BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

FLORIDA POWER & LIGHT COMPANY

REBUTTAL TESTIMONY OF DR. STEVEN R. SIM

DOCKET NO. 130199 - EI

JUNE 10, 2014

Q. Please state your name and business address.

A. My name is Steven R. Sim and my business address is Florida Power & Light Company, 9250 West Flagler Street, Miami, Florida 33174.

Q. Have you previously submitted direct testimony in this proceeding?

A. Yes.

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

A. Yes. I am sponsoring the following eight exhibits that are attached to my rebuttal testimony:

Exhibit SRS – 17: Benefits (Only) Calculation Comparison: Minnesota VOS vs. Florida Screening Tests;

Exhibit SRS – 18: Incorrect and/or Misleading Statements Made in the Testimonies of Witnesses Woolf and Mims;

Exhibit SRS – 19: A Look at a Typical Screening Curve Analysis: A Generation Option;

Exhibit SRS – 20: A Look at a Typical Screening Curve Analysis: A DSM Option;

Exhibit SRS – 21: ACEEE's LCOE Formula;

Exhibit SRS – 22: Table from NREL's Economic Evaluation Document;

Exhibit SRS – 23: SACE 1% GWh Goal Analysis: A Look at Resulting Electric Rates and Customer Bills; and,

Exhibit SRS – 24: Sierra Club 1% GWh Goal Analysis: A Look at Resulting Electric Rates and Customer Bills.

Q. What is the purpose of your rebuttal testimony?

A. My rebuttal testimony discusses and/or responds to a number of statements and recommendations made by the four intervenor witnesses who filed testimony in this docket: Dr. Fine (EDF), Mr. Rábago (SACE), Ms. Mims (SACE), and Mr. Woolf (Sierra Club) from a resource planning perspective.

Q. How is your rebuttal testimony structured?

A. My rebuttal testimony is divided into three main parts. In the first part, I will briefly discuss DSM solar-related comments, particularly concerning the testimonies of Dr. Fine and Mr. Rábago. This discussion begins on page 5. In the second part of the testimony I will address the testimonies of Ms. Mims and Mr. Woolf. My discussion of their testimonies is organized into four sections and begins on page 26. The third part is my conclusion that begins on page 89.

Q. Please provide a summary of what you will discuss in this rebuttal testimony.

A. Regarding the DSM solar-related comments, mostly found in the testimonies of Dr. Fine and Mr. Rábago, that are discussed in Part I, I find no fault in the fact that none of the witnesses have objected to FPL's recommendation that the solar water heating DSM Pilot programs be allowed to expire as scheduled at the end of this year. I do disagree with their recommendation that the DSM photovoltaics (PV) Pilot programs be allowed to continue despite the fact that the programs have never been cost-effective for FPL's customers and are not cost-effective today. I point out some misconceptions each witness has regarding FPL's integrated resource planning (IRP) analysis process. I disagree with their recommendation that Florida's time-tested DSM evaluation approach be suddenly thrown out and replaced with a brand new evaluation approach based on the Minnesota Value of Solar (VOS) approach. The reasons for my disagreement with this recommendation are that: (i) this VOS approach is not a cost-effectiveness test, (ii) it ignores well known system cost impacts thus overstating DSM PV benefits, and (iii) it takes a one-sided view of DSM PV. In addition, I discuss that PV applications other than DSM PV would allow FPL's customers to receive both substantially more MW of installed PV, and more PV-generated MWh, for the same expenditure that is being made for FPL's solar Pilot programs.

In Part II, I first point out that the testimonies of Ms. Mims and Mr. Woolf attempt to avoid the obvious facts that: (i) DSM is less cost-effective now than in previous years, and (ii) the increased impact of energy efficiency codes and standards has diminished the market potential for utility DSM. Second, I discuss the fact that the testimonies of Ms. Mims and Mr. Woolf are riddled with inaccurate and/or misleading statements. Through these statements they demonstrate that they clearly do not understand FPL's IRP process. Third, I evaluate the DSM goals recommended by these two witnesses. In doing so I respond to the over-simplistic mantra that DSM is cheaper than supply-side resources by explaining why a Levelized Cost of Energy (LCOE) analysis is meaningless for the purpose of making resource decisions. I also demonstrate the significant cost impacts to FPL's customers that do not participate in utility DSM programs that would result from the witnesses' 1% reduction in retail sales GWh goal recommendations. My conclusion is that, due to the vast number of problems in their testimonies, and the fact that their recommended goals are both extreme and unsupported, their testimonies do not warrant serious consideration.

In Part III, I explain that adhering to sound resource planning principles for setting DSM goals in the past has assisted FPL in its ability to serve its customers with a high level of generating efficiency, low emission rates, and low electric rates. The intervenor witnesses do not (and cannot) challenge these results. By again using these sound principles in the 2014 goals-setting, Florida and FPL may be described as "out of touch" with what "leading" states are now doing in regard to DSM. However, if being "out of touch" results in a high level of generating efficiency, low emission rates, and low electric rates, then we should be delighted with this description. Florida and FPL should be proud to continue down the path of using sound resource planning principles it has used over most of the last two decades and ignore the "go along to get along" entreaties from other parties who ask Florida to radically change course.

Part I: DSM Solar Testimony

Q. Please briefly describe the testimonies of Dr. Fine and Mr. Rábago.

A. Both testimonies focus solely on PV applications of solar energy and address the Florida utilities' DSM PV Pilot programs. The messages in each of the two testimonies are similar and can be summarized as follows: (i) FPL and the other utilities should continue their DSM PV Pilot programs after their scheduled expiration at year-end 2014, and (ii) the DSM PV Pilot programs should be evaluated using "value of solar" (VOS) calculations. The recent Minnesota VOS calculation approach is repeatedly pointed to by these witnesses as a model for the type of VOS calculation approach that Florida should use.

Q. Did Mr. Woolf also provide testimony on the topic of the utilities' DSM PV Pilot programs?

A. Yes. Mr. Woolf also recommends that FPL's DSM PV Pilot programs be continued, with modifications, and that the Commission open a separate docket to investigate appropriate demand-side renewable goals and address the role of utility-owned solar PV systems. While my rebuttal is tailored toward responding to Dr. Fine and Mr. Rábago, much of the discussion is applicable to the recommendations of Mr. Woolf as well.

Q. Did any of these witnesses recommend continuation of FPL's solar water heating Pilot programs?

A. No. None of them recommended that the solar water heating Pilot programs be continued. This is consistent with FPL's view that these non-cost-effective programs should be allowed to expire at the end of 2014 as scheduled.

Q. In regard to FPL's PV Pilot programs, are these programs appropriately evaluated as DSM programs?

A. Yes. To understand why, it is helpful to look at the three basic types of PV applications:

1) Central Station PV: Large-scale (MW) PV facilities at one specific location in which 100% of the output is fed into the utility grid. FPL's DeSoto (25 MW) and Brevard County (10 MW) PV facilities are examples of this type of PV application.

2) Distributed Generation (DG) PV: Medium-scale (MW or kW) PV facilities at multiple locations located nearer to load centers (than with central station PV) in which 100% of the output is fed into the utility grid. FPL's C&I Solar Partnership Program that is under development and that was described in FPL's 2014 Site Plan is an example of this type of PV application.

3) DSM PV: Small-scale (kW) PV installation at a home or business premise that is primarily intended to serve all or part of the customer's load (as any DSM measure does) and the remaining portion, if any, of the PV output is fed into the utility grid. FPL's DSM PV Pilot programs are examples of this type of PV application.

Because a substantial majority, if not all, of the PV output serves to lower the customer's load, DSM PV programs such as FPL's PV Pilot programs impact FPL system similarly to other DSM programs.

Q. Were FPL's PV Pilot programs and DSM PV measures evaluated in the same manner as all other DSM measures during the IRP analyses performed for this docket?

A. Yes.

Q. What were the results of those analyses?

A. All of the DSM PV Pilot programs and DSM PV measures, as well as the DSM Solar Water Heating Pilot Programs and DSM solar water heating measures, failed both the RIM and TRC preliminary screening tests.

Q. Were these results in the 2014 analyses similar to the results from earlier cost-effectiveness analyses performed in 2010, when the Pilot programs were introduced, and in the years between 2010 and 2014?

A. Yes. The 2014 result is consistent with the 2010 analyses and with every annual cost-effectiveness analysis that has been performed since then. In other words, the 'initial' analyses of the DSM PV programs that were conducted in

2010 showed that the Pilot programs were not cost-effective. Five years later, the programs are still not cost-effective. This consistent result of being non-cost-effective in each of these five years is not surprising when considering that, these programs started off as non-cost-effective, and there has been a trend over the same time frame of steadily decreasing cost-effectiveness for DSM measures in general.

And, as Mr. Rábago indicates in his testimony, a trend such as this one is important:

> *"The Companies should focus not just on numbers of systems, dollars, kilowatts, and kilowatt hours. For a pilot program that should translate into a full program, it is the direction that the numbers are moving that is most important..."* (Page 11, lines 15 – 17, emphasis added)

In regard to the DSM PV Pilot programs, the outcomes of analyses performed over the last five years have consistently shown the Pilot programs are not cost-effective. Thus, in Mr. Rábago's terms, the "direction" is definitely unfavorable for the PV Pilot programs.

Q. **Is that why FPL is recommending that the DSM PV Pilot programs be allowed to expire at the end of their current program terms?**

A. Yes. There is more than enough evidence to conclude that the PV Pilot programs are not in the best interests of FPL's customers. The general body of

FPL's customers is harmed by DSM programs that are not cost-effective and continuing the DSM PV Pilot programs would only result in continuing to harm FPL's customers. FPL believes that its customers can be better served by pursuing PV through other applications. I will return to the idea of pursuing other PV applications shortly.

Q. Do Dr. Fine and Mr. Rábago claim that FPL's IRP analyses somehow short-changed DSM PV, compared to other DSM measures, in the cost-effectiveness evaluations?

A. Yes. One such claim was based on a misconception of the period of time over which FPL analyzed the DSM PV Pilot programs. Dr. Fine states in his testimony:

> *"The utilities used a two-year payback period to determine the cost-effectiveness of the distributed solar PV program."* (Page 22, lines 4 & 5)

and,

> *"I recommend that the utilities use a longer payback period to measure the program's cost-effectiveness that better aligns with the useful life of the distributed solar PV investment." (Page 22, lines 13 & 14)*

FPL did use a two-year payback in the last step of its preliminary economic screening process. However, all of the PV-based DSM measures failed to survive earlier screening steps and never even made it to the two-year payback screening step. All of the earlier screening steps assumed at least a 30-year life for the PV equipment, not two years as Dr. Fine apparently believes. In addition, the payback screen works in the opposite manner suggested by Dr. Fine – the longer the term of the payback criterion, the fewer the number of DSM measures that survive this screening step.

Mr. Rábago makes another unfounded time-related claim:

> *"...they did not value transmission and distribution cost avoidance during the entire 30+ years that a distributed solar PV system is likely to operate."* (Page 7, line 25 through Page 8, line 2)

Again, this is incorrect. FPL's preliminary screening analyses of all DSM measures, including DSM PV measures, appropriately accounted for projected transmission and distribution cost savings for at least 30 years (with the exact number of years varying depending upon when the DSM installation was assumed to occur).

Q. Do Dr. Fine and Mr. Rábago agree that DSM PV should be evaluated in a consistent manner with other DSM measures?

A. No. In addition to the "input- or assumption-based" misconceptions that DSM PV was short-changed in FPL's analyses, the two witnesses take issue with the entire analytical approach that FPL and the state of Florida have used to evaluate DSM for several decades. What these two witnesses want is to toss out this time-tested evaluation approach and replace it with a brand new evaluation approach.

Both witnesses are in basic agreement regarding what this brand new approach should look like. As Dr. Fine states:

> *"I recommend that the Commission generally use as a starting point the Minnesota VOS protocol…"* (Page 25, lines 19 & 20)

Q. Have you examined the Minnesota Value of Solar approach and, if so, what was your view of it?

A. Yes. I have examined the calculation approach as described in the document Minnesota Value of Solar: Methodology, Prepared for Minnesota Department of Commerce, Division of Energy Resources, January 31, 2014. The description of the approach, and how it will be applied, lacked detail in certain areas. In addition, it will probably take a few years to see how it actually works in practice in Minnesota. However, I believe the description that was provided gives a pretty good idea of how it was designed to work.

Based on that description, I have two primary observations about this calculation approach. First, it is not a true cost-effectiveness test. Second, it is an incomplete and one-sided compilation of supposed benefits.

Q. Please explain what you mean by your statement that it "is not a true cost-effectiveness test."

A. The objective of a true DSM cost-effectiveness test is to examine the projected system benefits of implementing a DSM measure as well as the costs and cost impacts from implementing the DSM measure. Then, using the benefits and costs information, the utility can determine if it is in the best interests of all of its customers to implement the DSM measure by examining projected "directional" impacts on electric rates and costs. In other words, are electric rates projected to increase or decrease as a consequence of adopting a particular DSM measure?

The Minnesota VOS approach does not meet this standard. It examines only the benefit side of the ledger. For example, it does not appear to account for a utility's administrative costs of implementing a DSM PV program and/or tariff. Nor does it provide projections on what direction(s) electric rates and costs will be driven by implementation of the DSM PV measure.

Instead, the objective of the Minnesota VOS approach is to provide a projection of annual payments that will be made, presumably by the utilities' customers, to DSM PV participants over a 25-year period (with the understanding that new VOS calculations will be performed each year). In other words, it is a "what will a participant be paid" calculation. Thus this VOS calculation is somewhat similar in basic concept to a Standard Offer

Contract calculation. Neither of these calculations is a true cost-effectiveness test calculation.

Q. In what ways is the Minnesota VOS approach an incomplete and one-sided compilation of supposed benefits?

A. There are two major problems with the Minnesota VOS approach that make it incomplete and one-sided. The first relates to the categories of system cost impacts from DSM that appear to be accounted for as benefits in the Minnesota VOS calculation compared to the system cost impacts that are accounted for as benefits in the RIM and TRC screening tests used in Florida. Exhibit SRS – 17 provides a benefits (only) comparison of the two approaches. In other words, this exhibit examines only categories of system benefits and does not address DSM PV-related program costs.

Column (1) lists 10 categories of system cost impacts that, at a minimum, should be accounted for on the benefits side of the ledger in a DSM cost-effectiveness test analysis. As columns (2) and (3) indicate, the first six of these benefits categories are accounted for both in the Minnesota VOS calculation and in the Florida screening tests. The remaining four benefits categories are accounted for in the Florida screening tests, but are not accounted for in the Minnesota VOS calculation.

Among these four categories, there are two pairs of system cost impacts. One pair accounts for fuel-related system cost impacts and the other pair accounts for emission-related system cost impacts. For either pair, the net impact of the two components is typically a net <u>penalty</u> to the DSM measure being evaluated.

Q. Would you please explain why the net impact of these pairs of system cost categories is typically a penalty for DSM measures?

A. Yes. Mr. Rábago's testimony reflects a lack of understanding of this concept when he states:

> *"FPL takes the position of assessing a penalty against distributed solar PV based on 'avoiding fuel-efficient new generation,' though the basis for this approach is not explained in testimony or response."* (Page 9, lines 23 – 25)

Let me first state that these system cost impacts apply to all DSM and generation options, not just to DSM PV, when a new generator is avoided. I'll explain this using a system fuel cost perspective (the system environmental cost perspective works in an identical fashion). When a DSM option with a non-zero kW reduction is implemented on a utility system (thus getting credit for avoiding or deferring a new generation unit), there are three impacts that occur to the utility system:

1) The kW reduction avoids the new generation unit. Thus the kW reduction avoids the fuel cost that would have been incurred to operate the new generating unit. This is a benefit for DSM.

2) However, without the addition of the new generating unit, the existing generating units on the utility system must operate more hours to deliver the GWh that would have been supplied by the avoided unit. Because a new generating unit is typically more fuel-efficient than most existing generating units on the utility system, the operation of the existing generating units will result in additional fuel costs that are <u>higher</u> than the cost of fuel that would have been needed to operate a new generating unit. This represents a naturally occurring fuel "penalty" for DSM that is also driven by the kW reduction of DSM. When taken together, the net effect of (1) and (2) is a system fuel "penalty" for DSM; i.e., a reduction in projected DSM benefits.

3) The kWh reduction aspect of DSM serves to lower sales and to lower system fuel costs from the marginal unit on the system, thus offsetting, at least to a degree, the net fuel penalty that occurs from the impacts (1) and (2) described above.

All three of these system fuel (and environmental) cost impacts must be accounted for in order to develop a complete and accurate determination of system cost impacts, or benefits, for any DSM measure that has a kW component that is given credit for avoiding or deferring new generation additions. The Minnesota VOS approach to avoided fuel costs appears to be based solely on avoiding fuel that is burned by the marginal unit on the system. This is analogous to only the third, kWh-driven step described above. Because the Minnesota VOS calculation does not address all three of these cost impacts, it provides only an incomplete and inaccurate accounting of cost impacts for DSM PV.

Q. Is accounting for a "fuel (or environmental) penalty" something that has only recently been introduced in regard to DSM analyses in Florida?

A. No. This "net fuel penalty" calculation to analyze DSM impacts on utility systems has been used in Florida by the FPSC Staff and Florida utilities for at least 30 years. This is both appropriate and necessary to account for all of the impacts on utility customers. Furthermore, all of the commercially available production costing and optimization models that FPL has used in the last 20 years account for this impact in analyses of both DSM and Supply options when a new generating unit is avoided by another resource option.

Q. Does the Minnesota VOS calculation properly include all categories of costs associated with DSM PV?

A. No. It fails to take into account some of the costs that DSM PV would impose on the system as described above. This is shown in columns (4) and (5) of

Exhibit SRS – 17. In these columns, the projected system cost impacts on the benefit side of ledger for all 10 system cost categories are provided based on values derived from an analysis of FPL's Residential DSM PV Pilot program that has been previously provided in this docket in response to discovery. The Minnesota VOS calculation does not account for the 7th through the 10th system cost categories and thus would project total benefits that are 12% too high simply by virtue of not taking all system costs associated with DSM PV into account.

Q. What is the second reason why you view the Minnesota VOS approach as "an incomplete and one-sided compilation of supposed benefits"?

A. This has to do with how the Minnesota VOS calculation and the Florida screening tests differ in regard to addressing system environmental costs. In Florida, if environmental costs are used in an analysis, then projected environmental compliance costs are typically used because these are reasonably ascertainable and will directly impact the costs that the utility incurs and its customers pay through electric rates. Also, compliance costs typically represent the lowest cost alternative that will avoid the environmental impacts. However, in the Minnesota VOS calculation, externalities are used instead. As the term implies, externalities refer to impacts that are external to those incurred in the market being examined (e.g., impacts external to electric utility costs and electric rates paid by utility customers in this docket). Therefore, the perceived costs of these externalities are not typically recovered from the utility's customers (unless a calculation, such as the Minnesota VOS approach, attempts to internalize these costs so that utility customers are paying for them).

Because externalities are less well defined than projected compliance costs, and the magnitude of externality cost values may be limited only by one's imagination, their use in the Minnesota VOS calculation will likely result in supposed environmental benefits for DSM PV that far exceed the projected compliance costs that are typically used in Florida.

For example, the document states that "the federal social cost of CO_2 emissions" is used (page 39, emphasis added). The document states that this social cost value for the year 2020 is $51.22 per ton which is much higher than the environmental compliance cost projections FPL has seen and utilized in recent years. Thus the use of externalities, rather than environmental compliance costs, will result in an even greater overstatement of projected benefits for DSM PV than is shown in Exhibit SRS – 17.

Furthermore, the Minnesota VOS calculation does not appear to account for externalities and/or other factors (property tax revenues for the municipality the generator would be located in, for example) that would favor the generating unit that is projected to be avoided by DSM PV. In this regard, the Minnesota VOS approach is clearly one-sided in its perspective.

FPL witness Deason's rebuttal testimony also addresses problems regarding the use of externalities in analyzing resource options. These problems include giving credit for avoiding costs that are not considered in setting a utility's electric rates and which are arguably beyond the FPSC's jurisdiction. Accounting for such costs will typically increase electric rates. For all of these reasons, the Commission has never approved the inclusion of externalities for the purpose of assessing DSM or other resource options.

Q. Based on these shortcomings in the Minnesota VOS approach, would you recommend that Florida adopt this approach to evaluating DSM PV?

A. No. Using the Minnesota VOS approach may be fine for someone who wishes to promote any type of PV use regardless of whether it is cost-effective for a utility's customers. However, the use of this VOS calculation would not be a good thing for FPL's customers because it could lead to paying for PV applications that either cannot deliver the value that has been attributed to them or are a more expensive way of delivering value than customers need to bear.

The Florida DSM screening test approach, in particular the use of the RIM test, is a far better way to perform initial evaluations of DSM options such as DSM PV. The RIM test evaluates projected benefits, costs, and cost impacts that will impact electric rates with which all of FPL's customers will be served. Thus the RIM test meets the objective of a true cost-effectiveness test to help determine whether a resource option should be implemented based on what direction electric rates and costs are projected to go. The Minnesota VOS calculation was simply not designed to meet this objective. It was designed to calculate a cost value that would be paid to DSM PV participants.

Q. Do Dr. Fine and Mr. Rábago discuss other, non-DSM approaches to utilizing PV?

A. Yes. Mr. Rábago's testimony contains the following passage in which he supports a non-DSM PV approach:

> *"Q. What recommendations do you offer regarding community solar programs discussed by the companies?*
> *A. I believe that community solar programs offer an important opportunity to make participation in the benefits of distributed solar an option for more customers and in more areas of a utility service territory."* (Page 33, lines 18-22)

Dr. Fine's testimony supports another non-DSM PV approach:

> *"I also recommend that the Commission consider implementing a utility-owned commercial rooftop PV program."* (Page 19, lines 12-14)

Other statements in his testimony offer additional support for the idea of utility-owned PV installations. For example:

"The total installed cost for distributed installations fell 12 percent in 2012 and has fallen 33 percent over the past three years. The cost decline is even greater for utility installations." (Page 15, lines 9 – 12)

In addition, he states in a table on page 17 of his testimony that in 2013 the reported average installed cost for FPL's residential DSM PV Pilot program was *$4.10/watt*. By comparison, FPL's current estimates for the cost of installing utility-scale PV are significantly lower.

These statements suggest two things. First, if the objective is to promote and utilize PV in a more efficient and economic manner than the demonstrably non-cost-effective DSM PV approach, significantly more MW of PV can be installed right now with utility-owned, utility-scale PV for the same amount of money than with a continuation of the DSM PV. Second, if the trend of greater cost declines for utility installations compared to non-utility installations continues, then this economic advantage for utility-owned, utility-scale PV will only increase in the future.

Note also that this advantage refers only to how many MW of PV can be installed for the same expenditure amount between utility and non-utility installations. In addition, the first year capacity factor of FPL's DSM PV Pilot programs has been approximately 17% to 20%. The current projection for utility-scale PV facilities' first year capacity factor is approximately 20% to

25%. Consequently, not only will a given expenditure amount result in more MW of PV capacity being installed with utility versus non-utility installations, more MWh of energy will also be produced from each installed MW in utility versus non-utility installations.

Based on these considerations, it is clear that Florida and FPL's customers would get more value per dollar spent on PV if those expenditures were made for utility-scale PV than with a continuation of the DSM PV Pilots which have never been cost-effective. Any consideration of PV should focus on the relative economics of the different PV applications. If PV is to be promoted as a matter of public policy, FPL believes that the PV application(s) most economic for FPL's customers should be pursued.

Q. Is FPL proposing an alternative to the uneconomic solar rebate pilot programs?

A. Yes. FPL witness Koch presents in his rebuttal testimony the framework for a research and development (R&D) program that FPL believes could be substituted for the ineffectual and non-cost-effective solar pilot programs that FPL is currently funding.

Q. Does Dr. Fine's testimony address a program that is similar to what FPL proposes?

A. Yes. Dr. Fine's testimony contains a discussion involving a recent Duke Energy Carolinas petition to the North Carolina Utilities Commission for approval of a utility-owned distributed PV program. He quoted passages from the Duke Carolinas witness (Owen Smith) in that docket in which the witness discussed the benefits of their PV petition. In addition to helping Duke Carolinas meet a state RPS requirement, the following benefits were mentioned by the witness:

> *"The Program will enable the Company to understand the impact of distributed generation on its system...* [and] *...The Program will enable the Company to develop and enhance competencies as owners and operators of renewable generation facilities."* (Dr. Fine testimony, page 26, lines 21 – 29).

