

**BEFORE THE FLORIDA
PUBLIC SERVICE COMMISSION**

**DOCKET NO. 11 0309 -EI
FLORIDA POWER & LIGHT COMPANY**

**IN RE: FLORIDA POWER & LIGHT COMPANY'S
PETITION TO DETERMINE NEED FOR
MODERNIZATION OF PORT EVERGLADES PLANT**

DIRECT TESTIMONY & EXHIBIT OF:

RENE SILVA

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FPSC-COMMISSION CLERK

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2 **FLORIDA POWER & LIGHT COMPANY**

3 **DIRECT TESTIMONY OF RENE SILVA**

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5 **NOVEMBER 21, 2011**

6
7 **INTRODUCTION AND CREDENTIALS**

8
9 **Q. Please state your name and business address.**

10 A. My name is Rene Silva. My business address is 9250 West Flagler Street,
11 Miami, Florida 33174.

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

13 A. I am employed by Florida Power & Light Company (FPL) as Senior Director,
14 Resource Assessment and Planning (RAP).

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

16 A. I manage the RAP group, the department that is responsible for developing
17 FPL's integrated resource plan (IRP) and other related activities, such as
18 quantifying the need for future resource additions, and analyzing the
19 economic and other impacts to the FPL system from the addition of resource
20 options.

21 **Q. Please describe your educational background business experience.**

22 A. I graduated from the University of Michigan with a Bachelor of Science
23 Degree in Engineering Science in 1974. From 1974 until 1978, I was

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1 employed by the Nuclear Energy Division of the General Electric Company in
2 the area of nuclear fuel design. While employed by General Electric, I earned
3 a Masters Degree in Mechanical Engineering from San Jose State University
4 in 1978.

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6 I joined the Fuel Resources Department of FPL in 1978, as a fuel engineer,
7 responsible for purchasing nuclear fuel. While employed by FPL, I earned a
8 Masters Degree in Business Administration from the University of Miami in
9 1986. In 1987 I became Manager of Fossil Fuel, responsible for FPL's
10 purchases of fuel oil, natural gas, and coal. In 1990, I assumed the position of
11 Director, Fuel Resources Department, and in 1991 became Manager of Fuel
12 Services, responsible for coordinating the development and implementation of
13 FPL's fossil fuel procurement strategy. In 1998, I was named Manager of
14 Business Services in the Power Generation Division (PGD). In that capacity,
15 I managed the group that is responsible for coordinating (a) the development
16 of PGD's long-term plan for the effective and efficient construction, operation
17 and maintenance of FPL's fossil generating plants, (b) the preparation of PGD
18 annual budgets and tracking of expenditures, and (c) the preparation of reports
19 related to fossil generating plant performance. On May 1, 2002, I was
20 appointed to my current position.

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1 **Q. Are you sponsoring any exhibits in this case?**

2 A. Yes. I am sponsoring Exhibit RS-1, which is attached to my direct testimony.

3 Exhibit RS-1 Summary of Benefits of Modernization of FPL's
4 Port Everglades Plant (PEEC Project)

5

6

PURPOSE

7

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

9 A. The purpose of my testimony is to support FPL's request that the Florida
10 Public Service Commission (Commission) grant an affirmative determination
11 of need for the modernization of FPL's Port Everglades Plant (Port
12 Everglades).

13 **Q. What does the proposed modernization of Port Everglades involve?**

14 A. The proposed modernization, which is to be renamed the Port Everglades
15 Next Generation Clean Energy Center (PEEC) and henceforth will be referred
16 to in my testimony as the PEEC Project or the Project, consists of removing
17 the existing four steam units at Port Everglades, which are currently in
18 inactive reserve, and adding a new advanced combined cycle unit with
19 summer peak rating of about 1,277 MW at the same plant site by June of
20 2016.

21

22 By replacing the old, far less efficient Port Everglades steam generating units
23 with new, advanced, cleaner generation, the PEEC Project will enable FPL to

1 produce energy much more efficiently beginning in 2016. The Project will
2 transform 1,187 MW of less efficient oil and gas-fueled steam generation into
3 about 1,277 MW of highly efficient, state-of-the-art, environmentally
4 sensitive advanced combined cycle generation.

5 **Q. How is your testimony organized?**

6 A. My testimony consists of the following eight sections:

- 7 • Section 1 outlines FPL’s request before the Commission regarding the
8 proposed PEEC Project.
- 9 • Section 2 introduces FPL’s witnesses.
- 10 • Section 3 describes the criteria used by FPL to determine that FPL has a
11 need for generation capacity in 2016 and explains why that need cannot
12 reasonably be met by additional demand side management (DSM) or
13 additional renewable resources.
- 14 • Section 4 describes the results of comparing FPL’s resource plan with
15 PEEC in 2016 (the “PEEC Resource Plan”) to a resource plan that would,
16 as an alternative to PEEC, return to service the four Port Everglades steam
17 units, all of which have been placed in inactive reserve (the “Return to
18 Service Resource Plan”).
- 19 • Section 5 describes the results of comparing the PEEC Resource Plan to a
20 resource plan that would, as an alternative to PEEC, add a new combined
21 cycle unit at a greenfield site in 2016 (the “GFCC Resource Plan”).
- 22 • Section 6 describes the results of comparing the PEEC Resource Plan to a
23 resource plan that would add combustion turbines (CTs) in simple cycle

1 mode at a greenfield site in 2016 and thus defer PEEC to 2019 (the
2 “GFCT Resource Plan”).

