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April 12, 2019

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

Re: Docket No. 20190015-EG: Commission Review of Numeric Conservation Goals (Florida Power & Light Company)

Dear Mr. Teitzman:

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

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

- Prefiled Testimony and Exhibits of T. Koch (document 2 of 4);
- Prefiled Testimony and Exhibits of A. Whitley (document 3 of 4);
- Prefiled Testimony and Exhibits of S. Sim (document 4 of 4).

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

Sincerely,

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

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

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

Commission Review of Numeric Conservation Goals (Florida Power & Light Company)	Docket No: 20190015-EG Filed: April 12, 2019

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

Pursuant to Sections 366.81 and 366.82, Florida Statutes ("F.S."), and Rule 25-17.0021, Florida Administrative Code ("F.A.C."), Florida Power & Light Company ("FPL") petitions the Florida Public Service Commission ("Commission") to approve the numeric conservation goals attached as Exhibit TRK-4 for FPL for the years 2020-2029. In support of this petition, FPL states:

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

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

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

BACKGROUND AND OVERVIEW

4. Rule 25-17.0021, F.A.C., establishes that the Commission shall set DSM goals for each utility at least once every five years. This rule was promulgated pursuant to the Florida Energy Efficiency and Conservation Act ("FEECA"). Each utility is required to propose numeric goals for the ten-year period and provide ten-year projections of the total cost-effective, summer and winter peak demand savings (kW) and annual energy savings (kWh) reasonably achievable in the residential and commercial/industrial classes through

DSM. These goals must be based upon the utility's most recent planning process. *See* Rule 25-17.0021(1)-(3), F.A.C.

5. FPL is an industry leader in DSM and has been offering DSM programs for more than forty years, predating Florida's adoption of FEECA. Through year-end 2018 and after accounting for the 20% total reserve margin, FPL has avoided the need to construct the equivalent of more than 15 new 400 megawatt ("MW") generating units (a Summer peak demand reduction of 4,840 MW) and has reduced annual energy consumption by 86,108 gigawatt hours ("GWh") at the generator – equal to approximately 75% of the electric consumption of all of FPL's customers for a year. FPL's supply-side efficiency improvements have also yielded significant benefits for its customers. For example, due to a reduction in the average heat rate of its generation fleet, FPL uses 15% less fossil fuel to produce the same number of kilowatt-hours in 2019 than it did in 2009. Importantly, FPL has achieved these demand-side and supply-side savings while keeping electric rates low for all customers – not just those who choose to participate in DSM programs. This is evident since FPL's residential customer bills are the lowest in the state and 30% below the national average as of the time of this filing.

6. FPL's proposed DSM goals for the 2020-2029 timeframe are based on FPL's current resource planning process as required by Rule 25-17.0021, F.A.C. Of the three resource plans analyzed, the resource plan reflecting FPL's proposed DSM goals will result in the lowest levelized system average electric rates over the analysis period. The testimony and exhibits of FPL witnesses Thomas R. Koch, Andrew W. Whitley, and Dr. Steven R. Sim

and Nexant witness Jim Herndon further support and explain FPL's proposed DSM goals and are incorporated herein by reference.[1]

DEVELOPMENT OF PROPOSED DSM GOALS

7. FPL followed a rigorous, six-step analytical process similar to the process it has used in past DSM goal-setting proceedings to develop DSM goals. This process utilizes current forecasts and assumptions and appropriately reflects FPL's specific resource needs and system costs. In sum, the six-step process, which is discussed more fully in the testimonies of FPL witnesses Thomas Koch and Andrew Whitley and Nexant witness Jim Herndon, consists of the following:

- First, a Technical Potential ("TP") analysis determines the breadth of measures to be considered and their maximum hypothetical demand and energy savings, conducted by Nexant witness Herndon;
- Second, FPL's resource needs during the DSM Goals timeframe are determined, conducted by FPL witness Whitley and FPL's Integrated Resource Planning group;
- Third, a preliminary economic screening of the DSM measures is performed using the Participant, Rate Impact Measure ("RIM"), and Total Resource Cost ("TRC") preliminary screening tests, their maximum rebate amounts are calculated, and the impact of free riders is taken into account (as required by Rule 25-17.0021, F.A.C.), conducted by FPL witness Whitley;

[1] Contemporaneously with this filing, Nexant, a consultant retained by the FEECA utilities, will be filing separately the testimony of Mr. Jim Herndon and his market potential study for each utility in support of the goals to be established in this docket.

- Fourth, the ten-year Achievable Potential ("AP") is determined based on the maximum rebate levels for all measures that passed the preliminary economic screening, conducted by FPL witness Koch;
- Fifth, Supply and DSM-based resource plans are developed (*i.e.*, three resource plans were developed for this proceeding), conducted by FPL witness Whitley; and
- Sixth, those resource plans are analyzed from both economic and non-economic (*i.e.*, fuel usage and system emission) perspectives to determine the optimum level of DSM Goals, conducted by FPL witness Whitley.

8. Further, as explained by FPL witness Sim, several factors have significantly affected the cost-effectiveness of DSM measures and, ultimately, FPL's proposed level of DSM goals. First, current forecasts and assumptions have changed significantly since DSM goals were last evaluated in 2014. Second, FPL's generating system is more fuel efficient – and projected to become even more fuel efficient in the future. Third, current forecasted fuel costs are lower, and current projected carbon dioxide emission compliance costs are lower. All of these factors greatly benefit customers by keeping electric rates low. At the same time, however, these factors reduce the cost competitiveness of DSM as a resource option because the benefits of DSM (*i.e.*, avoiding these costs) have been reduced.

9. Additionally, the amount of energy and demand savings projected to be delivered by Florida Building Code and federal equipment manufacturing standards (collectively, "Codes and Standards") over the ten-year goals period has greatly increased. Customers will receive the benefit of these Codes and Standards, but at the same time, this represents a significant decrease in potential energy and demand savings that might

otherwise have been available from utility DSM measures. In some instances, Codes and Standards have eliminated the opportunity for certain DSM measures to play a role in FPL's DSM portfolio because they have become the new "baseline." This has the effect of reducing the amount of cost-effective DSM that a utility can offer.

RESULTS OF DSM GOAL-SETTING ANALYSES

10. The results of FPL's six-step analysis support FPL's proposed goals of 352 Summer MW, 259 Winter MW, and 1,023 MWh for the 2020-2029 DSM Goals period. The resource plan that includes the RIM-based 352 Summer MW portfolio of DSM meets FPL's resource planning requirements and is projected to result in the lowest Levelized System Average Electric Rates of the resource plans analyzed (*i.e.*, including a Supply Only Resource Plan). This resource plan is projected to result in the lowest annual electric rates of any of the DSM-based resource plans and avoid the cross-subsidization of DSM program participants by customers who do not participate. From a non-economic perspective, there were only relatively small differences in projected system emissions and system fossil fuel use among the three resource plans, due in large part to FPL's already low emission profile and high fuel efficiency. The economic and non-economic results of FPL's analyses are described in detail by FPL witness Whitley. The annual Summer MW savings associated with the RIM-based 352 MW portfolio and corresponding Winter MW and annual MWh savings are presented in Exhibit TRK-4 to the testimony of FPL witness Koch.

11. While these proposed DSM goals represent a modest decline in the current DSM goals approved in FPL's 2014 DSM goals proceeding, it is significant to note that given the much higher levels of DSM now being captured due to the impacts of changes to

Codes and Standards, there are more DSM savings projected for FPL's customers by 2029 in this proceeding than were projected in the 2014 DSM Goals proceeding.

LOW INCOME CUSTOMER ASSISTANCE AND ELECTRIC VEHICLE RESEARCH & DEVELOPMENT PILOT

12. While utility-provided incentives for traditional energy efficiency (EE) conservation measures are no longer cost-effective, FPL recognizes that these measures have been one of the primary sources of assistance to low income customers. As a result, FPL is proposing to expand its existing Low Income program. Although this program is not cost-effective, FPL believes this program should continue and is warranted to support this vulnerable group of customers and to replace EE program options no longer available. This program is consistent with Order No. PSC-14-0696-FOF-EU in the Commission's 2014 Conservation Goals docket for FPL (Docket No. 20130199-EI), wherein the Commission recognized the importance of, and shared FPL's commitment to, supporting these customers.

13. Moreover, with traditional EE measures no longer viable, FPL continues to search for potential next-generation DSM measures. FPL's 2019 Ten-Year Site Plan shows that electric vehicles ("EV") are projected to add approximately 460 Summer MW to FPL's system peak load through 2028. Therefore, FPL proposes adding a Research & Development ("R&D") pilot within its existing Conservation Research & Development program to evaluate the technical and operational feasibility of reducing system peak demand through use and control of residential EV chargers.

WHEREFORE, for the reasons above and more fully supported by the testimony and exhibits filed herewith, FPL respectfully requests that the Commission approve the proposed numeric conservation goals for FPL attached to the direct testimony of FPL

witness Koch as Exhibit TRK-4. FPL also requests that the Commission approve FPL's proposed low income program and EV R&D pilot as alternatives to traditional EE programs.

Respectfully submitted,

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

CERTIFICATE OF SERVICE
DOCKET NO. 20190015-EG

I HEREBY CERTIFY that a true and correct copy of FPL's Petition for Approval of Numeric Conservation Goals with accompanying testimony and exhibits was served by electronic delivery this 12nd day of April, 2019 to the following:

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By: *s/ William P. Cox*
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BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

FLORIDA POWER & LIGHT COMPANY

DIRECT TESTIMONY OF THOMAS R. KOCH

DOCKET NO. 20190015-EG

APRIL 12, 2019

TABLE OF CONTENTS

I. INTRODUCTION

Q. Please state your name and business address.

A. My name is Thomas R. Koch. My business address is 6100 Village Boulevard, West Palm Beach, Florida 33407.

Q. By whom are you employed and what is your position?

A. I am employed by Florida Power & Light Company (FPL) as Senior Manager, Demand-Side Management Strategy, Cost & Performance.

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

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

Q. Please describe your educational background and professional experience.

A. I have a Master of Business Administration and a Master of Science in Computer Information Systems, both from University of Miami, and a Bachelor of Music from West Chester University.

I joined FPL's Finance Department in 1985, working on forecasting and regulatory projects. In 1989, I became Treasury Manager responsible for FPL's short-term cash management, investing and borrowing. In 1991, I joined Customer Service where I was responsible for program management of various tariffed offerings, product development and commercial/industrial retail market strategy. Beginning in 1998, I served in a number of positions in

Power Delivery: Manager, Development & Planning; Manager, Environmental Department; Manager, Underground Department; and Manager, Financial Forecasting. In these positions, I was responsible for: day-to-day field operations; regulatory proceedings; growth activities; policy and procedure development; and regulation compliance. In 2009, I rejoined Customer Service and assumed my current position in 2011.

Q. Are you sponsoring any exhibits in this case?

A. Yes. I am sponsoring Exhibits TRK-1 through TRK-4, which are attached to my testimony:

TRK-1 – Current DSM Programs and Achievements

TRK-2 – Current DSM Programs and Associated Measures

TRK-3 – 2020-2029 Achievable Potential – RIM and TRC

TRK-4 – 2020-2029 Proposed DSM Goals

Q. What is the scope of your testimony?

A. My testimony provides the following:

I. Describes FPL's historical DSM achievements;

II. Provides an overview of the 2019 DSM Goals development process;

III. Discusses impacts of significant market forces on utility-sponsored DSM;

IV. Discusses the Achievable Potential development for which I am responsible, including the impact of significant market forces;

V. Summarizes FPL's proposed 2020-2029 DSM Goals; and

VI. Proposes increased assistance for Low Income customers and a research & development pilot project.

Q. Are there other FPL witnesses that are providing direct testimony in this docket?

A. Yes. There are two other FPL witnesses filing direct testimony in this docket. They are Mr. Andrew W. Whitley and Dr. Steven R. Sim, both from FPL's Integrated Resource Planning department.

Q. What subject matter is addressed in Mr. Whitley's direct testimony?

A. Mr. Whitley addresses the preliminary cost-effectiveness screening of individual DSM measures that he performed as part of the Economic Potential phase of the analyses. He also discusses the economic analyses of three resource plans: a resource plan without any incremental DSM for the 2020-2029 time period (the "Supply Only" resource plan), and two resource plans with DSM, including one with FPL's proposed DSM Goals.

Q. What subject matter is addressed in Dr. Sim's direct testimony?

A. Dr. Sim discusses the continuing trend of decreasing DSM cost-effectiveness by describing the drivers which have significantly reduced the "benefits" side of DSM benefit-to-cost (or cost-effectiveness) analyses. His testimony addresses why it is both logical and appropriate for FPL's proposed DSM Goals to be lower than the goals set by the Commission in the last DSM Goals docket in 2014.

Q. Please summarize your testimony.

A. Energy efficiency is fundamentally all about customers' decisions. Beyond the government-mandated compliance levels set by the Florida Building Code and federal equipment manufacturing standards (collectively, "Codes and Standards"), it is each customer's voluntary decisions that determine how many energy efficiency options they adopt and, therefore, how much energy efficiency is collectively implemented in Florida. The amount and effect of energy efficiency residential and business customers ultimately install is driven by three decisions: first, the characteristics of the property they elect to purchase or lease; second, the equipment they elect to retain or replace; and third, how they elect to operate that equipment.

The purpose of utility-sponsored DSM in fulfilling the intent of the Florida Energy Efficiency and Conservation Act (FEECA) is straightforward – to encourage customers to voluntarily implement cost-effective conservation measures (which reduce peak demand and/or energy usage) that they would not otherwise elect to implement on their own. Utilities' DSM programs support customers' decision-making by picking up where the Codes and Standards leave off, by promoting cost-effective efficiency beyond the government mandates. The impact of Codes and Standards has been dramatic and provides an important starting point and frame of reference for the role of utility DSM. DSM programs work to influence customers' decisions by

providing education on energy efficiency and, where cost-effective, financial incentives.

Because utility DSM programs are funded by the general body of customers, it is critical that DSM be implemented in a cost-effective manner to ensure fairness for all customers, both DSM participants and non-participants. Absent this, non-participating customers would be forced to cross-subsidize DSM-participating customers to their financial detriment. In addition, DSM represents one of two types of resources available to address future load needs (the other being supply-side resources), so it is important that the level of DSM be based on sound economic analysis within the utility's Integrated Resource Planning (IRP) process such that these two types of resources compete to provide the best result for all customers.

Historical DSM Achievements – For more than 40 years, FPL has focused on delivering DSM programs that help customers manage their energy use while maintaining the discipline to avoid promoting DSM measures that result in higher electric rates than supply-side alternatives. Consistent with FEECA and the Commission's DSM Goals Rule (Rule 25-17.0021, F.A.C.), certain critical goal-setting policies have been followed to ensure the best balance of resources was achieved. First, by relying on the Rate Impact Measure (RIM) test, rate impacts to all customers have been recognized and cross-subsidization has been eliminated or minimized. Second, incentives to "free

rider" participants are minimized by use of the two-year payback criterion. Finally, customers are not asked to pay for more DSM than can be used beneficially within a utility's IRP process. Following these policies has yielded resource plans, including DSM portfolios, which have provided the most favorable long-term electric rate impact for all customers.

Significant Market Forces – There are two significant marketplace changes that have had dramatic impacts on FPL's DSM Goals developed in prior dockets and will continue to play an even more significant role during future years. First, as discussed in more detail in the testimony of FPL witness Sim, all but one of the eight drivers of FPL's system costs (*e.g.*, generation capital, system fuel cost, etc.) are significantly lower than in the prior two DSM Goals dockets. FPL witness Sim's analysis shows that projected DSM benefits have decreased more than 33% in the five-year period since DSM Goals were last set. Lower system costs result in enormous benefits for all FPL customers and Florida as a whole by keeping electric rates low. However, these lower system costs automatically result in decreasing the value the Megawatt (MW) and Megawatt-hours (MWh) reductions that utility-sponsored DSM programs could potentially provide. Accordingly, if the costs "to be avoided" by DSM are lower, then fewer DSM measures will be cost-effective.

Second, as explained in the testimony of FPL witness Sim, there have been significant increases in mandated energy efficiency as a result of changes to

Codes and Standards. The effect of these Codes and Standards is positive for overall energy efficiency in Florida because it means that 100% of customers are subject to governmental requirements to install higher efficiency end-uses, rather than just those that a utility could induce through voluntary DSM programs. However, these mandated improvements also have the effect of significantly reducing the amount of incremental efficiency benefits achievable from a participating customer installing even more efficient end-use equipment. This, in turn, diminishes the number and scope of cost-effective utility DSM programs/measures. It should be recognized that these increased Codes and Standards represent normal, naturally-occurring external forces which FPL must reconcile in its forecasting and IRP process and necessarily will reduce the amount of cost-effective utility-sponsored DSM.

Although Codes and Standards reduce the economic viability of utility DSM, FPL's customers are projected to receive more significant reductions in both peak load and energy by the year 2029 than was projected in the last two DSM Goals dockets. For example, in the current projection, FPL's customers are projected to receive reductions of approximately 4,820 MW peak load and 12,049,520 MWh from Codes and Standards by 2029. In the 2009 docket, the reduction projections were 2,209 MW peak load and 9,359,212 MWh. Therefore, the current savings projections are much higher at approximately 118% and 29% larger, respectively. In addition, when considering all sources of MW and MWh savings, both from Codes and Standards and DSM Goals,

FPL customers are projected to receive more total peak demand and energy reductions by the year 2029 than the previous projections from the 2014 DSM Goals.

DSM Goals Development Process – As explained in greater detail by Nexant witness Herndon and FPL witness Whitley, the FPL Goals development process involves multiple analyses in a six-step process. First, a Technical Potential (TP) analysis determines the breadth of measures to be considered and their maximum hypothetical demand and energy savings. Second, FPL's resource needs during the DSM Goals timeframe are determined. Third, a preliminary economic screening (Economic Potential or EP) of the DSM measures is derived based on the Participant, RIM, and Total Resource Cost (TRC) preliminary screening tests, and their maximum incentive amounts are calculated. At this stage of the process, FPL also performed sensitivity analyses to assess the impact of variations in certain key assumptions: higher and lower fuel costs, shorter and longer (one and three-year) customer payback periods to evaluate free riders; and inclusion of carbon dioxide (CO_2) costs. Fourth, the ten-year (2020-2029) Achievable Potential (AP) is determined based on the maximum incentive levels for all measures that passed the prior screening. In the fifth and sixth steps, various resource plans utilizing the AP based on measures that passed the RIM and Participant screening tests are developed and analyzed, respectively, to determine the optimum level of DSM Goals. I discuss the fourth step (development of the

AP), while Nexant witness Herndon discusses the first step and FPL witness Whitley discusses the other steps in the analytical process.

FPL's Proposed 2020-2029 DSM Goals – FPL's proposed cumulative DSM Goals for 2020-2029 are 352 Summer MW, 259 Winter MW and 1,023 Megawatt-hours (MWh). They are the result of FPL's robust analytical process, requiring months of analyses. FPL's proposed Goals were developed in compliance with Rule 25-17.0021, F.A.C., and the Commission's traditional policies on DSM goal-setting that have provided large cumulative amounts of DSM savings over the years. FPL's proposal will establish DSM Goals at a reasonable and appropriate level given current projections of FPL system costs while continuing to maintain low electric rates for all FPL customers.

Proposed Assistance for Low Income Customers – Because of the aforementioned economics, utility-provided incentives for traditional energy efficiency (EE) measures are not cost-effective. However, EE measures have been one of the primary sources of assistance to low income customers. FPL is therefore proposing to not only retain, but expand its existing Low Income program. Although this program is not cost-effective, FPL believes continuing to provide assistance to this vulnerable group is appropriate and warranted to replace EE program options that will no longer be available. This proposal is consistent with the Commission 2014 Goals docket Order No.

PSC-14-0696-FOF-EU, wherein the Commission recognized the importance of supporting these customers.

Proposed Electric Vehicle Research & Development Pilot Project – With traditional EE measures no longer being viable, FPL is searching for potential next-generation DSM replacements. FPL's 2019 Ten-Year Site Plan (TYSP) shows that electric vehicles (EV) are projected to add approximately 460 Summer MW to FPL's system peak load through 2028. Therefore, FPL proposes adding a Research & Development (R&D) pilot within the existing Conservation Research & Development (CRD) program to evaluate the technical and operational feasibility of FPL reducing system peak demand through control of residential EV chargers.

II. FPL'S HISTORICAL DSM ACHIEVEMENTS

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

A. FPL began offering DSM programs in the late 1970s prior to the Florida Legislature's adoption of FEECA in 1980. Since then, FPL has maintained a continuous commitment to cost-effective DSM. As described in greater detail by FPL witness Whitley, FPL has made DSM an integral part of its IRP process and has consistently evaluated DSM in accordance with the Commission's long-standing goal-setting policies. Through this process, FPL

has developed a wide array of cost-effective load management (LM) and EE programs for both residential and business customers, which have achieved large cumulative reductions. Through year-end 2018, FPL's highly effective DSM efforts have resulted in a cumulative Summer peak demand reduction of 4,840 MW. After accounting for the 20% total reserve margin requirements, this equates to eliminating the need to construct the equivalent of approximately 15 new 400 MW generating units. Cumulative energy consumption savings are 86,108 GWh at the generator, equal to approximately 75% of the consumption of all of FPL's customers for a year. At the same time, the discipline of working within the traditional Commission goal-setting policies has helped ensure that FPL's electric rates remain low. As a result, FPL's bills are the lowest in the state and 30% below the national average as of the time of this filing.

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

A. As shown on Exhibit TRK-1, most of FPL's current programs have been offered since the 1980s or early-1990s. Cumulatively, as of year-end 2018, there have been approximately 7.6 million participants in these programs (some customers have participated in multiple programs) representing more than 4,100 Summer MW and over 80,500 GWh (about 85% and 95% respectively of FPL's cumulative total including discontinued programs). Exhibit TRK-2 provides the list of measures associated with FPL's programs.

Load Management (LM) – FPL operates one of the largest LM programs in the nation. As of year-end 2018, FPL's Residential On Call® program, established in 1986, was the largest residential program in the United States with about 711,000 participants. Along with FPL's over 21,000 business LM participants, FPL currently has over 1,700 MW of Summer LM demand reduction available for use by FPL's system operators.

Energy Efficiency (EE) – FPL has also offered large EE programs for decades. Almost two million customers have participated in FPL's residential Air Conditioning program, making their home's largest source of energy use more efficient than required by the Codes and Standards that were applicable at the time of installation. Likewise, more than 20,000 business customers have participated in FPL's Heating, Ventilation and Air Conditioning (HVAC) program, installing efficient direct expansion (DX) and chiller units as well as Thermal Energy Storage (TES) systems. In addition, over 21,000 business customers have participated in FPL's Business Lighting program, which has experienced a significant increase in lighting participation due to customers replacing existing lights with light-emitting diodes (LED). Combined, current EE programs represent over 2,400 Summer MW and almost 100% of the total GWh shown on Exhibit TRK-1.

Customer Education (Surveys) – Since 1981, FPL has emphasized energy efficiency education for customers. FPL uses residential Home Energy

Surveys (HES) and Business Energy Evaluations (BEE) as a foundational component of its DSM portfolio. These are used for customer education on conservation measures that make economic sense for customers, whether offered as a part of FPL's programs or not. FPL has performed almost four million HESs and almost 250,000 BEEs via online, phone and on-site delivery channels. Since 2015, more than 300 residential customers per day had a HES and more than 40 business customers per work day had FPL conduct a BEE. In addition to the utility-provided educational resources, customers also have access to many other public sources of information (such as governmental resources like ENERGY STAR®, contractors, appliance retailers, and manufacturers) to help them decide on what actions they wish to implement to use energy more efficiently.

Q. Has this success resulted in low electric rates and bills for FPL's customers?

A. Yes. Through disciplined evaluation of DSM and adherence to the Commission's long-standing DSM policies, FPL has been able to achieve this success while keeping electric rates low for all customers. This approach is a contributor to FPL's typical residential monthly bill being the lowest in Florida and 30% below the national average. Clearly, the manner in which FPL and the Commission have historically implemented DSM is working. In other words, FPL's and the Commission's focus on cost-effective DSM has been successful in striking the balance between energy conservation and maintaining low rates for all customers.