This description indicates that the Duke Carolinas program is, at least in part, an R&D effort. An R&D-based PV effort in Florida that addressed all three types of PV applications would be more valuable to FPL's customers than an extension of the DSM PV application used in the DSM PV Pilot programs.

Q. In summary, what do you recommend in regard to the DSM PV Pilot programs and the witnesses' view that the Minnesota VOS approach be used to evaluate DSM PV programs?

A. I recommend the following:

1) Allow proven cost-ineffective DSM solar water heating and DSM PV Pilot programs to expire as scheduled at the end of 2014. They have not been cost-effective since their inception and they are not cost-effective today. In lieu of these pilot programs, FPL and other Florida IOUs could use the money spent on those programs more

productively by conducting R&D that helps gather information on the system impacts of both DSM and non-DSM PV applications.

2) Encourage FPL and the other utilities to look at alternate PV applications that deliver more PV MW and MWh per dollar than the DSM PV Pilot programs, even if these more promising PV applications are non-DSM applications.

3) Disregard the suggestion to throw away a DSM cost-effectiveness analysis approach that has served Florida well for decades, and to replace it with an unproven framework from a non-Florida jurisdiction with distinctly non-Florida circumstances, to evaluate DSM PV. The Minnesota VOS calculation is not a cost-effectiveness test and clearly overstates the projected system cost savings value. In addition, it will be interesting to see what the Minnesota experience with this approach will actually be in practice over the next few years. A prudent course for Florida will be to observe to see if the problems apparent in the calculations are addressed.

Q. Are there any other aspects of either of these testimonies that you would like to address?

A. Yes. There is one other item I would like to address from Dr. Fine's testimony that concerns projected CO_2 emissions for the state of Florida. He states:

"Recent emissions trends suggest that the state is going in the wrong direction as emissions are rising". (Page 10, lines 5 & 6)

This statement appears to be based on 2008 and 2010 data and projections for the Florida economy as a whole, its power sector, and its transportation sector. However, a more recent projection specifically for FPL's utility system was provided in Exhibit SRS – 15 of my direct testimony. This projection shows that FPL's annual system CO_2 emissions are projected to decrease by approximately 13% over the 2015 to 2025 time frame despite significant growth in customer load.

This projection is a direct result of FPL's successful on-going efforts to improve the efficiency, and lower costs, in generating electricity using clean natural gas and in increasing the portion of its total electricity generation that comes from emission-free nuclear power. Not only have these efforts resulted in low emissions, but in low costs and low electric rates as well. These are great results for FPL's customers. However, lower emissions, costs, and electric rates for the FPL system also serve to explain why the trend of declining DSM cost-effectiveness seen across the U.S. is heightened for FPL.

Part II: Ms. Mims' and Mr. Woolf's Testimonies

Q. How is your discussion of Ms. Mims' and Mr. Woolf's testimonies organized?

A. My discussion is organized into four general areas for which I will use the following headings:

1) Ignoring the Obvious;

2) Failure to Understand FPL's IRP Process and Analyses;

3) An Evaluation of the Recommended Alternate Goals and Impacts on FPL's Customers; and,

4) Other Comments.

I will generally refer to these two witnesses collectively as "these witnesses." However, when discussing specific statements in testimony, I will specify which witness made the statement being discussed.

1) Ignoring the Obvious

Q. FPL's direct testimony pointed out that there were two primary reasons for FPL's proposed goals being lower than in years past: (1) DSM is less cost-effective than it has been in the past; and (2) the increased impact of energy efficiency codes and standards has lowered the potential market for utility DSM by addressing many energy efficiency opportunities that

otherwise could have been addressed by utility DSM. Did these witnesses acknowledge that these two factors will logically result in a reduced role for utility DSM?

A. No. These witnesses generally failed to acknowledge that DSM is less cost-effective than in previous years and that energy efficiency codes & standards are eliminating the potential market for specific equipment that otherwise would exist as an opportunity for utility DSM. Not surprisingly, instead of acknowledging these realities, they attempted to avoid these two facts as much as possible.

However, perhaps recognizing that they could not avoid these two key facts entirely, Mr. Woolf offered the following passage:

> *"These proposed DSM goals are not low because the DSM opportunities are not available or are not cost-effective – as the Utilities claims. The proposed goals are also not low because...new building codes and standards are going to eliminate DSM opportunities – as the Utilities claim".* (Page 4, line 18 through page 5, line 2)

In this statement, Mr. Woolf is widening the scope of the topic to make it appear that FPL is dismissing all utility DSM opportunities. In regard to the first sentence, FPL has not claimed that there are no available DSM opportunities that are cost-effective. In fact, FPL is proposing 337 MW of

DSM – the equivalent of avoiding a new 400 MW power plant – as cost-effective for its system. The point is that DSM measures in general are less cost-effective now than they were in previous years. This means that fewer DSM measures pass preliminary economic screening than was the case in previous years. In addition, it means that for those measures that do pass this screening, the maximum incentive level that can be paid for those measures is generally lower than in previous years. Both of these outcomes result in lower Achievable Potential for DSM.

However, Mr. Woolf eventually does make one statement that shows he recognizes the obvious fact that DSM cost-effectiveness is declining:

> "*...avoided costs are less than they were in the past.*" (Page 78, line 13)

In regard to his second statement, FPL has not said that new building codes and standards are going to eliminate all DSM opportunities. What FPL has said, and what is obviously true, is that if codes and standards now require a certain level of energy efficiency for electrical equipment, the potential for utility DSM to have obtained that exact same efficiency gain from that equipment has been eliminated. For example, if codes and standards previously allowed the sale of an air conditioner with a SEER level of 14, but now require a minimum SEER of 15, the potential for utility DSM to 'move' a customer from selecting a 14 SEER air conditioner to a 15 SEER model has been eliminated. These are simple, indisputable facts.

Again, in regard to the impact of codes and standards' impact on utility DSM, Mr. Woolf eventually does admit the obvious:

> *"It is true that increasing building codes and standards will make it more difficult to achieve DSM savings over time."* (Page 78, lines 26 & 27)

Q. Would you please provide an example that demonstrates that DSM is less cost-effective than it was in previous years?

A. Yes. I will present two examples, one for a single DSM measure and one that addresses the entire projected Achievable Potential. First, let's compare the RIM and TRC cost-effectiveness results for a single DSM measure (code number RSF150 which is a residential R-0 to R-19 ceiling insulation measure), assuming no change in the kW, kWh, life of measure, administrative costs, or incentive costs, from the 2009 goals-setting analyses and the 2014 analyses. The same RIM and TRC preliminary screening tests are used in these calculations. The respective benefit-to-cost ratios are:

	RIM	TRC
2009	1.21	3.16
2014	1.03	2.30

The cost-effectiveness ratios under both preliminary screening tests are clearly lower now than in 2009 which indicate that the measure is less cost-effective now than it was in 2009. From this example it is obvious that other measures that were closer to a 1.01 ratio in 2009 would now fall below that threshold value in 2014 and be eliminated in the preliminary economic screening steps.

Moving from a comparison of a single individual DSM measure to all of the individual DSM measures, we now compare the Achievable Potential results from 2009 and 2014. The list of total DSM measures analyzed, and the screening process itself, remained essentially the same between the two years. The 2014 results shown include CO_2 costs to further ensure the comparison is a valid one. The respective Achievable Potential MW values are:

	RIM	TRC
2009	949	1,153
2014	504	577

The decrease in the Achievable Potential MW from 2009 to 2014 is approximately 50% under either of the preliminary screening tests. Because Achievable Potential addresses all DSM measures identified initially in the Technical Potential step which have survived the preliminary economic screening process, these results indicate that there has been a significant decrease in DSM cost-effectiveness in general across all DSM measures.

Q. Does the projection of higher impacts of codes and standards also contribute to the current lowering of Achievable Potential results?

A. Yes. In 2009, the projected Summer MW impact from codes and standards over the 10-year goals-setting period was projected to be 1,255 MW. The current projection of this impact over the present 10-year goals-setting period is projected to be 1,823 MW. Thus the projected impact has increased by almost 50%. After accounting for FPL's 20% reserve margin criterion, the 1,823 MW of energy efficiency is equivalent to avoiding more than five additional new power plants of 400 MW each. Therefore, this increase in energy efficiency delivered by codes and standards is significant – and is benefiting all FPL customers because customers do not fund these efficiency gains through the Energy Conservation Cost Recovery Clause. It also, however, clearly contributes to the current lower Achievable Potential DSM MW values.

Q. Is the dramatic lowering of DSM cost-effectiveness something only being seen in Florida?

A. No. I have the privilege of representing FPL in biannual meetings of the Southeast Electric Exchange's IRP Task Force. The group consists of representatives of a number of utilities that range geographically from Oklahoma to Ohio to Florida. This group includes utilities who operate under traditional regulatory structures as well as ones who operate in so-called deregulated regulatory structures and/or power pools. At each of these meetings, resource planning issues and trends are discussed in a roundtable format.

A recurring issue in these information sharing meetings in recent years is the trend of steadily decreasing cost-effectiveness of DSM. (I note that this trend is of particular concern to utilities for whom excessively high DSM goals have been set and/or who are operating under DSM-linked reward-and-penalty structures.) Because many, if not all, of the utilities in the Task Force are seeing this trend, the issue of decreasing cost-effectiveness of DSM is definitely not unique to Florida.

Q. Is there anything special about FPL's utility system which is contributing even more to this trend of decreasing DSM cost-effectiveness?

A. Yes. Efficiency is not something unique to DSM resources; efficiency applies to generation resources as well. Since 2001, FPL's fossil-fueled generation system has seen a 20% improvement in its efficiency. This means that FPL now can generate the same amount of electricity using 20% less fossil fuel – a fact SACE and Sierra Club should appreciate but which they are understandably silent about when these generation efficiency improvements are discussed in regard to contributing to declining cost-effectiveness of DSM for FPL's system. These generation efficiency gains result in lower fuel costs to produce each kWh of electricity. In regard to DSM, it means that the kWh reduction aspect of DSM options now provides lower benefits than in previous years, making DSM options less cost-effective. Furthermore, FPL's system is projected to become even more efficient, and to lower fuel costs even more, with the completion of the Port Everglades modernization project and the planned addition of the Turkey Point 6 & 7 nuclear units. Both Ms. Mims and Mr. Woolf have chosen to ignore the important role that utility system efficiency and lowered costs play in DSM cost-effectiveness analyses.

Q. **Despite their attempts to avoid seriously discussing the obvious fact of decreasing cost-effectiveness of DSM, did these witnesses' testimonies suggest to you that they are actually concerned about this?**

A. Yes. There were two aspects of their testimonies that suggest to me that they really do recognize the trend of decreasing cost-effectiveness of DSM and, rather than accept that fact, they are trying to avoid that reality by changing the rules of the game in Florida. They attempt to do so through two discussions or suggestions.

The first "change the rules of the game" discussion/suggestion is that Florida is not using the Utility Cost Test (UCT) in its preliminary screening of DSM measures. Regarding this topic, Mr. Woolf states:

> *"...the Utilities ignore one of the most useful screening tests available: the Utility Cost test."* (Page 20, lines 21 & 22)

It is not surprising that Sierra Club would prefer that Florida use the UCT in its preliminary screening of DSM measures. Use of the UCT will result in even higher benefit-to-cost ratios for DSM measures than the already "low hurdle" TRC test. To demonstrate that, let's return to our previous example of the RIM and TRC benefit-to-cost ratios in 2014 for a single DSM measure. When we now add the UCT benefit-to-cost ratio for that measure, we have the following:

	RIM	TRC	UCT
2014	1.03	2.30	3.71

As shown above, the UCT represents an even lower hurdle for DSM than the already low-hurdle TRC test. In addition, the UCT shares a fundamental flaw inherent in the TRC test: neither the UCT nor TRC test accounts for the important impacts on electric rates from DSM. In previous DSM goals dockets in Florida, the UCT was rarely, if ever mentioned. The TRC test was ardently endorsed by intervenors desiring the highest possible DSM goals as the only correct cost-effectiveness test to use. However, in 2014, with the cost-effectiveness of DSM having significantly declined to the point where a significant number of DSM measures are no longer passing even the TRC test, it is not surprising that the UCT is now being discussed. This is an attempt to change the rules in Florida so that the bar for DSM resource options is lowered.

Q. What is the other "change the rules" suggestion that is offered in these testimonies?

A. That suggestion is to include additional "non-energy benefits" on the DSM side of the ledger in the preliminary economic screening of DSM measures. Both of these witnesses believe this would be a really good thing to do. First, Ms. Mims states:

> *"The Utilities do not appear to take into account non-energy benefits, also known as Other Program Impacts (OPI)."* (Page 47, lines 20 & 21)

Perhaps to avoid the interpretation of OPI as an impact to "Other People's Income," Ms. Mims immediately provides some examples of OPIs which include: *"improved health and safety, increased comfort."* (Page 48, lines 1 & 2) I will return to these non-energy benefit examples in a moment.

Mr. Woolf also gets into this act by stating that:

> *"DSM goals should reflect DSM benefits beyond those that accrue to the utility system. To do so, non-energy benefits should be included in DSM screening."* (Page 36, lines 13-15);

And, in regard to accounting for non-energy benefits, Mr. Woolf states:

"... I recommend that the Commission require the Utilities do apply the following...adders: 50 percent for low-income customer programs; 25% for residential non-low-income customer programs; and 10% for commercial and industrial customer programs." (Page 38, lines 6-9)

The potential impact of including such non-energy benefits in DSM preliminary screening analyses is demonstrated in Ms. Mims' Figure 10 that is presented on page 49 of her testimony. This figure shows that use of such benefits in Massachusetts can change the TRC test's beuefit-to-cost ratio many times over. For example, in regard to the Residential Retrofit program, the TRC benefit-to-cost ratio increases from what appears on her chart to be roughly a 1.1 ratio to a ratio of roughly 5.5 solely by applying non-energy benefits.

In other words, the use of non-energy benefits in DSM analyses is a miracle cure for the indisputable ailment of decreasing DSM cost-effectiveness.

Q. Would inclusion of non-energy benefits in DSM analyses in Florida be a good idea?

A. No. There are numerous reasons why this is a bad idea and I'll mention a few of them. First, inclusion of non-energy benefits is an obvious attempt to artificially make the cost-effectiveness of DSM appear better than it really is. Second, making non-cost-effective DSM appear to be cost-effective through the inclusion of non-energy benefits will result in unnecessary increases in electric rates if the non-cost-effective DSM measures are implemented.

Third, even if one wanted to try to account for non-energy benefits, it would be impossible to place an accurate cost value on such benefits. Even Mr. Woolf admits as much when he states:

> *"...there is some uncertainty regarding the magnitude of some participant non-energy benefits"* (Page 37, lines 16 & 17).

His attempt to heavily qualify this statement does not hide the fact that any cost values attributed to non-energy benefits are, at best, highly uncertain. He reveals as much regarding his 10% to 50% recommended "adders" to TRC benefits in the following statement:

> *"These recommended values are based on my extensive review of non-energy benefits in other states, and are conservative relative to some of the quantified values of non-energy benefits that I am aware of."* (Page 38, lines 10-12)

In plain English, these estimates vary all over the place.

Fourth, once one starts down the path of trying to identify what impact to society will count as a "non-energy benefit", it will be impossible to know where the correct place is to draw the line and say "stop, we won't count any more impacts."

Fifth, use of non-energy benefits as adders to DSM benefits appears to be entirely one-sided with various benefits counting only on the DSM side of the ledger. Common sense would tell one that there have to be non-energy benefits on the supply side of the ledger as well. Examples might include: employment impacts, property tax impacts, economic development benefits from lower electric rates, etc. And, returning to Ms. Mims' examples of 'non-energy benefits' that include *"improved health and safety, increased comfort,"* lower electric rates that result from not implementing high levels of non-cost-effective DSM will certainly assist FPL's customers in these two considerations.

In regard to the issue of one-sidedness, it is interesting that Mr. Woolf's testimony points out that analysis of resource options should not be one-sided, as inclusion of non-energy benefits only on the DSM side of the ledger would be, when he discusses the guiding principles of the National Efficiency Screening Project (NESP). The NESP principle that is relevant to this discussion is:

"<u>Applicability to all resources.</u> In general, these principles should be applied to all types of electric and gas utility resources; both demand-side and supply-side resources." (Page 13, lines 17-19)

Yet the incredible increase in the TRC benefit-to-cost ratios in Massachusetts when 'non-energy benefits' are added as shown in Figure 10 of Ms. Mims' testimony suggests that the *"applicability to all resources"* principle may not have actually been put in practice. To see five-fold (or more) increases in benefit-to-cost ratios for DSM when non-energy benefits are incorporated strongly suggests that either these "benefits" are only incorporated on the DSM side of the ledger, or that benefits on the supply-side of the ledger were not pursued as diligently or imaginatively.

For at least all of these reasons discussed above, the notion that Florida should suddenly begin to account for non-energy benefits is a very bad idea. In addition, FPL witness Deason discusses in his rebuttal testimony why inclusion of non-energy benefits would be contrary to established practice and good regulatory policy.

Q. Please summarize this section of your rebuttal testimony.

A. The testimonies of Ms. Mims and Mr. Woolf attempt to ignore the obvious fact that DSM is less cost-effective now than in previous years. A simple comparison of the cost-effectiveness of a single DSM measure in 2009 and 2014, and of the Achievable Potential MW in 2009 and 2014, clearly shows that DSM cost-effectiveness has diminished. This is not a phenomenon specific to Florida and to how Florida utilities analyze DSM, though it is exacerbated by the increasingly high efficiency of FPL's generation system. This is a very good thing for FPL's customers, but it also lowers the benefits that DSM can provide.

The testimonies of these two witnesses also attempt to ignore the obvious regarding another issue: an almost 50% increase in the projected impact of codes and standards in 2014 compared to 2009 will definitely reduce the potential for utility DSM to address the specific efficiency gains that are now addressed by the codes and standards.

Nonetheless, their testimonies also suggest that they are aware that utility DSM is now less cost-effective. Their testimonies recommend that Florida should "change the rules" to protect DSM resources. They suggest that Florida should implement the UCT which presents a significantly lower hurdle for DSM in screening analyses, thus giving the appearance that DSM is more cost-effective than it actually is. In addition, they recommend that Florida now incorporate a set of "adders" to boost DSM benefits by up to 50% despite the fact that these adders are based on highly uncertain, speculative values that are completely one-sided in their application.

These suggestions/recommendations are an attempt to deny the current reality for DSM: DSM is less cost-effective now than in previous years, particularly for FPL, and the growing impact of energy efficient codes and standards is reducing the potential for utility DSM efficiency improvements that have already been addressed by the codes and standards. As a result, a reduced role for utility DSM, as seen in FPL's proposed DSM goals, is now warranted. The FPSC should not seriously consider these witnesses' calls to change the rules in Florida to shield one type of resource option (i.e., DSM) from reality.

2) Failure to Understand FPL's IRP Process and Analyses

Q. The testimonies of Ms. Mims and Mr. Woolf contained statements that were critical of FPL's IRP process and analyses. Were you surprised by this?

A. Not at all. In my approximately 35 years of performing resource analyses for FPL, I have come to the conclusion that some organizations are almost fanatical in how fervently they hold onto the belief that DSM resources <u>must</u> always be better than all other resource options. Consequently, when faced with analyses that show that DSM should play a smaller role in FPL's resource plans than in previous years, it was expected that the analyses, assumptions, motives, etc. might be criticized.

Q. Did these testimonies include "summary" statements regarding FPL's IRP process and analyses?

A. Yes. I believe the following two statements, one from each of these two witnesses, sum up the view they have of FPL's IRP process and analyses:

> *"FPL lacks transparency and analytical rigor in its resource planning…."* (Mims, Page 7, line 24);

and,

> *"It is also clear that if the Utilities were to adopt significantly higher DSM goals, then customer bills would be reduced significantly. This is the basic conclusion from a straightforward comparison of the costs of supply-side and demand-side resources; unencumbered by opaque, unduly complex and constraining resource planning practices."* (Woolf, Page 72, lines 9-12)

I will come back to their descriptions of *"lacks…analytical rigor" and "unduly complex"* later in my testimony. For the moment, let me just state that I believe part of the reason for these summary statements is that these witnesses simply do not understand FPL's IRP process and analyses. This is clear from the number of inaccurate and/or misleading statements that are present throughout their testimonies.

Q. Please discuss these incorrect and/or misleading statements.

A. Exhibit SRS – 18 provides a listing of at least some of the statements from their testimonies that are inaccurate and/or misleading. The exhibit's 10 pages provide several dozen examples of inaccurate and/or misleading statements. This partial listing of such statements also includes the correct information for the topic they have addressed. Many of these statements are about FPL's IRP process and analyses.

From both the number and breadth of these inaccurate and/or misleading statements, it is obvious that Ms. Mims and Mr. Woolf do not understand the resource planning process and analyses that they have chosen to attack.

Q. Are there other problematic statements in their testimonies that you did not include in Exhibit SRS – 18?

A. Yes. I'll discuss two of them. The first is the following statement from Mr. Woolf in which he attempts to argue that the RIM test overstates the lost revenue component of the RIM test:

> *"The Utilities estimate lost revenues on the basis of a projection of total electricity prices…This is not the correct methodology for estimating lost revenues that will impact rates. The correct methodology is to use a projection of fixed components of rates, not the fixed plus variable components of rates."* (Page 25, lines 21-25)

I disagree. Let me illustrate using fuel costs, which is the predominant component of variable costs. An analyst starts with a projection of electric rates that includes a projection of the fuel component of the rates. Thus the analyst has a projection of the fuel-based revenues that are expected to be recovered. However, once a DSM option is added to the system, there are several fuel cost impacts that will occur as previously discussed in Part I of my testimony. Some impacts will lower the utility system's fuel costs and some will increase the utility system's fuel costs. In the RIM test, the net effect of these fuel cost impacts from DSM is compared to the forecasted fuel-based revenues. The net effect of DSM on fuel costs is accounted for on the benefit side of the ledger and the reduction in fuel-based revenues is accounted for on the cost side of the ledger as part of lost revenues.

This comparison appropriately captures whether the fuel component of electric rates will increase, decrease, or remain unchanged due to DSM impacts. To exclude the fuel-based revenues on the cost side of the ledger, and include the net fuel impacts on the system on the benefit side of the ledger, would incorrectly understate the impact of DSM on electric rates. (It would also artificially inflate the benefit-to-cost ratios of the RIM test which is in keeping with Mr. Woolf's recommendation to add non-energy benefits to the DSM side of the ledger.)

Q. What is the other problematic statement you would like to discuss that is not included in Exhibit SRS – 18?

A. This is actually a series of statements that is made in Mr. Woolf's testimony and it refers to the concept of "bills." The following two statements provide good examples:

> *"Higher DSM goals would result in reduced costs, and therefore* ***reduced bills.*** *"* (Page 9, line 1, emphasis added);

and,

> *"Maintaining low utility system costs, and therefore low customer bills on average…. "* (Page 22, line 18 & 19, emphasis added)

I do not believe that Mr. Woolf's testimony ever explains what he is actually referring to when he uses the terms "bills" and "customer bill."

In statements in which he uses the phrase *"reduced bills,"* he is giving the misleading impression that bills for all customers will be reduced by high levels of DSM. He provides cover for himself by occasionally making slightly revised statements such as *"low customer bills on average,"* Mr. Woolf is simply referring to total costs as "bills." Because total costs do decrease with DSM additions, he claims that the utility's total "bill" to all customers will, on average, decrease. This is just a verbal construct that ignores the fact that high levels of DSM increase electric rates, resulting in actual bill increases for many actual customers. His use of the term "bills" in this fashion is an attempt to ignore the fact that non-cost-effective DSM will inevitably lead to unnecessary cross-subsidization between DSM participants and non-participants in which the non-participants will be harmed. In other words, in the context of DSM, there is no one "bill" impact, or even an "average bill." There are participants and there are non-participants, and non-participants' bills will go up if electric rates go up.

