PREC

Mr. Taylor conducts applied research and outreach on water, energy, and land use efficiency in Florida. He develops analytical techniques for accurate and cost-effective measurement of impacts related to conservation programs. He works with various stakeholder groups to assess impact of energy conservation measures. His recent projects to inform policy decisions include assessing the impacts of Florida's Weatherization Assistance Program and developing and implemented a model energy conservation program for multi-family residential structures. He has been affiliated with PREC since 2005.

Jennison Kipp, Resource Economist, PREC

Ms. Kipp conducts applied research and outreach on water, energy, and land use efficiency in Florida. Her focus is on accounting for the full costs and benefits of alternative resource management scenarios. Her recent projects to inform policy decisions include assessing the impacts of energy-efficiency DSM and certification programs in Florida's residential sector and estimating the energy and carbon costs of alternative water supplies in the Tampa Bay region. She is an alumnus of the Florida Natural Resources Institute with graduate degrees in applied economics and environmental pollution control. She has been affiliated with PREC since 2006.

Rajnish Barua, Ph.D., Executive Director, NRRI

Dr. Rajnish Barua is executive director of the National Regulatory Research Institute (NRRI). Dr. Barua has over 25 years of experience in the energy field. He has worked as the executive director of the Organization of PJM States, Inc. (OPSI), an inter-governmental association of the regulatory commissions of 13 states and the District of Columbia. He also served as the energy advisor to the Chairman of the Pennsylvania Public Utility Commission and as the director of Integrated Resource Planning in the Maryland Public Service Commission. He previously served as a regulatory policy administrator in the Delaware Public Service Commission. His experience includes regulatory policy, restructuring of the electric industry, regional energy markets, and other related matters. Dr. Barua has provided training and technical assistance to energy regulators of over 25 nations, primarily from Africa, Eastern Europe, and South Asia. He has published and presented extensively in regional, national, and international conferences. Dr. Barua is a Senior Fellow of the Public Utility Research Center at the University of Florida and was a member of the NERC Operating Committee (2009-11).