3 • Section 7 discusses the unmatched advantages of the Project compared to
4 possible alternatives that any third party could propose, based on which
5 advantages FPL determined that PEEC is much more cost-effective than
6 any viable third party offer could be.

7 • Section 8 presents the significant adverse consequences FPL and its
8 customers would face if the Commission did not grant an affirmative
9 determination of need for the PEEC Project, to be placed in service in
10 2016.

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12 SUMMARY

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14 **Q. Please summarize your testimony.**

15 A. FPL seeks an affirmative determination of need for the PEEC Project in 2016
16 because FPL has demonstrated that it has a need for new generation in 2016
17 based on FPL’s FPSC-approved reserve margin reliability criterion, and
18 because the resource plan that includes the PEEC Project in 2016 will result in
19 significantly greater benefits to FPL’s customers than the other resource plans
20 that FPL has evaluated. These benefits fall into four categories:

21 • First, the PEEC Project in 2016 will result in lower costs to FPL’s
22 customers. As shown in Exhibit JEE-3 attached to the testimony of
23 FPL witness Enjamio, the PEEC Resource Plan will result in

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significant customer savings when compared to the two resource plans without PEEC. Specifically, the PEEC Resource Plan will produce savings of about \$469 million, cumulative present value of revenue requirements in 2011 dollars (CPVRR) compared to the Return to Service Resource Plan; and savings of about \$838 million (CPVRR) compared to the GFCC Resource Plan.

The PEEC Resource Plan will also result in savings when compared to a resource plan that would defer the addition of PEEC. Specifically, the PEEC Resource Plan will produce savings of about \$425 million (CPVRR) compared to the GFCT Resource Plan. This result indicates that even a short delay in the addition of PEEC would unnecessarily increase costs to customers. In addition, if PEEC were to be deferred, the cost of building PEEC later would likely be greater than currently projected (especially if the economy improved and there were increased competition for the necessary labor and materials). Moreover, as discussed in the testimonies of Mr. Modia and Mr. Enjamio, a three year delay in adding generation in the Miami-Dade/Broward County area may not be feasible from a system reliability perspective due to the growing imbalance between demand and generation in that area, without substantial transmission upgrades, or without incurring additional costs to keep Turkey Point Unit 1 in service. Therefore,

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the adverse consequence of a delay could be significantly greater than reflected above.

Further, only the PEEC Project, (or incurring the much higher costs for customers of returning to service the old steam units at Port Everglades to service), would enable FPL to avoid the need for a transmission upgrade costing approximately \$638 million in 2016 dollars, to address the growing imbalance between firm generating capacity and load in Miami-Dade and Broward Counties.

The unmatched advantages of the PEEC Project compared to long-term purchases from existing generating facilities or from new generating units ensures that the PEEC Resource Plan would also result in significant customer savings relative to any other resource plan that would include a capacity purchase from a third party. FPL estimates, based on information presented in the testimonies of FPL witnesses Modia and Gnecco, that a new third-party generator built in Miami-Dade County or Broward County would have an initial capital cost between \$900 million and \$1 billion higher than that of PEEC, in 2016 dollars, not including the cost of water, due to the cost of land, transmission facilities and the gas pipeline system expansion. FPL estimates that a new third-party

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generator built outside Miami-Dade and Broward Counties would have an initial capital cost between \$950 million and \$ 1.1 billion higher than that of PEEC, in 2016 dollars, not including the cost of water nor that of a gas lateral, due to the cost of land and transmission facilities, including the cost of the transmission upgrades that would be required to address the growing imbalance between generation and demand in Miami-Dade and Broward Counties. These higher capital costs do not reflect the very real possibility that third parties would have higher capital costs for generation equipment and construction at such greenfield units compared FPL’s costs for PEEC, and they do not reflect costs for water that a third party likely would incur.

- Second, the PEEC Project will provide significant environmental benefits. Building PEEC instead of returning to service the existing Port Everglades Units 1-4 will enable FPL to reduce system air emissions during the analysis period for PEEC (2016 – 2047) as follows: carbon dioxide (CO₂) by about 22 million tons, sulfur dioxide (SO₂) by 41 thousand tons, and nitrogen oxide (NO_x) by 33 thousand tons. These emission reductions will help FPL meet whatever emission limits may be imposed in the future.

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- Third, the PEEC Project will enable FPL to reduce fuel use. The estimated average base heat rate (a measure of fuel efficiency) for PEEC is 6,330 Btu/kWh, approximately 35% better than the Port Everglades units it will replace. With the PEEC Project, FPL’s system average heat rate will improve to 8,042 Btu/kWh in 2017 after PEEC is placed in service, compared to 8,145 Btu/kWh under the Return to Service Resource Plan, an improvement of 1.3%. As a result, the PEEC Project will reduce FPL’s use of natural gas and fuel oil. For example, natural gas use in 2017 through 2026 alone would be reduced by about 48 million MMBtu and fuel oil use would be reduced by about 5.3 million barrels, compared to the resource plan that returns to service the four Port Everglades steam units. This fuel efficiency gain will help offset, in part, the effects of projected rising fuel prices in the future.