Q. Do these witnesses acknowledge the flexibility of DSM to be increased or decreased as resource needs and cost-effectiveness warrant?

A. No. In fact, these two witnesses are strongly resisting the Florida utilities' conclusion, based on months of analyses performed by each individual utility, that the appropriate course of action at this time is to reduce utility DSM goals.

My involvement in utility DSM efforts began in 1979 and has continued through today. Utility DSM was in its infancy in 1979. One of the initial big selling points regarding DSM was the flexibility it offered to utilities. It could be ramped up quickly if load growth accelerated. Likewise, it could be ramped down quickly if load growth stalled or the cost-effectiveness of DSM began to decline. This flexibility attribute of DSM still exists today. However, some organizations such as SACE and Sierra Club now see the flexibility attribute of DSM as something that can only work in one direction: ever upwards.

FPL has utilized DSM's inherent flexibility. In 2004, FPL's DSM goals were set at approximately 88 MW (Summer) per year. After experiencing very high peak loads in 2005, FPL voluntarily increased its DSM implementation quickly to its current level of approximately 120 MW per year. However, by the time the 2009 DSM goals docket rolled around, both FPL's rate of load growth, and DSM cost-effectiveness, had decreased. Therefore, FPL sought to utilize the inherent flexibility of DSM and reduce DSM implementation in its 2009 DSM goals filing. Accordingly, FPL proposed goals of approximately 66 MW per year.

However, FPL's goals were significantly increased to an average of about 150 MW per year in the 2009 docket. Yet soon thereafter, recognizing the rate impacts that would occur from implementing such a high level of DSM, FPL was instructed to return to its then current DSM levels, which averaged about 120 MW per year. In 2014, DSM cost-effectiveness has significantly decreased even more than in 2009. Furthermore, energy efficiency codes and standards have diminished some of the market potential for utility DSM, particularly in regard to air conditioning equipment.

Consequently, FPL is attempting to again utilize the inherent flexibility of DSM to reduce its goals to a proper level that utilizes those utility DSM options that remain cost-effective. However, rather than accept the current reality of declining DSM cost-effectiveness, and embracing the ability of DSM to be quickly ramped down or up as a fundamental strength of DSM, the testimonies of these two witnesses argue fiercely against FPL's planned reduction in DSM levels.

Q. Why do you believe these witnesses are so resistant to reduced levels of DSM?

A. I believe much of their resistance stems from the business motives of the organizations they represent. DSM has become a fair sized industry in the U.S. and organizations like Mr. Woolf's employer, Synapse Energy Economics (Synapse), have now been in business for over a decade. Synapse, and other such organizations, consistently push for ever higher levels of DSM regardless of changing load forecasts, changing fuel cost forecasts, etc. This is not surprising because DSM is their business. Therefore, these organizations have a vested interest in attempting to convince as many utilities, regulators, and legislators as possible to commit to DSM at ever increasing levels.

In this regard, organizations such as Synapse and SACE are simply special interests attempting to sway decision makers to decide in favor of their product (DSM) as often as possible instead of presenting impartial, analytically-based recommendations. It is good for their individual businesses to do so and I don't fault them for attempting to get favorable decisions that will enable them to stay in business. But I believe viewing these testimonies as coming from special interest organizations helps explain the extreme and unsupported recommendations for DSM goals that I will discuss next in my rebuttal testimony.

3) An Evaluation of The Recommended Alternate Goals and Impacts on FPL's Customers

The Alternate Recommended Goals & Their Development

Q. In regard to the DSM goals recommended by Ms. Mims and Mr. Woolf for FPL, were they based on FPL-specific economic analyses?

A. No.

Q. Were their goals at least based on Florida-specific economic analyses?

A. No.

Q. Were their goals based on any economic analyses at all?

A. No.

Q. Please describe their recommended goals.

A. The primary DSM goal for both witnesses is for GWh reduction. Both recommend a 1% reduction in retail sales (but differ slightly in regard to what year that goal should be reached). In regard to MW reduction, Ms. Mims appears not to have any such goal in mind. Mr. Woolf recommends that FPL's

2013 ratio of MW-reduction-to-MWh-reduction be used and then multiplied by the GWh goal. The resulting product is his recommended MW goal.

Q. Please describe how their recommended goals were developed?

A. Because they offer no description of how they arrived at their recommended goals, it appears that the GWh goal was developed by simply pulling an arbitrary percentage value out of the air. Then the MW goal recommended by Mr. Woolf appears to have been developed by selecting an arbitrary ratio value from an arbitrarily selected year, then multiplying the arbitrary ratio by the arbitrary GWh value.

Q. What justification did they give for their GWh and MW goals?

A. In regard to the GWh goal, both witnesses essentially said that it was selected because (paraphrasing) "other people are doing it." In regard to Mr. Woolf's MW goal, he really gave little or no justification as to why he selected this approach. Mr. Woolf does admit that his MW-reduction-to-MWh-reduction ratio is a *"...simplistic assumption...."* (Page 85, line 23)

Q. In regard to FPL's analyses that led to the identification of its proposed goals, how long did it take to complete those analyses?

A. These analyses took at least five months of continuous work to complete.

Q. How long do you estimate it took for these witnesses to develop their recommended goals?

A. Selecting an arbitrary number for the GWh goal would have been quick. However, an arbitrary year had to be selected, and then a ratio had to be calculated, for the MW goal. Taking all of this into account, I cannot imagine why it would take more than five minutes in total to develop their goals recommendations.

Q. Their "select an arbitrary number" approach certainly wasn't *"unduly complex,"* but didn't one of these witnesses also state that FPL's IRP process *"lacked… analytic rigor"*?

A. Ironically, yes.

A Discussion of Their LCOE-based "Justification"

Q. In the absence of actual economic analyses, did these witnesses attempt to offer anything that could serve as an economic justification?

A. Yes. However, just as certain intervenors attempted to do in the 2009 Goals docket, these witnesses chose a levelized cost of electricity (LCOE) approach to serve as their economic "justification." This was an unfortunate choice.

Q. Why is an LCOE approach an unfortunate choice?

A. It is an unfortunate choice because the results of an LCOE comparison are meaningless if the objective is to make a final decision regarding two competing resource options, such as a generation option and a DSM option.

Q. Didn't you discuss this previously in the 2009 DSM docket?

A. Yes. In the 2009 DSM Goals docket, my rebuttal testimony included a detailed 15-page explanation regarding why a cents/kWh LCOE comparison of dissimilar resource options, such as generation and DSM options, could not provide a meaningful answer to the question of which resource option should be selected for a utility. This explanation was also subsequently repeated in my rebuttal testimonies in the 2009 and 2010 nuclear cost recovery dockets (Docket Nos. 090009-EI and 100009-EI).

Q. **Is that explanation still valid today?**

A. Yes.

Q. **Please summarize the explanation.**

A. A typical LCOE calculation looks at the projected $/MWh, or cents/kWh, cost of an individual resource option to either generate electricity or to reduce electricity use. However, the perspective taken is solely of the individual resource option itself and assumes that the resource option is completely unconnected to a utility system. In other words, an LCOE calculation is based on a starting point assumption that the generator or DSM option is "placed in a field by itself" with no connection to a utility system. The LCOE calculation then develops a cost of operating the resource option by itself.

However, this starting point assumption is clearly unrealistic because any resource option will be connected to the utility system. As a result, the addition of the resource option will have a number of impacts on the operation of other existing resources on the utility system. These are termed "system impacts" and are accounted for in IRP analyses, but not in LCOE calculations.

For example, assume that a LCOE calculation is performed for a new combined cycle (CC) generating unit. The LCOE calculation will account for the annual cost of fuel used to run the CC unit. For simplicity's sake, let's assume that annual cost of fuel in a particular year is $100 million. However, the new CC unit would not operate on the utility system unless it was less expensive to run the new CC unit than it was to run existing generating units on the system.

Therefore, for each hour the new CC unit operates and incurs fuel cost, the operation of more expensive existing generating units will be reduced. The result is that the system fuel savings will be greater than the cost of fuel to operate the CC unit. For example, assume the annual fuel savings from reduced operation of the existing generating units is $110 million. Then the true annual fuel cost for the utility system from operating the new CC unit is a net fuel <u>savings</u> of $10 million (= $110 million saved from existing units - $100 million spent to operate the new CC unit).

Because an LCOE calculation accounts only for the fuel cost to operate the new CC unit, an LCOE calculation fails to account for the fuel savings from reduced operation of the more expensive existing generating units on the system. Thus an LCOE calculation only accounts for the $100 million fuel cost for the new CC unit and fails to end up with the correct result of a $10 million net fuel savings from placing the new CC unit on the utility system. (Note that this problem with LCOE calculations is identical to the problem earlier discussed in regard to the Minnesota VOS calculation.)

As this example shows, an LCOE calculation can be wildly inaccurate regarding the true cost of placing a resource option on a utility system because it fails to account for a number of system impacts similar to this net fuel impact. Thus LCOE calculations provide incomplete, and thus inaccurate, results regarding the true costs of resource options.

LCOE calculations (also commonly called "screening curve" analyses) may be useful only in screening applications where similar resources are being compared. In fact, LCOE calculations can only provide meaningful screening results when the resources in question are identical, or nearly identical, in regard to at least four characteristics:

(1) resource capacity (MW);
(2) annual capacity factor;
(3) the percentage of the resource's capacity (MW) that is firm capacity; and,
(4) the projected life of the resource.

If at least all of these four characteristics of competing resources are identical, or nearly identical, the system impacts of the individual resources will be similar and can be ignored in a simple screening among these similar resources.

However, DSM and generation options are very dissimilar resource options and typically share none of these four characteristics. Therefore, use of an LCOE calculation to compare these very dissimilar resource options cannot give meaningful results. Most importantly, because an LCOE calculation fails to account for a number of system cost impacts that must be known before a complete cost picture of competing resource options is known, LCOE calculations should never be used to make a final resource decision for a utility.

Q. Since the time of the 2009 DSM Goals docket, have you further examined the LCOE approach that SACE and the Sierra Club are still advocating in these two testimonies?

A. Yes. On at least three occasions I have had the opportunity to further consider the LCOE approach and perform additional examinations. These three examinations can be summarized as follows:

1) Using current forecasts and assumptions, updated LCOE calculations for a combined cycle (CC) unit were performed. Similar to the analysis presented in rebuttal testimony in 2009, this examination looked at how the projected LCOE value for the CC unit will change if even one of a number of system impacts is accounted for.
2) A fairly recent American Council for an Energy-Efficient Economy (ACEEE) publication that used projected low LCOE

values for DSM options, and higher LCOE values for generation options, to recommend implementation of large amounts of DSM was examined. The second examination took a critical look at both the LCOE formula used by ACEEE and the assumptions used in LCOE calculations. This examination concluded by performing a series of LCOE calculations for one DSM option. In these calculations, changes to various assumptions were sequentially made, one at a time, to make these assumptions more reflective of real world DSM. These more realistic assumptions result, not unexpectedly, in increases in projected LCOE costs for DSM.

3) The third examination returned to the specific LCOE formula used by ACEEE to see if their application of the formula followed guidelines for evaluating energy efficiency and renewable energy options that were specified in a publication by the U.S. Department of Energy's National Renewable Energy Laboratory (NREL). In short, ACEEE's attempted application of this specific LCOE formula to decide between competing DSM and Supply options is not recommended by NREL's guidelines.

These three examinations demonstrate two things about LCOE calculations. First, by failing to account for system impacts that accompany the choice of every resource option, LCOE calculations can only provide inaccurate information and should never be used to make a final resource decision.

Second, in regard to the values produced in an LCOE calculation, one can significantly change (or manipulate) what the resulting values will be through the choice of inputs to the calculation.

Q. Would you please discuss the first of these three examinations?

A. Yes. Similar to the LCOE calculation presented in the 2009 rebuttal testimony, a new LCOE calculation for a 2019 CC unit was performed. This calculation used the same CC unit cost and performance assumptions, and the same forecasts for fuel costs, etc., that were used in the DSM goals analyses performed for this docket. FPL then performed a second, modified LCOE calculation in which only one set of system impacts was accounted for. This second LCOE calculation assumed that there would be a 10% net savings for the FPL system in regard to system fuel costs and system environmental compliance costs. This 10% net savings assumption is representative of the net impact that FPL typically sees in more detailed analyses. These projected system net savings are incorporated in the second LCOE calculation.

For example, the first LCOE calculation shows that the cost of fuel to operate the new CC unit in the first year of operation was $422 million. In the second, modified LCOE calculation, it was assumed that the system fuel cost avoided by operating the new unit (which reduces the operating hours of existing, more expensive-to-operate generating units) would be $464 million (= $422 x 1.10). The end result for the first year is that the net fuel impact for the entire FPL system would be a net savings of $42 million.

Both of the LCOE calculations were performed using FPL's levelized cost of electricity calculation spreadsheet. The results of this examination are provided in Exhibit SRS – 19 which consists of three pages. Page 1 of 3 presents the results of the two calculations and pages 2 of 3 and 3 of 3 present the two LCOE calculations.

The result of the 1st calculation is a projected LCOE cost of $95/MWh, or 9.5 cents/kWh, for the CC unit assuming a 90% capacity factor (which is a representative capacity factor value for a new CC unit on FPL's system). This projected LCOE cost for a CC unit is similar to those regularly seen in LCOE-based reports presented by organizations such as SACE and Sierra Club in dockets like this one.

However, the result of the 2nd calculation, an LCOE calculation modified to account for just system fuel cost and environmental cost impacts, is a projected LCOE cost of $23/MWh, or 2.3 cents/kWh, for the same 90% capacity factor assumption.

Accounting for just this one set of system impacts only begins to move a typical LCOE calculation towards the desired outcome of any resource analysis: to fully account for all cost impacts to a utility system from the addition of a resource option. Yet accounting for only this one set of system impacts lowers the original LCOE projected value of 9.5 cents/kWh by a factor of more than 4 to 2.3 cents/kWh. (Needless to say, the LCOE-based reports favored by SACE and the Sierra Club do not discuss the results of more accurate modified LCOE calculations such as this one.)

The results of this examination are consistent with the results of prior analyses that were discussed in my rebuttal testimony in 2009. And these results show how misleading the results of a typical LCOE calculation are and why one should never make a final resource decision based on LCOE calculations. Fortunately, neither any Florida utility nor the state of Florida makes final resource decisions based on such a flawed method of comparing resource options.

Q. Please discuss the second examination you made which involves an LCOE calculation formula and associated assumptions.

A. The second examination looked at two aspects of LCOE calculations used in the ACEEE's September 2009 report Saving Energy Cost-Effectively: A National Review of the Cost of Energy Saved Through Utility-Sector Energy Efficiency Programs. Those two aspects that were examined are: (i) assumptions used in their LCOE calculation; and (ii) the formula actually used to calculate the LCOE values.

In regard to the assumptions, the ACEEE's report did not provide much readily available information regarding specific assumptions. However, the report did state that a real discount rate of 5% was used in their LCOE calculations and that values in the 2009 document were present valued back to the year 2007. FPL noted that the discount rate selected by ACEEE for their calculation is substantially different than the approximate 7%-to-8% range of discount rates that FPL has recently used in its IRP analyses, which results in a lower cents/kWh projected result for DSM.

With that in mind, FPL performed a series of LCOE calculations for a representative DSM option again using the same FPL LCOE spreadsheet that was used in the LCOE projections for a CC unit discussed above. The initial LCOE calculation for this DSM option used a particular set of economic assumptions/inputs. Then, these assumptions/inputs were varied one at a time in additional LCOE calculations.

The DSM option was assumed to have the following characteristics: 1 kW of demand reduction, 1,752 kWh reduction (i.e., an equivalent capacity factor of 20%), and a 10-year measure life. These assumptions remained unchanged throughout the LCOE calculations. The starting point economic assumptions/inputs were: (i) a 5% discount rate, (ii) a 2019 installation (the same year as the avoided unit would have gone in service as was assumed in the LCOE calculations for the CC unit discussed above), and (iii) an accounting of administration and incentive costs needed to initially sign up DSM participants.

Then, the following sequential changes to the economic assumptions/inputs were made:

- The discount rate was changed from 5% to 7.54% (to match the discount rate used in the CC LCOE calculation);
- The DSM installation year was changed from 2019 to 2014 (to reflect the reality that DSM implementation must occur a number of years prior to when a generating unit would go in-service in order to sign up enough DSM MW to avoid that unit);
- The fact that the DSM option has only a 10-year life, but the CC unit it is seeking to avoid has a 30-year life, is addressed by assuming that the DSM option (or its equivalent) is "re-signed up" in the 11th year and again in the 21st year with escalation of the administration costs; and,
- The impact of unrecovered revenue requirements is also accounted for.

An LCOE calculation was made for each of these five cases. The results are presented in Exhibit SRS – 20. This exhibit consists of 6 pages. Page 1 of 6 summarizes the results. Pages 2 of 6 through 6 of 6 present the calculation for each of the five cases.

As shown on page 1 of 6, the initial LCOE value is 3.5 cents/kWh. This projected LCOE value is within the 2 to 4 cents/kWh range typically reported for DSM in LCOE-based reports favored by organizations such as SACE and the Sierra Club.

However, the calculated LCOE values for the other four cases steadily increase as economic assumptions/inputs are changed. It is important to note that each of these changes resulted in adjustments that: (i) used identical assumptions (discount rate and number of years of costs addressed in the calculations) to those used in Exhibit SRS – 19 which calculated an LCOE value for a CC unit, and/or (ii) used more realistic assumptions regarding when DSM is implemented to avoid a generating unit; and/or (iii) accounted for additional costs that would need to be incurred to maintain the kW and kWh reductions for the 30-year life of the generator that DSM seeks to avoid; and/or (iv) accounted for the unrecovered revenue requirement impact of DSM on electric rates.

The revised LCOE calculations showed the projected cents/kWh cost of the DSM option increasing steadily from 3.5 cents/kWh to 4.8 cents/kWh in the first three revised cases, then jumping significantly to 17.6 cents/kWh when the impact of unrecovered revenue requirements is incorporated.

Q. **Do you draw any new conclusions from these LCOE calculations?**

A. Yes. I have already discussed the fact that a final resource decision should never be made based on an LCOE calculation because this type of calculation fails to account for very significant system impacts that occur if a resource option is added to a utility system. This makes an LCOE calculation meaningless in regard to resource decisions.

The new conclusion I draw from these five LCOE calculations is that an LCOE value for a single DSM option can vary over a wide range depending upon what assumptions or inputs are selected for use in the calculation. Therefore, attempting to present LCOE projected values for resource options in support of a type of resource option, without also presenting the key assumptions/inputs used in the calculation, makes an LCOE-based argument even more meaningless (if such a thing is possible).

Q. You mentioned earlier that you also took a look at the ACEEE's LCOE calculation formula. Please discuss what you found.

A. In regard to their LCOE calculation, ACEEE used a formula instead of a spreadsheet approach. The LCOE formula they used is presented in Exhibit SRS – 21. This one-page exhibit presents both the formula itself and a simple calculation using that formula.

As the top half of the exhibit shows, the formula is based on a "Capital Recovery Factor." This makes it an odd choice for use in attempting to calculate LCOE values for DSM options because the vast majority of DSM options have no utility-incurred capital costs associated with them. (Only a relatively few DSM options, such as load management options, have capital costs.) This raises the question of how applicable a "Capital Recovery Factor"-based formula is when applied to non-capital costs.

This question is underscored by the calculation shown in the bottom-half of the exhibit. A very simple DSM option was selected for this calculation. The DSM option is assumed to cost $50, reduce 1,000 kWh, and have a one-year life. The LCOE calculation using this formula appears to produce a value of 5.4 cents/kWh. This is disturbing because simple math shows that is the wrong answer. $50, or 5,000 cents divided by 1,000 kWh results in a 5.0 cents/kWh answer.

Therefore, not only is the applicability of a capital cost-based formula to non-capital costs questionable, at least in this one example this specific capital cost-based formula appears to provide the wrong answer.

Q. Would you please now discuss the third examination you made regarding whether the LCOE calculation approach is appropriate when attempting to compare DSM and Supply options?

A. Yes. While puzzling over the ACEEE's use of a capital cost-based formula for calculations of non-capital costs, and the fundamental problems inherent in attempting to use an LCOE calculation to compare very dissimilar resource options, I ran across an interesting document. The document is <u>A Manual for the Economic Evaluation of Energy Efficiency and Renewable Energy Technologies.</u> The document was released by the United States Department of Energy's National Renewable Energy Laboratory (NREL) in 1995. As a national laboratory, one would expect NREL to have taken an impartial view of how best to analyze energy efficiency and renewable energy technologies.

The document's introductory chapter begins by stating the document's objective:

"This manual is a guide for analyzing the economics of energy efficiency and renewable energy (EE) technologies and projects. It is intended (1) to help analysts determine the appropriate approach or type of analysis and the appropriate level of detail and (2) to assist EE analysts in completing consistent analyses using standard assumptions and bases, when appropriate." (Page 1, 1st paragraph)

To that end, the document examines a number of methods of performing economic analyses (or *"economic measures"* as they are referred to in the document) including, but not limited to: net present value (NPV), revenue requirements (RR), internal rate of return (IRR), etc. Among the methods analyzed is LCOE and the LCOE formula discussed is identical to the previously discussed formula used by ACEEE.

In the document's third chapter, a Table 3-1 is presented. The table is described in the document's text as follows:

"Table 3-1 is a quick reference for identifying the appropriate economic measure for different investment features and decision criteria. Letters in the table indicate whether the measure is recommended, generally not

recommended, or commonly used. A blank cell signifies that the measure is acceptable. An 'R' signifies that the measure is recommended. However, this does not mean that the other economic measures are inappropriate. On the other hand, <u>an 'N' means that the measure is not generally recommended and may yield incorrect results and conclusions.</u>" (Page 36, full page, emphasis added)

Exhibit SRS – 22 provides a reproduction of Table 3-1 from the NREL document. Shading has been added to the table to highlight the table's conclusions regarding LCOE. Specifically, the table states that the use of an LCOE calculation to select from mutually exclusive alternatives is "N" (Not recommended). DSM and generation options are typically considered as mutually exclusive alternatives, and they are certainly mutually exclusive alternatives in a DSM goals analysis in which DSM seeks to avoid the addition of generation units in FPL's resource plans.

NREL's recommendation to avoid using LCOE calculations to select from mutually exclusive alternatives is entirely consistent with FPL's view that final resource decisions should never be made based on LCOE calculations. However, the witnesses' use of LCOE calculation to justify high levels of DSM rather than generation additions is completely inconsistent with NREL's recommendation.

Q. Please summarize your view of SACE's/Sierra Club's use of LCOE calculation results to justify their recommendation for higher DSM goals.

A. I have three comments regarding this topic. First, for all of the reasons discussed above, it is clear that LCOE calculations are meaningless if the objective is to make final resource decisions between dissimilar, competing options. Because DSM and generation options are about as dissimilar as resource options can be, LCOE calculations are definitely meaningless in regard to this docket. The FPSC should base its DSM goals decision on comprehensive system analyses that utilize current assumptions and projections of resource needs. The IRP analyses FPL performed for this docket is such an analysis.

Second, it is disappointing that, five years after the fundamental flaws in attempting to justify resource decisions based on LCOE calculations had been explained in detail in Florida's 2009 goals docket, and in two Florida nuclear cost recovery dockets, these witnesses continue to use LCOE calculations as part of their testimonies in a new Florida docket. Although it is disappointing, it is not surprising.

The LCOE spiel appears to be a staple in organizations such as SACE's "DSM is always better" playbook. Their LCOE argument sounds good superficially, especially for an audience that either does not already understand the fundamental flaws inherent in attempting to use LCOE calculations to compare resource options, or which does not then take a critical look at this calculation approach. Because such organizations have little else they can use in attempting to make an economic justification for high levels of DSM, I suspect the LCOE spiel will remain in their playbook. These organizations will have to hope that LCOE's superficial appeal will be enough to get by with audiences who are not curious enough to examine their claims.

Third, these witnesses' use of LCOE calculations again in the 2014 docket has allowed the results of additional critical examinations of LCOE to be presented to the FPSC. These additional examinations, discussed above, only serve to further point out how fundamentally flawed an attempt to justify resource decisions on LCOE calculations is. In this regard, their testimonies have afforded FPL the opportunity to add these new critical examinations of LCOE into the record for the FPSC and other interested parties.