III. OVERVIEW OF 2019 DSM GOALS DEVELOPMENT PROCESS

Q. Please provide an overview of the main analyses performed to develop the 2019 DSM Goals.

A. Though there are multiple individual steps in the process, Goals development involves three primary interrelated analyses:

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

(2) **Economic Potential (EP)** – preliminary economic screening of the DSM measures; and

(3) **Achievable Potential (AP)** – the ten-year (2020-2029) achievable customer participation in the measures which survived the EP.

FPL and the other six utilities subject to FEECA (FEECA Utilities) worked jointly on certain aspects of the analyses and also engaged a nationally recognized DSM consultant, Nexant, who has performed many of these types of studies to assist with portions of the work. Nexant conducted the TP analysis for FPL and the other FEECA Utilities. Nexant also performed the EP and/or AP analyses for some of the other FEECA Utilities.

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

A. FEECA requires the Commission to *"…evaluate the full technical potential of all available demand-side and supply-side conservation and efficiency*

measures, including demand-side renewable energy systems." (Section 366.82(3), F.S.) The TP's purpose is to identify the theoretical maximum limit to reducing Summer and Winter electric peak demand and energy. The TP assumes every identified potential end-use measure (or measures) is installed everywhere it is "technically" feasible to do so from an engineering standpoint. The TP ignores cost, customer acceptance, or any other real-world constraints (such as product availability, contractor/vendor capacity, cost-effectiveness, and customer preferences). Therefore, the TP is purely hypothetical and in no way reflects the MW and MWh savings that are achievable through real-world voluntary utility programs.

Nexant performed the TP analyses for each of the FEECA Utilities. This included coordinating the development of the DSM measure list and gathering all data necessary to perform the analysis. The analysis required extensive iterative analytical work and continuous collaboration among the FEECA Utilities to ensure that it was comprehensive. Nexant witness Herndon's testimony provides the analysis details and results. As evidence of the comprehensiveness of the analysis, during the development process the FEECA Utilities shared their draft measure list with Southern Alliance for Clean Energy (SACE) and gathered and considered their input. Ultimately, the draft measure list was comprehensive, and SACE's review resulted in no additions or revisions to the list.

Q. Does the TP represent an adequate assessment of the full Technical Potential of all available demand-side and supply-side conservation and efficiency measures, including demand-side renewable energy systems, pursuant to Section 366.82(3), F.S.?

A. Yes. FPL believes the result of the TP to be reasonable and represents an adequate assessment of the full Technical Potential of all measures given the comprehensive, iterative approach taken.

Q. Please briefly describe the Economic Potential (EP) Analysis.

A. The EP analysis is a preliminary economic screening of the DSM measures identified in the TP. As described by FPL witness Whitley, it involves conducting Participant, RIM, and TRC preliminary screening tests. The maximum cost-effective supportable incentive amount is calculated for any passing measures. During the EP analysis, FPL also performed sensitivity analyses to assess the impact of variations in certain key assumptions: higher and lower fuel costs, shorter and longer (one and three-year) customer payback periods to evaluate free riders; and inclusion of CO_2 costs.

Q. Please briefly describe the Achievable Potential (AP) Analysis.

A. The AP represents the aggregate amount of Summer MW, Winter MW and annual MWh for the residential and business sectors that could reasonably be achieved for those measures that passed the EP screening. The projected annual recruitment levels of participating customers for each measure are based on the maximum incentive levels from the EP. The AP methodology and FPL's results are further described in Section V of my testimony.

Q. Please describe the Commission's long-standing goal-setting policies and the benefits provided to all customers.

A. The Commission has long recognized that Goals for utility-sponsored DSM are not an end in themselves. The absolute level of the Goals will and should change as considerations of cost-effectiveness, technology and other economic factors change over time. By applying these policies, the Commission has approved DSM Goals and Plans that have resulted in substantial levels of DSM being implemented, while at the same time avoiding the large rate impacts that would come from setting Goals on another basis such as the TRC test or some arbitrary metric (such as percentage of a utility's total electric sales). I will discuss three very important Commission policies.

First, consider the use of the RIM test (coupled with the Participant test). This ensures that rate impacts to all customers and cross-subsidization are eliminated or minimized. The RIM test accounts both for the cost of incentives paid to program participants and the upward pressure on rates from, unrecovered revenue requirements associated with sales reduced by DSM. Incentives paid to program participants are a cost of administering the program and are passed on to the general body of customers through the Energy Conservation Cost Recovery (ECCR) clause. Unrecovered revenue requirements due to sales reduced by DSM reduce contributions toward covering fixed costs and therefore put upward pressure on rates for the general

body of customers. Both of these extremely important issues are ignored by the TRC test. The Commission has also long recognized that the use of TRC can result in cross subsidies between customers and could disproportionately impact low-income customers. In its Order No. PSC-94-1313-FOF-EG, the Commission stated:

> *"We will set overall conservation goals for each utility based on measures that pass both the Participant and RIM tests… 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."*
>
> ***
>
> *"All customers, including low-income customers, should benefit from RIM-based DSM programs. This is because RIM-based programs ensure that both participating and non-participating customers benefit from utility-sponsored conservation programs. Additional generating capacity is deferred and the rates paid by low-income customers are less than they otherwise would be."*

Second, is the use of the two-year payback screening criterion to minimize the impact of "free riders." The term free riders refers to the fact that many cost-effective conservation measures will be undertaken on a customer's own volition, without the need for promotion or incentive provided by the

customer's utility company and paid for by the general body of customers. It simply recognizes that rational customers will act in their own economic interest and take measures to reduce energy consumption, if it is sufficiently attractive economically for them to do so without a utility incentive payment. It is an example of a free market economy working as it should – rational economic decisions being made in one's best interest without government intervention through mandates or provision of incentives.

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

It should be emphasized that the ultimate goal is to achieve the maximum amount of cost-effective conservation by the most efficient means. The objective is not to set DSM Goals higher than they should be simply for the sake of having higher Goals. A proper recognition of free riders is necessary to achieve the appropriate Goals.

The Commission has used a two-year payback criterion for decades as the threshold for the point below which a customer would be a free rider and, therefore, should not be considered eligible for an additional utility-provided incentive. This policy has been litigated in multiple previous DSM Goals proceedings wherein the Commission has determined it was an appropriate metric for determining free riders. In fact, the Commission reaffirmed their position in the 2014 DSM Goals docket, Order No. PSC-14-0696-FOF-EU, stating, *"We approved goals based on a two-year payback criterion to identify free riders since 1994 and we find it appropriate to continue this policy."* This method remains an effective common-sense approach that is both reasonable and administratively efficient for meeting the Rule 25-17.0021, F.A.C., requirement that Goals reflect consideration of free riders. It ensures that incentives (and their associated impact to the rates of non-participants) will not be provided in an unnecessary situation.

The last Commission policy is ensuring that DSM Goals are considered in the context of the utility's IRP process. Rule 25-17.0021, F.A.C., states: *"In a proceeding to establish or modify goals, each utility shall propose numerical goals for the ten year period and provide ten year projections, based upon the utility's most recent planning process…"* This language guarantees that the amount of cost-effective DSM being proposed is actually needed based on the current IRP. In other words, the utility's customers are not asked to pay for more DSM than could be productively deployed on the utility's system and

therefore, inclusion of the DSM Goals would result in rates for the general body of customers that are lower, or at a minimum no higher, than the plan would have been without including the DSM Goals. This also provides consistency with the amount of cost-effective DSM that is available to evaluate supply-side alternatives in need determination proceedings.

IV. SIGNIFICANT MARKET FORCES IMPACTING UTILITY DSM

Q. What marketplace changes are impacting utility-sponsored DSM?

A. There are two significant marketplace changes affecting FPL's DSM programs. First, as discussed in more detail in the testimony of FPL witness Sim, all but one of the drivers of FPL's system costs (*e.g.*, generation capital, system fuel cost, etc.) are significantly lower than in the past two DSM Goals dockets. FPL witness Sim's analysis shows that projected DSM benefits have decreased more than 33% in the five-year period since DSM Goals were last set. These reductions result in enormous benefits for all FPL customers, and Florida as a whole, by keeping electric rates low. However, avoiding system costs represents the primary cost-effectiveness benefits achieved through utility-sponsored DSM. Accordingly, if the value of costs "to be avoided" from DSM MW and MWh savings are lower, then fewer DSM programs will be cost-effective. Second, the ever-increasing Codes and Standards will continue to impact all appliances and building design.

Q. Please elaborate on the effects of increased Codes and Standards.

A. Increased Codes and Standards impact all residents and businesses by mandating higher energy efficiency minimums for prospective end-use equipment installations and/or building design improvements. The increasing impact of Codes and Standards for FPL is dramatic. As discussed by FPL witness Sim, in 2009, FPL projected that the reduction on its 2029 Net Energy for Load (NEL) from Codes and Standards would be 9,359,212 MWh. FPL's current projection of the impact on the 2029 NEL is 12,049,520 MWh – an increase of almost 29%. This means that very significant amounts of energy efficiency will still be delivered to FPL's customers. To provide context, FPL's 2019 NEL forecast for the year 2029 is 128,967,611 MWh, which means that the energy reduction delivered through Codes and Standards represents more than 9% of the total FPL's projected NEL.

The Summer peak impacts are even more dramatic. In 2009, FPL projected that the peak load that would be reduced by Codes and Standards for 2029 would be 2,209 MW. FPL's current projection of the impact on peak load in the year 2029 has increased to 4,820 MW. This represents an additional reduction in 2029 peak load of approximately 118%. To fully appreciate the truly significant amounts of peak load reduction for FPL's customers from Codes and Standards, consider that FPL's 2019 forecast of Summer peak load forecast for the year 2029 is 28,008 MW and, therefore, the 4,820 MW reduction represents more than 17% of FPL's total projected Summer peak

load. Because all customers must comply with the higher energy efficiency requirements, market penetration and therefore MW and MWh conservation impacts will be vastly higher as compared to induced participation in voluntary utility programs.

In addition to the reduction in available MW and MWh savings opportunities for utility-offered DSM programs due to Codes and Standards' impacts, DSM programs are affected in two other ways by these increases. First, any utility-offered measures that are no longer above Codes and Standards are rendered obsolete. The previously-achieved utility participation and energy and demand savings will now be attained by the Codes and Standards instead, thereby replacing efficiency gain opportunities that used to be obtained from DSM programs. For example, in 2015 the minimum residential air conditioning Seasonal Energy Efficiency Ratio (SEER) standard was increased from the previous level of 13 to 14. As a result, FPL's previously-offered 14 SEER measure was eliminated from FPL's DSM program.

Second, the "baseline" efficiency level also increases, reducing the incremental savings that the remaining DSM measures could achieve. For example, the 2015 residential air conditioning SEER level increase from 13 to 14 resulted in a loss of 0.13 Summer kW and 275 annual kWh incremental savings for all higher SEER units. For a customer installing a straight-cool air conditioner with a 16 SEER, this represented efficiency replacements of more

than 35% for both Summer kW and annual kWh from the then-current 0.36 Summer kW and 731 annual kWh savings (relative to the previous 13 SEER baseline). This Codes and Standards replacement of participating customer demand and energy savings significantly affected utility program/measure cost-effectiveness which caused FPL to eliminate some of its previously-incented higher SEER level units and put downward pressure on its sector-level DSM Goals, simply because there were less savings to be realized through DSM programs.

Lighting has been equally impacted by its Codes and Standards changes. In fact, in just the last few years, market dynamics have transformed to the point that LEDs have become the de facto, if not the only, reasonable choice for many lighting applications.

Q. Will the impact of changes in Codes and Standards during the upcoming DSM Goals period be substantially greater than in prior periods?

A. Yes. I have previously provided comparisons to the 2009 Goals docket. But, as described by FPL witness Sim, the increases are large even from the 2014 DSM Goals docket where FPL's customers were projected to receive reductions of approximately 10,645,000 MWh and 3,705 MW peak load from Codes and Standards by 2029. The current savings projection is much higher at 12,049,520 MWh and 4,820 MW – approximately 15% and 30% larger, respectively. This means that FPL customers' usage as a whole is projected to be much more energy efficient than as recently as five years ago. Although

Codes and Standards reduce the economic viability of FPL's DSM versus the prior 2014 docket, the efficiency improvements will provide FPL's customers the same fuel savings, emission reductions and other benefits – the only difference is that FPL's non-participating customers will not have to fund the utility DSM incentives to get these efficiencies.

Q. Has FPL's DSM portfolio been modified in the past due to changes in market forces?

A. Yes. FPL's DSM portfolio has never been static. Over the decades, programs have been added, removed or modified to adapt to changing FPL resource requirements and market conditions. A few examples are: (a) in 2006, FPL faced increased short-term resource needs and significantly increased its DSM implementation by increasing LM recruitment and adding some new measures; (b) in 2012, FPL removed its residential air conditioning right-sizing measure because the Florida Building Code had been updated to mandate it; and (c) in 2015, as previously mentioned, FPL adjusted its residential air conditioning program for the 13 to 14 SEER change.

V. 2020-2029 ACHIEVABLE POTENTIAL

Q. Please summarize the process that FPL used to develop its DSM Achievable Potential (AP).

A. As described by FPL witness Whitley, measures from the TP are screened under both RIM and TRC cost-effectiveness tests coupled with the Participant

test, and the years-to-payback screening is also applied in both instances. Five unique measures passed the preliminary economic screening under RIM and 56 passed under TRC.[1] Maximum incentives for each measure in the base case RIM and TRC screenings were also determined as part of this analysis. The measures that passed the preliminary screening tests and their maximum incentives were used as inputs to the next analysis, the determination of AP under both the RIM and TRC screening test paths. The AP determination analysis was performed under my direction.

Q. Please explain the process FPL used to develop its RIM and TRC APs.

A. The AP process used in this docket is the same basic approach used by FPL and relied upon by the Commission in the 2014 DSM Goals docket. For each measure that passed the EP preliminary screening under either RIM or TRC, FPL used a combination of quantitative information, qualitative information and FPL's market experience to develop the AP. The AP represents the sum of FPL's estimates of Summer MW, Winter MW and Annual MWh for 2020-2029 for each measure. In contrast to the TP and EP values, the AP MW and MWh values represent meaningful "real-world" inputs of DSM annual potential that can be reasonably achieved and used in the rest of FPL's IRP process.

[1] The RIM and TRC-passing unique measures expanded to over 38 and 873 permutations respectively when accounting for: three residential housing types; 13 commercial business types; 13 industrial segments, three commercial/industrial rate classes, and both new and existing construction.

Voluntary DSM programs recruit participants through marketing, education, training, and by providing financial incentives. A customer's decision on whether or not to participate in a given DSM measure is the result of many interrelated factors. FPL calculated the estimated ten-year customer adoption level, or participation, on a measure-by-measure basis relying on a number of elements that reflect FPL's market experience:

- Historical FPL adoption rates – provided "baseline" market experience reflecting both the empirical and the non-quantifiable factors (such as customer awareness, etc.);
- Projected changes in market conditions – used to adjust historic adoption for changes, such as lower projected incentives;
- Change in participant's years-to-payback – with compared to without the maximum incentives; and
- Payback Acceptance Curves – provided the percent of customers who should select a measure based on years-to-payback. These curves are based on customers' stated preferences from market research.

For currently-offered measures, FPL used its historic achievements adjusted for any changes in incentive levels. For new measures (*i.e.,* those not included in FPL's current DSM portfolio), the Year 1 (2020) participation was assumed to be zero due to the likely timing of final DSM Plan and Program Standards approvals and the time and logistics required to launch and generate customer awareness – all of which will likely take essentially all of 2020 to

complete. For 2021-2029, FPL applied a two-year ramp-up rate, until the measure reached its steady-state adoption, at which point customer growth rates based on FPL's 2019 TYSP projections were applied.

For residential measures, each customer residence represents one participant. For business measures, due to the differences between various types of businesses, a "participant" was normalized to one Summer kW, which put the calculations on a standardized basis. The projected adoption values were translated into their respective kW and kWh amounts and then summed to create the residential and business sector AP under both RIM and TRC screening test paths.

Q. What are FPL's RIM and TRC APs for 2020-2029?

A. FPL's RIM and TRC APs are shown in Exhibit TRK-3.

Q. Why are the ten-year AP amounts lower than the TP?

A. It should be expected that the AP will be substantially less than the TP. The TP is a theoretical construct that essentially represents 100% market penetration everywhere a measure is assumed to be technically feasible. In contrast, the AP represents the amount of demand and energy savings that are both preliminarily cost-effective and projected to be reasonably achievable through voluntary customer participation in the marketplace over the ten-year Goals period.

The two significant market forces previously discussed have a massive impact on the AP. Both the increased Codes and Standards and the lower avoided cost benefits substantially reduced the number of measures passing the EP. FPL's AP is the product of normal market forces which have made it more difficult for utility DSM to compete with the cost of supply-side resources. Again, this should not be viewed as a negative consequence, but rather a positive result of greater system efficiency (*i.e.,* lower avoided costs) and increased conservation and efficiency of customer usage as a whole.

VI. PROPOSED 2020-2029 DSM GOALS

Q. Once FPL determined its AP, how were the proposed DSM Goals determined?

A. As discussed by FPL witness Whitley, FPL used the AP based on those measures that passed the RIM and Participant tests and the two-year payback screen (consistent with the Commission's traditional goal-setting policies) as an input to the fifth and sixth steps of the DSM goal development process, in which various resource plans are developed and analyzed to determine the level of DSM Goals that represents an optimal mix of DSM and supply-side measures and thus minimizes the overall electric rates for all customers.

Q. What are FPL's proposed DSM Goals for 2020-2029?

A. FPL's proposed DSM Goals are set forth on Exhibit TRK-4. They result from the robust analytical process, requiring months of analyses and thorough

vetting of all assumptions, that Nexant witness Herndon and FPL witnesses Whitley, Sim and I describe. FPL's proposed Goals were developed in compliance with Rule 25-17.0021, F.A.C., and the traditional goal-setting policies that have served FPL's customers well over the years by providing substantial amounts of DSM while keeping all customers' electric rates low.

FPL's proposed Goals of 352 Summer MW, 259 Winter MW and 1,023 MWh appropriately reflect the amount of cost-effective DSM reasonably achievable over the ten-year planning period and, after accounting for the 20% total reserve margin, is equivalent to avoiding yet another 400 MW power plant, on top of the 15 such plants that FPL's DSM programs have already avoided. Though both annual and cumulative figures are shown, FPL proposes the Commission return to the use of cumulative Goals which had been the case prior to 2009.

Q. Is it reasonable that the 2020-2029 Goals are lower than those established in 2014?

A. Yes. Goals can, will and should vary, potentially significantly, from one reset period to another. As previously discussed, there have been significant market changes since 2014 which have reduced utility-sponsored DSM competitiveness. Setting prospective Goals should not be done based on an arbitrary target (such as previously-established Goals or a percentage of total sales), but instead should be based on the level that the IRP analytics determine, using current forecasts and assumptions, represent the lowest long-

term electric rate impacts for FPL's customers. The end objective is certainly not to have ever-increasing conservation goal levels without regard to cost and electric rates. Rather, the objective is to have appropriate goals, regardless of their absolute value. The DSM Goals, whether higher or lower, are not an end in themselves, but instead represent one of the resources available to meet projected needs in the most cost-effective manner possible in order to keep electric rates and customer bills as low as possible.

Q. Considering savings from all sources – FPL's proposed DSM Goals as well as Codes and Standards – what is the impact on projected total peak demand and annual energy reductions in the current docket v. the 2014 docket?

A. Overall, when factoring in all sources of savings, from both DSM Goals and due to Codes and Standards, FPL customers are currently projected to receive significantly more total MW and MWh reductions by the end of the Goals period in 2029 than the previous projection from the 2014 DSM Goals.

FPL customers are currently projected to have 4,820 MW of peak reduction from Codes and Standards in 2029. Adding the 352 MW savings from FPL's proposed Goals yields a total of 5,172 MW. The similar projection from 2014 showed customers were projected to receive 3,705 MW of peak reduction from Codes and Standards in 2029. With the addition of 526 MW from utility-sponsored DSM, the total was 4,231 MW. Therefore, the current projection represents more than a 22% savings increase.

For annual energy reduction, FPL customers are projected to have 12,049,520 MWh of annual energy reduction from Codes and Standards in 2029. Including the 1,023 MWh from FPL's proposed Goals yields a total of 12,050,543 MWh. The similar projection from 2014 showed customers were projected to receive 10,645,000 MWh of annual energy reduction from Codes and Standards in 2029. With the addition of 526,274 MWh of utility-sponsored DSM, the total was 11,171,274 MWh of annual energy reduction. Therefore, the current projection represents an approximate 8% savings increase.

Q. Should the Commission establish additional goals for efficiency improvements in generation, transmission and distribution?

A. No. As a normal course of business, FPL continually looks for opportunities to reduce the cost of providing electrical service to our customers. The potential for supply-side improvements is continually evaluated by FPL in its ongoing resource planning analyses. As noted in FPL witness Sim's testimony, the fuel-efficiency of FPL's generating system has dramatically improved evidenced by the heat rate of FPL's fossil fuel generating units having improved by approximately 29% since 2001 and continuing to improve. Supply-side efficiency and conservation are also analyzed in every need determination for new generation. Rule 25-17.001, F.A.C., supports this stating: "*. . . general goals and methods for increasing the overall efficiency of the bulk electric power system of Florida are broadly stated since these methods are an ongoing part of the practice of every well-managed electric*

utility's programs and shall be continued." The Commission agreed with this position in its 2009 Goals Order stating:

> *"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." and "… goals in these areas will not be set as part of this proceeding."*

The Commission reaffirmed this position in its 2014 Goals Order.

Q. How do the proposed goals impact the development of demand-side renewable energy systems?

A. None of the demand-side renewable energy (DSRE) system measures proved cost-effective in the analysis. Therefore, beyond the provisions already included in Rule 25-6.065, F.A.C., Goals for DSRE systems should be zero. This is consistent with the Commission's 2014 Goals Order decision which stated that:

> *"Each of the IOUs should continue to implement the provisions of Rule 25-6.065, F.A.C., Interconnection and Net Metering of*

Customer-Owned Renewable Generation. The rule is an appropriate means to encourage the development of demand-side renewable energy, as it expedites the interconnection of customer-owned renewable energy systems and benefits participating customers through net metering."

VII. PROPOSED ASSISTANCE FOR LOW INCOME CUSTOMERS AND EV R&D PILOT PROJECT

Q. Please describe FPL's Low Income program.

A. Foremost, FPL believes the best way to help low income customers is by keeping electric rates low. FPL uses a multi-prong approach to support low income customers through DSM. The first prong is to continue to keep electric rates low for all customers by focusing DSM efforts on cost-effective DSM programs (*i.e.*, programs that pass the RIM screening test). The second prong is energy efficiency education. FPL's residential Home Energy Survey, offered through multiple channels, provides education on actions customers can take to reduce their electric cost by participating in FPL's DSM programs and also by taking actions and implementing measures, many at low or no cost, which are not offered as part of FPL's DSM programs. The third prong is offering participation in FPL's residential programs, such as Residential On Call®. Over the years, participation rates for low income customers in FPL's DSM programs have been in approximately the same proportion as FPL's

customer base as a whole. The final prong is participation in FPL's Low Income program which is designed specifically for low income customers. This program includes measures that do not pass RIM and some that have customer payback periods of less than two years.

Q. Why is FPL proposing to retain and expand its Low Income Program in this proceeding?

A. As previously discussed, in the decades since FEECA was enacted, the marketplace has evolved dramatically. While utility-provided incentives for traditional EE measures no longer make sense because they are not cost-effective, they have been one of the sources of assistance to low income customers. In recognition of these changes, FPL is proposing to retain and expand its existing Low Income program. Although this program is not cost-effective, FPL believes continuing to provide assistance to this vulnerable group is appropriate and warranted to replace eliminated EE program options that will no longer be available. This proposal is consistent with the Commission 2014 Goals docket Order No. PSC-14-0696-FOF-EU, wherein the Commission recognized the importance of supporting these customers. If approved, the estimated ten-year amounts of 14 Summer MW, 4 Winter MW and 34,000 MWh associated with this proposal should be added to FPL's currently proposed 2020-2029 DSM Goals.

Q. Please describe FPL's proposed R&D pilot project for EVs and its purpose.

A. With traditional EE measures no longer being viable, FPL is searching for

potential next-generation DSM program replacements. Due to the projected 460 Summer MW increase from EVs to FPL's system through 2028 as shown in FPL's 2019 TYSP, FPL proposes adding a pilot project to the existing CRD program to evaluate the technical and operational feasibility of reducing the peak demand impact of residential EV chargers through direct utility control. This pilot would also assess the design parameters for a cost-effective DSM program. Consistent with FPL's other CRD projects, any associated kW or kWh savings would not be additive to FPL's 2020-2029 DSM Goals.