- Fourth, the PEEC Project will provide societal benefits. The Project will enable FPL to increase system generation as required to maintain system reliability and also improve system fuel efficiency thereby reducing fuel costs, without using new land and without increasing the allocation of water resources to plant use. The Project will also avoid the need for new rights-of-way for transmission facilities and gas pipelines. In addition, because PEEC can receive backup fuel delivered via waterborne transport,

1 it will contribute to much greater system reliability in the event of
2 a disruption in gas delivery than would be the case with inland
3 plants that must rely solely on truck deliveries.

4
5 In summary, bringing the PEEC Project into service in 2016 is the best, most
6 cost-effective alternative available, as part of FPL's strategic resource plan, to
7 reliably meet the growing electricity needs of FPL's customers in this time
8 frame, while also reducing CO₂ and other air emissions. The benefits of the
9 PEEC Project discussed above are summarized in Exhibit RS-1, attached to
10 my testimony.

11
12 Without the PEEC Project in 2016, FPL's customers would be served by a
13 less efficient, more costly and less environmentally sensitive system. Also,
14 without the Project, FPL would lose the opportunity to achieve significant
15 near-term CO₂ emission reductions while also taking a major step toward
16 compliance with any CO₂ emission limit that may be imposed by future laws
17 or regulations, all in a highly cost-effective way. These factors support the
18 conclusion that FPL should be granted an affirmative determination of need
19 for the PEEC Project in 2016, because the Project is needed to meet the
20 system reliability criteria considered essential by FPL and previously
21 approved by the Commission, and it is the most cost-effective alternative
22 available to enable FPL to provide adequate electricity at a reasonable cost to
23 FPL's customers.

1 **Q. Do all the resource plans presented in your testimony reflect the removal**
2 **from generation service of Turkey Point Unit 1 by 2016?**

3 A. Yes. All resource plans presented in this testimony to show the economic
4 advantage of the PEEC Project in 2016 reflect the removal of Turkey Point
5 Unit 1 from generation service by 2016. This is because, as FPL witness
6 Enjamio discusses in his testimony, removing Turkey Point Unit 1 from
7 service by 2016 results in reduced cost to customers under all resource plans.
8 For example, the cost of the PEEC Resource Plan is \$300 million CPVRR
9 lower than the cost of the same plan modified only to reflect the inclusion of
10 Turkey Point Unit 1. Conversely, if the PEEC Project were to be delayed, then
11 to the extent that such a change were to require that transmission upgrades be
12 implemented or that Turkey Point Unit 1 remain in service to address system
13 reliability concerns, costs to FPL's customers would increase.

14

15 **I. FPL'S REQUEST FOR COMMISSION APPROVALS**

16

17 **Q. Please explain the Commission decision that FPL seeks in this**
18 **proceeding.**

19 A. FPL seeks from the Commission an affirmative determination of need for the
20 PEEC Project, with an in-service date of June 2016.

21 **Q. What is the basis for FPL's requested need determination?**

22 A. FPL has previously petitioned the Commission and received an exemption
23 from the requirement of Rule 25-22.082(18), F.A.C., that a request for

1 proposals (RFP) be conducted for the modernization of Port Everglades. In its
2 order granting the exemption, the Commission reached the following
3 conclusions:

- 4 • FPL has demonstrated that the Project will likely increase the reliable
5 supply of electricity to the utility's ratepayers by providing base load
6 generation to the area of most concentrated electrical use on FPL's
7 system;
- 8 • FPL has demonstrated that the Project will otherwise serve the public
9 welfare by providing benefits beyond the provision of electric service; and
- 10 • It is unlikely that a respondent to an RFP could provide similar benefits.

11 Order No. PSC-11-0360-PAA-EI, dated August 26, 2011, at page 3.

12

13 FPL's request for an affirmative determination of need for this Project is the
14 culmination of an extensive evaluation designed to identify the best, most
15 cost-effective alternative available to meet FPL's resource need beginning in
16 2016. FPL's evaluation began with FPL's assessment of its customers' future
17 generation capacity needs after cost-effective DSM measures and renewable
18 resources were considered. FPL then compared the PEEC Project to the other
19 alternatives that I described above, such as returning to service the existing
20 Port Everglades steam units from inactive reserve, instead of building PEEC;
21 building a new combined cycle unit at a greenfield site instead of building
22 PEEC; or adding combustion turbines at a greenfield site in 2016, and thus

1 delaying PEEC to 2019. These comparisons resulted in the selection of the
2 PEEC Project as the most cost-effective self-build option available to FPL.

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4 FPL also examined the unmatched advantages of building PEEC at the
5 existing Port Everglades site, which is located in the area of FPL's service
6 territory with the highest concentration of load, and determined that there
7 would be significant additional costs to FPL's customers if FPL were to enter
8 into a long-term agreement to purchase power produced by a third party
9 generator. The results of this evaluation confirmed that the PEEC Project is
10 the best and most cost-effective alternative overall available to FPL to meet
11 resource needs beginning in 2016.

12 **Q. How much additional generating capacity will be needed to meet FPL**
13 **customers' needs in 2016?**

14 A. Based on FPL's September 2011 load forecast, FPL projects that despite
15 demand reductions achieved through FPL's extensive DSM additions, in order
16 to keep pace with population and economic growth in Florida, by 2016 FPL
17 will have to add about 284 MW of new generation capacity over and above
18 the capacity that will have been added through 2015, including the previously
19 approved uprates at FPL's existing nuclear units and the modernizations of
20 FPL's Cape Canaveral and Riviera Beach plants. FPL's resource need is
21 projected to increase in subsequent years.