Impact of Intervenors' Proposed Goals on FPL's Customers

Q. Both of these witnesses focus on a recommended goal of a 1% reduction in GWh sales. Did either of these two witnesses provide any analyses regarding the magnitude of impacts to electric rates and corresponding bill impacts to DSM non-participants that would result from their recommended goal?

A. No. They offer no such analyses. However, Mr. Woolf offered the following opinion:

> *"The rate impacts of the Sierra Club goals will not be much higher than those of the Utilities' goals."* (Page 87, lines 2 & 3)

He offers no analyses to back this statement up.

Q. Could these two witnesses have offered an analysis to demonstrate the impacts of their recommendations?

A. Yes. Such an analysis was possible using a few of the exhibits that were presented in my direct testimony and a response to a discovery request.

Q. Did FPL perform such an analysis?

A. Yes. Because both witnesses recommend a "1% reduction of retail sales" goal, the analysis focused on the impacts this GWh goal would have.

Q. Please discuss how the analysis was structured.

A. Because the timing (i.e., the year) of when the full 1% goal was to be met differed between SACE and the Sierra Club's recommendations, two analyses were performed. One analysis was performed using SACE's 1% GWh goal timing and the other analysis was performed using the Sierra Club's 1% GWh goal timing. The analysis was structured as follows:

- The levelized system average electric rate sheet for the TRC 576 MW resource plan was the starting point. This sheet provides information for the TRC 576 MW resource plan that was equivalent to the information provided for the RIM 337 MW resource plan in Exhibit SRS – 12 of my direct testimony. An electronic version of the sheet for the TRC 576 MW resource plan was provided to all parties in response to SACE's 2nd set of discovery, POD # 2.
- Because this sheet utilizes the projected total GWh sales value, and the 1% reduction goal applies only to the retail sales portion of total sales, FPL developed annual modifiers to address the additional impact of the GWh goal on total GWh sales. These annual modifiers were then multiplied by the previously projected net annual GWh sales to derive reduced annual total sales projections in line with the GWh goal.
- Because the "1% reduction in retail sales" goal would reduce projected variable costs, the same annual modifiers were multiplied by the previously projected variable costs to derive reduced annual variable costs.

- In order to achieve such an extreme level of GWh reduction, projected DSM expenditures would have to increase. The GWh associated with 1% of FPL's retail sales is approximately 10 times the GWh associated with the TRC 576 plan. FPL very conservatively assumed that the currently projected DSM costs for the TRC 576 MW resource plan would double.

The projected impacts of their recommended GWh goal on electric rates and customer bills were then determined and the results were presented in several ways for each analysis:

- The levelized system average electric rate was developed and compared to the levelized system average electric rates for the five resource plans previously analyzed. This information is presented in the same formats used in Exhibits SRS – 11 and SRS – 12 of my direct testimony.
- The one-time additional cost that would be needed to make the levelized system average electric rate of the RIM 337 MW resource plan equal to the levelized system average electric rate associated with the recommended goal was determined. This information is presented in the same format used in Exhibit SRS – 13 of my direct testimony.
- The projected annual system average electric rates for the years 2015 through 2025 were determined.

- The projected bills for a customer with a 1,200 kWh usage over the years 2015 through 2025; i.e., a non-participant in utility DSM, based on the annual electric rates developed were developed and compared to the equivalent projections for the five resource plans previously analyzed. The projected electric rate and customer bill information is presented in the same format used in Exhibit SRS – 14 of my direct testimouy. In addition, a cumulative 10-year bill impact for 2015 through 2025 for such a customer was also developed.

Q. What were the results of these analyses?

A. The results of these analyses are presented in Exhibit SRS – 23 (SACE) and Exhibit SRS – 24 (Sierra Club). Each exhibit consists of four pages. I'll summarize these results as follows:

- Page 1 of 4 of the two exhibits shows that the levelized system average electric rate is projected to be 12.1728 cents/kWh for the Sierra Club's 1% GWh goals recommendation and 12.2368 cents/kWh for SACE's 1% GWh goals recommendation.
- Page 2 of 4 compares the respective levelized electric rates for the 1% GWh goal analysis to the comparable levelized electric rate for the other five resource plans previously analyzed. In both analyses, the levelized system average electric rates for the 1% GWh goals analysis are significantly higher than the levelized rates for the other five resource plans (including the supply-only resource plan). In addition,

this page also shows that the 1% GWh goals recommendations will not avoid cross-subsidization of customer groups. In fact, it will increase cross-subsidization by a significant amount.

- Page 3 of 4 begins to put into perspective the magnitude of how much higher the 1% GWh goal's levelized system average electric rate is compared to those of the other five resource plans.

Exhibit SRS – 13 of my direct testimony showed that to increase the levelized system average rate of the RIM 337 MW plan to the higher levelized electric rate of the TRC 337 MW plan, a one-time additional cost of $630 million in 2024 would be needed. Page 3 of 4 of Exhibit SRS – 23 now shows that the one-time additional cost in 2024 of approximately $18,680 million, or $18.7 billion, would be needed to bring the RIM 337 MW resource plan's levelized system average electric rate to the much higher levelized system average electric rate with SACE's 1% GWh goal. In addition, Page 3 of 4 of Exhibit SRS – 24 shows that the one-time additional cost in 2024 of approximately $16,266 million, or $16.3 billion would be needed to bring the RIM 337 MW resource plan's levelized system average electric rate to the much higher levelized system average electric rate with the Sierra Club's 1% GWh goal.

- Page 4 of 4 continues to put the magnitude of the impacts of the 1% sensitivity case on electric rates and individual customer bills into perspective. There are two tiers of information on the page. The top tier shows the projected annual values for electric rates and customer bills based on 1,200 kWh usage. An examination of these values shows that these values with the two 1% GWh goals are significantly higher than for any of the five resource plans.

The bottom tier presents the projections in two ways. First, the differentials in customer bills based on 1,200 kWh usage (i.e., a monthly bill) for the four "with DSM" resource plans, and with the 1% GWh goals, compared to the Supply Only resource plan. The projected bill increases with the 1% GWh goals analysis are enormous compared to that of the RIM 337 plan as shown by the projected monthly impacts for selected years shown below:

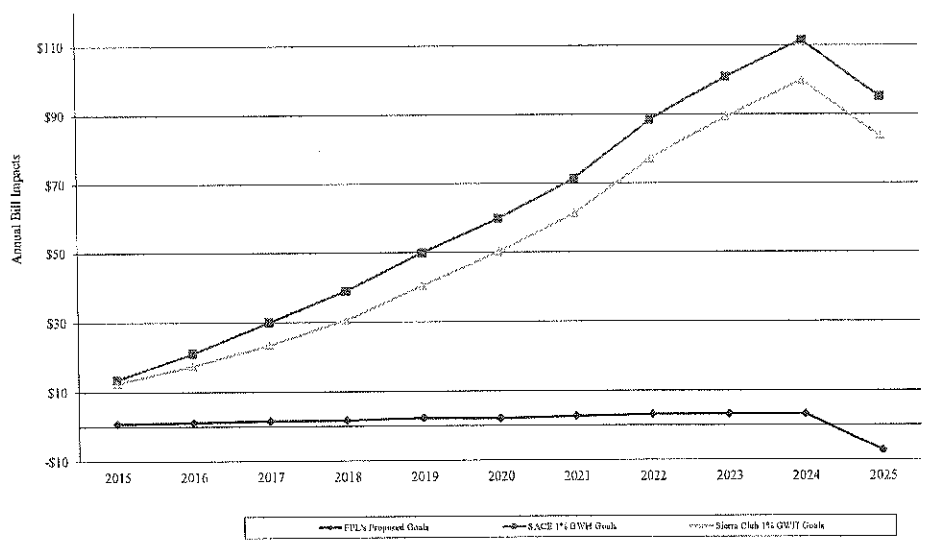
Projected 1,200 kWh Bill Impact Compared to the Supply Only Plan

	RIM 337 MW Plan	SACE 1% GWh	Sierra Club 1% GWh
2015	$0.07	$1.13	$1.04
2019	$0.20	$4.17	$3.38
2024	$0.28	$9.30	$8.32
2025	($0.60)	$7.94	$6.99

The bottom tier of Exhibits SRS – 23 and SRS – 24 also presents the customer bill information in a second way. This shows both the <u>annual</u> customer bill impacts, and the <u>cumulative</u> customer bill impacts for the years 2015 through 2025, for the RIM 337 plan, and with the respective 1% GWh goals, versus the Supply Only resource plan. The corresponding <u>annual</u> customer bill differential values for all years from 2015 through 2025 are presented graphically in Figure 1 below:

Figure 1

Projection of Annual Customer Bill Impacts of SACE's & Sierra Club 1% GWH Goals, and FPL's Proposed Goals vs Supply Only Plan (for 1,200 kWh Monthly Usage)



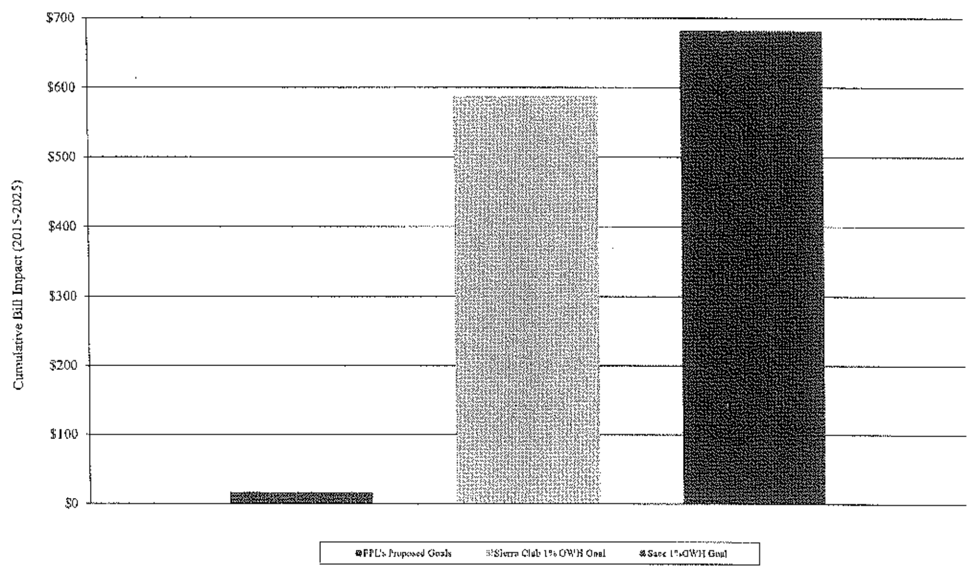
Both of the 1% GWh goals recommendations are projected to result in higher, and generally increasingly higher, annual customer bills for a customer whose 1,200 kWh usage remains unchanged compared to either the Supply Only plan or the RIM 337 MW plan.

In regard to the <u>cumulative</u> bill impact for such a customer over the 2015-2025 time period, the RIM 337 MW plan is projected to result in approximately a $15 cumulative increase in the customer's total bill (and shows a bill savings beginning in 2025) versus the Supply only plan over the 2015-2025 period. Conversely, the Sierra Club 1% GWh goal recommendation is projected to result in a cumulative increase of approximately $586 in the customer's bills over the same time period. The SACE 1% GWh goal recommendation is projected to result in a cumulative increase of approximately $681 in the customer's bills over the same period.

Figure 2 illustrates these enormous differentials in cumulative bill impacts over this time period for a customer with 1,200 kWh usage between the RIM 337 MW plan and the two 1% GWH goal recommendations.

Figure 2

Projection of Cumulative Customer Bill Impacts of SACE's & Sierra Club's 1% GWH Goals, and FPL's Proposed Goals vs Supply Only Plan (for 1,200 kWh Monthly Usage)



Therefore, the 1% GWh goal recommendations of either Sierra Club or SACE are clearly projected to result in significantly higher annual and cumulative bills for individual customers who do not participate in utility DSM and whose usage remains at a 1,200 kWh level. The higher bill impacts are projected to begin immediately and steadily increase throughout the goals-setting period.

Q. What conclusion can be drawn from these analyses of projected impacts to electric rates and individual customer bills from the 1% GWh reduction of retail sales goals recommended by SACE and the Sierra Club?

A. Three conclusions can be drawn. First, Figures 1 and 2 clearly show that the individual customer bill impacts that will result from the witnesses' recommended GWh goals are significantly different from the *"...will not be much higher than those of the Utilities' goals"* claim of Mr. Woolf in regard to electric rate increases. The projected bill impacts for individual customers who are non-participants in utility DSM programs from either of the 1% GWh goal recommendations would definitely be significant from the beginning.

Second, the projected bill impacts from the SACE 1% GWh recommendation are even worse than the Sierra Club's 1% GWh recommendation. This is due to the fact that SACE's recommendation is for the 1% GWh reduction level to be reached in 2016 while the Sierra Club's 1% GWh recommendation is for this reduction level to be reached three years later in 2019. Therefore, the longer such an extreme GWh goals recommendation is delayed, the better. Obviously, the best solution for FPL's customers is to never implement such a recommendation.

Third, it is important to keep in mind that the usage level used in these projections, 1,200 kWh, is the usage level of a residential customer. For commercial and industrial non-participants whose usage levels are much higher, their annual and cumulative bill impacts would be much greater.

Q. There appear to be two factors driving these projected increases in electric rates and non-participating customer bills that would result from the 1% GWh goals recommendations: recovery of costs over fewer GWh and higher DSM expenditures. Which of the two factors is the bigger driver?

A. In these analyses, the biggest driver by far is the fact that costs will be recovered over fewer GWh. However, there should be little question that DSM expenditures would have to increase to meet higher goals. Mr. Woolf expressed this in the following statement:

> *"...DSM program goals and budgets can be set in a way to increase customer participation. Energy efficiency program goals and budgets could be increased to grow the number of customers that experience bill reductions."* (Page 31, lines 10-12)

In order to test the sensitivity of the individual customer bill impacts discussed above to DSM expenditure levels, FPL ran a separate analysis, labeled "SACE 1% GWh (2)," in which the projected DSM expenditure increase was cut in half. The results of that analysis in regard to individual non-participating customer monthly bills with a 1,200 kWh usage are shown on the right-most column in the table below:

	Projected 1,200 kWh Bill Impact Compared to the Supply Only Plan		
	RIM 337 MW Plan	SACE 1% GWh	SACE 1% GWh (2)
2015	$0.07	$1.13	$0.83
2019	$0.20	$4.17	$3.78
2024	$0.28	$9.30	$8.82
2025	($0.60)	$7.94	$7.68

Thus the DSM expenditure assumption has relatively little impact on the much higher monthly bills resulting from a 1% GWh reduction goal.

In regard to cumulative bill impacts for such a customer over this time frame, this assumption of a 50% reduction in the increase in DSM expenditures also only decreases the projected impact a relatively small amount. The original projection for the SACE 1% GWh goal of approximately $681 is only decreased by a relatively small amount to approximately $631.

These results show that the projected increase in customer bills from a 1% GWh goal would be driven almost completely by the reduction in GWh over which costs would be recovered; i.e., by an increase in electric rates.

Q. Is there a simple explanation for why a 1% GWh reduction goal results in such significant increases in electric rates and customer bills whose usage does not change?

A. Yes. A 1% reduction in retail sales goal may seem relatively innocuous at first glance. However, one must keep in mind that this goal calls for reducing retail sales <u>each year</u> by another 1%. The impact from the reduction in the first year remains in place during the second year when another 1% reduction is piled on top of the first year's impact, and so forth. Thus there is an additive effect that continues as long as the 1% GWh goal stays in place. At the end of the 10-year period, this would mean approximately a 10% decrease in total retail sales for FPL. Recovering fixed costs – costs that are not impacted by an energy only goal – over 10% fewer retail sales GWh will result in a significant increase in electric rates and a significant increase in bills for individual customers who cannot change, or who choose not to change, their electric usage.

4) Other Comments

Q. What will you address in this section of your rebuttal testimony?

A. I will address a few comments in these witnesses' testimonies related to topics that have not yet been addressed.

Q. What is the first of those comments?

A. The first such comment is one made by Mr. Woolf in his testimony:

"...one of the key challenges in setting DSM goals is striking the appropriate balance between reduced costs and increased rates...." (Page 87, lines 11 & 12)

Q. What is your reaction to that statement?

A. I have a couple of reactions. First, in IRP analyses of resource options one should not start with an objective of looking for "an appropriate balance between costs and rates." Instead, the first issue to be considered is system reliability in terms of when does the utility have resource needs and what are the magnitudes of those resource needs. Only then does one begin analyses that examine how best to meet the specific annual resource needs of the utility.

FPL's IRP analyses are based on determining how to meet resource needs at the lowest electric rate impact. This is because electric rate levels affect all of FPL's customers.

However, if one wanted to "strike a balance between costs and electric rates" in their decision-making, I can envision a two-column checklist. One column would have "Lowers Costs?" as its heading. The other column would have "Lowers Electric Rates?" as its heading. In FPL's IRP analyses for this docket, all of the With DSM resource plans are projected to lower costs compared to the Supply Only resource plan. However, only one of the With

DSM resource plans, the RIM 337 MW plan, will also result in lower electric rates compared to the Supply Only plan.

Consequently, the table just discussed would look as follows:

Resource Plan	Lowers Costs?	Lowers Electric Rates?
RIM 337 MW	**Yes**	**Yes**
TRC 337 MW	Yes	No
RIM 526 MW	Yes	No
TRC 576 MW	Yes	No

Recall that FPL's IRP analyses start with a blank slate in regard to incremental DSM. One possibility that was examined was to add no incremental DSM. That possibility is represented by the Supply Only resource plan. The four With DSM resource plans incorporate different levels and/or types of incremental DSM. If one's objective is to determine if any of the With DSM resource plans accomplish both "objectives" of lowering costs and lowering electric rates compared to the Supply Only plan (i.e., thus striking a "balance" between costs and electric rates), only the RIM 337 MW resource plan accomplishes both objectives. Thus the RIM 337 MW resource plan is the best choice if the objective is find the best balance between the issues of cost and electric rates.

However, these witnesses are not interested in an actual balance along these lines. Instead, their definition of balance appears to be: lower costs as much as possible and try to ignore the resulting higher electric rates.

Q. Do they offer a "fix" for the problem of higher electric rates caused by inappropriately high levels of DSM?

A. Not really. They first try to ignore it as seen in the statement of Mr. Woolf's that was earlier discussed in which he stated that electric rates with very high DSM goals *"will not be much higher than those of the Utilities' goals."* We've seen how incorrect that statement was.

Perhaps to cover themselves if anybody checked the accuracy of that statement, Mr. Woolf offers the following "fix":

> *"Utilities should be able to serve a large portion of customers with efficiency programs, thereby offsetting any increases in rates that might occur."* (Page 87, lines 6 & 7)

In other words, Mr. Woolf's suggested "fix" is do a lot more of the same thing that caused the high electrical rates problem in the first place. Non-participants will be harmed from electric rate increases that are driven by any level of non-cost-effective DSM. It should be obvious that non-participants will be harmed even more if one were to try to solve their problem by implementing even more non-cost-effective DSM that further increases electric rates.

The testimonies of these witnesses lead me to believe that the witnesses have a very dismissive, almost cavalier attitude toward the problem of high electric rates that their recommended goals would result in.

Q. Please explain.

A. These witnesses first attempt, with a few "trust me" statements, to give the impression that their recommended goals will result in little to no electric rate increases. They offer no analysis specific to FPL or Florida to support their claims. Then, still in full "trust me" mode, they claim that any increased electric rate problems and non-participant bill problems can be magically solved by just implementing even more DSM. They again offer nothing to support this second claim. Their testimonies suggest that the witnesses simply will not even consider that increasing electric rates will be harmful for a portion, and perhaps a large portion, of FPL's customers who will be non-participants in voluntary utility DSM programs. I view this attitude as both dismissive and cavalier.

Perhaps this is to be expected. The main, if not sole, objective of these witnesses is to reduce electric consumption. Higher electric rates typically encourage customers to reduce usage. If these witnesses can unnecessarily increase electric rates through high levels of utility DSM, then these witnesses have the best of both worlds for their objective. They get energy reduction directly from high levels of DSM, and they get more energy reduction indirectly due to increasing electric rates caused by the high levels of DSM.

This is quite a business model for organizations such as SACE and Synapse. However, it ignores the obvious fact that all customers who either cannot participate, or choose not to participate, in voluntary utility DSM programs will be harmed by higher electric rates. These non-participants, as well as DSM participants, are all FPL's customers. FPL cannot ignore the fact that unnecessarily high electric rates, such as those that would occur as a result of arbitrarily high DSM levels, will harm a substantial portion of its customers. This is one of the primary reasons why FPL is proposing DSM goals of 337 MW. FPL's proposed goals result in lower electric rates for all of FPL's customers.

Q. Were there any specific comments in either of these two witnesses' testimonies that you would like to point out because you are in agreement with the comment?

A. Yes. I have already mentioned two such statement earlier in my testimony in which Mr. Woolf stated that *"...avoided costs are less than they were in the past"* and that *"It is true that increasing building codes and standards will make it more difficult to achieve DSM savings over time."*

In addition, there are four other statements in Mr. Woolf's testimony that I would like to point out because they are also important points to make in this docket and I also agree with these statements. The first of these statements is actually a quote from the FPSC Order in the 2009 DSM goals docket:

"Those who do not or cannot participate in an incentive program will not see their monthly utility bill go down unless they directly decrease their consumption of electricity. If that is not possible, non-participants could actually see an increase in their monthly utility bill. Since participation in DSM programs is voluntary and this Commission is unable to control the amount of electricity each household consumes, *<u>we should ensure the lowest possible overall rates to meet the needs of all customers.</u>"* (Page 18, lines 19-25, emphasis added)

FPL agrees with this key principle espoused by the Commission.

The second statement in Mr. Woolf's testimony that I agree with is the following:

"Applying the RIM test to screen efficiency programs...may lead to the lowest rates...." (Page 22, lines 14 & 15)

FPL agrees and utilized the RIM screening test to help ensure that its proposed DSM goals are projected to deliver the lowest possible electric rates of any of the With DSM resource plans.

The third statement of his that I am in agreement with is:

> "...*it is important to avoid cross-subsidies where possible....*" (Page 23, line 13)

Unnecessary cross-subsidization that results from selection of inappropriate levels of DSM is an excellent example of the type of cross-subsidies that can and should be avoided.

The fourth statement of Mr. Woolf's that I agree with is the following:

> "*As explained in DEF's and FPL's testimony, the number of payback years influence consumer decisions for adopting energy efficiency measures....*" (Page 101, lines 3 & 4)

FPL again agrees and uses this consideration to address free-riders.

Part III: Conclusion

Q. Based on your experience, do you believe that an IRP analysis approach is the best approach to use when making resource decisions?

A. Yes. An IRP approach, such as the IRP process that FPL utilizes, is by far the best approach to use when making resource decisions for a utility's customers. It requires analysis of the timing and magnitude of resource needs, plus analysis of the capacity and energy impacts that competing resource options will have on the utility system from both an economic and non-economic perspective.

Q. For how long has FPL's generation analyses utilized FPL's IRP process?

A. FPL has used its IRP process to analyze generation options since at least 1991 which was the year I joined FPL's Resource Assessment & Planning department, then named the System Planning department.

Q. For how long has FPL's DSM analyses utilized FPL's IRP process?

A. FPL also has used its IRP process to analyze DSM options since at least 1991.

Q. Did the analyses that developed FPL's proposed DSM goals in this docket utilize FPL's IRP process?

A. Yes.

Q. Why is FPL proposing DSM goals based on IRP analyses?

A. FPL is doing so because it believes that an IRP analysis approach will result in the best resource decisions for FPL's customers.

Q. Are the intervenor witnesses recommending alternate goals based on IRP analyses and, if not, why not?

A. No. Their testimonies do not explain why they choose not to utilize IRP principles and analyses. Instead, they choose to base their alternate goals recommendations on arbitrarily selected numbers which, if accepted by the FPSC, would result in those witnesses' objective of ever-increasing amounts of DSM, and ever-increasing electric rates, being realized. Their objective of ever-increasing amounts of DSM also appears to be based, at least in part, on the fact that such an objective is economically beneficial to organizations such as SACE and Synapse.