Q. Does this conclude your direct testimony?

A. Yes.

Current DSM Programs and Achievements

Current DSM Programs	Inception Date	Cumulative - Inception to Year-End 2018* Participants	Summer MW	Winter MW	GWh
Residential					
1 **Home Energy Survey****	1/1981	3,980,992	n/a	n/a	n/a
2 **Load Management (On Call®)**	7/1986	710,643	854	706	24
3 **Air Conditioning**	10/1990	1,950,130	1,326	471	27,434
4 **New Construction (BuildSmart®)**	2/1996	47,528	44	34	692
5 **Ceiling Insulation**	10/1981	579,096	259	296	11,165
6 **Low Income**	3/2005	14,686	15	1	38
Business					
7 **Business Energy Evaluation****	10/1990	247,509	n/a	n/a	n/a
8 **Commercial/Industrial Demand Reduction**	5/2000	604	315	202	29
9 **Commercial/Industrial Load Control**	4/1988	337	466	392	93
10 **Business On Call**	6/1995	20,397	79	0	1
11 **Heating, Ventilating & Air Conditioning**	2/1990	20,252	415	92	12,500
12 **Lighting**	6/1984	21,065	306	190	24,929
13 **Custom Incentive**	4/1993	128	55	64	3,626
Current DSM Programs Total		**7,593,367**	**4,133**	**2,448**	**80,532**
Discontinued DSM Programs***		2,295,981	707	575	5,576
Grand Total		**9,889,348**	**4,840**	**3,022**	**86,108**

Notes:

* MW and GWh values are at the generator

** No MW or GWh savings attributed to Survey programs

*** On-going savings related to participation in programs discontinued in FPL's 2015 DSM Plan or before

Current DSM Programs and Associated Measures

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

2020-2029 Achievable Potential – RIM [2]

	FPL Achievable Potential - Combined (RIM)					
	Summer MW		Winter MW		Annual MWh	
Year	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
2020	35.2	**35.2**	25.9	**25.9**	102	**102**
2021	35.2	**70.4**	25.9	**51.7**	102	**205**
2022	35.2	**105.6**	25.9	**77.6**	102	**307**
2023	35.2	**140.8**	25.9	**103.5**	102	**409**
2024	35.2	**176.1**	25.9	**129.4**	102	**511**
2025	35.2	**211.3**	25.9	**155.2**	102	**614**
2026	35.2	**246.5**	25.9	**181.1**	102	**716**
2027	35.2	**281.7**	25.9	**207.0**	102	**818**
2028	35.2	**316.9**	25.9	**232.9**	102	**920**
2029	35.2	**352.1**	25.9	**258.7**	102	**1,023**

	FPL Achievable Potential - Residential (RIM)					
	Summer MW		Winter MW		Annual MWh	
Year	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
2020	24.0	**24.0**	20.7	**20.7**	12	**12**
2021	24.0	**48.1**	20.7	**41.5**	12	**23**
2022	24.0	**72.1**	20.7	**62.2**	12	**35**
2023	24.0	**96.1**	20.7	**82.9**	12	**47**
2024	24.0	**120.1**	20.7	**103.7**	12	**58**
2025	24.0	**144.2**	20.7	**124.4**	12	**70**
2026	24.0	**168.2**	20.7	**145.1**	12	**81**
2027	24.0	**192.2**	20.7	**165.9**	12	**93**
2028	24.0	**216.2**	20.7	**186.6**	12	**105**
2029	24.0	**240.3**	20.7	**207.4**	12	**116**

	FPL Achievable Potential - Business (RIM)					
	Summer MW		Winter MW		Annual MWh	
Year	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
2020	11.2	**11.2**	5.1	**5.1**	91	**91**
2021	11.2	**22.4**	5.1	**10.3**	91	**181**
2022	11.2	**33.6**	5.1	**15.4**	91	**272**
2023	11.2	**44.7**	5.1	**20.6**	91	**363**
2024	11.2	**55.9**	5.1	**25.7**	91	**453**
2025	11.2	**67.1**	5.1	**30.8**	91	**544**
2026	11.2	**78.3**	5.1	**36.0**	91	**635**
2027	11.2	**89.5**	5.1	**41.1**	91	**725**
2028	11.2	**100.7**	5.1	**46.2**	91	**816**
2029	11.2	**111.9**	5.1	**51.4**	91	**906**

[2] Values are at the generator

2020-2029 Achievable Potential – TRC [3]

	FPL Achievable Potential - Combined (TRC)					
	Summer MW		Winter MW		Annual MWh	
Year	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
2020	45.9	**45.9**	32.2	**32.2**	12,640	**12,640**
2021	46.5	**92.4**	32.3	**64.5**	15,651	**28,291**
2022	47.1	**139.5**	32.4	**96.9**	18,749	**47,040**
2023	47.7	**187.2**	32.6	**129.5**	21,936	**68,976**
2024	47.6	**234.7**	32.2	**161.7**	21,628	**90,604**
2025	47.5	**282.2**	31.9	**193.6**	21,382	**111,986**
2026	47.4	**329.5**	31.6	**225.2**	21,187	**133,172**
2027	47.3	**376.8**	31.4	**256.6**	21,036	**154,208**
2028	47.2	**424.1**	31.2	**287.8**	20,922	**175,131**
2029	47.2	**471.3**	31.0	**318.9**	20,841	**195,972**

	FPL Achievable Potential - Residential (TRC)					
	Summer MW		Winter MW		Annual MWh	
Year	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
2020	25.7	**25.7**	25.1	**25.1**	4,349	**4,349**
2021	25.8	**51.4**	24.7	**49.8**	4,620	**8,969**
2022	25.9	**77.3**	24.4	**74.2**	4,989	**13,958**
2023	26.0	**103.4**	24.1	**98.3**	5,440	**19,398**
2024	25.9	**129.3**	23.8	**122.1**	5,072	**24,470**
2025	25.8	**155.1**	23.4	**145.5**	4,765	**29,235**
2026	25.7	**180.7**	23.1	**168.6**	4,508	**33,743**
2027	25.6	**206.3**	22.9	**191.5**	4,295	**38,039**
2028	25.5	**231.9**	22.7	**214.2**	4,120	**42,158**
2029	25.5	**257.3**	22.5	**236.8**	3,976	**46,135**

	FPL Achievable Potential - Business (TRC)					
	Summer MW		Winter MW		Annual MWh	
Year	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
2020	20.2	**0.0**	7.1	**7.1**	8,291	**8,291**
2021	20.7	**20.7**	7.6	**14.7**	11,031	**19,322**
2022	21.2	**41.9**	8.0	**22.7**	13,760	**33,082**
2023	21.7	**63.5**	8.5	**31.2**	16,496	**49,578**
2024	21.7	**85.2**	8.5	**39.6**	16,556	**66,134**
2025	21.7	**106.9**	8.5	**48.1**	16,617	**82,751**
2026	21.7	**128.6**	8.5	**56.6**	16,678	**99,429**
2027	21.7	**150.3**	8.5	**65.1**	16,740	**116,170**
2028	21.7	**172.0**	8.5	**73.6**	16,802	**132,972**
2029	21.7	**193.7**	8.5	**82.1**	16,865	**149,837**

[3] Values are at the generator

2020-2029 Proposed DSM Goals [4]

	FPL Proposed Goals - Combined					
	Summer MW		Winter MW		Annual MWh	
Year	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
2020	35.2	**35.2**	25.9	**25.9**	102	**102**
2021	35.2	**70.4**	25.9	**51.7**	102	**205**
2022	35.2	**105.6**	25.9	**77.6**	102	**307**
2023	35.2	**140.8**	25.9	**103.5**	102	**409**
2024	35.2	**176.1**	25.9	**129.4**	102	**511**
2025	35.2	**211.3**	25.9	**155.2**	102	**614**
2026	35.2	**246.5**	25.9	**181.1**	102	**716**
2027	35.2	**281.7**	25.9	**207.0**	102	**818**
2028	35.2	**316.9**	25.9	**232.9**	102	**920**
2029	35.2	**352.1**	25.9	**258.7**	102	**1,023**

	FPL Proposed Goals - Residential					
	Summer MW		Winter MW		Annual MWh	
Year	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
2020	24.0	**24.0**	20.7	**20.7**	12	**12**
2021	24.0	**48.1**	20.7	**41.5**	12	**23**
2022	24.0	**72.1**	20.7	**62.2**	12	**35**
2023	24.0	**96.1**	20.7	**82.9**	12	**47**
2024	24.0	**120.1**	20.7	**103.7**	12	**58**
2025	24.0	**144.2**	20.7	**124.4**	12	**70**
2026	24.0	**168.2**	20.7	**145.1**	12	**81**
2027	24.0	**192.2**	20.7	**165.9**	12	**93**
2028	24.0	**216.2**	20.7	**186.6**	12	**105**
2029	24.0	**240.3**	20.7	**207.4**	12	**116**

	FPL Proposed Goals - Business					
	Summer MW		Winter MW		Annual MWh	
Year	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
2020	11.2	**11.2**	5.1	**5.1**	91	**91**
2021	11.2	**22.4**	5.1	**10.3**	91	**181**
2022	11.2	**33.6**	5.1	**15.4**	91	**272**
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2028	11.2	**100.7**	5.1	**46.2**	91	**816**
2029	11.2	**111.9**	5.1	**51.4**	91	**906**

[4] Values are at the generator

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

FLORIDA POWER & LIGHT COMPANY

DIRECT TESTIMONY OF ANDREW W. WHITLEY

DOCKET NO. 20190015-EG

APRIL 12, 2019

TABLE OF CONTENTS

I. INTRODUCTION

Q. Please state your name and business address.

A. My name is Andrew W. Whitley, and my business address is 700 Universe Blvd., Juno Beach, Florida 33408.

Q. By whom are you employed and what is your position?

A. I am employed by Florida Power & Light Company (FPL) as Principal Engineer in the Integrated Resource Planning department of FPL's Finance Business Unit.

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

A. I conduct resource planning and production cost analyses that examine the timing and magnitude of FPL's resource needs as well as the economics of how to meet those needs.

Q. Please describe your educational background and professional experience.

A. I graduated from Lehigh University in 2004 with a Bachelor of Science in Mechanical Engineering. I joined FPL in 2004 as part of FPL's Distribution Business Unit, and performed various engineering tasks related to providing new service as well as maintaining the reliability of existing services to FPL's customers. In 2007, I joined FPL's Resource Assessment and Planning group (now referred to as the Integrated Resource Planning group). During that time, I have been involved in a variety of resource planning projects for FPL. Starting in 2011, I began regularly updating FPL's cost-effectiveness models and then evaluating Demand Side Management (DSM) measures and

programs. In 2013 and 2014, I was the principal analyst involved in performing FPL's analysis in support of its 2014 DSM Goals. As part of this analysis, I evaluated FPL's resource needs that could be met with DSM, conducted cost-effectiveness screening of DSM measures, and performed rate impact analyses on FPL's proposed Goals.

After my work on the previous DSM Goals, I was involved in performing analysis in support of both the Okeechobee Clean Energy Center (in 2015) and Dania Beach Clean Energy Center Need Determination (in 2017-2018) filings.

Q. Are you sponsoring any exhibits in this case?

A. Yes. I am sponsoring Exhibits AWW-1 through AWW-14 which are attached to my testimony:

- Exhibit AWW-1: FPL's Resource Planning Process as Applied to DSM Goal-Setting;
- Exhibit AWW-2: Economic Elements Accounted for in DSM Preliminary Screening Tests: Benefits and Costs;
- Exhibit AWW-3: Summary Results of Preliminary Economic Screening of Individual DSM Measures (w/o and w/CO_2 Costs);
- Exhibit AWW-4: Summary Results of Preliminary Economic Screening of Individual DSM Measures: Sensitivity Cases;
- Exhibit AWW-5: Forecasted Fuel and Environmental Compliance Costs;

- Exhibit AWW-6: Projection of FPL's Resource Needs for 2020-2031 with No Incremental DSM Signups After 2019;
- Exhibit AWW-7: Comparison of DSM Achievable Potential Summer MW Values with FPL's Projected Summer Resource Needs (Assuming the Resource Needs are Met Solely by DSM);
- Exhibit AWW-8: Overview of Supply Only and With DSM Resource Plans;
- Exhibit AWW-9: Example of Levelized System Average Electric Rate Calculation for the RIM Resource Plan;
- Exhibit AWW-10: Comparison of the Resource Plans: Economic Analyses Results and Consequences;
- Exhibit AWW-11: Additional Cost Needed to be Added to RIM Plan to Increase its Levelized System Average Electric Rate to That of the TRC Plan;
- Exhibit AWW-12: Comparison of the Resource Plans: Projection of System Average Electric Rates and Customer Bills (Assuming 1,200 kWh Usage);
- Exhibit AWW-13: Comparison of the Resource Plans: Projection of System Emissions; and
- Exhibit AWW-14: Comparison of the Resource Plans: Projection of System Oil and Natural Gas Usage.

Q. What is the scope of your testimony?

A. The scope of my testimony is as follows:

1. Provide an overview of FPL's resource planning process and DSM Goals evaluation process;
2. Review the relevant assumptions used in FPL's resource planning process;
3. Present the results of the Economic Potential preliminary screening analysis for all of the DSM Goals measures which served as inputs for the Achievable Potential work discussed in FPL witness Thomas R. Koch's testimony; and
4. Review the resource plans that are based on the results of the Achievable Potential analyses and how these resource plans meet FPL's resource needs and how they compare on economic and non-economic factors.

Q. Please summarize your testimony.

A. Utilizing FPL's resource planning process and the latest forecasts, assumptions and cost estimates, FPL's customers would experience the lowest electric rates with proposed DSM Goals that are based upon the application of the Rate Impact Measure (RIM) and Participant tests, plus the years-to-payback screening for cost-effectiveness. Those proposed DSM Goals are 352 megawatts (MW) Summer demand, 259 MW Winter demand and 1,023 megawatt-hours (MWh) energy reduction for the period 2020 through 2029.

In my testimony, I cover:

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

- Why the application of the RIM test, in conjunction with the Participant test, is most appropriate when setting DSM Goals;
- How the projected Achievable Potential of DSM compares to FPL's resource needs in the 2020-2029 timeframe;
- FPL's proposed Supply Only Resource Plan, With DSM Resource Plans, and how all of these plans compare on both economic and non-economic bases; and
- How the final resource plan based on FPL's proposed DSM Goals continues to provide reliable electric service for FPL's customers at low electric rates.

II. FPL'S RESOURCE PLANNING PROCESS

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

A. Yes. Beginning in 2018, and continuing into the first quarter of 2019, FPL undertook a months-long process to determine its resource plan for use in the 2019 DSM Goals filing, as well as all other 2019 analyses, including the 2019 Ten Year Site Plan (Site Plan). The assumptions used in FPL's planning process were developed in late-2018 and early 2019 and accurately represent a current projection of FPL's system.

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

A. There are two important reasons FPL used its most recent planning process to develop its DSM goals. First, Rule 25-17.0021 F.A.C., subsection (3) states in part that: "In a proceeding to establish or modify goals, each utility shall propose numerical goals for the ten-year period…, *based upon the utility's most recent planning process*…" (emphasis added) Accordingly, FPL based its proposed goals upon its most recent planning process to comply with the Commission's DSM Goals rule. Second, it is important for a utility to use its own resource planning process while setting DSM Goals or performing the analysis of any resource option, because each utility has its own specific characteristics that can alter the timing and magnitude of its resource needs, and can influence the cost-effectiveness of resource options.

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

A. There are 3 main goals of FPL's resource planning process:

1. Identify the timing of FPL's resource needs. The timing of future resource needs is largely determined by reliability standards (such as reserve margins and loss-of-load probability requirements).
2. Identify the magnitude of these resource needs, *i.e.*, how many MW of capacity are needed to satisfy reliability criteria.
3. Identify the type of resources, either supply-side or demand-side, that can meet these capacity needs. This selection is determined by the

option that is projected to result in the lowest electric rates for FPL's customers.

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

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

Note that if one were comparing two resource plans that have the same level of DSM, the two plans will have the same NEL. Therefore, the plan with the lower CPVRR in that scenario also would have the lower Levelized System Average Electric Rate. However, in an evaluation of varying DSM Goals portfolios, some plans will have different NELs, and, therefore, cannot be evaluated on CPVRR alone. Evaluating portfolios based on lowest electric

rates, instead of lowest CPVRR costs eliminates the possibility of selecting a portfolio of resource options that results in higher electric rates for all of FPL's customers than a competing portfolio. It also ensures there is no cross-subsidization between participating and non-participating customers.

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

A. An overview of FPL's IRP process is presented annually in FPL's Site Plan filings. One can summarize FPL's IRP process by the following four tasks:

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

Q. How does FPL apply its IRP process to the specific analyses that are needed for a DSM Goals-setting docket?

A. In a DSM Goals-setting docket, FPL freezes its DSM additions before the start of the next DSM Goals period. FPL assumes no incremental DSM, and, "starting from scratch," projects how much DSM should be implemented for the next ten years. FPL approaches that task by applying its IRP process in a

6-Step analysis approach. This same basic process was used by FPL in its prior DSM Goals-setting dockets.

Q. Please summarize the 6-Step resource planning process for DSM Goals-setting.

A. An overview of the 6 step planning process is presented in Exhibit AWW-1. The process can be summarized as follows:

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

Step 2: Assuming no incremental DSM signups occur after December 31, 2019, FPL's projected resource needs for 2020 through 2029 were determined. Two determinations of resource needs are made: one if the resource needs are theoretically met solely by Supply options and one if the resource needs are theoretically met solely by DSM options. These two projections are different because of FPL's 20% total reserve margin criterion. For example, if the resource need to be met solely by DSM options for a given year is 100 MW, the resource need to be met solely by Supply options for the same year is 100 MW x (1 + 0.2) = 120 MW.

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

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

Step 4: The remaining DSM measures, and their accompanying maximum incentive levels, are then analyzed to determine the projected

Achievable Potential over the 2020 through 2029 time period. Again, this step is divided into two separate paths of analysis depending on the cost-effectiveness screening tests that are being applied. The resulting projection for each DSM measure represents the projected maximum annual signups for each year of the ten-year DSM Goals period. Cumulatively, the sum of these projected maximum annual signups for each DSM measure identifies how many MW of DSM resources are projected to be available each year to potentially meet FPL's projected annual resource needs. FPL witness Koch addresses the process of evaluating the Achievable Potential for the remaining DSM measures in his direct testimony.

Step 5: In this step, the projections of resource needs developed previously in Step 2 are used again in several ways. First, FPL uses the projection of resource needs, if the needs are met solely by Supply options, to develop a resource plan in which only Supply options are added. This resource plan is referred to as the "Supply Only" Resource Plan. Next, FPL compares the projected maximum annual DSM MW signups identified in Step 4 to the projected annual resource needs if those needs are met solely by DSM options. From this comparison, at least two "With DSM" Resource Plans are developed, one based on the RIM and Participant tests; another based on the TRC and Participant tests. These resource plans may consist solely of DSM measures, or a combination of DSM and

Supply options, for the ten-year Goals-setting period. At the conclusion of Step 5, the Supply Only and With DSM Resource Plans have been developed for the more detailed system analyses.

Step 6: These resource plans are analyzed from both economic and non-economic perspectives. The best resource plan based on these perspectives is identified, and the amount of incremental DSM included in that plan is selected as FPL's proposed DSM Goals for the 2020 - 2029 time period.

Q. Does FPL's 6-step analytical process outlined above result in Supply and DSM resource options being evaluated on a level playing field?

A. Yes. One of the objectives of integrated resource planning is to evaluate all resource options under consideration using a "level playing field" approach. FPL's analyses evaluate both Supply and DSM resource options in terms of the resource options' ability to meet FPL's resource needs. In addition, these analyses allow the resources to be fully evaluated from an economic perspective in regards to both benefits and costs, as well as from non-economic perspectives, using an identical set of evaluation metrics. In regards to the economic analyses, all projected cost impacts that will affect FPL's customers in terms of the electric rate levels they will be charged are accounted for in these analyses.

Q. Which of the 6 steps outlined above will you be addressing in your testimony?

A. I address Steps 2, 3, 5, and 6 of this process, plus other topics, in the remainder of my testimony. Nexant witness Herndon addresses Step 1, and FPL witness Koch addresses Step 4, plus other topics, in his direct testimony.

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

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

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

The second reliability criterion used by FPL is a Loss-of-Load-Probability (LOLP) criterion. LOLP is a projection of how well an electric utility system may be able to meet its firm demand (*i.e.*, a measure of how often firm load may exceed available resources). In contrast to a reserve margin approach that looks at the one Summer peak hour and the one Winter peak hour, the LOLP approach looks at the peak hourly demand for each day of the year. The LOLP approach takes into consideration the probability of individual generators

being out-of-service due to scheduled maintenance or forced outages. LOLP is typically expressed in terms of "numbers of times per year" that the system firm demand could not be served. FPL's LOLP criterion is a maximum of 0.1 days per year. This LOLP criterion is commonly used throughout the electric utility industry.

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

Q. What forecasts and assumptions did FPL use in its 2019 planning process?

A. Every year, FPL updates its forecasts as part of its IRP process and in support of filing its yearly Site Plan. In its 2019 resource planning work, including the analyses for this docket, FPL is using the following forecasts:

1. A forecast of fuel prices (natural gas, coal, and oil), dated December 3, 2018;
2. A forecast of projected hourly load, dated December 13, 2018; and

3. A forecast of carbon dioxide (CO_2) compliance costs, dated December 6, 2018 (Use of this forecast in one of the sensitivity analyses is explained later in my testimony).

As discussed in FPL's 2019 Site Plan, FPL made a number of assumptions regarding its resource mix that affected its projected resource needs in the 2019 planning process. These assumptions include:

- The retirement of Martin Units 1 & 2 in 2019;
- The retirement of Manatee Units 1 & 2 by the end of 2021;
- The addition of the Okeechobee Clean Energy Center in 2019;
- The addition of the Dania Beach Clean Energy Center in 2022; and
- The cumulative addition of approximately 8,053 MW (nameplate) of solar by the end of 2028 which is the last year addressed in the 2019 Site Plan. (FPL is also projecting the addition of another 1,200 MW of solar in 2029.)

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

A. Yes. FPL witness Dr. Steven R. Sim explains further the projected magnitude and effects of energy efficiency resulting from Codes and Standards.

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

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

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

A. FPL developed these resource plans primarily using the EGEAS (Electric Generation Expansion Analysis System) planning model. The EGEAS model utilizes dynamic programming to conduct an extensive evaluation of all possible resource plans that can meet a utility's reliability requirements. FPL and the Commission have relied upon this model in numerous prior proceedings, and it was used to develop FPL's 2019 Site Plan. EGEAS incorporated a number of FPL forecasts and assumptions into its analysis including the following:

- The 20% total Reserve Margin reliability criterion described earlier;
- Forecasts for peak load, energy, fuel prices, and environmental compliance costs;

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

After incorporating all of these parameters, EGEAS evaluated hundreds of possible resource plans that met FPL's future resource needs using only generation or supply options. At the end of this evaluation, the resource plan with the lowest projected electric rate for FPL's customers was identified as FPL's Supply Only Plan. From this plan, FPL selected an avoided unit (a unit which can be avoided or deferred due to DSM) to be used in its preliminary cost-effectiveness screening.

Q. Based on this Supply Only Resource Plan, what Supply option was selected for use in the preliminary cost-effectiveness screening?

A. A 1,886 MW (Summer) combined cycle (CC) unit with a projected in-service year of 2026 was selected as the unit to be considered potentially avoidable for the preliminary screening work.

Q. Why did FPL select the 2026 CC unit as its avoided unit?

A. This unit was selected based on several factors. First, as part of the best Supply Only Resource Plan, it was one of the most economic generation additions available. Second, it was located far enough in the future to allow DSM additions a meaningful chance to potentially avoid or defer it. Finally,

selection of a fossil unit conforms to the Commission's direction that DSM avoid or defer fossil fuel usage.