22

1 **Q. Do new DSM and renewable resources diminish the beneficial effects of**
2 **the PEEC Project?**

3 A. No. There is no currently identified additional cost-effective DSM not already
4 reflected in FPL's resource plan for the period through 2020. Therefore,
5 additional cost-effective DSM cannot be relied on to contribute to system
6 reliability, and there is no evidence to suggest that additional DSM could
7 provide economic benefits to FPL's customers that could in any way diminish
8 the unquestionable benefits provided by the PEEC Project.

9
10 Similarly, there are no known additional cost-effective renewable resources
11 that could provide any significant amount of firm generating capacity prior to
12 2019, at the earliest. Therefore, renewable capacity cannot be counted on to
13 contribute to system reliability in 2016 through 2018, as does the PEEC
14 Project. Furthermore, any future renewable resources that could cost-
15 effectively provide energy (but not firm capacity) would not compete with the
16 benefits described above that will be provided by the PEEC Project, but rather
17 would complement those benefits. Adding any such non-firm renewable
18 resources that may prove available would be fully consistent with the PEEC
19 Project.

20 **Q. Has FPL selected a specific turbine design for the PEEC Project?**

21 A. Not at this time. FPL is considering a number of advanced combustion
22 turbine (CT) designs and has not yet made a final decision for the PEEC
23 Project. However, for the purpose of FPL's analyses, we have used projected

1 costs and operating characteristics consistent with a 3x1 combined cycle unit
2 with “J” CT technology.

3 **Q. Will FPL continue to evaluate the type of equipment to be used for the**
4 **PEEC Project?**

5 A. Yes. As explained in the testimony of FPL witness Gnecco, FPL will
6 continue to evaluate various advanced CT designs from different
7 manufacturers to determine which design will provide the greatest benefits to
8 FPL’s customers.

9 **Q. If FPL were to select a CT design other than the one assumed in FPL’s**
10 **analysis, how does FPL propose to address such selection as it pertains to**
11 **the determination of need requested by FPL in this proceeding?**

12 A. FPL requests that, as part of the Commission’s Order granting an affirmative
13 determination of need for the PEEC Project, the Commission provide that its
14 determination is not predicated on the use of a particular CT design, thus
15 ensuring that FPL has the flexibility through its analysis and negotiations to
16 select the CT design that best meets customers’ needs in terms of reliability
17 and cost-effectiveness. Of course, FPL would select a different technology
18 from that assumed in the analyses only if the analyzed CT technology did not
19 prove to be technically viable or if projected costs to FPL’s customers related
20 to the PEEC Project, measured in terms of system CPVRR, would be lower as
21 a result of using another CT design, taking into account any changes in the
22 capital costs attributable to the choice of technology. FPL proposes that, in
23 the event FPL finalizes a selection of a CT design other than the analyzed

1 technology for PEEC subsequent to the Commission having granted a
2 determination of need for the Project, FPL would make an informational filing
3 to the Commission that documents the projected comparative cost advantage
4 of the CT design chosen.

5

6

II. INTRODUCTION OF FPL WITNESSES

7

8 **Q. How many witnesses are supporting FPL's petition through direct pre-**
9 **filed testimony?**

10 A. There are seven FPL witnesses, including myself, who are submitting direct
11 testimony.

12 **Q. Please summarize the topics addressed in the testimony of each of the**
13 **other FPL witnesses.**

14 A. FPL witness Dr. Rosemary Morley presents FPL's load forecasting process,
15 discusses the methodologies and assumptions used in that process, and
16 presents FPL's resulting load forecasts which were used in analyses
17 performed related to the PEEC Project.

18

19 FPL witness Juan Enjamio describes FPL's IRP process, presents the need for
20 new resources to meet customers' demand for electricity in 2016 through
21 2021, and explains the economic analyses FPL performed to evaluate the
22 PEEC Project compared to other self-build alternatives. Mr. Enjamio also
23 presents the results of FPL's analyses, and explains his conclusion that based

1 on FPL's evaluation, the PEEC Project constitutes the best, most cost-
2 effective choice for FPL's customers. In addition, Mr. Enjamio presents the
3 environmental compliance cost forecasts for SO₂, NO_x, and CO₂ developed
4 consistent with information provided by ICF International and utilized by FPL
5 in its analysis of the PEEC Project and available generation alternatives.

6
7 FPL witness Heather Stubblefield describes the fuel transportation plan to
8 deliver natural gas and light oil to PEEC and testifies to the ready availability
9 of natural gas for PEEC, as part of FPL's generation system. Ms. Stubblefield
10 also supports the fuel price forecast used in FPL's economic analysis of PEEC
11 and other generation alternatives.

12
13 FPL witness Kennard Kosky discusses the environmental benefits of PEEC,
14 including projected reductions in emissions that will be realized as a result of
15 PEEC. Mr. Kosky also supports FPL's use of the environmental compliance
16 cost forecasts developed consistent with information provided by ICF
17 International in FPL's economic analyses related to the PEEC Project.

18
19 FPL witness John Gnecco presents the engineering details of FPL's PEEC
20 Project, which involves the removal of the existing steam units at Port
21 Everglades, and the construction of a new state-of-the-art 3x1 combined cycle
22 unit at the same site. Included in Mr. Gnecco's testimony are the capital and
23 O&M costs, and the performance characteristics of the technology to be used

1 for the PEEC Project, which are reflected in FPL's economic analyses. Mr.
2 Gnecco also provides cost estimates related to building new generating units
3 (FPL or third-party) at a greenfield site.