Q. Intervenors recommend DSM goals of a 1% reduction in retail sales. FPL has sought approval of a RIM 337 MW portfolio. Would a good middle ground be the extension of the current DSM goals levels?

A. No. To better understand why this is so, one needs to return to the 2009 docket. Even at that time, utility DSM cost-effectiveness overall was declining and the impact of energy efficiency codes and standards was becoming more widely recognized. As a result, FPL proposed a reduction in the 2009 docket from its set-in-2004 DSM goals of approximately 88 MW/year down to 66 MW/year.

Thus the eventual decision to instruct FPL to continue to implement DSM at an average level of 120 MW/year meant that the 120 MW/year DSM implementation level was already not cost-effective in 2009. Since that time, DSM cost-effectiveness has further declined and the impact of energy efficiency codes and standards has increased. This means that DSM implementation at a 120 MW/year level is even more non-cost-effective and less supportable today than it was in 2009.

Q. What is your reaction to the perceived-dramatic decrease of DSM if FPL's proposed goals are adopted by the FPSC?

A. If FPL's proposed goals are adopted by the FPSC, then the decrease in goals from 120 MW/year to 34 MW/year will appear to be dramatic and may be deemed by some as questionable. I have two reactions to that.

First, as discussed in direct testimony, the FPL system is in a very desirable situation for FPL's customers in regard to fuel efficiency, low emissions, and low electric rates. With the approval of the FPSC, FPL was able to accomplish this by adhering to sound IRP principles and basing its decisions on rigorous IRP analyses. FPL's proposed goals are based on the utilization of these same sound IRP principles and analyses. Consequently, it should be made clear that FPL's proposed goals are based on a proven and logical approach that has shown to deliver very desirable results for FPL's customers.

Second, it is important to remember – with perfect 20-20 hindsight from a resource planning perspective – that the proposed decrease from 120 MW/year to 34 MW/year was not supposed to have happened in that manner. Recall that in 2004 FPL's goals were set at 88 MW/year. By 2009 it was clear to FPL that DSM cost-effectiveness was steadily declining and that energy efficiency codes and standards were delivering significant amounts of energy efficiency that could, therefore, no longer be delivered by utility DSM. Based on these facts, FPL proposed lowering its goals in 2009 from 88 MW/year to 66 MW/year. Both trends of declining cost-effectiveness of DSM and increasing energy efficiency from codes and standards have continued since 2009. As a result, FPL is now proposing that its DSM goals be lowered to 34 MW/year.

Thus, from a resource planner's perfect 20-20 hindsight view, what "should" have happened was a logical and step-wise decrease in DSM goal levels from 88 MW/year in 2004, to 66 MW/year in 2009, to the proposed 34 MW/year level in 2014. This decrease would have been consistent with trends of declining DSM cost-effectiveness and increasing impacts from energy efficiency codes and standards over that time period.

Q. **What is your reaction to the implications by the intervenor witnesses that FPL, and the state of Florida, have "outdated" views and are "not following [so called] leading states and utilities"?**

A. If someone wants to describe adhering to sound IRP principles and analyses in how a utility plans to meet its system needs as an "outdated" method, so be it. In my opinion such a statement simply reveals a lack of understanding regardiug how traditionally regulated utility systems operate and should be planned for. The IRP approach is the best way to perform such planning.

In regard to the notion of so called "leading" utilities and states, that view is in the eye of the beholder. Taking a lemming-like approach and following someone else to avoid criticism is behavior that should have been left behind when one ends their high school days. Doing the correct thing, regardless of any name calling or criticism that may ensue, is the very definition of what being a "leader" means. FPL is doing the correct thing for all of its customers by utilizing IRP principles and analyses to determine its proposed DSM goals. Thus I view FPL as a leader in how DSM analyses should be conducted. I hope that the 2014 docket decision will be a "leader" result, not a "lemming" result.

Q. In summary, what would be the best decision in this docket for all of FPL's customers?

A. FPL's proposed goals are based on sound IRP principles and analyses. Therefore, I believe that the best decision for all of FPL's customers is to adopt FPL's proposed goals.

Q. Does this conclude your rebuttal testimony?

A. Yes.

Benefits (Only) Calculation Comparison: Minnesota VOS vs. Florida Screening Tests

	(1)	(2)	(3)	(4)	(5)
	Benefits (Only) Categories *	**Projected Benefits (Only) Categories Included in Minnesota VOS Calculation?**	**Projected Benefits (Only) Categories Included in Florida RIM & TRC Screening Tests?**	**Benefits (Only) Category Values as Calculated for FPL's Residential PV Pilot Program: Minnesota VOS Perspective (CPVRR, $000) *****	**Benefits (Only) Category Values as Calculated for FPL's Residential PV Pilot Program: Florida Screening Tests Perspective (CPVRR, $000) *****
(1)	Avoided Generation Capacity Cost & Avoided Reserve Capacity Cost *	Yes	Yes	12,322	12,322
(2)	Avoided Plant O&M	Yes	Yes	9,819	9,819
(3)	Avoided Transmission Capacity Cost	Yes	Yes	2,439	2,439
(4)	Avoided Distribution Capacity Cost	Yes	Yes	325	325
(5)	Avoided Fuel Cost	Yes	Yes	30,937	30,937
(6)	Avoided Environmental Cost **	Yes	Yes	14	14
(7)	Fuel Cost Savings from Avoiding Generator	No	Yes	0	50,286
(8)	System Fuel Cost Penalty from Avoiding Generator	No	Yes	0	(56,246)
(9)	Emission Cost Savings from Avoiding Generator	No	Yes	0	21
(10)	System Emission Cost Penalty from Avoiding Generator	No	Yes	0	(29)

	(4)	(5)
Total Benefits (Only) Calculation =	55,856	49,888
Overstatement of Benefits (Only) in Minn. VOS Calculation =	5,968	---
% Overstatement of Benefits (Only) in Minn. VOS Calculation =	12%	---

* The benefit (only) categories listed above include all of those identified for the Minnesota VOS calculation, plus two fuel-related values and two environmental-related values, which FPL's DSM preliminary screening tests do account for. These four categories <u>should</u> be accounted for in any calculation of DSM benefits in which DSM is assumed to avoid or defer new generation additions. In this way, the complete set of fuel and environmental system impacts from DSM can be accounted for.

** The Minnesota VOS calculation addresses environmental impacts through externalities. The Florida screening tests typically address environmental impacts through projected costs of environmental compliance.

*** The values shown in Columns (4) and (5) are taken directly from the preliminary economic screening analysis of FPL's Residential PV Pilot program that was performed for this docket. These values are <u>benefit (only)</u> values. No program costs are accounted for in these values, therefore these value do <u>not</u> represent net benefits.

Incorrect and/or Misleading Statements Made in the Testimonies of Witnesses Woolf and Mims

	Witness	Starting Page/Line	Incorrect and/or Misleading Testimony Statement	Correct Information
1	Woolf	4/18	*"These proposed DSM goals are not low because the DSM opportunities...are not cost-effective - as the Utilities claims"* **(Incorrect)**	Compared to the 2009 DSM goals setting, DSM is significantly less cost-effective. As a result, more DSM measures now fail the screening and lower incentives levels remain for measures that still survive the screening. In 2009, using essentially the same cost-effectiveness screening approach as is used in 2014, the Achievable Potential was 949 MW (RIM) and 1,153 MW (TRC). In 2014, lower DSM cost-effectiveness has reduced the Achievable Potential by approximately 50%: 504 MW (RIM) and 577 MW (TRC). (Both sets of values use then current/current CO2 compliance costs.)
2	Woolf	5/1	" [These proposed DSM goals are not low because] *new building codes and appliance standards are going to eliminate DSM opportunities - as the Utilities claim."* **(Incorrect)**	Compared to the 2009 DSM goals-setting, significantly more energy efficiency is now projected to be delivered by energy efficiency codes and standards over the 10-year goals setting period: 1,823 MW (currently) compared to 1,255 MW (in 2009). This increase of approximately 50% more efficiency from codes and standards eliminates all utility DSM program technical and achievable potential for measures now addressed by these codes and standards.
3	Woolf	6/18	*"FPL's resource planning understates DSM capacity (i.e., MW) benefits by freezing in place several new generation options, including new combustion turbines and the Turkey Point Units 6 & 7."* **(Misleading and Incorrect)**	The only generation without the potential for avoidance/deferral by DSM is the partial replacement of the projected loss of 1,260 MW of GT capacity with 1,055 MW of new CT capacity. This partial replacement is necessary to ensure operational fast start capability in the Southeast Florida region. The 255 MW difference represents increased resource needs beginning in 2019 that DSM could compete for. All other resource needs through 2025, including those projected to be met by Turkey Point 6 & 7, were examined to see if sufficient DSM Achievable Potential existed to meet those needs. For 2022 & 2023, there insufficient DSM Achievable Potential to meet those resource needs.
4	Woolf	6/23	*"FPL's resource planning understates DSM energy (i.e., MWh) benefits by assuming that DSM measures can only be installed for meeting reliability needs."* **(Incorrect)**	FPL fully analyzed two resource plans, RIM 526 MW and TRC 576 MW, in which 100% of the projected DSM Achievable Potential was incorporated without any consideration for meeting reliability needs. In addition, the energy (MWh) related benefits, and costs, of all DSM assumed in all four "With DSM" resource plans was fully accounted for in FPL's analyses.

Incorrect and/or Misleading Statements Made in the Testimonies of Witnesses Woolf and Mims

	Witness	Starting Page/Line	Incorrect and/or Misleading Testimony Statement	Correct Information
5	Woolf	22/8	*"In economic terms, these existing costs* [referring to unrecovered revenue requirements or "lost revenues"] *are called sunk costs. Sunk costs should not be used to assess future resource investments because they are incurred regardless of whether the future project is undertaken. Application of the RIM test is a violation of this important micro-economic principle."* **(Incorrect)**	The sunk cost principle states that sunk costs are appropriately excluded when the comparison is of "going forward" costs of project A vs project B. However, the Rate Impact Test is not a strict evaluation of going forward costs. It is an evaluation of rate impacts. These costs will be/have been paid for by the utility and will be recovered from the utility's customers whether project A or B is selected. Therefore, it is entirely appropriate to determine how the recovery of those costs with either project will affect electric rates which is what the RIM test determines.
6	Woolf	24/26	*"FPL states that it would have to incur 'an additional cost of approximately $296,000,000 in 2015, or of approximately $630,000,000 in 2014' to raise rates enough to cover the TRC 337 MW plan relative to the RIM 337 MW plan....This is simply not true. The recovery of lost revenues does not result in 'additional' costs to the utility or to customers."* **(Incorrect and misleading)**	The $630 million value is in reference to the year 2024, not 2014. FPL did not state that lost revenues would result in an additional cost of $296 million or $630 million. Those cost values were used to simply show the magnitude of the differences in the system average levelized electric rates between the RIM 337 MW and TRC 337 MW resource plans; i.e. the difference in these levelized electric rates is equivalent to incurring an additional cost of either $296 million in 2015, or $630 million in 2024, in the RIM 337 MW plan to increase its levelized rate to the higher levelized rate of the TRC 337 MW plan.
7	Woolf	25/3	*"...the RIM test does not provide the specific information that utilities and regulators need to assess the actual rate and bill impacts of DSM programs."* **(Misleading)**	Neither the RIM nor TRC preliminary screening test provide complete information regarding projected rate and cost impacts. Instead, the two preliminary screening tests are designed to indicate in which direction (up or down) rates and/or costs are projected to likely go when compared with an equivalent size Supply option. Complete, and therefore more accurate, projections of rate and cost impacts are derived only with system analyses which was accomplished with FPL's IRP analyses conducted for this docket.
8	Woolf	26/5	*"Between rate cases, <u>DSM will not increase rates</u> because the Utilities' rates will not be adjusted to collect lost revenues of any kind....For this reason alone, the RIM test results provided by the Utilities are simply wrong - they significantly overstate the extent to which the Florida DSM programs might increase rates."* **(Incorrect and misleading)**	Lowering the number of GWh over which costs addressed in numerous clauses (capacity clause, environmental clause, etc.) are recovered results in higher cents/kWh charges for each of these clauses, thus raising electric rates for all customers. In addition, the RIM screening test does not attempt to project how much electric rates will increase just as neither the RIM nor TRC screening tests attempt to project how much costs may change. System analyses, not screening tests, provide these projections. Furthermore, the statement ignores the impact of 'regulatory lag' that is addressed in FPL witness Deason's rebuttal testimony.

Incorrect and/or Misleading Statements Made in the Testimonies of Witnesses Woolf and Mims

	Witness	Starting Page/Line	Incorrect and/or Misleading Testimony Statement	Correct Information
9	Woolf	34/12	*"Do you agree with FPL's and DEF's conclusion that the cost of complying with GHG regulations will have little impact on their efficiency opportunities? No. This conclusion is counter-intuitive...."* (Misleading)	Resource planning analyses often give correct results which may be counter-intuitive to individuals who are not experienced in actually performing such analyses. These individuals often overlook the fact that DSM has 3 separate impacts on system fuel and emissions. Two of these are system benefits and one is a system cost. The net effect on a DSM measure will vary by a number of factors: DSM measure, projected GHG cost values, etc.
10	Woolf	34/17	*"...FPL's...resource screening eliminated the majority of DSM measures before CO2 costs were even considered in the sensitivity analyses."* (Incorrect)	The w/CO2 sensitivity analyses analyzed all 850 DSM measures and started by first calculating all of the benefits, including CO2 benefits (and costs), accounted for in both preliminary screening tests. Only then did the 4-step preliminary screening process that examines DSM costs versus these benefits begin.
11	Woolf	35/3	*"...properly accounting for the value of avoiding GHG compliance costs would decrease the estimated rate impacts of DSM."* (Incorrect)	FPL's analyses do not support this statement and the witness has not offered any analyses of his own to back up this claim. In addition, the addition of GHG compliance costs to any utility system will automatically increase the total costs and electric rates of virtually all current utilities.
12	Woolf	41/25	*"FPL...perform two separate economic screening analyses in this process - first, a preliminary screen to determine the economically viable DSM measures, and second, a screen based on resource planning models...This results in 'double screening' which eliminates a large portion of the DSM measures before they are compared to supply-side resources with the resource planning models."* (Incorrect)	FPL's process conducted only one screening: the preliminary economic screening. In the system analysis, two resource plans, RIM 526 MW and TRC 576 MW, which assumed the full Achievable Potential DSM values, were fully evaluated. (Two other resource plans, RIM 337 MW and TRC 337 MW, were based on a competition between DSM measures to select the most economical DSM measures based on each screening test's perspective to provide 337 MW.)

Incorrect and/or Misleading Statements Made in the Testimonies of Witnesses Woolf and Mims

	Witness	Starting Page/Line	Incorrect and/or Misleading Testimony Statement	Correct Information
13	Woolf	52/13	*"FPL...set their DSM goals by including only those DSM measures that will not increase electricity rates."* **(Incorrect)**	Compared to the Supply Only resource plan, FPL's proposed DSM goals will raise electric rates in each year of the 10-year goals-setting period before then lowering electric rates. However, this "portfolio" of DSM measures results in lower electric rates than any of the other DSM portfolios. In addition, FPL's proposed DSM goals are projected to result in the lowest levelized system average electric rates of any of the 5 resource plans.
14	Woolf	53/7	*"Using rate impacts as the primary criterion to select DSM programs is inconsistent with the treatment of supply-side resources."* **(Incorrect)**	FPL selects supply-side resources that are projected to have the lowest system average rates. Because the number of GWh over which system costs are recovered does not change when choosing between supply options, the selection of the supply option with the lowest cost is also the supply option with the lowest electric rate impact, and vice versa.
15	Woolf	54/7	Discussing levelized system average rate calculations: *"Note that these rate impacts are based on lost revenue estimates that are grossly overstated as described in Section 3."* **(Incorrect)**	The levelized system average rate calculations presented in Exhibits SRS-12 and SRS-13 do not utilize any projection of "lost revenues" as shown by the column headings. The calculations are based simply on a projection of system net costs divided by a projection of system net GWh.
16	Woolf	58/10	*"DSM programs could potentially reduce the size of this* [combined cycle] *unit, thereby saving significant capacity costs."* **(Misleading)**	A smaller combined cycle would have lower capacity costs, but would result in lower fuel savings and emission savings than the 1,269 MW combined cycle unit utilized in the analyses. By pointing only to the capacity costs, Sierra Club witness Woolf is understating the energy (MWh) benefits of the larger combined cycle unit.

Incorrect and/or Misleading Statements Made in the Testimonies of Witnesses Woolf and Mims

	Witness	Starting Page/Line	Incorrect and/or Misleading Testimony Statement	Correct Information
17	Woolf	58/16	*"FPL does not use its optimization model to identify the best mix of supply-side and demand-side capacity resources."* **(Incorrect)**	FPL has several optimization tools and models. FPL appropriately used several of these optimization tools in developing the Supply Only resource plan and in developing the DSM portfolios incorporated in the RIM 337 MW resource plan and the TRC 337 MW resource plan. The other two "with DSM" resource plans, RIM 526 MW and TRC 576 MW, did not require additional optimization over the 10-year goals-setting period.
18	Woolf	59/9	*"FPL's DSM screening practices...conflicts with FPL's screening practices for supply-side resources."* **(Incorrect)**	FPL's screening practices for supply-side resources are not discussed or presented in FPL's filing. However, FPL evaluates or screens supply-side resources to determine the option projected to result in the lowest average system rates, which is entirely consistent with FPL's DSM screening process. Because the number of GWh over which system costs are recovered does not change when choosing between supply options, the selection of the supply option with the lowest cost is also the supply option with the lowest electric rate impact, and vice versa.
19	Woolf	59/21	*"FPL...has essentially ignored DMS's* [sic] *energy benefits, and has thus dramatically understated the economic and achievable DSM potential."* **(Incorrect)**	FPL fully accounted for all energy (kWh) benefits of each individual DSM measure in the preliminary economic screening and fully accounted for all energy (MWh) benefits of each DSM portfolio in the system economic and non-economic analyses.
20	Woolf	63/18	*"DSM offers many advantages, with the primary advantage being that DSM reduces utility system costs and thereby reduces customer bills. The one (and only) countervailing consideration is that DSM can potentially increase electricity rates."* **(Incorrect and misleading)**	DSM does not result in reduced customer bills for all customers unless the DSM selection is designed to reduce electric rates. Lower electric rates lower all customers' bills. If DSM selection increases electric rates, then under such DSM non-participants will see higher bills because electric rates have increased. In addition, another consideration for high levels of DSM are system reliability concerns. This has led FPL to institute a 3rd reliability criterion, the generation-only reserve margin (GRM).

Incorrect and/or Misleading Statements Made in the Testimonies of Witnesses Woolf and Mims

	Witness	Starting Page/Line	Incorrect and/or Misleading Testimony Statement	Correct Information
21	Woolf	68/8	*"...note that the DSM programs can help reduce the reserve margin requirements (in MW)..."* (Misleading or incorrect)	DSM does not reduce a utility's reserve margin criterion. For example, a 20% reserve margin criterion does not change from 20% to 19% because DSM is added to the system. Moreover, a high projected level of DSM can lead to the need for a new reliability criterion such as FPL's GRM criterion. It does take less MW of DSM than generation MW to <u>meet</u> the reserve margin criterion. FPL's IRP analyses fully accounts for this in both the preliminary economic screening and system analyses.
22	Woolf	76/9	*"It is also remarkable that FPL is proposing to reduce its DSM goals by so much more than the reductions proposed by the other companies. There is no reason why there should be such striking differences between the goal reductions across the four utilities."* (Incorrect)	Although the DSM measures considered by two different utility companies may be identical, there will always be differences between the two utilities in regard to the economics of their individual systems. In regard to FPL, FPL's generating system has become significantly more energy efficient and has lowered energy costs due to modernization efforts and nuclear capacity uprates. This means that, all else equal, DSM will be less cost-effective on FPL's system.
23	Woolf	85/14	*"...there is a big difference in the* [energy-to-capacity] *ratios across the four Utilities...There is no good reason for such differences across utilities within the same state."* (Incorrect)	No two utilities are identical. They will have different generation efficiencies, different marginal costs, different resource needs, etc. Consequently, the amount of DSM, and the type of DSM, that is projected to be cost-effective on each utility system will vary. This variation can be significant. Whether the two utilities being compared are in the same state or not is irrelevant.
24	Mims	6/25	*"...FEECA mandates that utilities use the total resource cost ("TRC")..."* (Incorrect)	Nowhere in the FEECA statutes is there a direction that specifically names the TRC test as the sole test for Florida to use. The statutes do not name a specific test, merely attributes of the testing. Florida utilities' interpretation of the statutes differs from this witness' interpretation.

Incorrect and/or Misleading Statements Made in the Testimonies of Witnesses Woolf and Mims

	Witness	Starting Page/Line	Incorrect and/or Misleading Testimony Statement	Correct Information
25	Mims	19/14	*"The Utilities do provide the residential bill impacts of a customer consuming 1200 kWh a month...the analysis is flawed because the Utilities use the same denominator (kWh) consumed for the TRC and RIM portfolios even though the TRC portfolio would result in less consumption."* **(Incorrect)**	The analysis in question focuses on what a customer whose monthly usage remains at 1,200 kWh regardless of whether a RIM or TRC portfolio has been used; i.e., the customer is a non-participant in either DSM portfolio. Such customers will receive a higher bill with the TRC portfolio than with the RIM portfolio because the TRC portfolio will result in higher electric rates.
26	Mims	32/4	*"Administrative costs should not be included in goal setting costs."* **(Incorrect)**	"Goal setting costs" encompass both preliminary economic screening analyses and system analyses. Florida requires administrative costs be included in both the RIM and TRC preliminary screening tests. (Even Sierra Club witness Woolf agrees that administrative costs should be included in these preliminary screening tests.) In system analyses of resource plans, omission of DSM administrative costs would result in incomplete cost information being used which would result in incorrect analysis results. Therefore, DSM administrative costs must be included to ensure a complete cost picture.
27	Mims	32/18	*"...the Utilities screened measures out of the energy efficiency potential based on cost-effectiveness -- inclusive of administration costs -- but did not take into account corresponding program benefits."* **(Incorrect)**	There are no "corresponding" benefits directly tied to administrative costs; there are only benefits associated with the kW and kWh reduction impacts of the DSM measure itself. FPL fully accounted for those benefits in its preliminary economic screening of DSM measures.
28	Mims	33/8	*"Utilities use of maximum incentive costs creates inflated total costs in benefit-cost tests."* **(Incorrect)**	FPL did not use maximum incentive costs in its preliminary screening analyses. The maximum incentive costs were developed only after all of these screening steps were completed.

Incorrect and/or Misleading Statements Made in the Testimonies of Witnesses Woolf and Mims

	Witness	Starting Page/Line	Incorrect and/or Misleading Testimony Statement	Correct Information
29	Mims	52/23	*"What little optimization analysis FPL did perform did not examine any additional energy efficiency after 2014."* **(Incorrect)**	FPL performed separate optimization analyses of both the RIM 337 MW DSM portfolio and the TRC 337 MW DSM portfolio. Both optimization analyses addressed 337 MW of additional energy efficiency and load management DSM measures for all of the 10 years in the goals-setting period, the years 2015 through 2024.
30	Mims	54/2	*"The limited reports FPL provided suggests* [sic]*: (1) FPL either limited the resources available for Strategist to choose such that a combined cycle unit in 2019 was always chosen or; (2) FPL forced Strategist to choose the combined cycle unit."* **(Incorrect)**	FPL provided all of the Strategist output reports that it relied upon in its analyses conducted for this docket. The Strategist model was used solely to examine only generation resources capable of meeting a 2019 resource need. The reports clearly show that all feasible generating options for this near-term resource need - combustion turbines, combined cycle unit, and PPAs - were evaluated. The results were consistent with results from recent years with the combined cycle emerging as the best choice. FPL did not force Strategist to choose a combined cycle.
31	Mims	54/7	*"...as a result of the few Strategist report*[sic] *FPL gave SACE, it does not appear that FPL can demonstrate that its choice of this unit for avoided cost purposes was the best choice for the system and customers."* **(Incorrect and misleading)**	The reports FPL provided clearly show that an analysis of CC, CT, and PPA options resulted in the CC being the economic choice for FPL's customers. Furthermore, if the CC unit chosen was not the economic choice, then a substitution of a more economic choice would then have resulted in even fewer DSM measures surviving the preliminary economic screening.
32	Mims	54/12	*"...FPL witness Sim states that DSM resources cannot meet projected resource needs then a supply option is added first and DSM resources are reduced to exactly meet FPL's need."* **(Incorrect or misleading)**	FPL fully analyzed two resource plans, RIM 526 MW and TRC 576 MW, in which 100% of the projected DSM Achievable Potential was incorporated without any consideration for meeting reliability needs. (The portion of the text SACE witness Mims is referring to clearly refers to the development of two other resource plans that were also analyzed in which DSM portfolios were optimized to meet FPL's specific resource needs.)