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

Q. Which preliminary screening tests for DSM were used in this step of FPL's DSM Goals-setting analyses?

A. FPL utilized four DSM screening tests in these analyses: the Participant screening test, the RIM preliminary screening test, the TRC preliminary screening test, and the years-to-payback screening test using a two-year criterion. All four of these tests are designed to provide preliminary economic screening information regarding the individual DSM measures being evaluated. The intent of the Participant test is to determine if it makes economic sense for an individual customer to participate in a specific DSM measure. The intent of the RIM test is to measure the effect of a DSM measure on FPL's electric rates which impact both participants and non-participants. When paired with the Participant test, the RIM test accounts for the perspectives of all FPL's customers. The intent of the TRC test is supposedly to measure the cost of a DSM measure to the utility as a whole. However, the TRC test does not account for a measure's effect on the electric rates for a non-participating customer, and is therefore incomplete. The intent of the years-to-payback test is to address the "free rider" issue so that the

utility, and all of its customers, are not making incentive payments, and incurring administrative costs, for DSM measures that customers likely will install even without an incentive payment.

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

A. Yes, but only for two types of emissions. FPL is accounting for projected compliance costs for sulfur dioxide (SO_2) and nitrogen oxides (NOx) in both the RIM and TRC preliminary screening tests. However, consistent with the direction provided in the Order Establishing Procedure for this docket (Order No. PSC-2019-0062-PCO-EG), FPL is not accounting for projected CO_2 compliance costs in these screening tests in FPL's base case analyses. FPL is analyzing the impact of projected CO_2 compliance costs in sensitivity screening analyses. In order to indicate whether CO_2 costs are included in the screening analyses, I will use the terminology of "w/ CO_2" and "w/o CO_2" for the different analyses.

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

A. Yes, all four tests have been used in prior filings, with the RIM and Participant tests and a years-to-payback screen of two years having been used by FPL to propose DSM Goals.

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

A. A summary of the costs and benefits considered by each test is provided in Exhibit AWW-2. The primary differences between these three tests result from the perspective that each test attempts to capture. The aptly-named Participant test focuses solely on the perspective of a participant in a DSM measure. This test compares the incremental costs associated with a DSM measure (mainly the initial cost of the measure compared to a baseline alternative) versus the benefits associated with that DSM measure (which primarily are the savings in the customer's bill from reduced energy usage).

The TRC test is supposedly designed with the intent of comparing the "total" cost of a DSM measure against its benefits. Although the TRC test does accurately capture the benefits associated with adding a DSM measure, it has several failings when analyzing the cost of a DSM measure. First, the TRC test "double-counts" the participant costs, as they have already been accounted for when using the Participant test. Second, the TRC does not include incentive payments in its cost calculation. These costs represent a significant portion of the total cost of implementing a DSM measure by a utility. Third, and most importantly, the TRC does not include the impact of a DSM measure on a utility's electric rates. This impact comes from unrecovered revenue requirements resulting from a DSM measure's savings. All else equal, if these unrecovered revenue requirements are not offset by an

equal amount of system benefits, the measure will result in higher electric rates for all customers including non-participating customers. Gauging the effects on customers' electric rates is instrumental in determining how a DSM measure affects all utility customers.

The RIM test also compares the costs and benefits of a DSM measure, but does so on a system-wide basis. The benefits calculation in the RIM test is identical to the benefits calculation in the TRC test. However, because the RIM test accounts for all of the costs and benefits passed on to a utility's entire base of customers, it is the only test that represents the effect of a DSM measure on both a participating customer and a non-participating customer. As a result of this perspective, the RIM test coupled with the Participant test is the appropriate method for setting DSM Goals, because it results in the lowest electric rates and also ensures that no cross-subsidization will occur from implementing DSM measures and programs.

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

A. The objective of the economic screening of DSM measures with the Commission's cost-effectiveness tests, Participant, TRC and RIM tests, is to identify all of the measures that are potentially cost-effective (in that their benefits are higher than their associated costs). These measures that are potentially cost-effective can be combined into a DSM portfolio(s) that meets

some or all FPL's projected resource needs. This portfolio (or portfolios) can then be compared on an economic basis to the Supply Only Plan established earlier.

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

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

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

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

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

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

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

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

Q. You had mentioned that the final step of this screening process involves screening for free riders. Why does this screening for free riders occur?

A. First, the Commission requires evaluation of free riders per Rule 25-17.0021, F.A.C. Second, screening for free riders ensures that utility incentives will not be provided to customers who would otherwise engage in a DSM measure with no incentive at all.

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

A. A years-to-payback screening with a two-year criterion assumes that a customer would engage in a DSM measure with no additional incentive if the economic payback for that measure was less than two years. This screening test recognizes that rational customers will act in their own economic interest and engage in DSM measures that reduce their energy consumption, if it is economic to do so even without incentives. This ensures that incentives (and

their associated impact to the electric rates of both participants and non-participants) will not be provided unnecessarily.

Q Has a years-to-payback screen of two years been used historically in Florida?

A, Yes, it has been used both by FPL in proposing DSM Goals, and the Commission in approving DSM goals. There have been five prior DSM goals proceedings pursuant to Rule 25-17.0021, F.A.C, a rule that requires the evaluation of free riders.

In each of those prior DSM goals dockets, pursuant to Rule 25-17.0021, F.A.C., FPL and other utilities have used the two years-to-payback screen to address free riders. In most, if not all, of those proceedings, the utilities' use of the two years-to-payback screen to account for free riders has been contested.

Most importantly, in each of those five previously contested DSM Goals proceedings, the Commission has approved goals that were developed using the two years-to-payback screen, in whole or in part. The Commission has been presented with alternatives to address free riders, and it has consistently approved DSM goals that used the two years-to-payback screening tool in each contested proceeding. This screen is battle-tested over twenty-five years of DSM hearings, and it should be used again in this proceeding.

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

A. The results of the economic screening are provided in Exhibit AWW-3. In summary, out of the 6,560 measures that came out of the Technical Potential study, 38 passed the RIM and Participant tests and the two years-to-payback screen path, and 873 measures passed the much less rigorous TRC test, the Participant test, and the two years-to-payback screen path.

Q. Was it expected that so many more DSM measures survived the TRC path compared to the RIM path?

A. Yes. As explained earlier, only the RIM test, in conjunction with the Participant test, fully captures all of the costs of a DSM measure when applied to the entirety of FPL's customers, both participating and non-participating; whereas the TRC test does not. Because the TRC test does not account for all costs impacts that are reflected in electric rates for all customers, it should be expected that more DSM measures survive the incomplete TRC screening path.

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

A. Yes. Sensitivities were developed for High and Low forecasts of fuel prices, longer and shorter years-to-payback criteria, and inclusion of compliance costs for CO_2. The results of these sensitivities can be seen in Exhibit AWW-4 (and the results with CO_2 are also presented in Exhibit AWW-3).

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

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

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

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

A. FPL is basing its 2019 DSM Goals on its Medium fuel forecast that is presented in Exhibit AWW-5. The Medium fuel forecast represents a logical

middle ground of fuel scenarios, and is consistent with the methodology used in all of FPL's recent filings before the Commission.

Q. Please discuss the CO_2 compliance cost forecast values in Column (8) of Exhibit AWW-5.

A. This forecast is a "composite" CO_2 cost forecast based on separate CO_2 cost forecasts from FPL and Duke Energy Florida (DEF). The creation of a composite CO_2 forecast allows DEF, FPL and Orlando Utilities Commission (OUC) (the only FEECA utilities performing a with CO_2 sensitivity analysis) to utilize a single CO_2 compliance cost forecast in the DSM Goals analyses as directed in Order No. PSC-2019-0062-PCO-EG. This composite forecast is a simple average developed by taking the annual CO_2 compliance cost values from FPL's and DEF's current CO_2 cost forecasts, summing these two values, and dividing by two. This created a new set of projected CO_2 cost values for each year for use in this docket.

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

A. Maximum incentives for measures that pass all four steps were calculated based on two parameters:

1. How much incentive can be offered and still allow the measure to pass the RIM and Participant tests?

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

For the RIM path of cost-effectiveness testing, the smaller of these two incentives is the maximum incentive that could be offered. For the TRC path of cost-effectiveness testing, only the years-to-payback criterion was used to determine the maximum incentive.

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

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

A. The two sets (RIM path and TRC path) of passing measures and their associated maximum incentives are provided to the DSM group and used to calculate the Achievable Potential associated with the passing measures. FPL witness Koch describes this process in further detail in his testimony.

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

Q. Referring back to FPL's resource planning process, what are the timing and magnitude of its resource needs in the DSM Goals timeframe (2020-2029)?

A. Exhibit AWW-6 details FPL's resource needs for this timeframe and two additional years.

Q. Why is it appropriate to develop and use multi-year resource plans in analyses leading to the setting of DSM Goals?

A. It is not only appropriate to do this, but also necessary if one is to capture and accurately compare all of the impacts that competing resource options with different capacity amounts, terms-of-service, heat rates, types of fuel, MW and MWh reduction impacts, and costs will have on FPL's system.

For example, assume we are comparing two Supply options, Option A and Option B, that both offer the same amount of capacity. Option A has a heat rate of 7,000 Btu/kWh and is offered to FPL for 15 years. Option B has an 8,000 Btu/kWh heat rate and is offered for 20 years. Evaluating these options from a resource plan perspective allows one to capture the economic impacts of both the heat rate and term-of-service differences. The lower heat rate of Option A allows it to be dispatched more than Option B, thus resulting in lower system fuel costs than Option B. However, Option B's longer term-of-

service means that it defers the need for future generation for a longer period. Therefore, Option B will avoid new capacity costs for more years than will Option A. Only by taking a multi-year resource plan approach to the evaluation can factors such as these for competing Supply options be captured and effectively compared.

In the case of DSM options, there are similar somewhat contradicting impacts upon the utility system. For example, the MWh reduction effect of DSM lowers the amount of energy that must be served, but the MW reduction effect of DSM is designed to defer/avoid the addition of new generating units that, if added, may significantly improve the fuel efficiency of the utility system. Consequently, one aspect of DSM (MWh reduction) can decrease system fuel usage, but the other aspect of DSM (MW reduction) will avoid the addition of fuel-efficient new units that would have also lowered system fuel usage if the DSM options had not been implemented, thus increasing system fuel usage. Once again, only by taking a multi-year resource plan approach to the evaluation can these contradicting impacts of DSM upon the utility system be properly captured and compared.

Q. Using these projected resource needs, what was the Supply Only Resource Plan developed by FPL?

A. The Supply Only Plan includes all of the assumptions regarding generation additions and retirements from FPL's 2019 planning work and its 2019 Site Plan, including:

- The retirement of Martin Units 1 & 2 in 2019;
- The retirement of Manatee Units 1 & 2 by the end of 2021;
- The addition of the Okeechobee Clean Energy Center in 2019;
- The addition of the Dania Beach Clean Energy Center in 2022; and
- The cumulative addition of approximately 8,053 MW (nameplate) of solar by the end of 2028 which is the last year addressed in the 2019 Site Plan. (FPL is also projecting the addition of another 1,200 MW of solar in 2029.)

In addition to these assumptions, two 1,886 MW CC units are added. The first unit goes into service in 2026 and the second unit goes into service in 2030.

Q. What were the Achievable Potential values for DSM and how does this DSM potential match up with FPL's projected resource needs?

A. The results of the Achievable Potential evaluation, which are discussed in detail in FPL witness Koch's direct testimony, were used as inputs for the resource planning process. Exhibit AWW-7 presents the projected total annual Achievable Potential Summer MW for DSM measures identified under either the RIM screening path (Column 1) or the TRC screening path (Column 2). These annual DSM potential Summer MW values are also compared to the annual resource need projections, if the resource needs are met solely by DSM options, which are carried over from Column 11 in Exhibit AWW-6 and presented here in Column 3.

Q. Please describe the "With DSM" Resource Plans that were developed for further analyses.

A. Two resource plans were created based upon the two separate cost-effectiveness screening paths detailed earlier. A summary of these two plans, along with a summary of the Supply Only Plan, is presented in Exhibit AWW-8. The first of these plans is the RIM Resource Plan. This plan is based on the measures that passed both the RIM and Participant tests, as well as passing the two years-to-payback screening for free riders. This plan is very similar to the Supply Only Plan in terms of supply resource options added; however, the 2030 CC unit was deferred to 2031 by the DSM additions.

The other "With DSM" plan, referred to as the TRC Resource Plan, utilizes measures that passed the TRC test and Participant test for cost-effectiveness and the two-year payback screening for free riders. This plan shares a similar pattern of resource additions with the RIM Resource Plan through the 2020-2029 timeframe, including a 2026 CC unit and deferring a 2030 CC unit to 2031.

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

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

A. This step begins with first determining system-wide variable costs. The UPLAN production costing model is used to develop projected annual fuel costs for the FPL system for each resource plan. Annual non-fuel variable costs (startup costs and variable O&M) for the new generation additions and system emissions are also projected using this model. Using the projected annual emissions, annual environmental compliance costs for the FPL system are then developed.

Second, fixed costs (capital, fixed O&M, capital replacement, etc.) for the new generation additions in each resource plan are determined.

Third, annual DSM administrative costs and incentive payments for the incremental DSM included in each resource plan are quantified.

Fourth, a projection of "other" existing FPL system costs not affected by the resource plans, but which are accounted for in system electric rate calculations, was determined. (Examples of these "other" system costs include

costs for existing generating units, existing transmission and distribution facilities, existing buildings, staff, etc.)

Fifth, a projection of "other DSM costs" for the Supply Only and "With DSM" Resource Plans was developed. These "other DSM costs" include costs not directly tied to any individual DSM measure, but which will be incurred as part of a DSM portfolio. Examples of such costs include energy surveys and on-going bill credits to existing load management participants.

Finally, the total annual MWh reductions by which DSM reduces the annual number of MWh over which FPL recovers its costs are determined.

The above information is then used to calculate a Levelized System Average Electric Rate for each resource plan. This electric rate metric is used as the primary economic basis by which the resource plans that include differing amounts of DSM are evaluated.

Q. How is the Levelized System Average Electric Rate for a resource plan calculated?

A. Exhibit AWW-9 presents the calculation of the Levelized System Average Electric Rate for one of the resource plans, the RIM Resource Plan. The calculation consists of three basic steps. First, the projected annual revenue requirements and annual gigawatt-hours (GWh) served are used to calculate a projected system average electric rate for each year as shown in Column 9.

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

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

A. The results of the economic analyses of the resource plans are presented in Exhibit AWW-10, which provides the projected Levelized System Average Electric Rate for each resource plan. In addition, Exhibit AWW-10 also states whether each resource plan will result in one group of customers subsidizing other groups of customers in regards to the resource plan's effect on electric rates. This important consideration is referred to as cross-subsidization between different groups of customers.

The results clearly point to the RIM Plan being the best option for FPL's customers. It provides the lowest Levelized System Average Electric Rate and ensures that no cross-subsidization between customer groups will occur. Note that although the Supply Only Plan does not have the lowest electric rate, it also avoids cross-subsidization.

Q. Are the differences in the Levelized System Average Electric Rates between the three resource plans presented in Exhibit AWW-10 meaningful?

A. Yes. This is demonstrated in Exhibit AWW-11. This exhibit compares the levelized rates in the RIM-based DSM plan versus the levelized rates in the TRC-based DSM plan. As shown in the exhibit, the seemingly modest differential in levelized rates between these two plans equates to a very large one-time cost of approximately $200 million in year 2029 being added unnecessarily to the RIM-based DSM plan.

Q. Was a projection made of electric rates and customer bills for the ten-year Goal-setting period for each resource plan?

A. Yes. Exhibit AWW-12 provides a comparison of electric rates and customer bills for the three resource plans.

In comparing the two "With DSM" Resource Plans during 2020-2029, the RIM Resource Plan is projected to result in the lowest electric rates and average customer bills in each year. The TRC Resource Plan is projected to result in the highest electric rates and the highest average customer bills in each year.

These results are expected. DSM additions typically put upward pressure on electric rates, and bills, in the years prior to avoiding/deferring a generating unit. This is typically seen in screening analyses of individual DSM measures. Also expected is that this near-term impact of placing upward

pressure on rates and bills is minimized by DSM measures that survived the RIM screening test path. Conversely, the TRC screening test does not allow the consideration of two important cost impacts on electric rates and, because this screening test does not include all relevant DSM-related costs for a DSM measure, DSM measures that "pass" only the TRC screening test path typically result in higher electric rates.

Q. Returning to Exhibit AWW-10, this exhibit presents information regarding whether the resource plans will avoid the potential for cross-subsidization of program participants by the general body of customers. Would you please discuss this further?

A. Yes. When a resource option, Supply or DSM, is selected, it will have an impact on FPL's electric rates that are charged to all customers and on the bills all customers will pay. The basic issue in regards to cross-subsidization is whether the impact of the resource selection on electric rates and bills will result in one group of customers subsidizing other customers.

For example, consider the case when FPL evaluates only Supply options. Because all customers on FPL's system are served by the Supply option if that option is chosen, all customers are "participants" in the selected Supply option. Electric rates and bills for all customers move in the same "direction"; either up or down from year-to-year compared to another Supply option that could be selected. Therefore, there is no subsidization of one group of customers by another group.

However, the same is not true for DSM options. With DSM options, customers have a choice to participate or not participate in DSM options for which they are eligible. Furthermore, customers cannot participate in DSM options they are ineligible for, or in measures which they may have already installed. This leads to an additional, and important, consideration of how the two different groups of customers, participants and non-participants, are impacted when DSM options are selected. If the utility chooses a DSM option that places upward pressure on electric rates compared to another DSM option, the result will be the formation of two groups of customers: one group of "losers" who do not, or cannot, participate in the first DSM option and who face higher electric rates and bills, and one group of "winners" who can and do, participate in the first DSM option and, through reduced usage, reduce their bills (even though electric rates will have increased due to the first DSM option being offered by the utility).

This outcome is undesirable because one group of customers (the non-participants) subsidizes the other group of customers (the participants) through higher electric rates caused by the imposition of the first DSM option, *i.e.*, there is a cross-subsidization of one customer group by another.

Q. How would you summarize the economic analyses results?

A. Two results from the economic analyses are noteworthy. First, the RIM Resource Plan helps meet FPL's resource needs through 2030 while providing the lowest system Levelized System Average Electric Rates over the analysis

period and the lowest electric rates of either of the "With DSM"-based Resource Plans for each year in the 2020-2030 time period. Second, the RIM plan meets FPL's resource needs while avoiding cross-subsidization of one customer group by another. The TRC Resource Plan achieves neither of these. These two factors combine to make the RIM Resource Plan the best resource plan from an economic perspective.

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

A. The non-economic analysis focused on two perspectives that address the years 2020-2030. The first perspective is a direct comparison of projected annual SO_2, NO_x, and CO_2 emissions for the FPL system for each of the resource plans. The second perspective is a direct comparison of projected annual FPL system oil and natural gas usage for the resource plans.

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

A. Yes. The results of the non-economic analyses are presented in Exhibits AWW-13 and AWW-14. There is very little difference between the three resource plans in regards to non-economic factors.

Q. Based on these results, which DSM portfolio should be the basis for FPL's DSM Goals?

A. Based on the economic and non-economic factors discussed previously, the RIM-based portfolio should be the basis for FPL's proposed DSM Goals.

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

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

Q. From a resource planning perspective, are FPL's proposed DSM Goals reasonable?

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

- The timing and magnitude of resource needs: via a combination of DSM and supply resources, the RIM Resource Plan ensures that all of FPL's resources needs are met throughout the time period of the analysis and all of FPL's reliability criteria are satisfied.
- The rate impact to FPL's customers: as discussed earlier, the RIM Resource Plan has the lowest Levelized System Average Electric Rate among the plans evaluated, ensuring that all of FPL's customers benefit from the plan and no cross-subsidization occurs between participants and non-participants of DSM measures.

Q. Is it reasonable and appropriate for FPL's proposed DSM Goals to be lower than the current DSM Goals?

A. Yes because less DSM is cost-effective than was the case in the last DSM Goals docket. FPL witnesses Sim and Koch discuss this in more detail in their testimonies.

Q. Does this conclude your direct testimony?

A. Yes.

FPL's Resource Planning Process as Applied to DSM Goal-Setting
(Steps Presented in Approximate Sequence)

Step Number	Step Name	Description of Work Undertaken in Step
Step 1	Development of DSM Technical Potential	The theoretical Technical Potential of DSM for the 10-year time period is developed ignoring all practical constraints such as cost, market forces, contractor levels, the utility's resource needs, etc.
Step 2	Determination of FPL's Resource Needs Over the 10-Year DSM Goals Time Period	Assuming zero growth in DSM signups after 12/31/2019 (i.e., just before the start of the 10-year time period for which DSM Goals are to be set), determine what FPL's projected resource needs are for that 10-year period if resource needs are met solely by Supply resources and if met solely by DSM resources. Updated forecasts and projections for load, generation capabilities (owned and purchased), etc. are used in making these determinations.
Step 3	Preliminary Economic Screening of Individual DSM Measures and Identification of Maximum Incentive Payments	Perform preliminary economic "screening" analyses of all individual DSM measures identified in Step 1's Technical Potential work. These screening analyses consist of multiple steps and utilize the RIM test, the Participant test, the TRC test, and the years-to-payback test. For those DSM measures that survive the screening, a maximum incentive payment for that measure is determined.
Step 4	Determination of Achievable Potential for DSM	For each DSM measure emerging from Step 3, the corresponding maximum incentive payment amount is used to develop a market projection of how much of each measure can be signed up in each year of the DSM Goals 10-year time period.
Step 5	Development of Supply Only and With DSM Resource Plans	Using the projection of FPL's resource needs developed in Step 2, a resource plan consisting of no incremental DSM signups (the "Supply Only" resource plan) is developed. In addition, using the projection of FPL's resource needs, and the achievable potential for DSM from Step 4, a resource plan(s) is developed which consists of a DSM portfolio and, as needed, accompanying Supply resources (the "With DSM" resource plan).
Step 6	Analyses of Resource Plans	The Supply Only and With DSM resource plans are evaluated from both economic and a non-economic perspectives to determine the best resource plan, and the accompanying amount of DSM that FPL will propose as its DSM Goals for the 2020-2029 time period.

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

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

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

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

Number of DSM Measures Evaluated in Preliminary Economic Screening = 6,560

Screening Step	w/o CO_2 Costs: RIM Test Preliminary Economic Screening	w/o CO_2 Costs: TRC Test Preliminary Economic Screening	w/ CO_2 Costs: RIM Test Preliminary Economic Screening	w/ CO_2 Costs: TRC Test Preliminary Economic Screening	Notes
Step (1) Total Number of DSM Measures at Starting Point =	6,560	6,560	6,560	6,560	
a) Number of DSM Measures Removed After Accounting for Unrecovered Revenue Requirements =	6,436	N.A.	6,436	N.A.	(1)
b) Number of DSM Measures Removed After Accounting for Participant Costs =	N.A.	3,991	N.A.	3,858	(2)
c) Number of DSM Measures Remaining After Screening Step 1 =	124	2,569	124	2,702	
Step (2) Number of DSM Measures Removed After Also Accounting for Administrative Costs =	12	379	4	280	
Number of DSM Measures Remaining After Screening Step 2 =	112	2,190	120	2,422	
Step (3) Number of DSM Measures Removed After Also Accounting Incentive Payments Needed to Bring the Participant Test Ratio Up to 1.00 for Certain Measures =	74	N.A.	80	N.A.	(3)
Number of DSM Measures Remaining After Screening Step 3 =	38	2,190	40	2,422	
Step (4) Number of DSM Measures Removed If Participant Payback is Less Than 2 Years Without Incentive Payments =	0	1,317	0	1,423	
Number of DSM Measures Remaining After Screening Step 4 =	38	873	40	999	
Final Number of DSM Measures Remaining After the Preliminary Economic Screening =	**38**	**873**	**40**	**999**	

Notes:

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

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

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

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

Base or Sensitivity Case	Fuel Cost Forecast	w/ or w/o CO_2 Compliance Costs	Years -to-Payback Test Criterion (Years)	Number of DSM Measures		Summer MW		Winter MW		Annual GWh	
				Surviving RIM Path Screening	Surviving TRC Path Screening	Surviving RIM Path Screening	Surviving TRC Path Screening	Surviving RIM Path Screening	Surviving TRC Path Screening	Surviving RIM Path Screening	Surviving TRC Path Screening
Base Case w/o CO_2 *	Medium	w/o	2	38	873	35.4	1,174.0	104.1	494.6	55.4	3,544.3
Base Case w/ CO_2 *	Medium	w/	2	40	999	36.6	1,240.2	110.9	535.0	57.8	3,884.7
Sensitivity Case 1	High	w/o	2	40	928	36.6	1,282.3	110.9	534.3	57.8	3,918.9
Sensitivity Case 2	Low	w/o	2	38	700	35.4	1,155.4	104.1	437.5	55.4	3,438.9
Sensitivity Case 3	Medium	w/o	1	38	1,338	35.4	1,619.7	104.1	994.3	55.4	5,489.8
Sensitivity Case 4	Medium	w/o	3	38	483	35.4	903.0	104.1	422.5	55.4	2,634.0

* These results were previously presented in Exhibit AWW-3.