4
5 FPL witness Pedro Modia presents the transmission requirements associated
6 with the competing alternatives for meeting FPL's generation need in 2016
7 and also maintaining system stability, as well as the projected costs of meeting
8 those transmission requirements. In addition, Mr. Modia explains why the
9 projected future imbalance between generation resources and electricity
10 demand in Miami-Dade and Broward Counties is a serious concern, lists the
11 alternative courses of action that FPL has considered to mitigate that
12 imbalance in the future, and explains why the PEEC Project is the best
13 alternative from a transmission perspective.

14
15 **III. NEED FOR GENERATION CAPACITY**

16
17 **Q. Please describe how FPL determined that there is a generation capacity**
18 **need in 2016.**

19 A. FPL evaluated the adequacy of existing and anticipated future resources to
20 meet the projected future needs of its customers using FPL's current peak load
21 electricity forecast, which is presented in the testimony of FPL witness
22 Morley, and applying the two reliability planning criteria previously approved
23 by the Commission. One planning criterion consists of maintaining a 20%

1 reserve margin; the other criterion consists of demonstrating that the Loss of
2 Load Probability (LOLP) in FPL's system will remain lower than 0.1 days per
3 year during the planning period. FPL witness Enjamio discusses the
4 reliability criteria and how they were applied in FPL's generation reliability
5 assessment for the PEEC Project.

6 **Q. What was the result of FPL's current system reliability assessment?**

7 A. As explained in the testimony of FPL witness Enjamio, FPL's reliability
8 assessment completed in September of 2011 determined that -- based on
9 projected future load growth, projected DSM additions through 2016,
10 projected firm capacity purchases that will be in effect in 2016 (reflecting firm
11 purchases from cost-effective renewable resources and the expiration or
12 suspension of power purchases by 2016), and the addition by 2015 of
13 previously approved generation projects now in construction -- FPL's total
14 projected resource need in 2016 is 284 MW.

15 **Q. What amount of DSM will be available by 2016?**

16 A. FPL projects that it will add about 681 MW (summer MW at the generator) of
17 incremental DSM in August of 2011 through August of 2016, sufficient to
18 avoid about 817 MW of new generating capacity in that period, based on
19 FPL's 20% reserve margin requirement. However, this projected increase in
20 DSM has already been reflected in the reliability assessment calculation FPL
21 has performed, which identified a need for 284 MW of new generation
22 capacity in 2016 above and beyond that DSM. Without any DSM additions,
23 FPL's total generation capacity need in this period would be 1,101 MW. The

1 817 MW avoided through DSM additions are equivalent to almost 74% of that
2 total capacity need.

3
4 It is important to note that, through 2010, FPL and its customers have avoided
5 the need for approximately 5,245 MW of generation capacity as a result of
6 cost-effective DSM programs. And it is estimated that an additional 109 MW
7 of capacity will be avoided as a result of DSM additions in January through
8 July of 2011, for a total of 5,354 MW of avoided capacity. Adding the 817
9 MW of capacity that will be avoided by DSM additions in August of 2011
10 through August of 2016, FPL and its customers will have avoided a total of
11 6,171 MW of generating capacity by August of 2016 as a result of DSM
12 programs, equal to more than 23% of the projected total amount of FPL-
13 owned generating capacity (almost 26,400 MW) that will be in operation by
14 2016.

15 **Q. Has FPL identified cost-effective DSM adequate to avoid or defer the**
16 **need for the PEEC Project?**

17 A. No. FPL has not identified any additional cost-effective DSM beyond that
18 already reflected in the reliability assessment calculations. FPL does not
19 believe that sufficient additional cost-effective DSM is available to avoid or
20 defer the need for the PEEC Project in 2016.

21
22 FPL will continue to evaluate DSM opportunities as part of its planning
23 process. To the extent that FPL were to identify and implement additional

1 cost-effective DSM opportunities in the future, such additional DSM would
2 help reduce the currently projected generation capacity need in the years after
3 2016.

4 **Q. What amount of cost-effective generation capacity from renewable**
5 **resources is available in 2016?**

6 A. FPL currently projects that about 740 MW of firm generation capacity from
7 renewable resources and Qualifying Facilities (QFs) will be available to FPL
8 in 2016. However, FPL's resource plan already reflects all currently projected
9 firm generating capacity from renewable resources.

10 **Q. Is there additional cost-effective firm generating capacity available from**
11 **renewable resources or QFs to avoid or defer the need for the PEEC**
12 **Project?**

13 A. No. As explained above, all the cost-effective firm generating capacity from
14 renewable resources and QFs that FPL anticipates would be delivered to FPL
15 in 2016 has already been reflected in FPL's resource plan. FPL is currently
16 pursuing discussions that could lead to power purchase agreements for firm
17 capacity and energy from biomass renewable resources potentially totaling up
18 to 180 MW. However, if FPL enters into these agreements, it is unlikely that
19 FPL would receive any firm capacity under them until the summer of 2019, at
20 the earliest. Therefore, neither the need for, nor the benefits provided by, the
21 PEEC Project would be diminished by DSM or renewable resources or QFs.