Incorrect and/or Misleading Statements Made in the Testimonies of Witnesses Woolf and Mims

	Witness	Starting Page/Line	Incorrect and/or Misleading Testimony Statement	Correct Information
33	Mims	55/7	*"FPL could build a combined cycle plant with total output less than 1,269 MW. Many other plants have been built at lower output, such as Duke Energy Carolina's recently approved Lee units."* **(Misleading)**	Although combined cycle plants of different sizes can be built, utilities select the combined cycle size and other unit characteristics that are best economically for their specific utility system. That is precisely why different utilities select different size combined cycle units. At the time assumptions were frozen for the DSM goals analyses, a 1,269 MW combined cycle unit was the most economical choice for combined cycle additions.
34	Mims	60/2	*"FPL concluded that a GRM was necessary for two reasons. First, because it reduces LOLP. LOLP is thought to balance reliability and economics, so the point of the GRM should not be to minimize LOLP."* **(Incorrect)**	LOLP is solely a reliability criterion. Once the LOLP reliability criterion is set, it is not used to "balance reliability and economics". It is used as a measure of system reliability. The lower the projected system LOLP, the more reliable the utility system is from a probabilistic perspective.
35	Mims	60/6	*"Second, FPL concluded that the GRM was beneficial because it increased reserves. The simple fact that more reserves are available at peak times does not mean that those reserves are needed or appropriately balance economics and reliability."* **(Incorrect)**	FPL did not conclude that a GRM reliability criterion was needed because it increased reserves, but because it increased operational reserves. These are two distinct considerations. FPL's analyses showed that additional operational reserves at FPL's system peak hour, which would be achieved by ensuring a minimal level of generation reserves, would be beneficial for FPL's customers. In regard to economics, the RIM 337 MW resource plan that meets the GRM criterion is projected to result in the lowest electric rates for all of FPL's customers of any of the four "With DSM" resource plans. Thus the RIM 337 MW resource plan is projected to result in higher levels of system reliability and the lowest electric rates. This is a desirable combination for FPL's customers.
36	Mims	60/11	*"Finally, the fact that FPL chooses not to apply the GRM until 2019 suggests to me that the standard is arbitrary. A planning reserve margin can change from year to year certainly, but I'm not aware of any reliability organization that simply chose to delay implementation of a reserve margin requirement until five years down the road. FPL has given no indication as to why reliability should not be compromised currently without the GRM but is necessary starting in 2019.* **(Incorrect)**	FPL chose to begin meeting the GRM in 2019 for two reasons. As clearly shown in Exhibit SRS-10, all five resource plans are projected to already be at or above a 10% GRM level each year from 2015 through 2018. Thus 2019 is the first year a GRM criterion is needed to ensure that a 10% GRM minimum level is maintained. In addition, FPL is following the approach used in 1999 when the total reserve margin criterion for the investor-owned utilities was changed from 15% to 20%. The 1999 decision called for the 20% total reserve margins to be achieved in five years (in 2004).

Incorrect and/or Misleading Statements Made in the Testimonies of Witnesses Woolf and Mims

	Witness	Starting Page/Line	Incorrect and/or Misleading Testimony Statement	Correct Information
37	Mims	60/18	*"FPL determined that its RIM 526 MW and TRC 576 MW sensitivity case plans are were* [sic] *non-conforming, and thus not eligible under FPL's criteria to continue to be evaluated in the goal setting proceeding. Thus the GRM could have the effect of unnecessarily limiting FPL's DSM efforts."* **(Incorrect)**	FPL fully evaluated both the RIM 526 MW and TRC 576 MW resource plans in its system analyses exactly as it evaluated the Supply Only, RIM 337 MW, and TRC 337 MW plan. This fact is discussed on many pages of FPL witness Sim's testimony and results of those analyses are detailed in the following exhibits to his testimony: Exhibits SRS-11, SRS-14, SRS-15, and SRS-16.

**A Look at a Typical Screening Curve Analysis:
A Generation Option**

	Correction	Levelized Cost of Electricity (cents/kWh)
Typical View w/o Corrections	None	9.5
w/ Only 1 Correction	Accounts for System Fuel Cost & Environmental Compliance Cost Net Savings	2.3

Screening Curve Results for a Natural Gas Combined Cycle Unit: Typical View w/o Corrections

(1)	(2)	(3)
	Discount Factor:	0.0754
	Base (MW)	1,269
	Heat Rate	6.334
	Fixed O&M ($/KW-yr)	0.00
	Capital Replace ($/kW-Yr)	0.00
	VOM ($/MWh)	0.00
	Gas Transportation	0.00
	in-service year	2019
	book life	30

Capacity Factor (%)	Levelized $/KW	Levelized $/MWh
0	226	0
5	255	581
10	283	324
15	- 312	238
20	341	195
25	370	169
30	399	152
35	428	140
40	457	131
45	486	123
50	515	118
55	544	113
60	573	109
65	602	106
70	631	103
75	660	100
80	689	98
85	718	96
90	747	95
95	776	93
100	805	92

(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	Fixed Costs					Variable Costs						DSM Costs		
Year	In-Service Year	Capital $000	Fixed O&M $000	Capital Replacement $000	Firm Gas Transportation $000	NO_x Emission $000	SO_2 Emission $000	CO_2 Emission $000	Hg Emission $000	Fuel Costs $000	Variable O&M $000	Admin. & Incentive Costs $000	Unrecovered Revenue Requirements $000	Total $000
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	1	125,487	8,243	4,137	0	198	13	0	0	422,433	7,060	0	0	567,571
2020	2	209,113	9,377	4,532	0	203	14	0	0	433,309	7,237	0	0	663,784
2021	3	201,322	8,426	21,463	0	208	14	0	0	444,185	7,417	0	0	683,035
2022	4	193,835	8,662	20,675	29,245	213	14	0	0	451,435	7,603	0	0	711,682
2023	5	186,626	11,815	21,156	43,868	218	15	35,633	0	465,937	7,793	0	0	773,061
2024	6	179,676	9,140	25,562	43,868	224	15	40,964	0	487,689	7,988	0	0	795,125
2025	7	172,958	9,396	27,910	43,868	229	15	46,903	0	516,692	8,187	0	0	826,158
2026	8	166,443	10,708	27,476	49,332	235	16	53,486	0	538,444	8,392	0	0	854,533
2027	9	160,037	9,929	26,809	52,065	241	16	60,752	0	560,196	8,602	0	0	878,647
2028	10	153,648	10,208	31,945	129,036	247	16	68,805	0	581,949	8,817	0	0	984,670
2029	11	147,259	18,672	38,780	167,522	253	17	78,562	0	610,951	9,037	0	0	1,071,054
2030	12	140,872	10,788	41,729	167,522	260	17	89,519	0	632,704	9,263	0	0	1,092,674
2031	13	134,485	11,107	73,132	167,522	266	18	101,272	0	647,205	9,495	0	0	1,144,501
2032	14	128,098	12,615	72,895	167,522	273	18	114,217	0	671,651	9,732	0	0	1,177,021
2033	15	121,713	11,739	74,698	167,522	280	19	128,423	0	697,022	9,976	0	0	1,211,391
2034	16	115,385	12,068	83,250	167,522	287	19	143,963	0	723,355	10,225	0	0	1,256,074
2035	17	109,175	16,321	85,197	167,522	294	20	160,910	0	750,686	10,481	0	0	1,300,605
2036	18	103,024	12,736	74,933	167,522	301	20	179,345	0	779,052	10,743	0	0	1,327,675
2037	19	96,874	13,094	72,907	167,522	309	21	199,348	0	808,493	11,011	0	0	1,369,577
2038	20	90,725	14,869	79,213	167,522	316	21	221,005	0	839,048	11,286	0	0	1,424,004
2039	21	85,149	13,860	77,151	167,522	324	22	244,405	0	870,761	11,569	0	0	1,470,762
2040	22	80,718	14,249	79,152	167,522	332	22	269,643	0	903,675	11,858	0	0	1,527,171
2041	23	76,861	25,627	76,773	167,522	341	23	296,814	0	937,837	12,154	0	0	1,593,952
2042	24	73,005	15,040	73,167	167,522	349	23	326,022	0	973,292	12,458	0	0	1,640,877
2043	25	69,149	15,462	67,617	167,522	358	24	357,371	0	1,010,091	12,770	0	0	1,700,364
2044	26	65,699	17,534	66,994	167,522	367	24	390,972	0	1,048,284	13,089	0	0	1,770,485
2045	27	62,540	16,344	70,401	167,522	376	25	426,941	0	1,087,923	13,416	0	0	1,845,488
2046	28	59,382	16,804	53,908	167,522	385	26	465,398	0	1,129,064	13,751	0	0	1,906,240
2047	29	56,224	17,277	49,480	167,522	395	26	506,467	0	1,171,764	14,095	0	0	1,983,250
2048	30	53,068	17,709	44,282	167,522	405	27	550,280	0	1,216,081	14,448	0	0	2,063,819
2049	31	23,915	18,151	35,856	167,522	415	28	596,972	0	1,262,077	14,809	0	0	2,119,744
NPV 2014		1,290,124	103,415	350,381	796,096	2,272	151	940,046	0	5,503,185	81,084	0	0	9,066,755
NPV i/s year		1,855,588	148,742	503,954	1,145,027	3,268	218	1,352,070	0	7,915,243	116,623	0	0	13,040,734
Levelized $/KW i/s year		115	9	31	71	0	0	83	0	489	7	0	0	805

(1)	(2)	(3)
	Discount Factor:	0.0754
	Base (MW)	1,269
	Heat Rate	6,334
	Fixed O&M ($/KW-yr)	0.00
	Capital Replace ($/kW-Yr)	0.00
	VOM ($/MWh)	0.00
	Gas Transportation	0.00
	in-service year	2019
	book life	30

Capacity Factor (%)	Levelized $/KW	Levelized $/MWh
0	226	0
5	223	509
10	221	252
15	218	166
20	216	123
25	213	97
30	211	80
35	208	68
40	206	59
45	203	52
50	201	46
55	198	41
60	196	37
65	193	34
70	191	31
75	188	29
80	186	26
85	183	25
90	181	23
95	178	21
100	176	20

Screening Curve Results for a Natural Gas Combined Cycle Unit: w/ Only 1 Correction Accounted for

(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	Fixed Costs					Variable Costs						DSM Costs		
Year	In-Service Year	Capital $000	Fixed O&M $000	Capital Replacement $000	Firm Gas Transportation $000	NO_x Emission $000	SO_2 Emission $000	CO_2 Emission $000	Hg Emission $000	Fuel Costs $000	Variable O&M $000	Admin. & Incentive Costs $000	Unrecovered Revenue Requirements $000	Total $000
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	1	125,487	8,243	4,137	0	(20)	(1)	0	0	(42,243)	7,060	0	0	102,663
2020	2	209,113	9,377	4,532	0	(20)	(1)	0	0	(43,331)	7,237	0	0	186,906
2021	3	201,322	8,426	21,463	0	(21)	(1)	0	0	(44,418)	7,417	0	0	194,188
2022	4	193,835	8,662	20,675	29,245	(21)	(1)	0	0	(45,144)	7,603	0	0	214,853
2023	5	186,626	11,815	21,156	43,868	(22)	(1)	(3,563)	0	(46,594)	7,793	0	0	221,078
2024	6	179,676	9,140	25,562	43,868	(22)	(1)	(4,096)	0	(48,769)	7,988	0	0	213,344
2025	7	172,958	9,396	27,910	43,868	(23)	(2)	(4,690)	0	(51,669)	8,187	0	0	205,935
2026	8	166,443	10,708	27,476	49,332	(24)	(2)	(5,349)	0	(53,844)	8,392	0	0	203,134
2027	9	160,037	9,929	26,809	52,065	(24)	(2)	(6,075)	0	(56,020)	8,602	0	0	195,321
2028	10	153,648	10,208	31,945	129,036	(25)	(2)	(6,880)	0	(58,195)	8,817	0	0	268,551
2029	11	147,259	18,672	38,780	167,522	(25)	(2)	(7,856)	0	(61,095)	9,037	0	0	312,292
2030	12	140,872	10,788	41,729	167,522	(26)	(2)	(8,952)	0	(63,270)	9,263	0	0	297,924
2031	13	134,485	11,107	73,132	167,522	(27)	(2)	(10,127)	0	(64,720)	9,495	0	0	320,864
2032	14	128,098	12,615	72,895	167,522	(27)	(2)	(11,422)	0	(67,165)	9,732	0	0	312,247
2033	15	121,713	11,739	74,698	167,522	(28)	(2)	(12,842)	0	(69,702)	9,976	0	0	303,072
2034	16	115,385	12,068	83,250	167,522	(29)	(2)	(14,396)	0	(72,336)	10,225	0	0	301,687
2035	17	109,175	16,321	85,197	167,522	(29)	(2)	(16,091)	0	(75,069)	10,481	0	0	297,504
2036	18	103,024	12,736	74,933	167,522	(30)	(2)	(17,934)	0	(77,905)	10,743	0	0	273,085
2037	19	96,874	13,094	72,907	167,522	(31)	(2)	(19,935)	0	(80,849)	11,011	0	0	260,591
2038	20	90,725	14,869	79,213	167,522	(32)	(2)	(22,100)	0	(83,905)	11,286	0	0	257,575
2039	21	85,149	13,860	77,151	167,522	(32)	(2)	(24,441)	0	(87,076)	11,569	0	0	243,698
2040	22	80,718	14,249	79,152	167,522	(33)	(2)	(26,964)	0	(90,368)	11,858	0	0	236,132
2041	23	76,861	25,627	76,773	167,522	(34)	(2)	(29,681)	0	(93,784)	12,154	0	0	235,436
2042	24	73,005	15,040	73,167	167,522	(35)	(2)	(32,602)	0	(97,329)	12,458	0	0	211,222
2043	25	69,149	15,462	67,617	167,522	(36)	(2)	(35,737)	0	(101,009)	12,770	0	0	195,735
2044	26	65,699	17,534	66,994	167,522	(37)	(2)	(39,097)	0	(104,828)	13,089	0	0	186,873
2045	27	62,540	16,344	70,401	167,522	(38)	(3)	(42,694)	0	(108,792)	13,416	0	0	178,696
2046	28	59,382	16,804	53,908	167,522	(39)	(3)	(46,540)	0	(112,906)	13,751	0	0	151,880
2047	29	56,224	17,277	49,480	167,522	(40)	(3)	(50,647)	0	(117,176)	14,095	0	0	136,733
2048	30	53,068	17,709	44,282	167,522	(40)	(3)	(55,028)	0	(121,608)	14,448	0	0	120,348
2049	31	23,915	18,151	35,856	167,522	(42)	(3)	(59,697)	0	(126,208)	14,809	0	0	74,304
NPV 2014		1,290,124	103,415	350,381	796,096	(227)	(15)	(94,005)	0	(550,318)	81,084	0	0	1,976,535
NPV i/s year		1,855,588	148,742	503,954	1,145,027	(327)	(22)	(135,207)	0	(791,524)	116,623	0	0	2,842,854
Levelized $/KW i/s year		115	9	31	71	(0)	(0)	(8)	0	(49)	7	0	0	176

A Look at a Typical Screening Curve Analysis:
A DSM Option

Assumptions and Adjustments

Case	Discount Rate	DSM Start Year	Years of Admin. & Incentive Costs Included	Includes Unrecovered Rev. Reqs as DSM Costs?	LCOE (cents/kWh)
Typical View w/o Corrections	5.00%	The year the avoided generator goes in-service	1 year (installation year only)	No	3.5
w/ 1 correction	7.54%	The year the avoided generator goes in-service	1 year (installation year only)	No	3.9
w/ 2 corrections	7.54%	5 years prior to the generator in-service year	1 year (installation year only)	No	4.2
w/ 3 corrections	7.54%	5 years prior to the generator in-service year	4 years (to address 10-year measure life)	No	4.8
w/ 4 corrections	7.54%	5 years prior to the generator in-service year	4 years (to address 10-year measure life)	Yes	17.6

Screening Curve Results for a DSM Program: Typical View w/o Corrections

(1)	(2)	(3)
	Discount Factor:	0.05
	Base (MW)	1.00
	Heat Rate	0
	Fixed O&M ($/KW-yr)	0.00
	Capital Replace ($/kW-Yr)	0.00
	VOM ($/MWh)	0.00
	Gas Transportation	0.00
	in-service year	2019
	book life	10

Capacity Factor (%)	Levelized $/KW	Levelized $/MWh
0	62	0
5	62	141
10	62	70
15	62	47
20	62	35
25	62	28
30	62	23
35	62	20
40	62	18
45	62	16
50	62	14
55	62	13
60	62	12
65	62	11
70	62	10
75	62	9
80	62	9
85	62	8
90	62	8
95	62	7
100	62	7

(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	Fixed Costs					Variable Costs						DSM Costs		
Year	In-Service Year	Capital $000	Fixed O&M $000	Capital Replacement $000	Firm Gas Transportation $000	NO_x Emission $000	SO_2 Emission $000	CO_2 Emission $000	Hg Emission $000	Fuel Costs $000	Variable O&M $000	Admin. & Incentive Costs $000	Unrecovered Revenue Requirements $000	Total $000
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	500	0	500
2019	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	2	0	0	0	0	0	0	0	0	0	0	0	0	0
2021	3	0	0	0	0	0	0	0	0	0	0	0	0	0
2022	4	0	0	0	0	0	0	0	0	0	0	0	0	0
2023	5	0	0	0	0	0	0	0	0	0	0	0	0	0
2024	6	0	0	0	0	0	0	0	0	0	0	0	0	0
2025	7	0	0	0	0	0	0	0	0	0	0	0	0	0
2026	8	0	0	0	0	0	0	0	0	0	0	0	0	0
2027	9	0	0	0	0	0	0	0	0	0	0	0	0	0
2028	10	0	0	0	0	0	0	0	0	0	0	0	0	0
2029	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2030	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2031	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2032	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2033	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2034	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2035	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2036	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2037	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2038	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2039	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2040	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2041	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2042	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2043	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2044	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2045	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2046	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2047	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2048	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2049	0													
	NPV 2014	0	0	0	0	0	0	0	0	0	0	392	0	392
	NPV i/s year	0	0	0	0	0	0	0	0	0	0	500	0	500
	Levelized $/KW i/s year	0	0	0	0	0	0	0	0	0	0	62	0	62

Screening Curve Results for a DSM Program: w/ 1st Correction

Discount Factor	0.0754
Base (MW)	1.00
Heat Rate	0
Fixed O&M ($/KW-yr)	0.00
Capital Replace ($/kW-Yr)	0.00
VOM ($/MWh)	0.00
Gas Transportation	0.00
in-service year	2019
book life	10

(1) Capacity Factor (%)	(2) Levelized $/KW	(3) Levelized $/MWh
0	68	0
5	68	155
10	68	77
15	68	52
20	68	39
25	68	31
30	68	26
35	68	22
40	68	19
45	68	17
50	68	15
55	68	14
60	68	13
65	68	12
70	68	11
75	68	10
80	68	10
85	68	9
90	68	9
95	68	8
100	68	8

(4)	(5)	(6)	(7) Fixed Costs	(8)	(9)	(10) Variable Costs	(11)	(12)	(13)	(14)	(15)	(16) DSM Costs	(17)	(18)
Year	In-Service Year	Capital $000	Fixed O&M $000	Capital Replacement $000	Firm Gas Transportation $000	NO_x Emission $000	SO_2 Emission $000	CO_2 Emission $000	Hg Emission $000	Fuel Costs $000	Variable O&M $000	Admin. & Incentive Costs $000	Unrecovered Revenue Requirements $000	Total $000
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	500	0	500
2019	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	2	0	0	0	0	0	0	0	0	0	0	0	0	0
2021	3	0	0	0	0	0	0	0	0	0	0	0	0	0
2022	4	0	0	0	0	0	0	0	0	0	0	0	0	0
2023	5	0	0	0	0	0	0	0	0	0	0	0	0	0
2024	6	0	0	0	0	0	0	0	0	0	0	0	0	0
2025	7	0	0	0	0	0	0	0	0	0	0	0	0	0
2026	8	0	0	0	0	0	0	0	0	0	0	0	0	0
2027	9	0	0	0	0	0	0	0	0	0	0	0	0	0
2028	10	0	0	0	0	0	0	0	0	0	0	0	0	0
2029	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2030	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2031	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2032	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2033	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2034	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2035	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2036	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2037	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2038	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2039	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2040	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2041	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2042	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2043	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2044	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2045	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2046	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2047	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2048	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2049	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NPV 2014		0	0	0	0	0	0	0	0	0	0	348	0	348
NPV i/s year		0	0	0	0	0	0	0	0	0	0	500	0	500
Levelized $/KW i/s year		0	0	0	0	0	0	0	0	0	0	68	0	68

Screening Curve Results for a DSM Program: w/ 2nd Correction

(1)	(2)	(3)
	Discount Factor	0.0754
	Base (MW)	1.00
	Heat Rate	0
	Fixed O&M ($/KW-yr)	0.00
	Capital Replace ($/kW-Yr)	0.00
	VOM ($/MWh)	0.00
	Gas Transportation	0.00
	in-service year	2015
	book life	10

Capacity Factor (%)	Levelized $/KW	Levelized $/MWh
0	73	0
5	73	167
10	73	83
15	73	56
20	73	42
25	73	33
30	73	28
35	73	24
40	73	21
45	73	19
50	73	17
55	73	15
60	73	14
65	73	13
70	73	12
75	73	11
80	73	10
85	73	10
90	73	9
95	73	9
100	73	8

(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
			Fixed Costs			Variable Costs						DSM Costs		
Year	In-Service Year	Capital $000	Fixed O&M $000	Capital Replacement $000	Firm Gas Transportation $000	NO_x Emission $000	SO_2 Emission $000	CO_2 Emission $000	Hg Emission $000	Fuel Costs $000	Variable O&M $000	Admin. & Incentive Costs $000	Unrecovered Revenue Requirements $000	Total $000
2014	0	0	0	0	0	0	0	0	0	0	0	500	0	500
2015	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	2	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	3	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	4	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	5	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	6	0	0	0	0	0	0	0	0	0	0	0	0	0
2021	7	0	0	0	0	0	0	0	0	0	0	0	0	0
2022	8	0	0	0	0	0	0	0	0	0	0	0	0	0
2023	9	0	0	0	0	0	0	0	0	0	0	0	0	0
2024	10	0	0	0	0	0	0	0	0	0	0	0	0	0
2025	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2026	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2027	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2028	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2029	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2030	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2031	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2032	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2033	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2034	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2035	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2036	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2037	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2038	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2039	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2040	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2041	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2042	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2043	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2044	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2045	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2046	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2047	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2048	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2049	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NPV 2014	0	0	0	0	0	0	0	0	0	0	500	0	500
	NPV i/s year	0	0	0	0	0	0	0	0	0	0	538	0	538
	Levelized $/KW i/s year	0	0	0	0	0	0	0	0	0	0	73	0	73

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A DSM Option
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Screening Curve Results for a DSM Program: w/ 3rd Correction

(1)	(2)	(3)
	Discount Factor:	0.0754
	Base (MW)	1.00
	Heat Rate	0
	Fixed O&M (\$/KW-yr)	0.00
	Capital Replace (\$/kW-Yr)	0.00
	VOM (\$/MWh)	0.00
	Gas Transportation	0.00
	in-service year	2015
	book life	35

Capacity Factor (%)	Levelized \$/KW	Levelized \$/MWh
0	83	0
5	83	190
10	83	95
15	83	63
20	83	48
25	83	38
30	83	32
35	83	27
40	83	24
45	83	21
50	83	19
55	83	17
60	83	16
65	83	15
70	83	14
75	83	13
80	83	12
85	83	11
90	83	11
95	83	10
100	83	10