Docket No. 20190015-EG
Summary Results of Preliminary Economic Screening
of Individual DSM Measures: Sensitivity Cases
Exhibit AWW-4, Page 1 of 1

Forecasted Fuel and Environmental Compliance Costs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fuel Costs *					Environmental Compliance Costs		
Year	Natural Gas Medium (Nominal $ per mmBtu)	Light Oil Medium (Nominal $ per mmBtu)	Coal Medium (Nominal $ per mmBtu)	Natural Gas High (Nominal $ per mmBtu)	Natural Gas Low (Nominal $ per mmBtu)	SO_2 (Nominal $ per ton)	NO_X (Nominal $ per ton)	CO_2 ** (Nominal $ per ton)
2020	$2.74	$14.10	$2.59	$3.17	$2.31	$0	$125	$0
2021	$2.71	$15.61	$2.65	$3.14	$2.29	$0	$125	$0
2022	$2.80	$14.65	$2.72	$3.24	$2.36	$0	$125	$0
2023	$3.02	$14.62	$2.80	$3.50	$2.54	$0	$125	$0
2024	$3.37	$15.02	$2.86	$3.90	$2.84	$0	$125	$0
2025	$3.68	$15.54	$2.93	$4.26	$3.10	$0	$125	$3
2026	$3.98	$15.84	$3.00	$4.61	$3.35	$0	$125	$4
2027	$4.19	$16.12	$3.06	$4.85	$3.53	$0	$125	$6
2028	$4.37	$16.39	$3.13	$5.06	$3.68	$0	$125	$8
2029	$4.54	$16.71	$3.19	$5.25	$3.82	$0	$125	$10
2030	$4.68	$17.02	$3.25	$5.42	$3.94	$0	$125	$12
2031	$4.80	$17.33	$3.31	$5.56	$4.04	$0	$125	$14
2032	$4.92	$17.65	$3.38	$5.69	$4.14	$0	$125	$16
2033	$5.02	$17.98	$3.45	$5.82	$4.23	$0	$125	$18
2034	$5.13	$18.31	$3.52	$5.94	$4.32	$0	$125	$20
2035	$5.23	$18.67	$3.60	$6.06	$4.41	$0	$125	$22
2036	$5.34	$19.01	$3.67	$6.18	$4.49	$0	$125	$24
2037	$5.44	$19.35	$3.75	$6.30	$4.58	$0	$125	$26
2038	$5.54	$19.70	$3.83	$6.42	$4.67	$0	$125	$28
2039	$5.65	$20.06	$3.91	$6.54	$4.76	$0	$125	$30
2040	$5.76	$20.42	$3.99	$6.67	$4.85	$0	$125	$33
2041	$5.82	$20.45	$4.08	$6.74	$4.90	$0	$125	$35
2042	$5.88	$20.48	$4.18	$6.81	$4.95	$0	$125	$37
2043	$5.95	$20.51	$4.27	$6.89	$5.01	$0	$125	$40
2044	$6.01	$20.54	$4.36	$6.96	$5.06	$0	$125	$43
2045	$6.08	$20.57	$4.46	$7.04	$5.12	$0	$125	$46
2046	$6.14	$20.60	$4.55	$7.11	$5.17	$0	$125	$49
2047	$6.21	$20.64	$4.65	$7.19	$5.23	$0	$125	$52
2048	$6.28	$20.67	$4.75	$7.27	$5.29	$0	$125	$55
2049	$6.35	$20.70	$4.85	$7.35	$5.34	$0	$125	$59
2050	$6.42	$20.73	$4.95	$7.43	$5.40	$0	$125	$63
2051	$6.49	$20.76	$5.06	$7.51	$5.46	$0	$125	$65
2052	$6.56	$20.79	$5.17	$7.59	$5.52	$0	$125	$67
2053	$6.63	$20.82	$5.28	$7.68	$5.58	$0	$125	$69
2054	$6.70	$20.85	$5.39	$7.76	$5.64	$0	$125	$71
2055	$6.78	$20.88	$5.51	$7.85	$5.70	$0	$125	$73
2056	$6.85	$20.91	$5.62	$7.93	$5.77	$0	$125	$75
2057	$6.92	$20.94	$5.75	$8.02	$5.83	$0	$125	$77
2058	$7.00	$20.97	$5.87	$8.11	$5.89	$0	$125	$79
2059	$7.08	$21.00	$6.00	$8.19	$5.96	$0	$125	$81
2060	$7.15	$21.04	$6.12	$8.28	$6.02	$0	$125	$84
2061	$7.23	$21.07	$6.26	$8.37	$6.09	$0	$125	$86
2062	$7.31	$21.10	$6.39	$8.47	$6.16	$0	$125	$88
2063	$7.39	$21.13	$6.53	$8.56	$6.22	$0	$125	$90
2064	$7.47	$21.16	$6.67	$8.65	$6.29	$0	$125	$92
2065	$7.55	$21.19	$6.81	$8.75	$6.36	$0	$125	$94

* The forecasted fuel cost values shown above are a subset of the numerous forecasted fuel cost values for delivery to different plants, from different pipelines, etc. The natural gas price represents the weighted average FGT Firm price forecast, the oil price represents the Light Oil price forecast, and the coal price represents the Scherer 4 price forecast.

** The CO_2 compliance costs shown above were used with the "w/CO_2 cost" sensitivity screening analysis. The values are a composite of FPL's and Duke Energy Florida's forecasted CO_2 costs that were combined to develop a single CO_2 cost forecast as required by the Order Establishing Procedure for this docket (Order No. PSC-2019-0062-PCO-EG). All other analyses used zero CO_2 compliance costs. SO2 compliance costs are contained in the provided fuel cost

Projection of FPL's Resource Needs for 2020 - 2031 with No Incremental DSM Signups After 2019

(MW at Generator)

Summer

	(1)	(2)	(3) = (1)+(2)	(4)	(5)	(6) = (4)-(5)	(7) = (3)-(6)	(8) = (7)/(6)	(9) = ((3)-(4))/(4)	(10) = ((6)*1.20)-(3)	(11) = (10)/1.20)
August of the Year	Projections of FPL Unit Capability * (MW)	Projections of Firm Purchases (MW)	Projection of Total Capacity (MW)	Peak Load Forecast * * (MW)	Summer DSM Forecast * * * (MW)	Forecast of Firm Peak (MW)	Forecast of Summer Reserves (MW)	Forecast of Summer Reserve Margins w/o Additions (%)	Forecast of Summer Generation Only Reserve Margins w/o Additions (%)	MW Needed to Meet 20% Reserve Margin if Provided by Supply Options Only (MW)	MW Needed to Meet 20% Reserve Margin if Supplied by DSM Options Only (MW)
2020	27,170	214	27,384	24,507	1,842	22,665	4,718	20.8%	11.7%	(185)	(154)
2021	27,456	114	27,570	24,668	1,842	22,826	4,743	20.8%	11.8%	(178)	(148)
2022	27,915	114	28,029	24,837	1,842	22,995	5,034	21.9%	12.9%	(435)	(362)
2023	28,258	114	28,371	25,173	1,842	23,331	5,040	21.6%	12.7%	(373)	(311)
2024	28,541	114	28,654	25,583	1,842	23,741	4,913	20.7%	12.0%	(165)	(137)
2025	28,939	114	29,052	25,939	1,842	24,097	4,955	20.6%	12.0%	(136)	(113)
2026	28,930	114	29,044	26,380	1,842	24,538	4,506	18.4%	10.1%	**402**	**335**
2027	29,269	110	29,379	26,867	1,842	25,025	4,355	17.4%	9.4%	**650**	**542**
2028	29,581	110	29,691	27,363	1,842	25,521	4,171	16.3%	8.5%	**933**	**778**
2029	29,818	110	29,928	28,008	1,842	26,166	3,762	14.4%	6.9%	**1,471**	**1,226**
2030	30,053	110	30,163	28,691	1,842	26,849	3,314	12.3%	5.1%	**2,055**	**1,713**
2031	30,041	110	30,151	29,254	1,842	27,412	2,739	10.0%	3.1%	**2,743**	**2,286**

Winter

	(1)	(2)	(3) = (1)+(2)	(4)	(5)	(6) = (4)-(5)	(7) = (3)-(6)	(8) = (7)/(6)	(9) = ((3)-(4))/(4)	(10) = ((6)*1.20)-(3)	(11) = (10)/1.20)
January of the Year	Projections of FPL Unit Capability * (MW)	Projections of Firm Purchases (MW)	Projection of Total Capacity (MW)	Peak Load Forecast * * (MW)	Winter DSM Forecast * * * (MW)	Forecast of Firm Peak (MW)	Forecast of Winter Reserves (MW)	Forecast of Winter Reserve Margins w/o Additions (%)	Forecast of Winter Generation Only Reserve Margins w/o Additions (%)	MW Needed to Meet 20% Reserve Margin if Provided by Supply Options Only (MW)	MW Needed to Meet 20% Reserve Margin if Supplied by DSM Options Only (MW)
2020	27,006	184	27,189	19,904	1,438	18,466	8,723	47.2%	36.6%	(5,030)	(4,192)
2021	27,026	114	27,139	20,264	1,438	18,826	8,313	44.2%	33.9%	(4,548)	(3,790)
2022	25,877	114	25,990	20,255	1,438	18,817	7,173	38.1%	28.3%	(3,410)	(2,842)
2023	27,053	114	27,166	20,528	1,438	19,090	8,076	42.3%	32.3%	(4,258)	(3,549)
2024	27,053	114	27,166	20,775	1,438	19,337	7,829	40.5%	30.8%	(3,961)	(3,301)
2025	27,053	114	27,166	20,932	1,438	19,493	7,673	39.4%	29.8%	(3,774)	(3,145)
2026	27,053	114	27,166	21,150	1,438	19,712	7,454	37.8%	28.4%	(3,512)	(2,927)
2027	27,053	110	27,163	21,374	1,438	19,936	7,227	36.2%	27.1%	(3,240)	(2,700)
2028	27,053	110	27,163	21,623	1,438	20,185	6,978	34.6%	25.6%	(2,941)	(2,451)
2029	27,053	110	27,163	21,889	1,438	20,451	6,712	32.8%	24.1%	(2,622)	(2,185)
2030	27,053	110	27,163	22,153	1,438	20,715	6,448	31.1%	22.6%	(2,305)	(1,921)
2031	27,053	110	27,163	22,404	1,438	20,966	6,197	29.6%	21.2%	(2,003)	(1,669)

* FPL generating unit capability values shown above assume the following major changes to the FPL system:
- Retirement of the Martin 1 and 2 units on 12/31/2018
- Okeechobee Clean Energy Center (OCEC) unit in-service in April 2019
- Retirement of the Manatee 1 and 2 units by the end of 2021
- Dania Beach Clean Energy Center (DBEC) in-service in June 2022
- Addition of a cumulative 9,253 MW (nameplate) of solar by 2029

** The Peak Load Forecast is FPL's December 2018 load forecast.

* * * DSM values shown represent no incremental DSM signups after December 2019

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

(Assuming the Resource Needs are Met Solely by DSM)

(MW at Generator)

	(1)	(2)	(3)	(4)	(5)
Year	**RIM Path** Cumulative DSM Achievable Potential (Summer MW)	**TRC Path** Cumulative DSM Achievable Potential (Summer MW)	Projected FPL Resource Needs if Resource Needs are Met Solely by DSM * (Summer MW)	**RIM Path** Can the Achievable Potential DSM Meet FPL's Resource Needs?	**TRC Path** Can the Achievable Potential DSM Meet FPL's Resource Needs?
2020	35	46	---	---	---
2021	70	92	---	---	---
2022	106	139	---	---	---
2023	141	187	---	---	---
2024	176	235	---	---	---
2025	211	282	---	---	---
2026	246	330	335	No	No
2027	282	377	542	No	No
2028	317	424	778	No	No
2029	352	471	1,226	No	No

* The projected Summer resource need values in Column (3) are from Exhibit AWW-6, Column 11.

Overview of Supply Only and With DSM Resource Plans

	Supply Only Resource Plan			RIM Resource Plan			TRC Resource Plan		
	Generation Additions * (MW)	Cumulative DSM Additions (MW)	Total Reserve Margin (%)	Generation Additions * (MW)	Cumulative DSM Additions (MW)	Total Reserve Margin (%)	Generation Additions * (MW)	Cumulative DSM Additions (MW)	Total Reserve Margin (%)
Year	---	---	---	---	---	---	---	---	---
2020		0	20.8%		35	21.0%		46	21.1%
2021		0	20.8%		70	21.2%		92	21.3%
2022		0	21.9%		106	22.5%		139	22.6%
2023		0	21.6%		141	22.3%		187	22.6%
2024		0	20.7%		176	21.6%		235	21.9%
2025		0	20.6%		211	21.6%		282	22.0%
2026	1,886 MW CC	0	26.0%	1,886 MW CC	246	27.3%	1,886 MW CC	330	27.8%
2027		0	24.9%		282	26.4%		377	26.8%
2028		0	23.7%		317	25.3%		424	25.8%
2029		0	21.6%		352	23.2%		471	23.8%
2030	1,886 MW CC	0	26.4%		---	21.0%		---	21.5%
2031		0	23.8%	1,886 MW CC	---	25.4%	1,886 MW CC	---	25.9%

* The generation additions shown are incremental to the generation changes discussed in the testimony that are common to all of the resource plans. These include:

- Retirement of the Martin 1 and 2 units on 12/31/2018
- Okeechobee Clean Energy Center (OCEC) unit in-service in April 2019
- Retirement of the Manatee 1 and 2 units by the end of 2021
- Dania Beach Clean Energy Center (DBEC) in-service in June 2022
- Addition of a cumulative 9,253 MW (nameplate) of solar by 2029

Example of Levelized System Average Electric Rate Calculation for the RIM Resource Plan

Year	(1) Annual Discount Factor 7.73%	(2) Resource Plan Variable Costs ($000, Nom)	(3) Resource Plan Fixed Costs ($000, Nom)	(4) Non-Resource Plan Other System Costs * ($000, Nom)	(5) = (2)+(3)+(4) System Revenue Requirements ($000, Nom)	(6) Load Forecast NEL (GWh)	(7) DSM Energy Reduction ** (GWh)	(8) = (6) - (7) Load Forecast NEL Adjusted by DSM (GWh)	(9) = ((5)/(8))/10 Annual Electric Rate (cents/kWh, Nom)	(10) = (9) *(1) Annual Electric Rate (cents/kWh, NPV)	(11) Nominal Levelized System Average Rate (cents/kWh)	(12) = (11) * (1) NPV Levelized System Average Rate (cents/kWh)
2019	1.000	2,120,510	0	7,586,380	9,706,890	121,100	28	121,072	8.01746	8.01746	9.6278	9.6278
2020	0.928	1,806,740	2,566	7,669,252	9,478,558	122,284	59	122,225	7.75502	7.19840	9.6278	8.9367
2021	0.862	1,792,250	78,833	7,705,581	9,576,664	122,370	59	122,310	7.82981	6.74618	9.6278	8.2953
2022	0.800	1,784,500	210,293	7,716,451	9,711,243	122,331	59	122,271	7.94237	6.35199	9.6278	7.6999
2023	0.742	1,882,400	337,872	7,821,043	10,041,315	122,680	60	122,621	8.18892	6.07911	9.6278	7.1472
2024	0.689	2,067,280	441,547	7,937,980	10,446,807	123,864	60	123,804	8.43817	5.81453	9.6278	6.6342
2025	0.640	2,189,470	592,290	7,951,483	10,733,242	124,440	60	124,380	8.62937	5.51949	9.6278	6.1581
2026	0.594	2,378,230	688,387	8,036,357	11,102,974	125,430	60	125,370	8.85615	5.25797	9.6278	5.7161
2027	0.551	2,472,840	882,142	8,171,527	11,526,509	126,520	60	126,460	9.11474	5.02308	9.6278	5.3058
2028	0.512	2,525,930	1,059,039	8,326,565	11,911,534	127,941	60	127,881	9.31458	4.76478	9.6278	4.9250
2029	0.475	2,593,390	1,242,934	8,490,504	12,326,827	128,968	60	128,907	9.56254	4.54053	9.6278	4.5715
2030	0.441	2,644,850	1,416,204	8,672,175	12,733,229	130,368	60	130,308	9.77166	4.30680	9.6278	4.2434
2031	0.409	2,769,990	1,494,312	8,852,117	13,116,419	131,676	60	131,616	9.96569	4.07706	9.6278	3.9388
2032	0.380	2,934,950	1,513,121	9,020,030	13,468,101	133,326	60	133,266	10.10618	3.83778	9.6278	3.6561
2033	0.352	2,973,960	1,468,878	9,169,386	13,612,224	134,288	60	134,228	10.14111	3.57463	9.6278	3.3937
2034	0.327	3,073,670	1,495,023	9,337,609	13,906,301	135,498	60	135,438	10.26765	3.35947	9.6278	3.1501
2035	0.304	3,225,540	1,562,429	9,508,749	14,296,718	136,706	60	136,646	10.46258	3.17754	9.6278	2.9240
2036	0.282	3,508,520	1,726,831	9,691,112	14,926,463	138,064	60	138,003	10.81602	3.04911	9.6278	2.7141
2037	0.262	3,650,880	1,861,706	9,854,522	15,367,108	138,933	60	138,872	11.06563	2.89558	9.6278	2.5193
2038	0.243	3,784,850	1,997,664	10,035,320	15,817,835	140,133	60	140,073	11.29258	2.74287	9.6278	2.3385
2039	0.225	3,892,000	2,011,136	10,219,433	16,122,570	141,312	60	141,252	11.41404	2.57339	9.6278	2.1707
2040	0.209	4,029,470	2,052,596	10,442,179	16,524,245	142,844	60	142,784	11.57292	2.42193	9.6278	2.0149
2041	0.194	4,189,780	2,144,925	10,634,303	16,969,007	144,981	60	144,921	11.70918	2.27457	9.6278	1.8702
2042	0.180	4,302,610	2,152,115	10,827,790	17,282,514	146,450	60	146,390	11.80583	2.12874	9.6278	1.7360
2043	0.167	4,558,530	2,180,318	11,023,698	17,762,546	147,916	60	147,856	12.01339	2.01069	9.6278	1.6114
2044	0.155	4,759,790	2,298,440	11,222,044	18,280,274	149,765	60	149,704	12.21091	1.89706	9.6278	1.4957
2045	0.144	4,848,750	2,391,652	11,422,719	18,663,122	150,845	60	150,784	12.37735	1.78490	9.6278	1.3884
2046	0.134	4,972,640	2,413,167	11,625,982	19,011,790	152,304	60	152,244	12.48771	1.67156	9.6278	1.2887
2047	0.124	5,109,260	2,472,437	11,831,987	19,413,684	153,766	60	153,705	12.63045	1.56932	9.6278	1.1962
2048	0.115	5,231,020	2,477,076	12,035,230	19,743,326	155,584	60	155,524	12.69475	1.46410	9.6278	1.1104
2049	0.107	5,333,920	2,534,495	12,244,942	20,113,356	156,653	60	156,592	12.84439	1.37503	9.6278	1.0307
2050	0.099	5,410,749	2,501,634	12,457,450	20,369,833	158,123	60	158,063	12.88720	1.28059	9.6278	0.9567
2051	0.092	5,488,701	2,465,730	12,672,969	20,627,399	159,599	60	159,539	12.92939	1.19257	9.6278	0.8880
2052	0.086	5,567,795	2,365,588	12,891,538	20,824,921	161,491	60	161,431	12.90019	1.10447	9.6278	0.8243
2053	0.079	5,648,046	2,288,539	13,116,714	21,053,298	162,571	60	162,511	12.95500	1.02955	9.6278	0.7651
2054	0.074	5,729,472	2,241,868	13,345,146	21,316,487	164,067	60	164,007	12.99729	0.95878	9.6278	0.7102
2055	0.068	5,812,092	2,139,604	13,576,884	21,528,580	165,570	60	165,510	13.00740	0.89065	9.6278	0.6592
2056	0.064	5,895,922	2,076,085	13,811,974	21,783,981	167,504	60	167,443	13.00975	0.82688	9.6278	0.6119
2057	0.059	5,980,982	1,988,354	14,049,563	22,018,899	168,598	60	168,538	13.06464	0.77077	9.6278	0.5680
2058	0.055	6,067,289	1,930,128	14,291,429	22,288,846	170,123	60	170,063	13.10621	0.71772	9.6278	0.5272
2059	0.051	6,154,862	1,828,198	14,537,648	22,520,709	171,656	60	171,596	13.12425	0.66712	9.6278	0.4894
2060	0.047	6,243,721	1,725,641	14,788,300	22,757,662	173,634	60	173,573	13.11127	0.61863	9.6278	0.4543
2061	0.044	6,333,886	1,662,993	15,043,463	23,040,342	174,746	60	174,686	13.18959	0.57766	9.6278	0.4217
2062	0.041	6,425,374	1,622,619	15,303,219	23,351,212	176,303	60	176,243	13.24943	0.53863	9.6278	0.3914
2063	0.038	6,518,208	1,621,466	15,567,651	23,707,324	177,869	60	177,809	13.33302	0.50312	9.6278	0.3633
2064	0.035	6,612,406	1,624,558	15,836,842	24,073,806	179,648	60	179,588	13.40504	0.46953	9.6278	0.3372
2065	0.033	6,707,990	1,602,686	16,110,879	24,421,555	181,444	60	181,384	13.46399	0.43775	9.6278	0.3130
										130.09004		130.09004

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

** DSM energy reductions are incremental from August 2019.

Levelized System Average Electric Rate (cents/kWh) = **9.6278**

Docket No. 20190015-EG
Example of Levelized System Average Electric Rate Calculation for the RIM Resource Plan
Exhibit AWW-9, Page 1 of 1

Comparison of the Resource Plans:
Economic Analyses Results and Consequences

Resource Plan ----------	Levelized System Average Electric Rate (cents/kWh) ----------	Avoids Cross-Subsidization of Customer Groups? ----------
RIM Plan	9.6278	Yes
Supply Only Plan	9.6321	Yes
TRC Plan	9.6332	No