22

23

1 **Q. Is the 20% reserve margin planning criterion appropriate for use in**
2 **FPL's IRP process?**

3 A. Yes. The 20% reserve margin reliability criterion is utilized in FPL's
4 integrated resource planning process, and it has been reviewed and approved
5 by the Commission. FPL believes that 20% is the minimum margin necessary
6 to ensure reliable service for FPL's customers.

7 **Q. Does FPL have concerns from a system planning perspective if a very**
8 **large portion of the overall 20% reserve margin criterion is met with**
9 **DSM as opposed to generation resources?**

10 A. Yes. Both FPL and the Florida Reliability Coordinating Council (FRCC) have
11 expressed serious concerns that, with the significant projected increases in
12 DSM, the contribution of generation resources to overall reserves will
13 continue to decrease to the point that DSM, and particularly load control (LC),
14 may be providing most of the reserves in the future. This could lead to
15 excessive use of LC, which based on history would likely result in many
16 residential customers canceling their participation with no advance notice.
17 FPL believes that specifying a minimum level of reserves to be provided by
18 generation capacity, for example, 10%, would effectively address this concern
19 and ensure that service reliability will be maintained throughout Florida for
20 the benefit of all customers. FPL's analysis to determine the optimal
21 minimum level of reserves from generation is still ongoing. However, I
22 should note that without the addition of PEEC in 2016, FPL reserves from
23 generation in 2016 would be only 6.3%. This means that generation would

1 provide less than a third of the total 20% reserve margin. This is of concern to
2 FPL for the reasons previously stated.

3

4 **COMPARISON OF THE PEEC PROJECT TO AVAILABLE**

5 **ALTERNATIVES**

6

7 **Q. Please describe the process that FPL used to select the PEEC Project as**
8 **the most cost-effective self-build alternative to meet FPL's need in 2016?**

9 A. FPL compared the cost (CPVRR) to its customers of the PEEC Resource Plan
10 that meets FPL's reliability criteria and includes the PEEC Project in 2016 to
11 the cost of each of three alternatives that I have described previously: the
12 Return to Service Resource Plan; the GFCC Resource Plan; and the GFCT
13 Resource Plan. As described below and explained in greater detail by FPL
14 witness Enjamio, the results of these economic analyses confirmed that the
15 PEEC Resource Plan has the lowest cost (CPVRR) of any resource plan
16 considered, and a much lower cost than resource plans that do not include
17 PEEC. Therefore PEEC constitutes the best, most cost-effective choice to
18 maintain system reliability for FPL's customers.

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1 **IV. EVALUATION OF THE PEEC PROJECT VS. RETURNING TO**
2 **SERVICE UNITS IN INACTIVE RESERVE**

3
4 **Q. Why did FPL compare the PEEC Project to returning to service the Port**
5 **Everglades units that have been placed in inactive reserve?**

6 A. Because these two alternatives are mutually exclusive, it is important to
7 confirm that the PEEC Project is more cost-effective than returning the
8 existing steam units to service, before the existing Port Everglades steam units
9 are permanently removed.

10
11 In addition, the PEEC Project and returning to service the existing steam units
12 are the only currently available alternatives that would enable FPL to maintain
13 a proper balance between generation capacity and electricity demand in
14 Miami-Dade and Broward Counties and thereby avoid the need for significant
15 transmission upgrades to increase the import capability of the FPL
16 transmission system into this critical area of Southeast Florida, as discussed
17 by FPL witness Modia.

18 **Q. What advantages does the PEEC Project provide, compared to returning**
19 **to service the existing Port Everglades steam units?**

20 A. As explained by FPL witness Gnecco, the PEEC Project will place in service a
21 new, cleaner, higher efficiency combined cycle generator instead of returning
22 to service the four existing steam units at Port Everglades, which have been
23 placed in inactive reserve. These existing units, which were built in the

1 1960s, have heat rates of approximately 9,800 Btu/kWh. In contrast, it is
2 estimated that PEEC will have an average base heat rate of about 6,330
3 Btu/kWh, approximately 35% lower than that of the old steam units. This
4 new combined cycle unit will use natural gas as the primary fuel, and will be
5 capable of using light fuel oil as backup fuel.

6

7 As a result, the resource plan with this cleaner, high efficiency PEEC unit will
8 reduce system emissions of CO₂, SO₂, and NO_x, reduce fuel use, and produce
9 very significant fuel cost savings, which will contribute to large overall
10 savings to FPL's customers. In addition, PEEC will use far less water for
11 cooling per unit of electricity produced.

12 **Q. Has FPL quantified the magnitude of the reduced emissions from the**
13 **PEEC Project compared to returning to service the Port Everglades**
14 **steam units?**

15 A. Yes. FPL has compared the emissions of its PEEC Resource Plan to those of
16 the Return to Service Resource Plan. As shown in Exhibit KFK-5 attached to
17 the testimony of FPL witness Kosky, the results of this comparison indicate
18 that during the projected life of PEEC, the PEEC Resource Plan will reduce
19 system CO₂ emissions by as much as 22 million tons compared to the Return
20 to Service Resource Plan. As a result, the PEEC Resource Plan will help FPL
21 meet any CO₂ emission targets that may be imposed in the future. Also, as is
22 presented in the testimony of FPL witness Enjamio, the PEEC Resource Plan

1 will reduce SO₂ emissions by about 41 thousand tons, and NO_x emissions by
2 33 thousand tons, during the projected life of PEEC.