(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
			Fixed Costs			Variable Costs						DSM Costs		
Year	In-Service Year	Capital \$000	Fixed O&M \$000	Capital Replacement \$000	Firm Gas Transportation \$000	NO_x Emission \$000	SO_2 Emission \$000	CO_2 Emission \$000	Hg Emission \$000	Fuel Costs \$000	Variable O&M \$000	Admin. & Incentive Costs \$000	Unrecovered Revenue Requirements \$000	Total \$000
2014	0	0	0	0	0	0	0	0	0	0	0	500	0	500
2015	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	2	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	3	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	4	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	5	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	6	0	0	0	0	0	0	0	0	0	0	0	0	0
2021	7	0	0	0	0	0	0	0	0	0	0	0	0	0
2022	8	0	0	0	0	0	0	0	0	0	0	0	0	0
2023	9	0	0	0	0	0	0	0	0	0	0	570	0	570
2024	10	0	0	0	0	0	0	0	0	0	0	0	0	0
2025	11	0	0	0	0	0	0	0	0	0	0	0	0	0
2026	12	0	0	0	0	0	0	0	0	0	0	0	0	0
2027	13	0	0	0	0	0	0	0	0	0	0	0	0	0
2028	14	0	0	0	0	0	0	0	0	0	0	0	0	0
2029	15	0	0	0	0	0	0	0	0	0	0	0	0	0
2030	16	0	0	0	0	0	0	0	0	0	0	0	0	0
2031	17	0	0	0	0	0	0	0	0	0	0	0	0	0
2032	18	0	0	0	0	0	0	0	0	0	0	0	0	0
2033	19	0	0	0	0	0	0	0	0	0	0	660	0	660
2034	20	0	0	0	0	0	0	0	0	0	0	0	0	0
2035	21	0	0	0	0	0	0	0	0	0	0	0	0	0
2036	22	0	0	0	0	0	0	0	0	0	0	0	0	0
2037	23	0	0	0	0	0	0	0	0	0	0	0	0	0
2038	24	0	0	0	0	0	0	0	0	0	0	0	0	0
2039	25	0	0	0	0	0	0	0	0	0	0	0	0	0
2040	26	0	0	0	0	0	0	0	0	0	0	0	0	0
2041	27	0	0	0	0	0	0	0	0	0	0	0	0	0
2042	28	0	0	0	0	0	0	0	0	0	0	0	0	0
2043	29	0	0	0	0	0	0	0	0	0	0	775	0	775
2044	30	0	0	0	0	0	0	0	0	0	0	0	0	0
2045	31	0	0	0	0	0	0	0	0	0	0	0	0	0
2046	32	0	0	0	0	0	0	0	0	0	0	0	0	0
2047	33	0	0	0	0	0	0	0	0	0	0	0	0	0
2048	34	0	0	0	0	0	0	0	0	0	0	0	0	0
2049	35	0	0	0	0	0	0	0	0	0	0	0	0	0
	NPV 2014	0	0	0	0	0	0	0	0	0	0	1,017	0	1,017
	NPV i/s year	0	0	0	0	0	0	0	0	0	0	1,094	0	1,094
	Levelized \$/KW i/s year	0	0	0	0	0	0	0	0	0	0	83	0	83

Screening Curve Results for a DSM Program: w/ 4^{th} Correction

(1)	(2)	(3)
	Discount Factor:	0.0754
	Base (MW)	1.00
	Heat Rate	0
	Fixed O&M ($/KW-yr)	0.00
	Capital Replace ($/kW-Yr)	0.00
	VOM ($/MWh)	0.00
	Gas Transportation	0.00
	in-service year	2015
	book life	35

Capacity Factor (%)	Levelized $/KW	Levelized $/MWh
0	309	0
5	309	706
10	309	353
15	309	235
20	309	176
25	309	141
30	309	118
35	309	101
40	309	88
45	309	78
50	309	71
55	309	64
60	309	59
65	309	54
70	309	50
75	309	47
80	309	44
85	309	42
90	309	39
95	309	37
100	309	35

(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
		Fixed Costs				Variable Costs						DSM Costs		
Year	In-Service Year	Capital $000	Fixed O&M $000	Capital Replacement $000	Firm Gas Transportation $000	NO_x Emission $000	SO_2 Emission $000	CO_2 Emission $000	Hg Emission $000	Fuel Costs $000	Variable O&M $000	Admin. & Incentive Costs $000	Unrecovered Revenue Requirements $000	Total $000
2014	0	0	0	0	0	0	0	0	0	0	0	500	86	586
2015	1	0	0	0	0	0	0	0	0	0	0	0	166	166
2016	2	0	0	0	0	0	0	0	0	0	0	0	169	169
2017	3	0	0	0	0	0	0	0	0	0	0	0	174	174
2018	4	0	0	0	0	0	0	0	0	0	0	0	185	185
2019	5	0	0	0	0	0	0	0	0	0	0	0	197	197
2020	6	0	0	0	0	0	0	0	0	0	0	0	201	201
2021	7	0	0	0	0	0	0	0	0	0	0	0	206	206
2022	8	0	0	0	0	0	0	0	0	0	0	0	215	215
2023	9	0	0	0	0	0	0	0	0	0	0	0	212	212
2024	10	0	0	0	0	0	0	0	0	0	0	570	215	785
2025	11	0	0	0	0	0	0	0	0	0	0	0	214	214
2026	12	0	0	0	0	0	0	0	0	0	0	0	216	216
2027	13	0	0	0	0	0	0	0	0	0	0	0	218	218
2028	14	0	0	0	0	0	0	0	0	0	0	0	221	221
2029	15	0	0	0	0	0	0	0	0	0	0	0	225	225
2030	16	0	0	0	0	0	0	0	0	0	0	0	227	227
2031	17	0	0	0	0	0	0	0	0	0	0	0	231	231
2032	18	0	0	0	0	0	0	0	0	0	0	0	238	238
2033	19	0	0	0	0	0	0	0	0	0	0	0	250	250
2034	20	0	0	0	0	0	0	0	0	0	0	660	256	916
2035	21	0	0	0	0	0	0	0	0	0	0	0	260	260
2036	22	0	0	0	0	0	0	0	0	0	0	0	271	271
2037	23	0	0	0	0	0	0	0	0	0	0	0	276	276
2038	24	0	0	0	0	0	0	0	0	0	0	0	282	282
2039	25	0	0	0	0	0	0	0	0	0	0	0	287	287
2040	26	0	0	0	0	0	0	0	0	0	0	0	292	292
2041	27	0	0	0	0	0	0	0	0	0	0	0	299	299
2042	28	0	0	0	0	0	0	0	0	0	0	0	305	305
2043	29	0	0	0	0	0	0	0	0	0	0	0	315	315
2044	30	0	0	0	0	0	0	0	0	0	0	775	323	1,098
2045	31	0	0	0	0	0	0	0	0	0	0	0	331	331
2046	32	0	0	0	0	0	0	0	0	0	0	0	340	340
2047	33	0	0	0	0	0	0	0	0	0	0	0	349	349
2048	34	0	0	0	0	0	0	0	0	0	0	0	358	358
2049	35	0	0	0	0	0	0	0	0	0	0	0	367	367
NPV 2014		0	0	0	0	0	0	0	0	0	0	1,017	2,760	3,777
NPV i/s year		0	0	0	0	0	0	0	0	0	0	1,094	2,968	4,062
Levelized $/KW i/s year		0	0	0	0	0	0	0	0	0	0	83	226	309

ACEEE's LCOE Formula

(from ACEEE's Sept. 2009 "Saving Energy Cost-Effectively" Document)

I. Formula: Cost of energy saved (in $/kwh) = (C x 10^6) x (Capital Recovery Factor) / (D x 10^3)

where the Capital Recovery Factor = [A*(1+A)^B] / [(1+A)^B)-1]

A = discount rate
B = estimated measure life in years
C = total program cost in millions of dollars
D = total kwh saved that year by the energy efficiency program

II. Example Calculation: using a proxy DSM measure

Assumptions:	Cost =	$50		
	Measure Life =	1		
	kwh savings =	1,000		
	discount factor =	0.08		
Calculation:	Cost =	$50		
	capital recovery factor =	0.0864	(numerator)	= [0.08*(1+0.08)^1]
	capital recovery factor =	0.08	(denominator)	= [(1+0.08)^1)-1]
	capital recovery factor =	1.08	(total)	= 0.0864/0.08
	kwh saved =	1,000		
	$/kwh =	$0.054		= ($500x1.08)/1000
LCOE Formula Result:	cents/kwh =	**5.4**		
Simple Calculation Check:	Cost=	$50		
	kwh savings =	1,000		
	$/kwh=	$0.05		
	cents/kwh=	**5.0**		

Table from NREL Document on Cost-Effectiveness Analysis

(from NREL's 1994 Document: A Manual for the Economic Evaluation of Energy Efficiency and Renewable Energy Technologies)

Table 3-1. Overview of Economic Measures Applying to Specific Investment Features and Decisions[a]

Investment Features	NPV	TLCC	RR	LCOE	IRR	MIRR	SPB	DPB	B/C	SIR
Investment after return					N					
Regulated investment			R							
Financing							N	N		N
Risk							C,R	R		
Societal Costs	C,R								C,R	
Taxes							N	N		
Combinations of investments										

Investment Decisions	NPV	TLCC[b]	RR[b]	LCOE	IRR[b]	MIRR	SPB	DPB	B/C	SIR
Accept/reject		N	N		C					
Select from mutually exclusive alternatives[b]	R	C		N	N	N	N	N	N	N
Ranking (Limited budget)				R	C,N	R	N	N	R	R

R - Recommended
N - Not recommended
C - Commonly Used

A blank cell indicates that the measure is acceptable

a. This table is intended to serve only as a rough guideline by which an analyst can identify those measures that warrant further investigation. Exceptions to each of the entries will occur.
b. Text discusses some of the exceptions.

Economic Measures

NPV - Net present value
TLCC - Total life-cycle cost
LCOE - Levelized cost of energy
RR - Revenue Requirements
IRR - Internal rate of return
MIRR - Modified internal rate of return
SPB - Simple payback period
DPB - Discounted payback period
B/C - Benefit-to-cost ratio
SIR - Savings-to-investment ratio

SACE 1% GWh Goal Analysis: A Look at Resulting Electric Rates and Customer Bills

(Levelized System Average Electric Rate)

Year	(1) Annual Discount Factor 7.54%	(2) Reduced Resource Plan Variable Costs ($000, Nom)	(3) Increased 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)	Reduced Load Forecast NEL Adjusted for Addl. 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)
2014	1.000	3,023,174	0	6,712,470	9,735,645	118,001	144	117,858	117,858	8.26051	8.26051	12.2368	12.2368
2015	0.930	3,186,088	85,976	7,042,136	10,314,200	121,606	254	121,352	120,976	8.52582	7.92804	12.2368	11.3788
2016	0.865	3,407,746	96,455	7,291,850	10,796,051	123,943	329	123,614	122,346	8.82416	7.63016	12.2368	10.5810
2017	0.804	3,591,136	103,423	7,557,379	11,251,938	124,914	419	124,495	122,196	9.20808	7.40387	12.2368	9.8392
2018	0.748	4,292,166	110,211	7,775,147	12,177,525	126,399	515	125,883	122,547	9.93698	7.42975	12.2368	9.1493
2019	0.695	4,248,600	310,156	8,077,906	12,636,662	127,673	618	127,055	122,675	10.30091	7.16185	12.2368	8.5078
2020	0.647	4,379,800	441,229	8,271,624	13,092,653	129,187	728	128,459	123,030	10.64180	6.88010	12.2368	7.9113
2021	0.601	4,437,510	437,191	8,502,872	13,377,573	129,454	845	128,609	122,128	10.95378	6.58527	12.2368	7.3566
2022	0.559	4,366,956	573,477	9,312,344	14,252,777	130,517	969	129,548	122,012	11.68147	6.53036	12.2368	6.8408
2023	0.520	4,242,924	771,017	9,515,091	14,529,032	132,357	1,101	131,256	122,658	11.84516	6.15759	12.2368	6.3612
2024	0.483	4,451,011	850,121	9,715,026	15,016,158	134,849	1,241	133,608	123,937	12.11600	5.85678	12.2368	5.9152
2025	0.449	4,699,228	989,644	9,516,970	15,205,842	136,455	1,313	135,141	124,930	12.17152	5.47110	12.2368	5.5004
2026	0.418	4,911,539	1,309,848	9,470,760	15,692,147	138,479	1,313	137,166	126,801	12.37539	5.17271	12.2368	5.1148
2027	0.389	5,189,759	1,525,567	9,490,440	16,205,766	140,323	1,313	139,010	128,506	12.61091	4.90158	12.2368	4.7562
2028	0.361	5,465,963	1,754,801	9,550,015	16,770,779	142,712	1,313	141,399	130,714	12.83013	4.63714	12.2368	4.4227
2029	0.336	5,769,211	1,935,566	9,561,265	17,266,042	144,165	1,313	142,852	132,058	13.07463	4.39419	12.2368	4.1126
2030	0.313	6,050,221	2,028,444	9,588,160	17,666,825	145,896	1,313	144,583	133,658	13.21798	4.13090	12.2368	3.8243
2031	0.291	6,357,067	2,186,671	9,608,336	18,152,074	147,521	1,313	146,207	135,159	13.43014	3.90292	12.2368	3.5561
2032	0.270	6,835,937	2,549,948	9,657,799	19,043,684	149,703	1,317	148,385	137,173	13.88298	3.75165	12.2368	3.3068
2033	0.251	7,594,191	3,205,977	9,628,360	20,428,528	150,841	1,313	149,527	138,228	14.77882	3.71372	12.2368	3.0749
2034	0.234	8,010,168	3,400,748	9,637,330	21,048,246	152,296	1,313	150,982	139,574	15.08038	3.52380	12.2368	2.8593
2035	0.217	8,427,031	3,836,517	9,647,074	21,910,622	153,760	1,313	152,447	140,928	15.54743	3.37822	12.2368	2.6589
2036	0.202	9,256,471	4,100,606	9,679,412	23,036,489	155,629	1,317	154,312	142,651	16.14881	3.26287	12.2368	2.4724
2037	0.188	9,665,026	4,317,974	9,664,376	23,647,376	156,538	1,313	155,225	143,495	16.47954	3.09624	12.2368	2.2991
2038	0.175	10,163,294	4,425,204	9,692,276	24,280,773	157,974	1,313	156,660	144,822	16.76591	2.92918	12.2368	2.1379
2039	0.162	10,667,092	4,656,450	9,734,402	25,057,944	159,414	1,313	158,101	146,154	17.14489	2.78538	12.2368	1.9880
2040	0.151	11,116,318	4,747,213	9,804,202	25,667,733	161,289	1,317	159,972	147,884	17.35672	2.62209	12.2368	1.8486
2041	0.140	11,693,145	5,288,837	9,882,005	26,863,987	162,778	1,313	161,465	149,264	17.99762	2.52827	12.2368	1.7190
2042	0.131	12,317,129	5,456,244	9,960,637	27,734,010	164,282	1,313	162,969	150,654	18.40907	2.40476	12.2368	1.5985
2043	0.121	13,192,693	5,767,038	10,039,993	28,999,725	165,800	1,313	164,486	152,057	19.07161	2.31663	12.2368	1.4864
2044	0.113	13,960,955	5,855,828	10,082,824	29,899,607	167,332	1,317	166,014	153,470	19.48243	2.20061	12.2368	1.3822
2045	0.105	14,664,449	5,978,423	10,127,611	30,770,483	168,878	1,313	167,564	154,903	19.86440	2.08643	12.2368	1.2853
2046	0.098	15,305,955	6,200,768	10,174,319	31,681,043	170,439	1,313	169,125	156,346	20.26348	1.97912	12.2368	1.1952
2047	0.091	16,040,895	6,200,292	10,222,913	32,464,100	172,014	1,313	170,701	157,802	20.57268	1.86844	12.2368	1.1114
2048	0.084	16,840,541	6,720,240	10,273,359	33,834,139	173,604	1,317	172,287	159,268	21.24346	1.79409	12.2368	1.0334
2049	0.079	17,589,286	6,889,401	10,325,591	34,804,278	175,210	1,313	173,896	160,756	21.65037	1.70026	12.2368	0.9610
2050	0.073	18,593,269	6,977,252	10,379,602	35,950,124	176,830	1,313	175,517	162,254	22.15670	1.61802	12.2368	0.8936
2051	0.068	19,530,689	6,987,868	10,435,361	36,953,918	178,466	1,313	177,152	163,766	22.56509	1.53231	12.2368	0.8310
2052	0.063	20,393,159	7,078,310	10,492,841	37,964,310	180,116	1,317	178,799	165,288	22.96852	1.45035	12.2368	0.7727
2053	0.059	21,368,416	7,302,346	10,552,014	39,222,777	181,783	1,313	180,469	166,833	23.51026	1.38047	12.2368	0.7185
2054	0.055	22,440,790	7,334,185	10,612,855	40,387,830	183,465	1,313	182,152	168,388	23.98504	1.30960	12.2368	0.6681
											165.66734		165.66734

* 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 LM participants, etc.).

** DSM energy reductions are incremental from August 2013.

Levelized System Average Electric Rate (cents/kWh) = 12.2368

SACE 1% GWh Analysis: A Look at Resulting Electric Rates and Customer Bills

(Comparison to 5 Resource Plans)

Resource Plan	Levelized System Average Electric Rate (cents/kWh)	Avoids Cross-Subsidization of Customer Groups ?
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RIM 337 MW	11.7412	Yes
Supply Only	11.7419	Yes *
TRC 337 MW	11.7579	No
Information for Non-Conforming Plans (Provided at the Request of FPSC Staff)		
RIM 526 MW	11.7431	No
TRC 576 MW	11.7636	No
Information for 1% GWh reduction goal		
SACE 1% GWh	12.2368	No

* This resource plan would avoid cross-subsidization of customer groups in the absence of the RIM 337 MW plan.

SACE 1% GWh Goal Analysis: A Look at Resulting Electric Rates and Customer Bills

(Additional Cost Needed to be Added to RIM 337 MW Plan to Increase its Levelized System Average Electric Rate to That of 1% GWh Analysis)

Year	(1) Annual Discount Factor 7.54%	(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)
2014	1.000	3,023,174	0	6,712,470	0	9,735,645	118,001	144	117,858	8.26051	8.26051	12.2368	12.2368
2015	0.930	3,196,997	3,160	7,042,136	0	10,242,292	121,606	223	121,383	8.43799	7.84638	12.2368	11.3788
2016	0.865	3,448,068	5,846	7,291,850	0	10,745,764	123,943	225	123,718	8.68569	7.51042	12.2368	10.5810
2017	0.804	3,668,702	8,653	7,557,379	0	11,234,734	124,914	228	124,686	9.01044	7.24496	12.2368	9.8392
2018	0.748	4,424,020	11,644	7,775,147	0	12,210,812	126,399	231	126,167	9.67827	7.23632	12.2368	9.1493
2019	0.695	4,419,283	208,619	8,077,906	0	12,705,808	127,673	235	127,438	9.97021	6.93193	12.2368	8.5078
2020	0.647	4,594,064	339,578	8,271,624	0	13,205,265	129,187	240	128,947	10.24083	6.62087	12.2368	7.9113
2021	0.601	4,701,022	332,152	8,502,872	0	13,536,046	129,454	246	129,208	10.47617	6.29814	12.2368	7.3566
2022	0.559	4,673,713	459,484	9,312,344	0	14,445,541	130,517	253	130,264	11.08942	6.19939	12.2368	6.8408
2023	0.520	4,583,369	652,881	9,515,091	0	14,751,342	132,357	262	132,095	11.16723	5.80517	12.2368	6.3612
2024	0.483	4,850,401	727,908	9,715,026	18,679,498	33,972,833	134,849	273	134,576	25.24437	12.20293	12.2368	5.9152
2025	0.449	5,136,370	952,030	9,516,970	0	15,605,370	136,455	280	136,175	11.45976	5.15116	12.2368	5.5004
2026	0.418	5,371,049	1,260,406	9,470,760	0	16,102,215	138,479	280	138,200	11.65139	4.87010	12.2368	5.1148
2027	0.389	5,628,809	1,645,227	9,490,440	0	16,764,475	140,323	280	140,044	11.97087	4.65281	12.2368	4.7562
2028	0.361	5,964,767	1,809,065	9,550,015	0	17,323,847	142,712	280	142,433	12.16284	4.39597	12.2368	4.4227
2029	0.336	6,266,668	2,039,547	9,561,265	0	17,867,480	144,165	280	143,886	12.41781	4.17344	12.2368	4.1126
2030	0.313	6,578,653	2,157,863	9,588,160	0	18,324,676	145,896	280	145,617	12.58419	3.93283	12.2368	3.8243
2031	0.291	6,915,598	2,221,186	9,608,336	0	18,745,120	147,521	280	147,241	12.73090	3.69972	12.2368	3.5561
2032	0.270	7,450,686	2,505,464	9,657,799	0	19,613,949	149,703	280	149,422	13.12651	3.54722	12.2368	3.3068
2033	0.251	8,279,929	3,070,860	9,628,360	0	20,979,149	150,841	280	150,561	13.93398	3.50142	12.2368	3.0749
2034	0.234	8,735,919	3,268,755	9,637,330	0	21,642,004	152,296	280	152,016	14.23663	3.32664	12.2368	2.8593
2035	0.217	9,187,855	3,693,073	9,647,074	0	22,528,002	153,760	280	153,481	14.67805	3.18932	12.2368	2.6589
2036	0.202	10,073,030	4,061,748	9,679,412	0	23,814,190	155,629	280	155,349	15.32952	3.09733	12.2368	2.4724
2037	0.188	10,514,972	4,354,944	9,664,376	0	24,534,292	156,538	280	156,259	15.70108	2.94998	12.2368	2.2991
2038	0.175	11,056,971	4,462,447	9,692,276	0	25,211,694	157,974	280	157,694	15.98773	2.79323	12.2368	2.1379
2039	0.162	11,603,959	4,692,697	9,734,402	0	26,031,057	159,414	280	159,135	16.35789	2.65752	12.2368	1.9880
2040	0.151	12,102,917	5,190,999	9,804,202	0	27,098,118	161,289	280	161,009	16.83024	2.54255	12.2368	1.8486
2041	0.140	12,736,924	5,192,557	9,882,005	0	27,811,486	162,778	280	162,499	17.11487	2.40427	12.2368	1.7190
2042	0.131	13,418,915	5,311,161	9,960,637	0	28,690,712	164,282	280	164,002	17.49407	2.28523	12.2368	1.5985
2043	0.121	14,369,049	5,608,855	10,039,993	0	30,017,897	165,800	280	165,520	18.13550	2.20292	12.2368	1.4864
2044	0.113	15,193,079	5,822,906	10,082,824	0	31,098,809	167,332	280	167,051	18.61633	2.10278	12.2368	1.3822
2045	0.105	15,966,093	5,852,053	10,127,611	0	31,945,757	168,878	280	168,598	18.94785	1.99016	12.2368	1.2853
2046	0.098	16,666,050	5,987,704	10,174,319	0	32,828,073	170,439	280	170,159	19.29257	1.88430	12.2368	1.1952
2047	0.091	17,457,023	6,560,845	10,222,913	0	34,240,781	172,014	280	171,735	19.93819	1.81082	12.2368	1.1114
2048	0.084	18,332,070	6,554,227	10,273,359	0	35,159,655	173,604	280	173,324	20.28550	1.71319	12.2368	1.0334
2049	0.079	19,149,008	6,658,212	10,325,591	0	36,132,811	175,210	280	174,930	20.65556	1.62213	12.2368	0.9610
2050	0.073	20,237,070	6,778,156	10,379,602	0	37,394,828	176,830	280	176,551	21.18081	1.54675	12.2368	0.8936
2051	0.068	21,247,070	6,909,669	10,435,361	0	38,592,100	178,466	280	178,186	21.65832	1.47073	12.2368	0.8310
2052	0.063	22,183,025	7,125,419	10,492,841	0	39,801,286	180,116	280	179,836	22.13197	1.39752	12.2368	0.7727
2053	0.059	23,256,053	7,166,139	10,552,014	0	40,974,207	181,783	280	181,503	22.57489	1.32555	12.2368	0.7185
2054	0.055	24,419,078	7,668,746	10,612,855	0	42,700,679	183,465	280	183,186	23.31007	1.27275	12.2368	0.6681
											165.66734		165.66734

* 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 LM participants, etc.).