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

Year	(1) Annual Discount Factor 7.73%	(2) Resource Plan Variable Costs ($000, Nom)	(3) Resource Plan Fixed Costs ($000, Nom)	(4) Non-Resource Plan Other System Costs * ($000, Nom)	(5) "What If" One-Time Cost ($000, Nom)	(6) = (2)+(3)+(4)+(5) System Revenue Requirements ($000, Nom)	(7) Load Forecast NEL (GWh)	(8) DSM Energy Reduction ** (GWh)	(9) = (7) - (8) Load Forecast NEL Adjusted by DSM (GWh)	(10) = ((6)/(9))/10 Annual Electric Rate (cents/kWh, Nom)	(11) = (10) *(1) Annual Electric Rate (cents/kWh, NPV)	(12) Nominal Levelized System Average Rate (cents/kWh)	(13) = (12) * (1) NPV Levelized System Average Rate (cents/kWh)
2019	1.000	2,120,510	0	7,586,380	0	9,706,890	121,100	28	121,072	8.01746	8.01746	9.6332	9.6332
2020	0.928	1,806,740	2,566	7,669,252	0	9,478,558	122,284	59	122,225	7.75502	7.19840	9.6332	8.9418
2021	0.862	1,792,250	78,833	7,705,581	0	9,576,664	122,370	59	122,310	7.82981	6.74618	9.6332	8.3000
2022	0.800	1,784,500	210,293	7,716,451	0	9,711,243	122,331	59	122,271	7.94237	6.35199	9.6332	7.7043
2023	0.742	1,882,400	337,872	7,821,043	0	10,041,315	122,680	60	122,621	8.18892	6.07911	9.6332	7.1513
2024	0.689	2,067,280	441,547	7,937,980	0	10,446,807	123,864	60	123,804	8.43817	5.81453	9.6332	6.6380
2025	0.640	2,189,470	592,290	7,951,483	0	10,733,242	124,440	60	124,380	8.62937	5.51949	9.6332	6.1616
2026	0.594	2,378,230	688,387	8,036,357	0	11,102,974	125,430	60	125,370	8.85615	5.25797	9.6332	5.7193
2027	0.551	2,472,840	882,142	8,171,527	0	11,526,509	126,520	60	126,460	9.11474	5.02308	9.6332	5.3088
2028	0.512	2,525,930	1,059,039	8,326,565	0	11,911,534	127,941	60	127,881	9.31458	4.76478	9.6332	4.9278
2029	0.475	2,593,390	1,242,934	8,490,504	**199,517**	12,526,345	128,968	60	128,907	9.71732	4.61402	9.6332	4.5741
2030	0.441	2,644,850	1,416,204	8,672,175	0	12,733,229	130,368	60	130,308	9.77166	4.30680	9.6332	4.2458
2031	0.409	2,769,990	1,494,312	8,852,117	0	13,116,419	131,676	60	131,616	9.96569	4.07706	9.6332	3.9410
2032	0.380	2,934,950	1,513,121	9,020,030	0	13,468,101	133,326	60	133,266	10.10618	3.83778	9.6332	3.6582
2033	0.352	2,973,960	1,468,878	9,169,386	0	13,612,224	134,288	60	134,228	10.14111	3.57463	9.6332	3.3956
2034	0.327	3,073,670	1,495,023	9,337,609	0	13,906,301	135,498	60	135,438	10.26765	3.35947	9.6332	3.1519
2035	0.304	3,225,540	1,562,429	9,508,749	0	14,296,718	136,706	60	136,646	10.46258	3.17754	9.6332	2.9257
2036	0.282	3,508,520	1,726,831	9,691,112	0	14,926,463	138,064	60	138,003	10.81602	3.04911	9.6332	2.7157
2037	0.262	3,650,880	1,861,706	9,854,522	0	15,367,108	138,933	60	138,872	11.06563	2.89558	9.6332	2.5207
2038	0.243	3,784,850	1,997,664	10,035,320	0	15,817,835	140,133	60	140,073	11.29258	2.74287	9.6332	2.3398
2039	0.225	3,892,000	2,011,136	10,219,433	0	16,122,570	141,312	60	141,252	11.41404	2.57339	9.6332	2.1719
2040	0.209	4,029,470	2,052,596	10,442,179	0	16,524,245	142,844	60	142,784	11.57292	2.42193	9.6332	2.0160
2041	0.194	4,189,780	2,144,925	10,634,303	0	16,969,007	144,981	60	144,921	11.70918	2.27457	9.6332	1.8713
2042	0.180	4,302,610	2,152,115	10,827,790	0	17,282,514	146,450	60	146,390	11.80583	2.12874	9.6332	1.7370
2043	0.167	4,558,530	2,180,318	11,023,698	0	17,762,546	147,916	60	147,856	12.01339	2.01069	9.6332	1.6123
2044	0.155	4,759,790	2,298,440	11,222,044	0	18,280,274	149,765	60	149,704	12.21091	1.89706	9.6332	1.4966
2045	0.144	4,848,750	2,391,652	11,422,719	0	18,663,122	150,845	60	150,784	12.37735	1.78490	9.6332	1.3892
2046	0.134	4,972,640	2,413,167	11,625,982	0	19,011,790	152,304	60	152,244	12.48771	1.67156	9.6332	1.2895
2047	0.124	5,109,260	2,472,437	11,831,987	0	19,413,684	153,766	60	153,705	12.63045	1.56932	9.6332	1.1969
2048	0.115	5,231,020	2,477,076	12,035,230	0	19,743,326	155,584	60	155,524	12.69475	1.46410	9.6332	1.1110
2049	0.107	5,333,920	2,534,495	12,244,942	0	20,113,356	156,653	60	156,592	12.84439	1.37503	9.6332	1.0313
2050	0.099	5,410,749	2,501,634	12,457,450	0	20,369,833	158,123	60	158,063	12.88720	1.28059	9.6332	0.9572
2051	0.092	5,488,701	2,465,730	12,672,969	0	20,627,399	159,599	60	159,539	12.92939	1.19257	9.6332	0.8885
2052	0.086	5,567,795	2,365,588	12,891,538	0	20,824,921	161,491	60	161,431	12.90019	1.10447	9.6332	0.8248
2053	0.079	5,648,046	2,288,539	13,116,714	0	21,053,298	162,571	60	162,511	12.95500	1.02955	9.6332	0.7656
2054	0.074	5,729,472	2,241,868	13,345,146	0	21,316,487	164,067	60	164,007	12.99729	0.95878	9.6332	0.7106
2055	0.068	5,812,092	2,139,604	13,576,884	0	21,528,580	165,570	60	165,510	13.00740	0.89065	9.6332	0.6596
2056	0.064	5,895,922	2,076,085	13,811,974	0	21,783,981	167,504	60	167,443	13.00975	0.82688	9.6332	0.6123
2057	0.059	5,980,982	1,988,354	14,049,563	0	22,018,899	168,598	60	168,538	13.06464	0.77077	9.6332	0.5683
2058	0.055	6,067,289	1,930,128	14,291,429	0	22,288,846	170,123	60	170,063	13.10621	0.71772	9.6332	0.5275
2059	0.051	6,154,862	1,828,198	14,537,648	0	22,520,709	171,656	60	171,596	13.12425	0.66712	9.6332	0.4897
2060	0.047	6,243,721	1,725,641	14,788,300	0	22,757,662	173,634	60	173,573	13.11127	0.61863	9.6332	0.4545
2061	0.044	6,333,886	1,662,993	15,043,463	0	23,040,342	174,746	60	174,686	13.18959	0.57766	9.6332	0.4219
2062	0.041	6,425,374	1,622,619	15,303,219	0	23,351,212	176,303	60	176,243	13.24943	0.53863	9.6332	0.3916
2063	0.038	6,518,208	1,621,466	15,567,651	0	23,707,324	177,869	60	177,809	13.33302	0.50312	9.6332	0.3635
2064	0.035	6,612,406	1,624,558	15,836,842	0	24,073,806	179,648	60	179,588	13.40504	0.46953	9.6332	0.3374
2065	0.033	6,707,990	1,602,686	16,110,879	0	24,421,555	181,444	60	181,384	13.46399	0.43775	9.6332	0.3132
											130.16353		130.16353

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

** DSM energy reductions are incremental from August 2019.

Levelized System Average Electric Rate (cents/kWh) = **9.6332**

Docket No. 20190015-EG
Additional Cost Needed to be Added to RIM Plan to
Increase its Levelized System Average Electric Rate
to That of TRC Plan
Exhibit AWW-11, Page 1 of 1

Comparison of the Resource Plans: Projection of System Average Electric Rates and Customer Bills (Assuming 1,200 kWh Usage)

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

	Supply Only Resource Plan		RIM Resource Plan		TRC Resource Plan	
Year	Projected Electric Rate (cents/kWh)	Projected Customer Bill ($/1,200 kWh)	Projected Electric Rate (cents/kWh)	Projected Customer Bill ($/1,200 kWh)	Projected Electric Rate (cents/kWh)	Projected Customer Bill ($/1,200 kWh)
2020	7.753	$93.03	7.755	$93.06	7.763	$93.16
2021	7.826	$93.91	7.830	$93.96	7.838	$94.06
2022	7.936	$95.24	7.942	$95.31	7.951	$95.42
2023	8.181	$98.17	8.189	$98.27	8.199	$98.38
2024	8.428	$101.14	8.438	$101.26	8.448	$101.38
2025	8.618	$103.42	8.629	$103.55	8.639	$103.67
2026	8.844	$106.13	8.856	$106.27	8.866	$106.40
2027	9.103	$109.23	9.115	$109.38	9.125	$109.51
2028	9.302	$111.63	9.315	$111.77	9.326	$111.91
2029	9.550	$114.60	9.563	$114.75	9.576	$114.91
2030	9.872	$118.47	9.772	$117.26	9.775	$117.30

2) Projection of Average Customer Bill Differentials:

Bill Differentials for Each Plan Compared to the Supply Only Plan			
Year	**Supply Only Resource Plan**	**RIM Resource Plan**	**TRC Resource Plan**
2020	$0.00	$0.03	$0.12
2021	$0.00	$0.05	$0.15
2022	$0.00	$0.07	$0.18
2023	$0.00	$0.09	$0.21
2024	$0.00	$0.12	$0.24
2025	$0.00	$0.13	$0.25
2026	$0.00	$0.14	$0.27
2027	$0.00	$0.14	$0.27
2028	$0.00	$0.15	$0.28
2029	$0.00	$0.15	$0.31
2030	$0.00	($1.21)	($1.17)

Docket No. 20190015-EG
Comparison of the Resource Plans: Projection of System Average Electric Rates and Customer Bills (Assuming 1,200 kWh Usage)
Exhibit AWW-12, Page 1 of 1

Comparison of the Resource Plans: Projection of System Emissions

SO_2 (thousand tons)			
Year	Supply Only Resource Plan	RIM Resource Plan	TRC Resource Plan
2020	1.2	1.2	1.2
2021	1.3	1.3	1.3
2022	1.1	1.1	1.1
2023	1.2	1.2	1.2
2024	1.1	1.1	1.1
2025	1.3	1.3	1.3
2026	1.2	1.2	1.2
2027	1.3	1.3	1.3
2028	1.3	1.3	1.3
2029	1.3	1.3	1.3
2030	1.4	1.4	1.4

NO_x (thousand tons)			
Year	Supply Only Resource Plan	RIM Resource Plan	TRC Resource Plan
2020	6.6	6.6	6.6
2021	6.5	6.5	6.5
2022	6.0	6.0	6.0
2023	5.8	5.8	5.8
2024	5.6	5.6	5.6
2025	5.6	5.6	5.6
2026	5.3	5.3	5.3
2027	5.1	5.1	5.1
2028	5.0	5.0	5.0
2029	5.0	5.0	5.0
2030	4.9	4.9	4.9

CO_2 (million tons)			
Year	Supply Only Resource Plan	RIM Resource Plan	TRC Resource Plan
2020	36.5	36.5	36.5
2021	36.2	36.2	36.2
2022	34.7	34.7	34.7
2023	34.2	34.2	34.2
2024	33.9	33.9	33.9
2025	33.2	33.2	33.1
2026	33.4	33.4	33.4
2027	33.2	33.2	33.1
2028	32.2	32.2	32.1
2029	31.9	31.9	31.8
2030	31.4	31.3	31.2

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

Oil (million mmBtu)			
Year	**Supply Only Resource Plan**	**RIM Resource Plan**	**TRC Resource Plan**
------	------	------	------
2020	0.1	0.1	0.1
2021	0.1	0.1	0.1
2022	0.0	0.0	0.0
2023	0.0	0.0	0.0
2024	0.0	0.0	0.0
2025	0.0	0.0	0.0
2026	0.0	0.0	0.0
2027	0.1	0.1	0.1
2028	0.1	0.1	0.1
2029	0.1	0.1	0.1
2030	0.2	0.1	0.1

Natural Gas (million mmBtu)			
Year	**Supply Only Resource Plan**	**RIM Resource Plan**	**TRC Resource Plan**
------	------	------	------
2020	582.7	582.7	582.7
2021	574.1	574.1	573.9
2022	552.7	552.7	552.6
2023	541.5	541.5	540.9
2024	540.2	540.2	539.5
2025	522.4	522.4	521.7
2026	530.0	530.0	529.1
2027	521.4	521.4	520.3
2028	504.5	504.5	503.5
2029	499.0	499.0	498.2
2030	488.1	487.5	486.3

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

FLORIDA POWER & LIGHT COMPANY

DIRECT TESTIMONY OF DR. STEVEN R. SIM

DOCKET NO. 20190015-EG

APRIL 12, 2019

TABLE OF CONTENTS

I. INTRODUCTION

Q. Please state your name and business address.

A. My name is Steven R. Sim, and my business address is 700 Universe Boulevard, Juno Beach, Florida 33408.

Q. By whom are you employed and what is your position?

A. I am employed by Florida Power & Light Company (FPL) as Director of Integrated Resource Planning.

Q. Please describe your duties and responsibilities for FPL in that position.

A. I direct and perform analyses that are designed to determine the magnitude and timing of FPL's resource needs and then develop the integrated resource plan with which FPL will meet those resource needs. I also direct and perform analyses that are designed to otherwise improve system economics and/or enhance system reliability for FPL's customers.

Q. Please describe your educational background and professional experience.

A. I graduated from the University of Miami (Florida) with a Bachelor's degree in Mathematics in 1973. I subsequently earned a Master's degree in Mathematics from the University of Miami (Florida) in 1975 and a Doctorate in Environmental Science and Engineering from the University of California at Los Angeles (UCLA) in 1979.

While completing my degree program at UCLA, I was also employed full-time as a Research Associate at the Florida Solar Energy Center during 1977 -

1979. My responsibilities at the Florida Solar Energy Center included an evaluation of Florida consumers' experiences with solar water heaters and an analysis of potential renewable energy resources applicable in the Southeastern United States, including photovoltaics, biomass, and wind power.

In 1979, I joined FPL. From 1979 until 1991, I worked in various departments including Marketing, Energy Management Research, and Load Management, where my responsibilities concerned the development, monitoring, and cost-effectiveness analyses of demand side management (DSM) programs. In 1991, I joined my current department, then named the System Planning Department, where I held different supervisory and/or managerial positions dealing with integrated resource planning (IRP). I assumed my present position in 2017.

Q. Have you previously testified on resource planning and/or DSM issues before the Florida Public Service Commission?

A. Yes. I have testified before the Florida Public Service Commission (FPSC) in numerous dockets. These dockets have dealt with a variety of issues such as system reliability and economic analyses of many types of resource options. Among the subjects addressed in those dockets are: (i) DSM goal-setting, (ii) need determination filings for new combined cycle (CC) units, advanced coal units, and nuclear units, (iii) nuclear feasibility analyses, and (iv) economics of solar and battery storage on FPL's system. In regard to DSM goal-setting, I

have provided testimony in all five of the previous FPSC DSM goal-setting dockets starting in 1994.

Q. Are you sponsoring any exhibits in this case?

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

Exhibit SRS-1	A Comparison of 2009, 2014, and 2019 Natural Gas Cost Forecasts for the Years 2020 - 2029;
Exhibit SRS-2	A Comparison of 2009, 2014, and 2019 CO_2 Compliance Cost Forecasts for the Years 2020 - 2029;
Exhibit SRS-3	A Comparison of 2009, 2014, and 2019 System Average Heat Rates for FPL's Gas-Fueled Generation Fleet;
Exhibit SRS-4	A Comparison of FPL's 2009, 2014, and 2019 In-Service Year Capital Costs for the Avoided CC Unit; and,
Exhibit SRS-5	A Comparison of a Benefits Only Calculation for a Proxy DSM Measure Using System Cost Values from the 2014 and 2019 DSM Goals Dockets

Q. What is the scope of your testimony?

A. My testimony is designed to support the testimonies of the other two FPL witnesses by explaining why it is both logical and appropriate for FPL's proposed DSM Goals to be lower than the goals set by the FPSC in the last

DSM Goals docket in 2014. Specially, I discuss the "benefits" side of benefit-to-cost (or cost-effectiveness) analyses of DSM measures that is a major topic in this docket and explain why the potential benefits of DSM measures, particularly on FPL's system, have decreased so significantly.

Q. Please summarize your testimony.

A. My testimony points out that DSM benefits are simply FPL system costs that are potentially avoided (or deferred) by DSM. I examine the eight primary "drivers" of FPL's system variable and fixed costs that are potentially avoidable by DSM. In this examination, I compare the current forecasted values for each driver with the forecasted values from the most recent DSM Goals dockets (2009 and 2014). The result of the examination is that seven of the eight drivers have been moving, and are continuing to move, in the direction of lower system costs for FPL.

This trend of overall lower FPL system costs is very beneficial for FPL's customers because it results in helping to keep electric rates low. However, lower system costs automatically reduce DSM's potential benefits from avoiding those same costs. Consequently, the cost-effectiveness of DSM on FPL's system, which has generally been trending lower for a number of years, is continuing to trend lower. I demonstrate the magnitude of the decrease in DSM benefits by calculating a benefits-only analysis of a DSM proxy measure first using the then-current FPL system cost values from the 2014 DSM Goals docket, then using the current 2019 system cost values. The

result is that projected DSM benefits have decreased more than 33% in the five-year period since DSM Goals were last set by the FPSC in 2014.

As a result, it is both logical and appropriate that the DSM Goals that FPL is proposing in this docket are relatively low. However, FPL's customers will still be receiving significant amounts of energy efficiency. As discussed in my testimony, two of the drivers that are lowering FPL's system costs are: (i) increased energy (MWh) reductions from Florida Building Code and federal equipment manufacturing standards (collectively, Codes and Standards), and (ii) increased peak load (MW) reductions from these same Codes and Standards. The forecasted amount of energy efficiency to be delivered to FPL's customers from these Codes and Standards by the year 2029 (the last year in the ten-year time period addressed in this docket) is now much greater than was the case in either the 2009 or 2014 DSM Goals dockets.

II. THE DRIVERS OF POTENTIAL BENEFITS OF DSM ON FPL'S SYSTEM

Q. Please discuss in general terms how DSM measures and programs can potentially benefit a utility system.

A. DSM measures and programs (DSM) can potentially benefit a utility system in two basic ways. First, DSM's kWh reductions can potentially lower the utility system's variable costs by lowering the amount of energy (MWh) that

the utility must serve throughout the year, thus lowering the costs of supplying those MWh. Second, DSM's peak hour kW reductions can potentially lower the utility system's fixed costs by lowering the capacity (MW), and the cost of that capacity, needed by the utility to ensure reliability at its Summer peak hour, its Winter peak hour, and throughout the remainder of the year. Therefore, both DSM's kWh reductions and kW reductions can potentially contribute to DSM cost-effectiveness by avoiding (or deferring) variable and/or fixed system costs. These system costs that could potentially be avoided by DSM represent the potential benefits of DSM.

Q. In regard to the benefits calculations for the Rate Impact Measure (RIM) and Total Resource Cost (TRC) preliminary cost-effectiveness screening tests, do both tests account for DSM benefits in regard to potentially avoidable variable and fixed system costs in the same way?

A. Yes. Although the RIM and TRC tests differ in what cost impacts are accounted for in the calculation as discussed by FPL witness Andrew W. Whitley, the two tests use identical calculations for the benefits side of the benefit-to-cost preliminary screening calculation. Thus, the points discussed in the remainder of my testimony regarding the benefits side of DSM cost-effectiveness apply equally to both the RIM and TRC screening tests.

Q. Are there certain factors that "drive" FPL's system costs that DSM could potentially avoid?

A. Yes. For FPL's system, there are eight primary drivers of system costs that DSM could potentially avoid. There are four drivers of system variable costs

and another four drivers of system fixed costs. I will discuss each of these drivers and examine the trends of these costs, beginning in the next section of my testimony.

In the examination of these trends, several different perspectives will be used that are appropriate for the specific driver being discussed. For example, one perspective that will be used for several of these drivers is to compare current (2019) forecasted costs for the years 2020 and 2029, the "bookend" first and last years for which DSM Goals are to be set in this docket, with forecasts FPL used in the two most recent DSM Goals dockets: the 2009 and 2014 DSM Goals dockets.

Q. Are the 2019 forecasts you will discuss in your testimony the same forecasts that FPL is using in this docket and in other aspects of FPL's 2019 resource planning work?

A. Yes. The 2019 forecasts for fuel cost, environmental compliance costs, and load that I discuss are the same forecasts that FPL is using in all of its 2019 resource planning work. FPL has also used these same forecasts in the analyses that support various recent FPSC filings, including those for: the 2019 Ten-Year Site Plan (Site Plan), 2019 Standard Offer Contract, 2020 Solar Base Rate Adjustment (SoBRA), 2020/2021 SolarTogether, and this 2019 DSM Goals docket.

III. TRENDS IN FPL SYSTEM VARIABLE COSTS

Q. What are the most important types of variable costs that could potentially be avoided by DSM?

A. Two types of costs comprise the vast majority of the variable system costs that are accounted for in FPL's resource planning work. These are: (1) system fuel costs and (2) system environmental compliance costs.

Q. What are the most important drivers in FPL's projection of these two types of system variable costs?

A. The four main drivers are: (i) fuel cost forecasts, (ii) environmental compliance cost forecasts, (iii) the efficiency with which fuel is converted into electricity by FPL's generating units, and (iv) the forecasted growth in the utility's energy (MWh) sales projected as net energy for load (NEL). I will discuss each of these drivers and the directional impact each has on potential DSM benefits in regard to kWh reductions lowering FPL system variable costs.

Q. Please discuss how FPL's forecasts of natural gas cost from the two most recent DSM Goals dockets compare with FPL's current forecast.

A. In this discussion, I will use the forecasted weighted-average cost ($/mmBTU) values for Florida Gas Transmission (FGT) from FPL's forecasts in 2009, 2014, and 2019. I will look first at the forecasted values for 2020 (the first year for which DSM Goals are to be set in this docket).

FPL's natural gas forecast from the 2009 DSM Goals docket for the year 2020 was $13.31. In the 2014 DSM Goals docket, the gas cost forecast for 2020 had dropped to $6.31, a decrease of more than 50%. The current gas forecast for 2020 is $2.74, a further decrease of more than 50% from 2014 to the present. Over the ten-year period of 2009 to 2019, the forecasted cost of natural gas for the year 2020 has decreased by almost 80%. A comparison of these forecasted cost values is presented graphically in Figure 1 below.

Forecasted Natural Gas Costs ($/mmBTU) for the Year 2020 from 2009, 2014, and 2019 Fuel Cost Forecasts

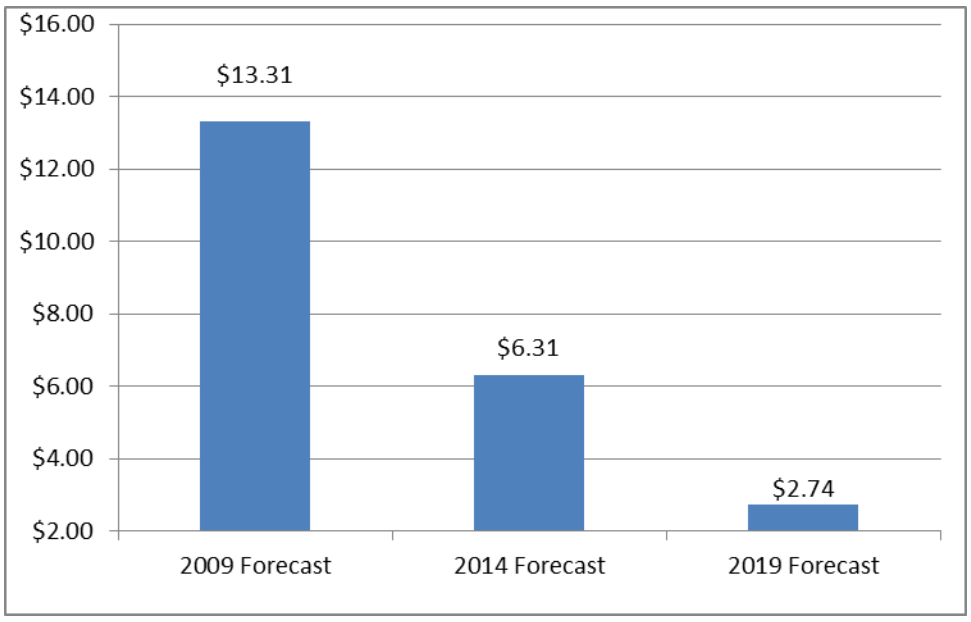

Figure 1

A very similar picture emerges when comparing these gas forecasts for the year 2029 (the last year for which DSM Goals are to be set in this docket). The 2009 DSM Goals docket used a forecasted cost for the year 2029 of

$15.87. By the time of the 2014 DSM Goals docket, the gas cost forecast for 2029 had dropped to $8.99, a decrease of more than 40% in forecasted natural gas costs from 2009 to 2014. The current gas forecast for 2029 is $4.54, a further decrease of approximately 50% from 2014 to the present. Over the ten-year period of 2009 to 2019, the forecasted cost of natural gas for the year 2029 has decreased by more than 70%. A comparison of these forecasted cost values is presented graphically in Figure 2 below.