3 **Q. Has FPL quantified the reduction in fuel use that will result from the**
4 **PEEC Project, compared to returning the old steam units to service?**

5 A. Yes. FPL has compared the amounts of natural gas and fuel oil used in FPL's
6 system under the PEEC Resource Plan to those under the Return to Service
7 Resource Plan. As presented in the testimony of FPL witness Enjamio, the
8 results of this comparison indicate that in 2017 through 2026 the PEEC
9 Resource Plan will reduce natural gas use by about 48 million MMBtu
10 compared to the Return to Service Resource Plan. Fuel oil use will also be
11 reduced by about 5.3 million barrels. Reducing oil and gas use is a very
12 important benefit to FPL's customers because of the projected rising cost of
13 natural gas and fuel oil in the future, and further because of the risk that actual
14 fuel costs in the future could be even higher than projected.

15 **Q. How does the cost of the PEEC Resource Plan compare with the Return**
16 **to Service Resource Plan?**

17 A. FPL determined that the PEEC Project in 2016 will result in significant
18 savings to its customers. Specifically, as discussed in detail in FPL witness
19 Enjamio's testimony, the PEEC Resource Plan will result in system savings of
20 \$469 million (CPVRR) compared to the Return to Service Resource Plan.
21 This result, combined with the other significant advantages of the PEEC
22 Project, demonstrate that the Project is far better than returning to service the

1 four Port Everglades steam units to meet its customers' resource needs in
2 2016.

3

4 **V. COMPARISON OF THE PEEC PROJECT VS. NEW FPL COMBINED**
5 **CYCLE GENERATION AT A GREENFIELD SITE**

6

7 **Q. What advantages does the PEEC Project provide compared to adding a**
8 **new combined cycle generating unit at a greenfield site?**

9 A. FPL's PEEC Project will place about 1,277 MW of new generation in
10 Broward County, which is in the area of FPL's service territory with the
11 highest electrical load concentration, and with a growing imbalance between
12 load and generation. FPL has not identified any viable greenfield sites in
13 Miami-Dade and Broward Counties, so using a greenfield site would mean
14 that the new generation would be outside the area with the highest load
15 concentration and would contribute to, rather than help reduce, the load vs.
16 generation imbalance. As stated earlier in my testimony, because of its
17 advantageous location, the PEEC Project directly addresses the imbalance in
18 Miami-Dade and Broward Counties, while new generation sited at a
19 greenfield site outside this area would contribute to the need for significant
20 transmission upgrades, estimated to cost approximately \$638 million in 2016
21 dollars. Adding new generation outside the Miami-Dade County and Broward
22 County area also would likely result in higher system transmission losses and,
23 therefore, higher fuel costs than with the PEEC Project.

1 In addition, the PEEC Project provides benefits that cannot be matched by any
2 generation addition at a greenfield site. This Project will increase FPL's
3 generating capacity without increasing the water allocated to FPL's use. Also,
4 there is no need for additional land for a new generating unit, nor are there
5 new rights-of-way required for transmission lines or gas pipelines.
6 Furthermore, because the PEEC Project will have the capability of receiving
7 light oil delivered using waterborne transportation, this new generation facility
8 will have much greater backup fuel supply reliability than any combined cycle
9 unit located at a greenfield site away from the coast where the supply of light
10 oil would be limited exclusively to truck delivery.

11 **Q. How does the cost of the PEEC Resource Plan compare with the GFCC**
12 **Resource Plan?**

13 A. As explained in the testimony of FPL witness Enjamio, FPL's analysis results
14 indicate that the cost of the PEEC Resource Plan will be \$838 million
15 (CPVRR) lower than the cost of the GFCC Resource Plan.

16

17 **VI. COMPARISON OF THE PEEC PROJECT VS. NEW FPL SIMPLE**
18 **CYCLE CTs AND THUS DEFER PEEC TO 2019**

19

20 **Q. How does the cost of the PEEC Resource Plan compare with the GFCT**
21 **Resource Plan?**

22 A. As also explained in the testimony of FPL witness Enjamio, FPL's analysis
23 results indicate that the cost of the PEEC Resource Plan will be \$425 million

1 (CPVRR) lower than the cost of the GFCT Resource Plan. In addition, if
2 PEEC were to be deferred, the cost of building PEEC later would likely be
3 greater than currently projected (especially if the economy improves and there
4 is increased competition for labor and materials). Moreover, as discussed in
5 the testimonies of Mr. Modia and Mr. Enjamio, a three-year delay in adding
6 generation in the Miami-Dade/Broward County area may not be feasible from
7 a system reliability perspective without substantial transmission upgrades, or
8 without incurring additional costs related to keeping Turkey Point Unit 1 in
9 service, due to the growing imbalance between demand and generation in that
10 area. Therefore, the adverse consequence of a delay could be significantly
11 greater than reflected above. These results confirm that proceeding with the
12 PEEC Project for a 2016 in-service date is more cost effective than deferring
13 the Project to 2019 by building simple cycle CTs.

14

15

16 **VII. EVALUATION OF PEEC VS. POSSIBLE POWER PURCHASES**

17

FROM THIRD PARTIES

18

19 **Q. Has FPL evaluated the benefits of the PEEC Project relative to possible**
20 **market alternatives?**

21 **A.** Yes. FPL considered the advantages of the PEEC Project relative to what a
22 third party would be able to offer. Because the advantages of the PEEC
23 project could not be matched by a third party offering, FPL does not believe

1 that there are any viable third-party alternatives that could substitute for the
2 Project on favorable economic terms.