** DSM energy reductions are incremental from August 2013.

Levelized System Average Electric Rate (cents/kWh) = 12.2368

SACE 1% GWh Goal Analysis: A Look at Resulting Electric Rates and Customer Bills

(Comparison of Annual Electric Rates and Customer Bills for 1,200 kWh Usage)

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

(Non-Conforming Resource Plans)

Year	Supply Only Resource Plan: Projected Electric Rate (cents/kWh)	Supply Only Resource Plan: Projected Customer Bill ($/1,200 kWh)	RIM 337 MW: Projected Electric Rate (cents/kWh)	RIM 337 MW: Projected Customer Bill ($/1,200 kWh)	TRC 337 MW: Projected Electric Rate (cents/kWh)	TRC 337 MW: Projected Customer Bill ($/1,200 kWh)	[redacted]	RIM 526 MW *: Projected Electric Rate (cents/kWh)	RIM 526 MW *: Projected Customer Bill ($/1,200 kWh)	TRC 576 MW *: Projected Electric Rate (cents/kWh)	TRC 576 MW *: Projected Customer Bill ($/1,200 kWh)	[redacted]	SACE 1% GWh Goal: Projected Electric Rate (cents/kWh)	SACE 1% GWh Goal: Projected Customer Bill ($/1,200 kWh)
2015	8.432	$101.18	8.438	$101.26	8.443	$101.32		8.450	$101.40	8.458	$101.50		8.526	$102.31
2016	8.677	$104.13	8.686	$104.23	8.691	$104.29		8.697	$104.37	8.709	$104.51		8.824	$105.89
2017	8.999	$107.99	9.010	$108.13	9.016	$108.19		9.024	$108.29	9.036	$108.43		9.208	$110.50
2018	9.666	$115.99	9.678	$116.14	9.686	$116.23		9.692	$116.31	9.707	$116.49		9.937	$119.24
2019	9.954	$119.45	9.970	$119.64	9.979	$119.74		9.985	$119.82	10.004	$120.05		10.301	$123.61
2020	10.226	$122.71	10.241	$122.89	10.252	$123.02		10.257	$123.09	10.279	$123.35		10.642	$127.70
2021	10.457	$125.49	10.476	$125.71	10.491	$125.90		10.494	$125.93	10.518	$126.22		10.954	$131.45
2022	11.067	$132.80	11.089	$133.07	11.109	$133.30		11.111	$133.33	11.141	$133.69		11.681	$140.18
2023	11.144	$133.73	11.167	$134.01	11.189	$134.27		11.190	$134.28	11.224	$134.69		11.845	$142.14
2024	11.341	$136.09	11.364	$136.37	11.388	$136.65		11.388	$136.65	11.425	$137.10		12.116	$145.39
2025	11.510	$138.12	11.460	$137.52	11.482	$137.79		11.474	$137.69	11.496	$137.95		12.172	$146.06

2) Projection of Average Customer Bill Differentials (Monthly assuming 1,200 kWh usage):

Year	Bill Differentials for Each Plan Compared to the Supply Only Plan: Supply Only	RIM 337 MW	TRC 337 MW	[redacted]	(Non-Conforming Resource Plans) RIM 526 MW *	(Non-Conforming Resource Plans) TRC 576 MW *	[redacted]	SACE 1% GWh Goal
2015	$0.00	$0.07	$0.14		$0.22	$0.32		$1.13
2016	$0.00	$0.10	$0.16		$0.24	$0.38		$1.76
2017	$0.00	$0.13	$0.20		$0.29	$0.44		$2.50
2018	$0.00	$0.15	$0.23		$0.31	$0.50		$3.25
2019	$0.00	$0.20	$0.30		$0.38	$0.60		$4.17
2020	$0.00	$0.18	$0.32		$0.38	$0.64		$4.99
2021	$0.00	$0.23	$0.41		$0.44	$0.73		$5.96
2022	$0.00	$0.27	$0.50		$0.53	$0.89		$7.37
2023	$0.00	$0.28	$0.54		$0.55	$0.96		$8.41
2024	$0.00	$0.28	$0.56		$0.56	$1.01		$9.30
2025	$0.00	($0.60)	($0.33)		($0.43)	($0.17)		$7.94

* The two non-conforming resource plans, the RIM 526 MW plan and the TRC 576 MW plan, utilize the full Achievable Potential MW without regard for optimizing selection and timing of DSM measures and without regard for meeting FPL's system reliability criteria.

3) Projection of Annual & 10-Year Total Customer Bill Impacts for 1,200 kWh Usage:

Year	RIM 337 MW Plan vs. Supply Only Plan	SACE 1% GWh vs. Supply Only Plan
2015	$0.90	$13.54
2016	$1.23	$21.17
2017	$1.58	$30.04
2018	$1.74	$39.00
2019	$2.36	$49.98
2020	$2.18	$59.92
2021	$2.71	$71.49
2022	$3.24	$88.50
2023	$3.34	$100.96
2024	$3.31	$111.59
2025	($7.19)	$95.30
Total =	$15.40	$681.48

Sierra Club 1% GWh Goal Analysis: A Look at Resulting Electric Rates and Customer Bills

(Levelized System Average Electric Rate)

Year	(1) Annual Discount Factor 7.54%	(2) Reduced Resource Plan Variable Costs ($000, Nom)	(3) Increased 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)	Reduced Load Forecast NEL Adjusted for Addl. 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)
2014	1.000	3,023,174	0	6,712,470	9,735,645	118,001	144	117,858	117,858	8.26051	8.26051	12.1728	12.1728
2015	0.930	3,190,083	85,976	7,042,136	10,318,194	121,606	254	121,352	121,128	8.51844	7.92118	12.1728	11.3193
2016	0.865	3,422,346	96,455	7,291,850	10,810,651	123,943	329	123,614	122,871	8.79840	7.60788	12.1728	10.5257
2017	0.804	3,617,391	103,423	7,557,379	11,278,194	124,914	419	124,495	123,090	9.16258	7.36728	12.1728	9.7877
2018	0.748	4,331,293	110,211	7,775,147	12,216,652	126,399	515	125,883	123,665	9.87886	7.38629	12.1728	9.1014
2019	0.695	4,289,898	310,156	8,077,906	12,677,960	127,673	618	127,055	123,868	10.23508	7.11609	12.1728	8.4633
2020	0.647	4,422,251	441,229	8,271,624	13,135,104	129,187	728	128,459	124,223	10.57382	6.83615	12.1728	7.8699
2021	0.601	4,480,838	437,191	8,502,872	13,420,902	129,454	845	128,609	123,320	10.88299	6.54272	12.1728	7.3181
2022	0.559	4,409,636	573,477	9,312,344	14,295,456	130,517	969	129,548	123,204	11.60305	6.48652	12.1728	6.8050
2023	0.520	4,284,173	771,017	9,515,091	14,570,281	132,357	1,101	131,256	123,850	11.76442	6.11561	12.1728	6.3279
2024	0.483	4,493,837	850,121	9,715,026	15,058,984	134,849	1,241	133,608	125,129	12.03476	5.81751	12.1728	5.8842
2025	0.449	4,744,083	989,644	9,516,970	15,250,696	136,455	1,313	135,141	126,122	12.09201	5.43536	12.1728	5.4717
2026	0.418	4,958,419	1,309,848	9,470,760	15,739,027	138,479	1,313	137,166	128,012	12.29500	5.13911	12.1728	5.0880
2027	0.389	5,239,296	1,525,567	9,490,440	16,255,302	140,323	1,313	139,010	129,732	12.52986	4.87008	12.1728	4.7313
2028	0.361	5,518,136	1,754,801	9,550,015	16,822,952	142,712	1,313	141,399	131,962	12.74836	4.60759	12.1728	4.3996
2029	0.336	5,824,278	1,935,566	9,561,265	17,321,110	144,165	1,313	142,852	133,318	12.99231	4.36653	12.1728	4.0911
2030	0.313	6,107,970	2,028,444	9,588,160	17,724,575	145,896	1,313	144,583	134,933	13.13580	4.10522	12.1728	3.8042
2031	0.291	6,417,746	2,186,671	9,608,336	18,212,752	147,521	1,313	146,207	136,449	13.34763	3.87894	12.1728	3.5375
2032	0.270	6,901,186	2,549,948	9,657,799	19,108,933	149,703	1,317	148,385	138,482	13.79884	3.72891	12.1728	3.2895
2033	0.251	7,666,678	3,205,977	9,628,360	20,501,015	150,841	1,313	149,527	139,548	14.69104	3.69166	12.1728	3.0589
2034	0.234	8,086,626	3,400,748	9,637,330	21,124,703	152,296	1,313	150,982	140,906	14.99206	3.50317	12.1728	2.8444
2035	0.217	8,507,468	3,836,517	9,647,074	21,991,059	153,760	1,313	152,447	142,273	15.45697	3.35857	12.1728	2.6450
2036	0.202	9,344,825	4,100,606	9,679,412	23,124,843	155,629	1,317	154,312	144,013	16.05748	3.24442	12.1728	2.4595
2037	0.188	9,757,280	4,317,974	9,664,376	23,739,629	156,538	1,313	155,225	144,865	16.38741	3.07893	12.1728	2.2871
2038	0.175	10,260,303	4,425,204	9,692,276	24,377,782	157,974	1,313	156,660	146,205	16.67374	2.91308	12.1728	2.1267
2039	0.162	10,768,910	4,656,450	9,734,402	25,159,762	159,414	1,313	158,101	147,549	17.05179	2.77025	12.1728	1.9776
2040	0.151	11,222,423	4,747,213	9,804,202	25,773,839	161,289	1,317	159,972	149,295	17.26369	2.60803	12.1728	1.8389
2041	0.140	11,804,756	5,288,837	9,882,005	26,975,598	162,778	1,313	161,465	150,689	17.90152	2.51477	12.1728	1.7100
2042	0.131	12,434,697	5,456,244	9,960,637	27,851,578	164,282	1,313	162,969	152,092	18.31231	2.39212	12.1728	1.5901
2043	0.121	13,318,618	5,767,038	10,039,993	29,125,650	165,800	1,313	164,486	153,508	18.97332	2.30469	12.1728	1.4786
2044	0.113	14,094,213	5,855,828	10,082,824	30,032,865	167,332	1,317	166,014	154,934	19.38424	2.18951	12.1728	1.3750
2045	0.105	14,804,421	5,978,423	10,127,611	30,910,456	168,878	1,313	167,564	156,381	19.76609	2.07611	12.1728	1.2786
2046	0.098	15,452,051	6,200,768	10,174,319	31,827,139	170,439	1,313	169,125	157,838	20.16445	1.96945	12.1728	1.1889
2047	0.091	16,194,006	6,200,292	10,222,913	32,617,211	172,014	1,313	170,701	159,308	20.47428	1.85951	12.1728	1.1055
2048	0.084	17,001,285	6,720,240	10,273,359	33,994,883	173,604	1,317	172,287	160,789	21.14258	1.78557	12.1728	1.0280
2049	0.079	17,757,177	6,889,401	10,325,591	34,972,169	175,210	1,313	173,896	162,290	21.54912	1.69230	12.1728	0.9560
2050	0.073	18,770,743	6,977,252	10,379,602	36,127,597	176,830	1,313	175,517	163,803	22.05556	1.61063	12.1728	0.8889
2051	0.068	19,717,110	6,987,868	10,435,361	37,140,340	178,466	1,313	177,152	165,329	22.46450	1.52548	12.1728	0.8266
2052	0.063	20,587,813	7,078,310	10,492,841	38,158,964	180,116	1,317	178,799	166,866	22.86801	1.44400	12.1728	0.7686
2053	0.059	21,572,379	7,302,346	10,552,014	39,426,739	181,783	1,313	180,469	168,425	23.40908	1.37453	12.1728	0.7148
2054	0.055	22,654,989	7,334,185	10,612,855	40,602,029	183,465	1,313	182,152	169,995	23.88427	1.30410	12.1728	0.6646
											164.80036		164.80036

* 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 LM participants, etc.).

** DSM energy reductions are incremental from August 2013.

Levelized System Average Electric Rate (cents/kWh) = 12.1728

Sierra Club 1% GWh Goal Analysis: A Look at Resulting Electric Rates and Customer Bills

(Comparison to 5 Resource Plans)

Resource Plan	Levelized System Average Electric Rate (cents/kWh)	Avoids Cross-Subsidization of Customer Groups ?
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RIM 337 MW	11.7412	Yes
Supply Only	11.7419	Yes *
TRC 337 MW	11.7579	No
Information for Non-Conforming Plans (Provided at the Request of FPSC Staff)		
RIM 526 MW	11.7431	No
TRC 576 MW	11.7636	No
Information for 1% GWh reduction goal		
Sierra Club 1% GWh	12.1728	No

* This resource plan would avoid cross-subsidization of customer groups in the absence of the RIM 337 MW plan.

Sierra Club 1% GWh Goal Analysis: A Look at Resulting Electric Rates and Customer Bills

(Additional Cost Needed to be Added to RIM 337 MW Plan to Increase its Levelized System Average Electric Rate to That of 1% GWh Analysis)

Year	(1) Annual Discount Factor 7.54%	(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)
2014	1.000	3,023,174	0	6,712,470	0	9,735,645	118,001	144	117,858	8.26051	8.26051	12.1728	12.1728
2015	0.930	3,196,997	3,160	7,042,136	0	10,242,292	121,606	223	121,383	8.43799	7.84638	12.1728	11.3193
2016	0.865	3,448,068	5,846	7,291,850	0	10,745,764	123,943	225	123,718	8.68569	7.51042	12.1728	10.5257
2017	0.804	3,668,702	8,653	7,557,379	0	11,234,734	124,914	228	124,686	9.01044	7.24496	12.1728	9.7877
2018	0.748	4,424,020	11,644	7,775,147	0	12,210,812	126,399	231	126,167	9.67827	7.23632	12.1728	9.1014
2019	0.695	4,419,283	208,619	8,077,906	0	12,705,808	127,673	235	127,438	9.97021	6.93193	12.1728	8.4633
2020	0.647	4,594,064	339,578	8,271,624	0	13,205,265	129,187	240	128,947	10.24083	6.62087	12.1728	7.8699
2021	0.601	4,701,022	332,152	8,502,872	0	13,536,046	129,454	246	129,208	10.47617	6.29814	12.1728	7.3181
2022	0.559	4,673,713	459,484	9,312,344	0	14,445,541	130,517	253	130,264	11.08942	6.19939	12.1728	6.8050
2023	0.520	4,583,369	652,881	9,515,091	0	14,751,342	132,357	262	132,095	11.16723	5.80517	12.1728	6.3279
2024	0.483	4,850,401	727,908	9,715,026	**16,265,835**	31,559,170	134,849	273	134,576	23.45084	11.33595	12.1728	5.8842
2025	0.449	5,136,370	952,030	9,516,970	0	15,605,370	136,455	280	136,175	11.45976	5.15116	12.1728	5.4717
2026	0.418	5,371,049	1,260,406	9,470,760	0	16,102,215	138,479	280	138,200	11.65139	4.87010	12.1728	5.0880
2027	0.389	5,628,809	1,645,227	9,490,440	0	16,764,475	140,323	280	140,044	11.97087	4.65281	12.1728	4.7313
2028	0.361	5,964,767	1,809,065	9,550,015	0	17,323,847	142,712	280	142,433	12.16284	4.39597	12.1728	4.3996
2029	0.336	6,266,668	2,039,547	9,561,265	0	17,867,480	144,165	280	143,886	12.41781	4.17344	12.1728	4.0911
2030	0.313	6,578,653	2,157,863	9,588,160	0	18,324,676	145,896	280	145,617	12.58419	3.93283	12.1728	3.8042
2031	0.291	6,915,598	2,221,186	9,608,336	0	18,745,120	147,521	280	147,241	12.73090	3.69972	12.1728	3.5375
2032	0.270	7,450,686	2,505,464	9,657,799	0	19,613,949	149,703	280	149,422	13.12651	3.54722	12.1728	3.2895
2033	0.251	8,279,929	3,070,860	9,628,360	0	20,979,149	150,841	280	150,561	13.93398	3.50142	12.1728	3.0589
2034	0.234	8,735,919	3,268,755	9,637,330	0	21,642,004	152,296	280	152,016	14.23663	3.32664	12.1728	2.8444
2035	0.217	9,187,855	3,693,073	9,647,074	0	22,528,002	153,760	280	153,481	14.67805	3.18932	12.1728	2.6450
2036	0.202	10,073,030	4,061,748	9,679,412	0	23,814,190	155,629	280	155,349	15.32952	3.09733	12.1728	2.4595
2037	0.188	10,514,972	4,354,944	9,664,376	0	24,534,292	156,538	280	156,259	15.70108	2.94998	12.1728	2.2871
2038	0.175	11,056,971	4,462,447	9,692,276	0	25,211,694	157,974	280	157,694	15.98773	2.79323	12.1728	2.1267
2039	0.162	11,603,959	4,692,697	9,734,402	0	26,031,057	159,414	280	159,135	16.35789	2.65752	12.1728	1.9776
2040	0.151	12,102,917	5,190,999	9,804,202	0	27,098,118	161,289	280	161,009	16.83024	2.54255	12.1728	1.8389
2041	0.140	12,736,924	5,192,557	9,882,005	0	27,811,486	162,778	280	162,499	17.11487	2.40427	12.1728	1.7100
2042	0.131	13,418,915	5,311,161	9,960,637	0	28,690,712	164,282	280	164,002	17.49407	2.28523	12.1728	1.5901
2043	0.121	14,369,049	5,608,855	10,039,993	0	30,017,897	165,800	280	165,520	18.13550	2.20292	12.1728	1.4786
2044	0.113	15,193,079	5,822,906	10,082,824	0	31,098,809	167,332	280	167,051	18.61633	2.10278	12.1728	1.3750
2045	0.105	15,966,093	5,852,053	10,127,611	0	31,945,757	168,878	280	168,598	18.94785	1.99016	12.1728	1.2786
2046	0.098	16,666,050	5,987,704	10,174,319	0	32,828,073	170,439	280	170,159	19.29257	1.88430	12.1728	1.1889
2047	0.091	17,457,023	6,560,845	10,222,913	0	34,240,781	172,014	280	171,735	19.93819	1.81082	12.1728	1.1055
2048	0.084	18,332,070	6,554,227	10,273,359	0	35,159,655	173,604	280	173,324	20.28550	1.71319	12.1728	1.0280
2049	0.079	19,149,008	6,658,212	10,325,591	0	36,132,811	175,210	280	174,930	20.65556	1.62213	12.1728	0.9560
2050	0.073	20,237,070	6,778,156	10,379,602	0	37,394,828	176,830	280	176,551	21.18081	1.54675	12.1728	0.8889
2051	0.068	21,247,070	6,909,669	10,435,361	0	38,592,100	178,466	280	178,186	21.65832	1.47073	12.1728	0.8266
2052	0.063	22,183,025	7,125,419	10,492,841	0	39,801,286	180,116	280	179,836	22.13197	1.39752	12.1728	0.7686
2053	0.059	23,256,053	7,166,139	10,552,014	0	40,974,207	181,783	280	181,503	22.57489	1.32555	12.1728	0.7148
2054	0.055	24,419,078	7,668,746	10,612,855	0	42,700,679	183,465	280	183,186	23.31007	1.27275	12.1728	0.6646
											164.80036		164.80036

* 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 LM participants, etc.).

** DSM energy reductions are incremental from August 2013.

Levelized System Average Electric Rate (cents/kWh) = 12.1728

Docket No. 130199-EI
Sierra Club 1% GWh Goal Analysis: A Look at Resulting Electric Rates and Customer Bills
Exhibit SRS-24, Page 3 of 4

Sierra Club 1% GWh Goal Analysis: A Look at Resulting Electric Rates and Customer Bills

(Comparison of Annual Electric Rates and Customer Bills for 1,200 kWh Usage)

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

	Supply Only Resource Plan		RIM 337 MW		TRC 337 MW		(Non-Conforming Resource Plans) RIM 526 MW *		TRC 576 MW *		Sierra Club 1% GWh Goal	
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 ($/1,200 kWh)	Projected Electric Rate (cents/kWh)	Projected Customer Bill ($/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)
2015	8.432	$101.18	8.438	$101.26	8.443	$101.32	8.450	$101.40	8.458	$101.50	8.518	$102.22
2016	8.677	$104.13	8.686	$104.23	8.691	$104.29	8.697	$104.37	8.709	$104.51	8.798	$105.58
2017	8.999	$107.99	9.010	$108.13	9.016	$108.19	9.024	$108.29	9.036	$108.43	9.163	$109.95
2018	9.666	$115.99	9.678	$116.14	9.686	$116.23	9.692	$116.31	9.707	$116.49	9.879	$118.55
2019	9.954	$119.45	9.970	$119.64	9.979	$119.74	9.985	$119.82	10.004	$120.05	10.235	$122.82
2020	10.226	$122.71	10.241	$122.89	10.252	$123.02	10.257	$123.09	10.279	$123.35	10.574	$126.89
2021	10.457	$125.49	10.476	$125.71	10.491	$125.90	10.494	$125.93	10.518	$126.22	10.883	$130.60
2022	11.067	$132.80	11.089	$133.07	11.109	$133.30	11.111	$133.33	11.141	$133.69	11.603	$139.24
2023	11.144	$133.73	11.167	$134.01	11.189	$134.27	11.190	$134.28	11.224	$134.69	11.764	$141.17
2024	11.341	$136.09	11.364	$136.37	11.388	$136.65	11.388	$136.65	11.425	$137.10	12.035	$144.42
2025	11.510	$138.12	11.460	$137.52	11.482	$137.79	11.474	$137.69	11.496	$137.95	12.092	$145.10

2) Projection of Average Customer Bill Differentials (Monthly assuming 1,200 kWh usage):

	Bill Differentials for Each Plan Compared to the Supply Only Plan			(Non-Conforming Resource Plans)		
Year	Supply Only	RIM 337 MW	TRC 337 MW	RIM 526 MW *	TRC 576 MW *	Sierra Club 1% GWh Goal
2015	$0.00	$0.07	$0.14	$0.22	$0.32	$1.04
2016	$0.00	$0.10	$0.16	$0.24	$0.38	$1.45
2017	$0.00	$0.13	$0.20	$0.29	$0.44	$1.96
2018	$0.00	$0.15	$0.23	$0.31	$0.50	$2.55
2019	$0.00	$0.20	$0.30	$0.38	$0.60	$3.38
2020	$0.00	$0.18	$0.32	$0.38	$0.64	$4.18
2021	$0.00	$0.23	$0.41	$0.44	$0.73	$5.11
2022	$0.00	$0.27	$0.50	$0.53	$0.89	$6.43
2023	$0.00	$0.28	$0.54	$0.55	$0.96	$7.44
2024	$0.00	$0.28	$0.56	$0.56	$1.01	$8.32
2025	$0.00	($0.60)	($0.33)	($0.43)	($0.17)	$6.99

* The two non-conforming resource plans, the RIM 526 MW plan and the TRC 576 MW plan, utilize the full Achievable Potential MW without regard for optimizing selection and timing of DSM measures and without regard for meeting FPL's system reliability criteria.

3) Projection of Annual & 10-Year Total Customer Bill Impacts for 1,200 kWh Usage:

Year	RIM 337 MW Plan vs. Supply Only Plan	Sierra Club 1% GWh vs. Supply Only Plan
2015	$0.90	$12.48
2016	$1.23	$17.46
2017	$1.58	$23.49
2018	$1.74	$30.63
2019	$2.36	$40.50
2020	$2.18	$50.14
2021	$2.71	$61.29
2022	$3.24	$77.20
2023	$3.34	$89.33
2024	$3.31	$99.89
2025	($7.19)	$83.85
	—	—
Total =	$15.40	$586.26

CERTIFICATE OF SERVICE
DOCKET NO. 130199-EI

I HEREBY CERTIFY that a true and correct copy of FPL's Rebuttal Testimony and Exhibits was served by electronic delivery this 10th day of June, 2014 to the following:

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