Forecasted Natural Gas Costs ($/mmBTU) for the Year 2029 from 2009, 2014, and 2019 Fuel Cost Forecasts

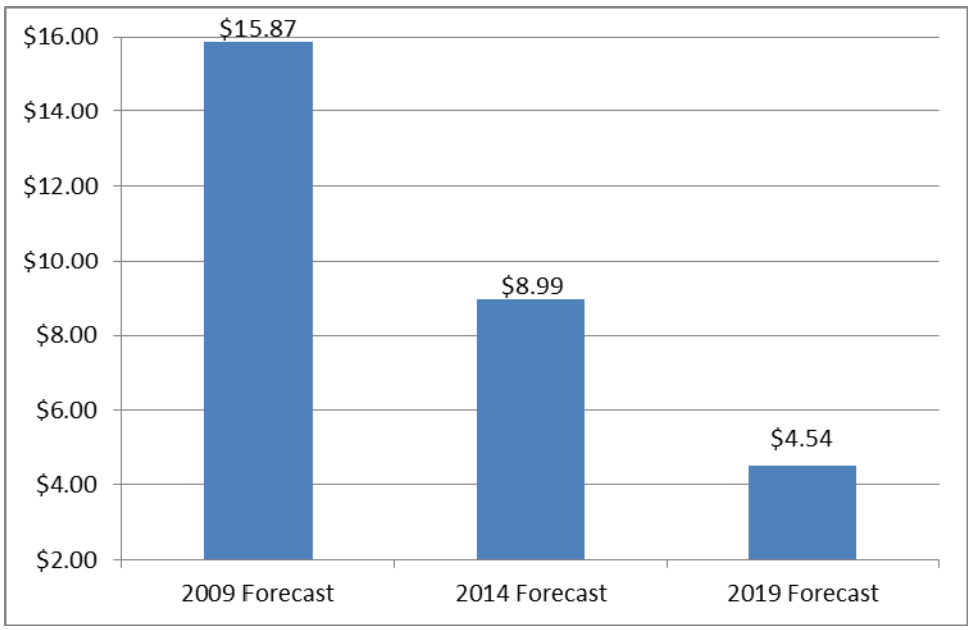

Figure 2

A comparison of the 2009, 2014, and 2019 forecasted values for each year in the 2020 – 2029 time period is presented in Exhibit SRS-1.

Thus, there has been a steady, and continuing, decrease in the forecasted cost of natural gas when examining the forecasts from the two most recent DSM Goals dockets and the forecast for the current docket. This is especially meaningful in regard to FPL because natural gas is the fuel that FPL burns on its margin (*i.e.,* it is the fuel that FPL burns for the last kWh it serves and for the kWh that DSM would potentially reduce) on FPL's system for virtually all annual hours.

This reduction in natural gas costs is very beneficial for FPL's customers. However, it also significantly reduces the potential fuel savings benefit from DSM. Consequently, this examination of the first of the eight drivers that will be examined shows that the trend in this cost results in decreased cost-effectiveness for DSM kWh reductions.

Q. The second driver of system variable costs that you listed is environmental compliance costs. Please discuss how the forecasts of environmental compliance costs from the two most recent DSM Goals dockets compare with FPL's current forecast.

A. In its resource planning work, FPL utilizes environmental compliance cost forecasts for carbon dioxide (CO_2) that it receives annually from an independent consultant, ICF International. FPL has utilized ICF's CO_2 compliance cost forecasts in its resource planning work, and in all of its

resource planning-related FPSC filings since 2007.[1] During this time period, the FPSC has consistently relied upon the use of ICF's CO_2 compliance cost forecasts in FPL analyses.

In the 2009 DSM Goals docket, the forecasted CO_2 compliance cost ($/ton) for the year 2020 was $26.85. However, by the 2014 DSM Goals docket, the forecasted compliance cost value for 2020 had dropped to $0. The current forecasted compliance cost value for 2020 remains at $0. So for the year 2020, the forecasted compliance costs have decreased by 100% *(i.e.,* they have disappeared). These forecasted compliance cost values for the year 2020 are presented graphically in Figure 3.

Forecasted CO_2 Compliance Costs ($/ton) for the Year 2020 from 2009, 2014, and 2019 Compliance Cost Forecasts

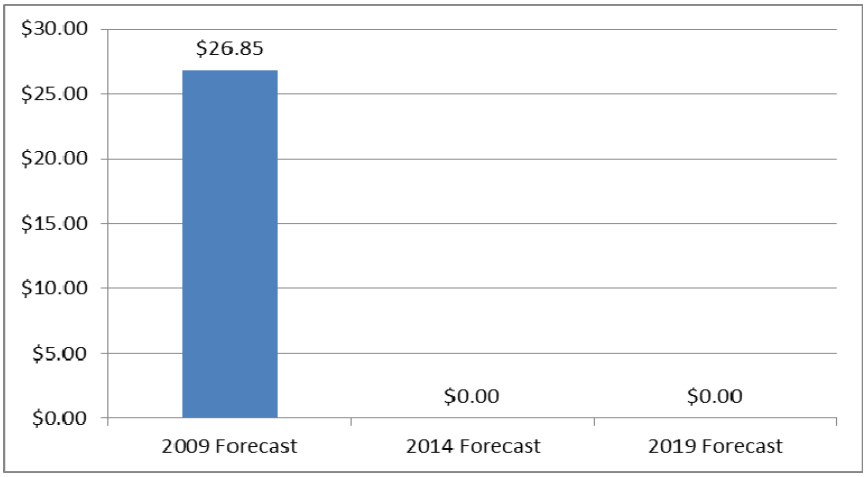

Figure 3

[1] Note as required by FPSC Order No. 2019-0062-PCO-EG, FPL and Duke Energy Florida have developed a single composite forecast of CO_2 compliance costs for use in this docket. This was also done for the 2014 DSM Goals docket. My discussion refers to the FPL component of that composite forecast.

A similar picture emerges when comparing the forecasted compliance cost values for the year 2029. The 2009 forecast projected a compliance cost for 2029 of $61.76. By 2014, the forecasted value for 2029 had dropped significantly to $18.75. The current forecasted value for 2029 has further decreased to $2.19. When comparing the 2009 and 2014 values for the year 2029, the forecasted compliance cost decreased by 70%. Then by 2019, the forecasted compliance cost value for 2029 decreased again by almost 90%. Over the ten-year period, the forecasted compliance cost value for the year 2029 decreased by 96%. These forecasted compliance cost values for the year 2029 are presented graphically in Figure 4.

Forecasted CO_2 Compliance Costs ($/ton) for the Year 2029 from 2009, 2014, and 2019 Compliance Cost Forecasts

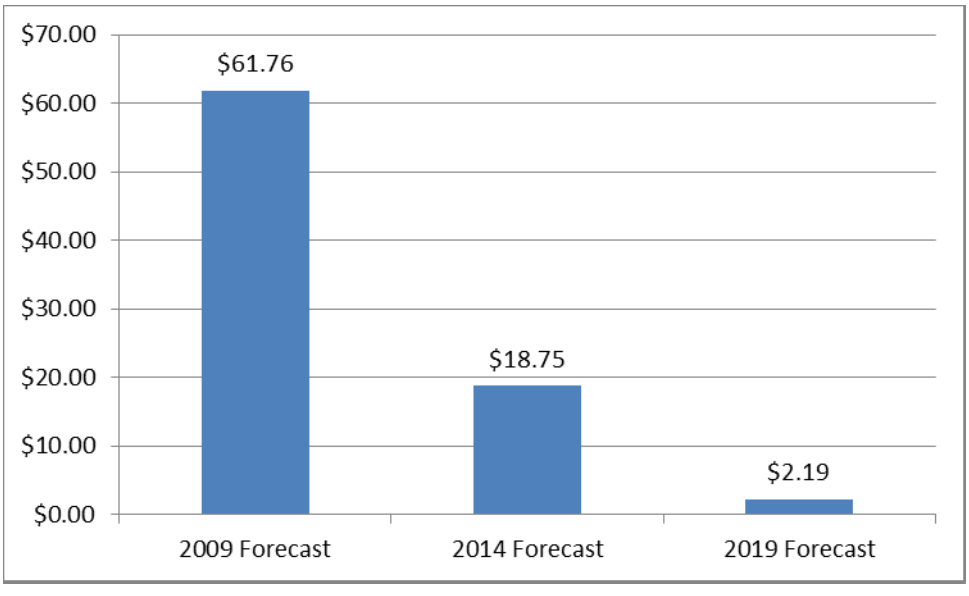

Figure 4

A comparison of the 2009, 2014, and 2019 forecasted compliance cost values for each year in the 2020 – 2029 time period is presented in Exhibit SRS-2.

Therefore, similar to forecasted gas costs, there has been a steady and continuing decrease in projected CO_2 compliance costs. This reduction in compliance costs is also very beneficial for FPL's customers. However, it also significantly reduces the potential compliance cost savings benefit from DSM kWh reduction. Consequently, this examination of the second of the eight drivers shows that the trend in this cost also results in decreased cost-effectiveness for DSM kWh reductions.

Q. The third driver you listed was the efficiency with which a utility system utilizes fuel to generate electricity. Please discuss.

A. All else equal, the more efficient a utility system is in converting fuel into electricity, the lower the utility system fuel costs and system emissions will be because less fuel is needed, and fewer emissions are produced, to produce a kWh of electricity. Whereas the trend of steadily declining natural gas and/or CO_2 compliance costs are factors that affect most, if not all, electric utilities, the fuel efficiency of a utility's generation system is very specific to the individual utility.

The efficiency at which FPL's fleet of gas-fueled[2] generating units (fleet) turns fuel into electricity, as measured by system average heat rates

[2] Some of FPL's gas-fueled generation units may occasionally burn a small amount of oil in certain circumstances when electrical demand is very high.

(BTU/kWh), has significantly improved and continues to improve. This has been accomplished through a number of proactive steps FPL has taken since at least 2001. One of these steps is to retire older, less fuel-efficient generating units and replace them with cost-effective modern generation technology with much improved fuel efficiency.

In 2001, the system average heat rate for FPL's gas-fueled fleet was 9,635 BTU/kWh. By the time of the 2009 DSM Goals docket, this heat rate for the FPL fleet had decreased to 8,032 BTU/kWh. The efficiency gains continued and, by the time of the 2014 DSM Goals docket, the heat rate had decreased to 7,376 BTU/kWh. Today, the projected heat rate for the FPL fleet is 6,869 BTU/kWh. The 2009, 2014, and 2019 values are presented graphically in Figure 5 and the derivation of these values is presented in Exhibit SRS-3.

FPL Gas-Fueled Generation Fleet Average Heat Rates

(BTU/kWh) for 2009, 2014, and 2019

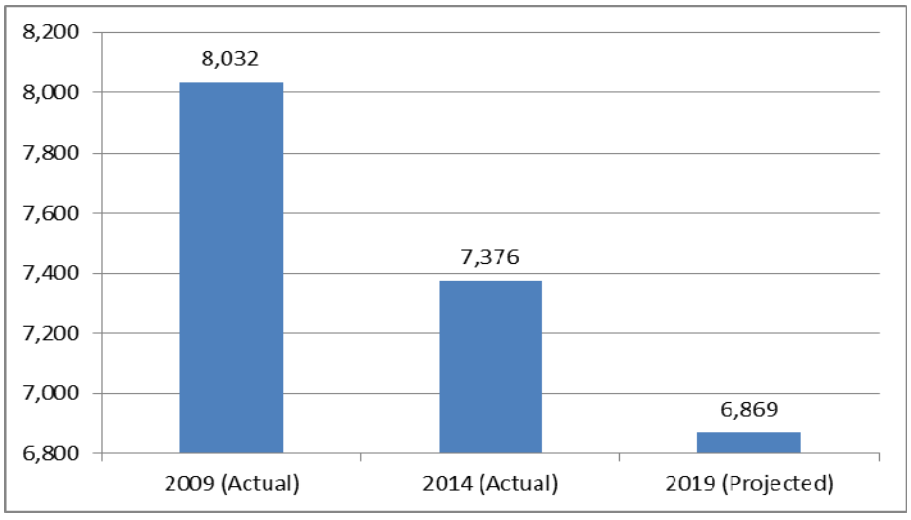

Figure 5

In the ten-year period from 2009 to the present, FPL's fleet has further improved the efficiency with which it burns natural gas by approximately 15%. This improvement in fuel efficiency in such a relatively short time is truly significant, especially when one considers the approximate 20,000 MW size of FPL's gas-fueled fleet.

Thus, FPL's system is not only using natural gas that costs much less, and facing much lower CO_2 compliance costs, than when prior DSM Goals were set, FPL's system is also burning less gas per each kWh it produces for its customers. Consequently, the fuel cost and compliance cost savings benefit that a DSM kWh reduction could potentially offer have been further reduced by the fuel efficiency improvements of FPL's fleet. This is again very beneficial for FPL's customers. However, it further reduces the potential benefits from DSM kWh reduction. As a result, the trend in this third of the eight drivers also results in decreased cost-effectiveness for DSM kWh reductions.

Q. The fourth driver of system variable costs that you listed was a utility's projected growth in NEL (MWh). Is there a factor that affects FPL's forecasted NEL that is especially important in this particular docket?

A. Yes. That factor is the steadily growing impact of Codes and Standards on the amount of energy a utility will need to produce to serve its customers. For a number of years, FPL has included in its annual Site Plan filings a projection of the impact of Codes and Standards on FPL's forecasted NEL (MWh) and

peak load (MW). FPL also presented its then-current projection of the impact of these Codes and Standards in its 2014 DSM Goals filing.

A comparison of the 2009, 2014, and 2019 projected impacts of these Codes and Standards on FPL's forecasted NEL for the last year (2029) of the ten-year goals-setting period in this docket shows how the projected impact of the Codes and Standards has significantly increased. The comparison is based on forecasted impacts from the 2005 inception of these Codes and Standards.

In 2009, FPL projected that the amount of energy that would be reduced by Codes and Standards for the year 2029 was 9,359,212 MWh. In 2014, that projection increased to 10,645,000 MWh, which represents an approximately 14% increase in the amount of energy projected to be decreased by Codes and Standards.

FPL's current projection of the impact on NEL in the year 2029 by Codes and Standards has again increased to 12,049,520 MWh. This represents an additional increase of approximately 13% in the amount of energy projected to be decreased by Codes and Standards. Over the ten-year period from 2009 to 2019, the projected reduction of FPL NEL for the year 2029 has increased by almost 29%.

The forecasted reductions in NEL due to Codes and Standards for the year 2029 from the 2009, 2014, and 2019 forecasts are presented graphically in Figure 6.

Forecasted NEL (MWh) Reduction from Codes and Standards for the Year 2029 from 2009, 2014, and 2019 Forecasts

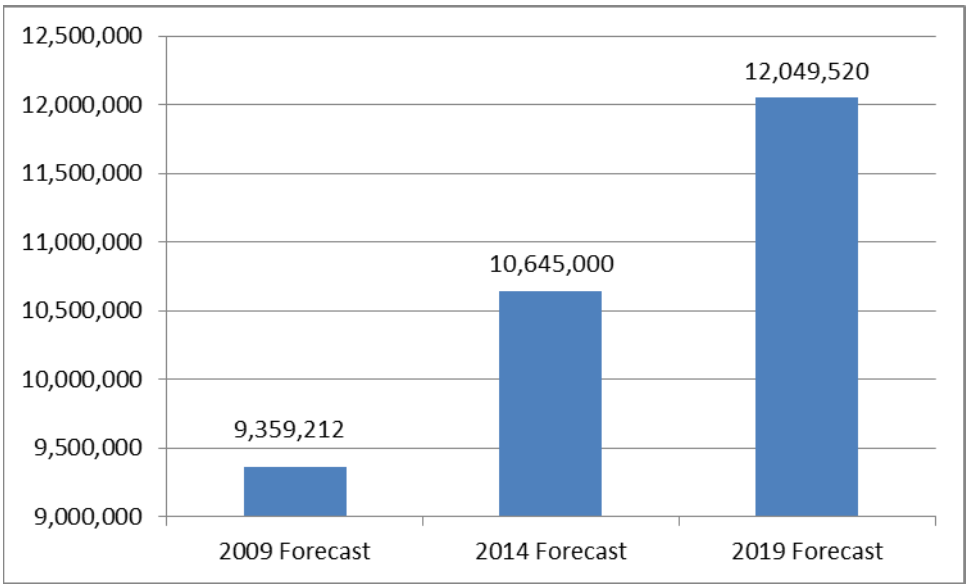

Figure 6

This graph shows that not only has the forecasted MWh reduction impact of the Codes and Standards been significant in each of the 2009, 2014, and 2019 DSM Goals dockets, but also that the latest forecast shows a significantly larger MWh reduction impact than did the previous forecasts.

Q. What are the implications of this forecasted increased MWh reduction impact of Codes and Standards?

A. There are several implications. First, FPL's NEL forecasts account for the projected impacts of these Codes and Standards, and, consequently, the NEL forecasts have been lower than they otherwise would have been.

Second, because FPL will be serving fewer MWh annually due to these Codes and Standards, there is less opportunity for DSM kWh reductions from utility DSM to be applied to FPL's system. This further lowers the potential benefits of kWh reductions from utility DSM. Consequently, the trend in this fourth of the eight drivers also results in decreased cost-effectiveness for DSM kWh reductions.

Third, the Codes and Standards have removed potential energy reduction opportunities that otherwise might have been addressed by utility DSM programs. This results in lower Economic Potential and Achievable Potential values for utility DSM programs (which are addressed in the testimonies of FPL witnesses Whitley and Thomas R. Koch).

Finally, and importantly for purposes of this DSM Goals docket, the Codes and Standards will deliver truly significant amounts of energy efficiency to FPL's customers. FPL's 2019 NEL forecast for the year 2029 is 128,967,611 MWh. The previously mentioned 12,049,520 MWh of energy

reduction delivered through these Codes and Standards projected for 2029 represents slightly more than 9% of the total energy FPL is projected to produce in that year.

Q. Please briefly summarize the above discussion of how the forecasted values for the four main drivers of FPL system variable costs have changed and what the impact is in regard to DSM cost-effectiveness.

A. There has been a trend of significant decreases in FPL system variable costs that are due to changes in each of the four drivers: (i) decreasing natural gas costs, (ii) decreasing CO_2 compliance costs; (iii) increasing efficiency with which FPL converts fuel into electricity, and (iv) decreasing amounts of MWh that no longer need to be generated due to Codes and Standards. In other words, all four drivers of FPL system variable costs have been steadily moving in the direction of lower costs.

Lower costs for natural gas, lower environmental compliance costs, and increased efficiency in converting fuel into electricity are all very good for FPL's customers because these help to keep electric rates low. However, these lower system variable costs also result in significantly decreased benefits that DSM kWh reductions could potentially provide. As a result, the cost-effectiveness of DSM, particularly for customers served by FPL's system of fuel-efficient generating units, has also significantly decreased.

However, as previously mentioned, FPL's customers will continue to receive a very large amount of energy (MWh) reduction through the same Codes and Standards that are contributing to the reduced cost-effectiveness of utility DSM programs.

IV. TRENDS IN FPL SYSTEM FIXED COSTS

Q. What are the most important types of fixed costs that could potentially be avoided by DSM's kW reductions?

A. The three most important types of fixed costs on FPL's system that DSM could potentially avoid through kW reduction are: (1) capital cost of new generating units, (2) system firm gas transportation costs, and (3) capital costs of new system transmission and distribution (T&D) facilities.

Q. What are the most important drivers in FPL's projection of these three system fixed costs?

A. In regard to system fixed costs for the FPL system, the four main drivers are: (i) capital ($/kW) costs for new generating units, (ii) annual costs for securing additional firm gas transportation for new CC unit additions, (iii) capital ($/kW) costs for transmission and distribution (T&D) expenditures that would be needed without incremental DSM, and (iv) the forecasted growth in the utility's peak load (MW). I will discuss each of these drivers and the directional impact each has on potential DSM benefits in regard to kW reductions lowering FPL system fixed costs.

Q. Please describe the avoided generating unit that FPL is using in this docket for the preliminary cost-effectiveness screening of DSM measures.

A. FPL's 2019 Site Plan shows a 2026 gas-fueled CC unit, and this CC unit is being used as the "avoided unit" in this docket for the preliminary cost-effectiveness screening of DSM measures. FPL also used a new CC unit as the avoided unit in both its 2009 and 2014 DSM dockets, which, coincidently, is helpful when comparing capital costs for the avoided units from the 2009, 2014, and 2019 dockets.

Q. Please discuss the current capital cost of this new 2026 CC unit and how this cost compares to the capital costs used for the avoided CC units in the 2009 and 2014 DSM Goals dockets.

A. In preliminary cost-effectiveness screening of DSM measures, FPL uses the projected capital cost of the avoided generating unit in terms of a $/kW value that is presented for the year in which the screening is performed. That cost is then escalated year-by-year by a constant annual escalation rate up to the year that the avoided unit is projected to go into service. For example, in the 2009 DSM Goals docket, the avoided unit was a 2019 CC unit. FPL used a capital cost of $725/kW that was a 2009 cost value (*i.e.*, a value produced in the year the analysis was performed) and escalated that value to determine the capital cost of the CC unit in its in-service year of 2019. Assuming a capital cost escalation rate of 3% per year, the 2019 capital cost value is $974/kW.

In order to compare on a common basis, the avoided CC unit capital costs from the two most recent DSM Goals dockets (2009 and 2014) with the current capital cost projection for the 2026 CC unit, the approach described above was used. The capital costs are compared in terms of the in-service years projected, respectively, in the 2009, 2014, and 2019 DSM Goals dockets. (A projected 2019 in-service date was projected in both the 2009 and 2014 dockets and, as mentioned above, a 2026 in-service date is projected in this docket.)

The result of this comparison of avoided CC unit capital costs for the 2009, 2014, and 2019 DSM Goals dockets is presented graphically in Figure 7. The derivation of these CC capital costs is presented in Exhibit SRS–4.

A Comparison of CC Avoided Capital Costs from 2009, 2014, and 2019 ($/kW, In-Service Year $)

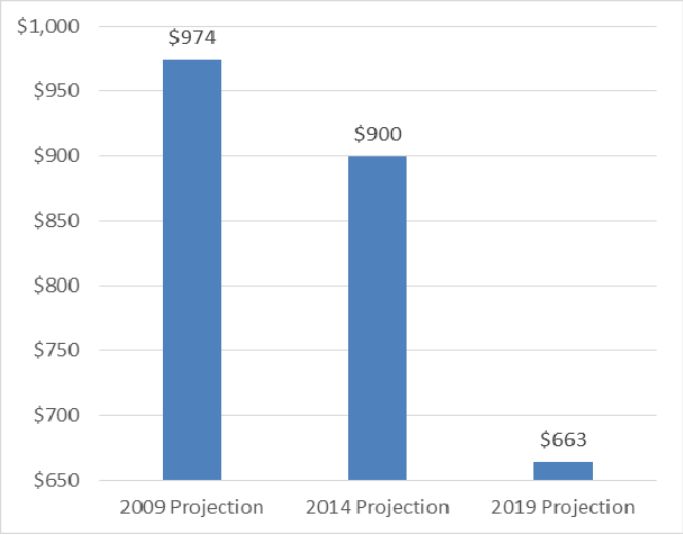

Figure 7

The projected capital costs of the CC units from each of the three dockets that DSM kW reductions might potentially avoid are: $974/kW (in the 2009 docket), $900/kW (in the 2014 docket), and $663/kW currently. Thus, the projected cost of a CC unit decreased by approximately 8% from the 2009 docket to the 2014 docket, and has decreased again by approximately 26% from the 2014 docket to now. Overall, the projected cost of CC unit has decreased by approximately 32% from the 2009 DSM Goals docket.

This significant decrease in the capital cost of the CC unit is again very beneficial for FPL's customers. However, it also reduces the potential benefits from DSM kW reductions. As a result, the trend in this fifth of the eight drivers also results in decreased cost-effectiveness for DSM.

Q. The second driver of system fixed costs was the cost of firm gas transportation costs. Please discuss.

A. As discussed above, in the 2009 and 2014 DSM Goals dockets, the avoided unit was a CC. When determining that a CC was the most economic generation option to meet future resource needs, FPL's evaluation included a projection of the amount of additional firm gas that would be needed on FPL's system to ensure that the new CC would have a reliable source of fuel, plus a projection of the cost for securing delivery of the firm gas. That cost was accounted for as a component in the fixed operations and maintenance (Fixed O&M) cost for the CC unit.

In the 2009 DSM Goals docket, the projected annual cost of needed firm gas transportation due to the new 2019 CC unit was $155 million beginning in 2019. In the 2014 DSM Goals docket, the projected annual cost of needed firm gas for the 2019 CC unit had decreased to $60 million beginning in 2022. However, in 2019 FPL now projects that no additional firm gas transportation will be needed if a 2026 CC unit is added to FPL's system.

The changes in projected firm gas transportation costs are primarily due to three factors. Two of these factors have been previously discussed. First, the increasing efficiency with which FPL's gas-fueled generation fleet uses fuel to produce electricity lowers the amount of natural gas that FPL needs. Second, the increasing impact of Codes and Standards lowers the amount of MWh that FPL needs to produce. The third factor is the very large amount of solar energy now being added to FPL's system. As shown in FPL's 2019 Site Plan, FPL now projects a total of approximately 8,053 MW (nameplate, AC) of photovoltaic (PV) generation facilities will be on FPL's system by the end of 2028 (the last year addressed by the 2019 Site Plan). In addition, FPL plans to add another 1,200 MW of PV in 2029 (the last year for which DSM Goals will be set in this docket.)

Assuming a 26% annual capacity factor for the approximately 9,250 MW (= 8,050 MW + 1,200 MW) of PV by the end of 2029, this results in a projection of approximately 21,000,000 MWh, or 21,000 GWh, of energy produced by

solar energy in 2029. This represents slightly more than 16% of the total energy FPL is expected to produce in that year. Consequently, this amount of energy will not need to be produced by gas-fueled generation.

The combination of these three factors result in no need for additional firm gas to accompany the 2026 CC unit that is being used as the avoided unit for the DSM preliminary screening of DSM measures in this docket. Thus, FPL currently projects a $0 fixed cost for additional firm gas transportation. A comparison of the projected annual firm gas transportation costs due to the CC avoided unit from the three DSM Goals dockets is presented graphically in Figure 8.

A Comparison of Projected Costs for New Firm Gas

($ millions, nominal)

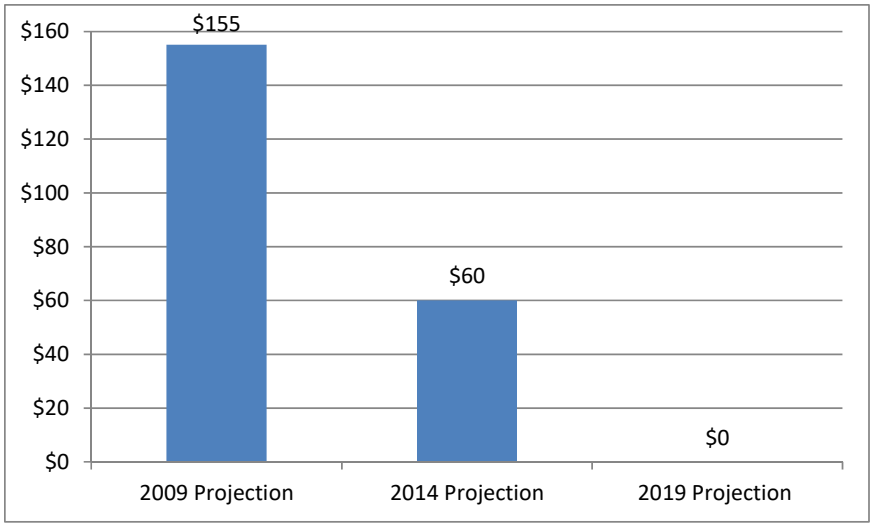

Figure 8

Once again, this decrease in FPL system costs is very beneficial for FPL's customers. However, it again reduces the potential benefits from DSM kW reductions. As a result, the trend in this sixth of the eight drivers also results in decreased cost-effectiveness for DSM.

Q. The third main driver of system fixed costs is the capital cost ($/kW) of T&D facilities. What is the trend in these costs?

A. In the previous two DSM Goals dockets, and again in this docket, the projected capital costs of T&D facilities that might potentially be avoided by DSM kW reductions were presented in terms of the $/kW costs for the first year of each of the ten-year goals-setting periods. In the 2009 DSM Goals docket, the projected $/kW capital costs combined for T&D was approximately $206/kW. In the 2014 docket, the projected combined T&D capital cost decreased to $172/kW. However, in the current docket, the projected combined T&D capital cost has increased to $396/kW. These projected combined T&D capital costs are presented graphically in Figure 9.

Projected T&D Capital Costs ($/kW) from 2009, 2014, and 2019

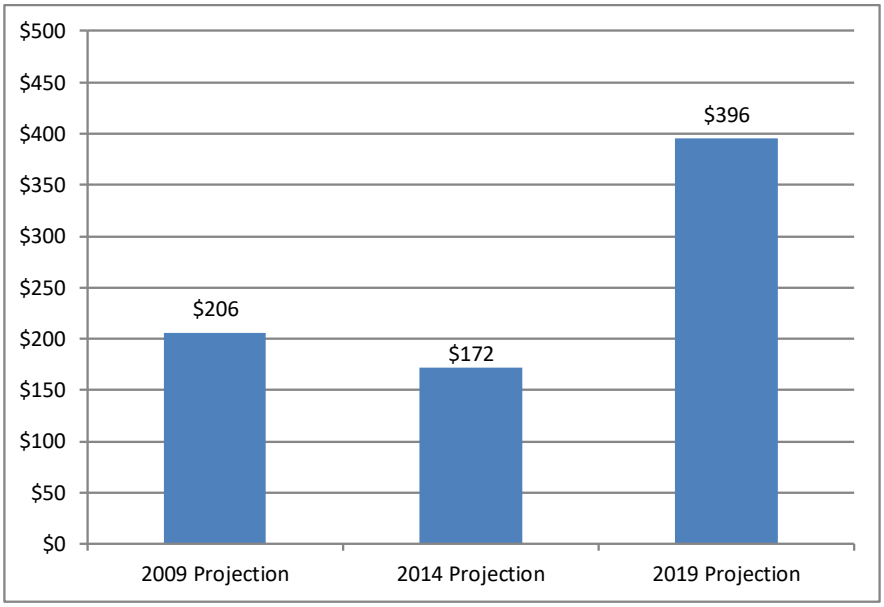

Figure 9

The forecasts for the types of T&D projects, and their associated costs, that are potentially avoidable by DSM can vary significantly from year to year. The current forecasts show a greater need for such projects at this point in time than in either 2009 or 2014. Thus, the forecasted costs (the numerator in the $/kW value) for such projects is currently higher than at the points in time in which the 2009 or 2014 cost values were developed. In addition, the forecasted growth in peak load is currently lower than in 2009 or 2014, which reduces the denominator (kW) in the $/kW T&D value, thus further increasing the $/kW projected cost.

Therefore, the net result for the seventh of the eight drivers is a projected increase in the potential benefits from DSM kW reductions. As such, this

driver is the first of the seven drivers examined so far that is projected to increase DSM cost-effectiveness.

Q. The fourth driver of system fixed costs is a utility's projected growth in peak load (MW). Does the projected impact of Codes and Standards also impact FPL's forecasted growth in peak load?

A. Yes. As previously mentioned, FPL has included in its recent Site Plan filings a projection of the impact of Codes and Standards on FPL's forecasted peak load (MW) as well as on FPL's projected NEL. FPL also presented its then current projection of the impact of these Codes and Standards on peak load in its 2014 DSM Goals filing.

A comparison of the 2009, 2014, and 2019 projected impacts of these Codes and Standards on FPL's forecasted summer peak load for the last year (2029) of the ten-year goals-setting period in this docket shows how the projected impact of the Codes and Standards has significantly increased. In 2009, FPL projected that the Codes and Standards would reduce the peak load for the year 2029 by 2,209 MW from the inception of the Codes and Standards in 2005. In 2014, the forecasted peak load reduction from the Codes and Standards increased to 3,705 MW, which represents an approximate increase of 68% increase in the peak load reduction from the Codes and Standards.

FPL's current projection of the impact of the Codes and Standards on the forecasted peak load for the year 2029 has again increased to a reduction of

4,820 MW. This represents an additional reduction in peak load from the Codes and Standards of approximately 30%. Over the ten-year period from 2009 to 2019, the projected reduction of FPL's peak load for the year 2029 has increased by approximately 118%.

The forecasted reductions in peak load for the year 2029 from the 2009, 2014, and 2019 forecasts are presented graphically in Figure 10.

Forecasted Peak Load (MW) Reduction from Codes and Standards for the Year 2029 from 2009, 2014, and 2019 Forecasts

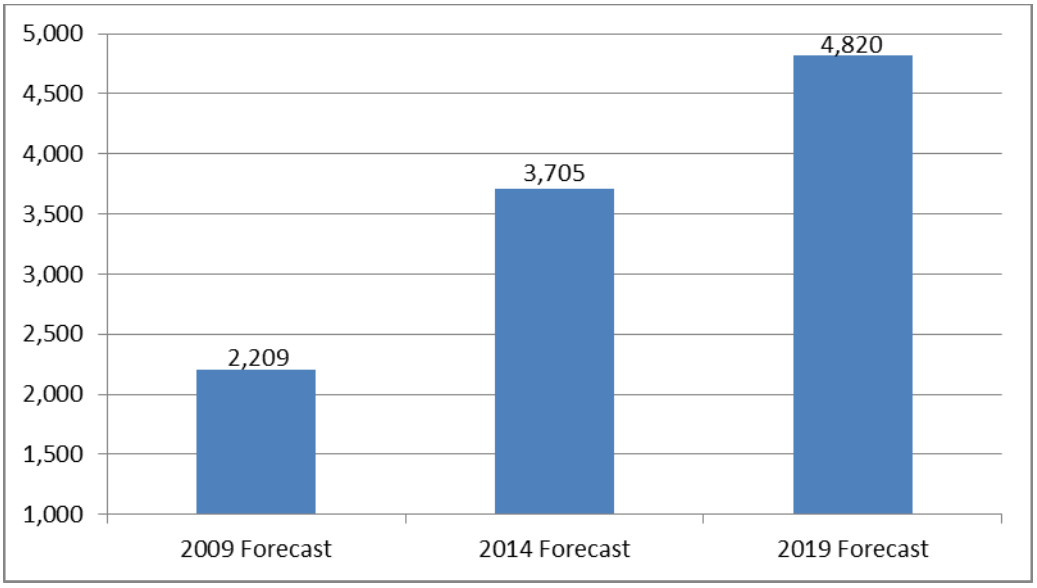

Figure 10

This graph shows that not only has the forecasted MW peak load reduction impact of the Codes and Standards been significant in each of the 2009, 2014,

and 2019 forecasts, but that the latest forecast shows a significantly larger MW reduction impact than did the previous forecasts.

Q. What are the impacts of the increased forecast of peak load (MW) reduction from Codes and Standards?

A. The impacts of the forecasted peak load (MW) reduction from the Codes and Standards are similar to those previously discussed regarding MWh reductions. First, FPL's peak load forecasts account for the projected impacts of these Codes and Standards, and, consequently, the peak load forecasts have been lower than they otherwise would have been.

Second, because FPL will need to plan for smaller growth than would otherwise be the case without the Codes and Standards, there is less opportunity for DSM kW reductions to be applied to FPL's system. This further lowers the potential benefits of DSM kW reductions. Consequently, assuming all else equal, the impact of this eighth of the eight drivers of system costs is to once again decrease DSM cost-effectiveness.

Third, the Codes and Standards have removed potential peak load reduction opportunities that otherwise might have been addressed by utility DSM programs. This results in lower Economic Potential and Achievable Potential values for utility DSM programs (a topic that is further addressed in the testimonies of FPL witnesses Whitley and Koch).

Finally, and importantly for purposes of this DSM Goals docket, the Codes and Standards will deliver truly significant amounts of peak load reduction to FPL's customers. FPL's 2019 Summer peak load forecast for the year 2029 is 28,008 MW. The amount of peak load reduction projected for 2029 from Codes and Standards is 4,820 MW, which represents slightly more than 17% of the forecasted Summer peak load.

Q. Please briefly summarize the above discussion of how the forecasted values for the four main drivers of FPL's system fixed costs have changed and what the impact is in regard to DSM cost-effectiveness.

A. The changes in forecasted values for three of the four drivers of FPL's system fixed costs has been to decrease those costs. Those changes include: (i) decreased capital ($/kW) costs for new CC units, (ii) elimination of costs for additional firm gas, and (iii) decreased growth in peak load (MW) due to the increased effects of Codes and Standards. Conversely, the changes in forecasted values for a fourth driver of FPL's system fixed costs, T&D capital costs, is in the opposite direction. The 2019 projection of T&D costs is higher than the cost projections used in the 2009 and 2014 DSM Goals dockets.

Q. The current values for seven of the eight drivers of FPL's system costs, compared to what those values were in the most recent two DSM Goals dockets, have moved in directions that result in overall lower FPL system costs while the current value for the remaining driver has moved in a direction to increase FPL system costs. When considering all eight drivers, what is the net impact on DSM's potential benefits (i.e., the potential to lower system costs from both kWh and kW reductions)?

A. In order to answer that question, two analyses were performed to compare DSM benefits that were based on FPL system costs projected in the last (2014) DSM Goals docket versus DSM benefits that are based on FPL system costs projected in this docket (2019). For both analyses, a proxy DSM measure was used in which the following "per participant" impacts were assumed: (i) 1 kW Summer reduction, (ii) 1 kW Winter reduction, and (iii) 1,000 kWh reduction. Both analyses also assumed that 1,000 participants would be signed up in the first year of the respective ten-year periods (in 2015 for the 2014 DSM Goals-based analysis and in 2020 for the 2019 DSM Goals-based analyses).

The 2014-based analysis used the same DSM preliminary cost-effectiveness screening tool (FPL's CPF model) and inputs that was used in the 2014 DSM Goals docket, but with one exception. That exception is the use of the same discount rate that FPL is using in this docket (7.73%). The 2019-based

analysis uses the same CPF model with updated input values as discussed throughout my testimony.

Using the system cost values from the 2014 DSM Goals docket, the projected total benefits, presented in terms of cumulative present value of revenue requirements (CPVRR), are approximately $3.3 million. However, using the current system cost values, the projected total CPVRR benefits have decreased to approximately $2.2 million. The results of this comparison are presented graphically in Figure 11.

Projected Total Benefits for both the RIM and TRC Screening Tests for the Proxy DSM Measure Using 2014 and 2019 System Cost Values (CPVRR, $000)

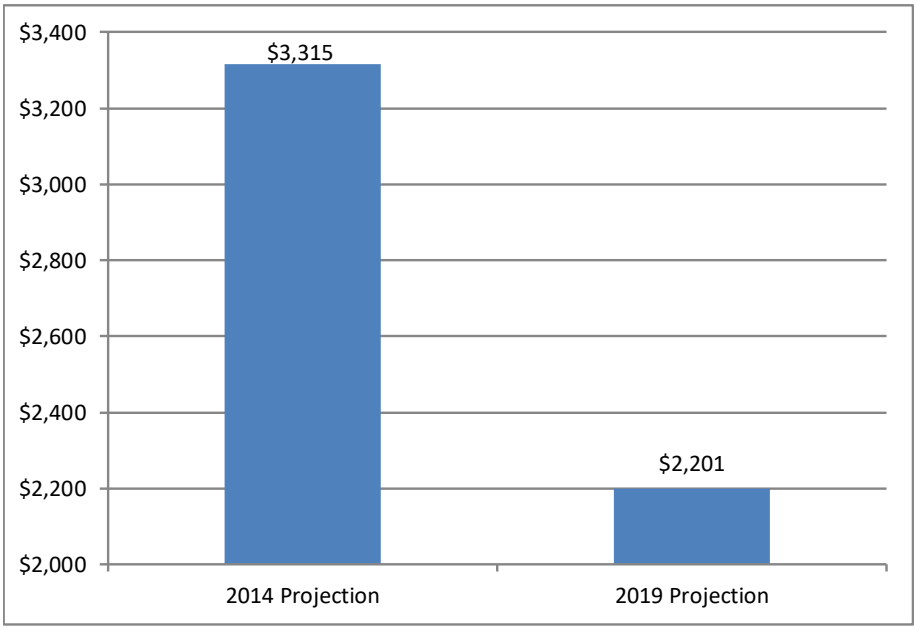

Figure 11

Exhibit SRS–5 provides the projected benefits for both calculations by individual category (avoided unit capital costs, etc.) that sum to the total values shown in Figure 11. As mentioned earlier, these benefits are identical for both the RIM and TRC preliminary screening tests. As shown in the exhibit, the net impact of the changes to all eight drivers of FPL's system costs is to reduce the projected benefits by slightly more than 33%. This is a very significant reduction in the potential benefits of DSM.

This result is to be expected because of the lower values in seven of the eight drivers of FPL's system costs. Lower system costs are very good for FPL's customers because it helps keep electric rates low. However, these lower system costs automatically result in decreasing the benefits that kWh and kW reductions from utility DSM programs can potentially provide as shown by the results of this comparison.

V. CONCLUSIONS

Q. What conclusions do you draw from this examination of FPL system variable and fixed costs?

A. I draw four conclusions from this examination:

1) In regard to the eight main drivers of FPL system costs that could potentially be avoided by DSM, seven of the eight drivers now result in lower FPL system costs. The impact of the remaining driver, forecasted

T&D costs, is more than overcome by the impacts of the other seven drivers. Consequently, the potential benefits of utility DSM measures on FPL's system, whether calculated in the RIM or TRC screening test, are now significantly lower than in the last two DSM Goals dockets.

2) Because the potential benefits of these DSM measures have been significantly reduced, it is to be expected that fewer DSM measures now emerge from the Economic Potential analyses, and that lower Achievable Potential values now emerge, compared to the results from the last two DSM Goals dockets.

3) Therefore, it is both logical and appropriate that FPL's proposed DSM Goals for the 2020 through 2029 time period are lower than FPL's proposed goals in the last two DSM Goals dockets. In fact, anyone who has been examining the trends in those system costs could have expected a lowering of proposed DSM Goals in 2019.

4) Although it is logical and appropriate that FPL's proposed DSM Goals have been lowered based on current analyses using updated costs, it is important to keep in mind that FPL's customers are projected to receive significantly greater levels of both energy and peak load reductions by the year 2029 than was projected in the last two DSM Goals dockets due primarily to the higher forecasted impacts of Codes and Standards.

For example, in the 2014 DSM Goals docket, FPL's customers were projected to receive approximately 10,645,000 MWh of energy reduction from the Codes and Standards by 2029. The current projection is even higher: 12,049,520 MWh of energy reduction by 2029. In regard to peak load (MW) reduction, the projection for 2029 in the 2014 DSM Goals docket was a reduction of 3,705 MW from Codes and Standards. However, the current projection is even higher: 4,820 MW.

Thus, one of the main factors that reduces the current economic viability of utility DSM is simultaneously increasing the amount of energy efficiency that FPL's customers will receive.

Q. From both a resource planning perspective and from the perspective of someone who has analyzed DSM measures and programs on FPL's system since the 1980s, do you believe that the DSM Goals FPL is proposing are reasonable for FPL's customers?

A. Yes. The fact that seven of the eight drivers of FPL's system costs are now significantly lower than they were in the 2014 DSM Goals docket is a very good thing for FPL's customers. However, lower system costs mean that DSM's potential benefits from avoiding system costs are automatically lowered as well. Consequently, the lower DSM Goals that FPL is proposing are simply a logical outcome and represent a very positive situation for FPL's customers. As such, FPL's proposed DSM Goals are logical, appropriate, and reasonable for FPL's customers.

In regard to the testimonies of FPL witnesses Whitley and Koch, assuming all else equal, lower DSM benefits result in two general impacts in regard to DSM analyses: (i) fewer DSM measures survive the preliminary economic screening, and (ii) incentive payment amounts that can be paid while still keeping a DSM measure cost-effective are lowered. Both of these impacts result in lower DSM Achievable Potential and lower DSM Goals.

Q. Does this conclude your direct testimony?

A. Yes.

A Comparison of 2009, 2014, and 2019 Natural Gas
Cost Forecasts for the Years 2020 - 2029
(Weighted Average FGT Firm Gas)

Year	2009 Forecast ($/mmBTU)	2014 Forecast ($/mmBTU)	2019 Forecast ($/mmBTU)
2020	$13.31	$6.31	$2.74
2021	$13.57	$6.41	$2.71
2022	$13.84	$6.62	$2.80
2023	$14.11	$6.93	$3.02
2024	$14.39	$7.34	$3.37
2025	$14.68	$7.65	$3.68
2026	$14.97	$7.96	$3.98
2027	$15.26	$8.26	$4.19
2028	$15.56	$8.68	$4.37
2029	$15.87	$8.99	$4.54

A Comparison of 2009, 2014, and 2019 CO_2 Compliance Cost Forecasts for the Years 2020 - 2029

Year	2009 Forecast ($/ton)	2014 Forecast ($/ton)	2019 Forecast ($/ton)
2020	$26.85	$0.00	$0.00
2021	$28.97	$0.00	$0.00
2022	$32.66	$0.00	$0.00
2023	$35.00	$8.51	$0.00
2024	$38.99	$9.78	$0.00
2025	$43.16	$11.20	$0.00
2026	$45.88	$12.77	$0.52
2027	$50.39	$14.50	$0.84
2028	$55.09	$16.42	$1.76
2029	$61.76	$18.75	$2.19

A Comparison of 2009, 2014, and 2019 System Average Heat Rates for FPL's Gas-Fueled Generation Fleet

	(1)	(2)	(3) = ((2)x1,000,000) / ((1)x1,000)	(4)
Year	**Energy Produced (MWh)**	**Annual Fuel Use (mmBTU)**	**Average Heat Rate (BTU/kWh)**	**Notes**
2009	67,309,549	540,610,113	8,032	1
2014	79,569,997	586,929,827	7,376	1
2019	85,662,848	588,444,175	6,869	2

Notes:
1 - Values for Columns (1) & (2) for 2009 and 2014 are actual values reported in FPL's Schedule A.
2 - Values for Columns (1) & (2) for 2019 are projections from FPL's UPLAN production costing model.

A Comparison of 2009, 2014, and 2019 In-Service
Year Capital Costs for the Avoided CC Unit
($/kW, nominal $, w/o AFUDC)

	(1)	(2)	(3)
	2009 DSM Goals	**2014 DSM Goals**	**2019 DSM Goals**
Start Year =	2009	2014	2019
CC cost =	725	776	558
In-Service Year =	2019	2019	2026
Year			
2009	725	---	---
2010	747	---	---
2011	769	---	---
2012	792	---	---
2013	816	---	---
2014	840	776	---
2015	866	799	---
2016	892	823	---
2017	918	848	---
2018	946	873	---
2019	**974**	**900**	558
2020			572
2021			586
2022			601
2023			616
2024			631
2025			647
2026			**663**

A Comparison of a Benefits Only Calculation for a Proxy DSM Measure
Using System Cost Values from the 2014 and 2019 DSM Goals Dockets
(CPVRR, $000, in Start Year $, with 7.73% Discount Rate)

Assumptions for the Proxy DSM Measure:

Summer kW reduction =	1
Winter kW reduction =	1
Annual kWh reduction =	1,000
Number of participants in Year 1 =	1,000

Category of System Impact by DSM	Results Using System Cost Values from the 2014 DSM Goals Docket	Results Using System Cost Values from the 2019 DSM Goals Docket	Change (2019 Values - 2014 Values)
Avoided Gen Unit Capacity Cost	1,306	759	(547)
Avoided Gen Unit Fixed O&M	955	386	(569)
Avoided Gen Unit Variable O&M	83	14	(68)
Avoided Gen Unit Fuel Cost	5,076	2,350	(2,725)
Replacement Fuel Cost	(5,663)	(2,511)	3,153
Avoided Transmission Cap Cost	268	523	255
Avoided Transmission O&M Cost	70	93	23
Avoided Distribution Cap Cost	36	101	66
Avoided Distribution O&M Cost	35	51	15
Program Fuel Savings	1,324	442	(883)
Program Off-Peak Payback	0	0	0
Avoided Gen Unit Emission Benefit	987	415	(572)
Replacement Emission Cost	(1,294)	(474)	820
Program Emission Benefit	132	51	(82)
Off-Peak Emissions Payback Cost	0	0	0
Total RIM and TRC Benefits =	**3,315**	**2,201**	**(1,114)**

Percentage Change in Total RIM and TRC Benefits =	**-33.6%**

Docket No. 20190015-EG
A Comparison of a Benefits Only Calculation for a Proxy DSM Measure
Using System Cost Values from the 2014 and 2019 DSM Goals Dockets
Exhibit SRS-5, Page 1 of 1