3 **Q. What does FPL anticipate a third party could offer?**

4 A. A third party could offer to sell to FPL capacity from an existing generator, or
5 offer to build new generating capacity in the form of CTs in single cycle mode
6 or a combined cycle unit at a greenfield site as the source of a firm capacity
7 sale to FPL.

8 **Q. Is there any existing generator owned by a third party in Miami-Dade or
9 Broward County?**

10 A. No. Any generating capacity that could be sold to FPL from an existing
11 generator would be from a facility outside Miami-Dade and Broward Counties
12 and would therefore not contribute to balancing load and generation in that
13 critical area of FPL's service territory.

14 **Q. Could a third party build a new generating unit at a site in Miami-Dade
15 or Broward Counties to sell generating capacity to FPL?**

16 A. In theory, yes. However, it is highly unlikely that it could actually be done,
17 and even less likely that it could be completed by 2016. Furthermore, to the
18 extent that a third party could obtain and license a site and construct a new
19 generating unit by 2016, it would be very costly. A third party would have to
20 obtain land and water for a new plant, new transmission facilities, including
21 transmission lines to connect to the FPL system, and a substantially expanded
22 natural gas transportation system to deliver natural gas to the plant. Building
23 this generator in Miami-Dade County or Broward County would also require

1 permits to build the generating facility where no similar facility exists, as well
2 as an approved transmission corridor for the transmission lines and an
3 approved corridor for the gas pipeline expansion, both through the most
4 densely populated area of Florida.

5 **Q. Is FPL aware of any third party that owns or controls a site in Miami-**
6 **Dade County or Broward County that could be used to build a new**
7 **generating plant?**

8 A. No.

9 **Q. Is FPL aware of any third party that has requested studies related to**
10 **siting transmission facilities or a gas pipeline expansion in Miami-Dade**
11 **County or Broward County, or that has applied for access to water to**
12 **operate a new generating plant in the area?**

13 A. No.

14 **Q. In the unlikely event that a third party could place in service a new**
15 **generator in Miami-Dade County or Broward County by 2016, along**
16 **with the necessary new gas delivery system and new transmission**
17 **facilities, what are the advantages of the PEEC Project in 2016, relative to**
18 **what a third party could offer?**

19 A. The cost of the PEEC Project would be significantly lower than this
20 hypothetical third party alternative, even assuming that the third party could
21 build the generator at the same cost as FPL. This is because the PEEC Project
22 would have no cost for new land, no cost for water access, no cost for a new
23 gas pipeline to deliver fuel, and no cost for new transmission lines to connect

1 to the FPL system. These items would add very significant costs to any third
2 party proposal, which would make such a proposal cost much more than the
3 \$1,185 million (2016 dollars) projected overnight construction cost of the
4 PEEC Project described in FPL witness Gnecco's testimony. Based on
5 information provided in the testimonies of FPL witnesses Modia and Gnecco,
6 it is estimated that such a third-party plant would have higher capital costs of
7 at least \$900 million for land, transmission and an expanded gas transportation
8 system, compared to PEEC. Also there would be additional cost for water.

9 **Q. If a third party were to offer a capacity sale from an existing generator**
10 **located outside Miami-Dade and Broward Counties, what inherent**
11 **disadvantages would that offer have relative to PEEC?**

12 A. Such an offer would result in higher fuel costs. Because there is no third party
13 advanced combined cycle unit in Florida available to deliver generation to
14 FPL, any offer from a Florida generator necessarily would involve using one
15 or more combustion turbines in single cycle mode, which would have a much
16 higher heat rate than PEEC. Also, generation from outside Southeast Florida
17 would likely contribute to higher system transmission losses than would be
18 the case with PEEC as part of the system. These two disadvantages would
19 make energy costs much higher for any third-party alternative.

20

21 In addition, as explained in the testimony of FPL witness Modia, because of
22 the growing imbalance between generation and demand in Miami-Dade and
23 Broward Counties, unless a significant amount of generation (such as PEEC)

1 is added in that critical area prior to 2020, FPL would have to increase the
2 electricity import capability into that area by 2020, by upgrading FPL's
3 transmission system at a projected cost of approximately \$638 million in 2016
4 dollars. Therefore, the cost of purchasing capacity from outside Miami-Dade
5 and Broward Counties instead of adding generating capacity in the Miami-
6 Dade and Broward County area would include the cost burden of upgrading
7 the transmission system to allow greater electricity imports into that area.
8 Based on information provided in the testimonies of FPL witnesses Modia and
9 Gnecco, it is estimated that such a third-party plant would have higher capital
10 costs of at least \$950 million for land and transmission facilities compared to
11 PEEC. There would also be additional cost for water and a gas pipeline
12 lateral.

13 **Q. Could a third party offer to sell capacity from a new advanced combined**
14 **cycle unit located in Florida (but outside Miami-Dade and Broward**
15 **Counties), or from an existing or new combined cycle unit located outside**
16 **Florida?**

17 A. Yes, and in this case it is possible that the third party's proposed unit would
18 not have a heat rate disadvantage compared to PEEC. However, generation
19 associated with these offers would still likely contribute to greater system
20 transmission losses than would PEEC, especially those associated with offers
21 from outside Florida, which could experience losses of up to 10% at peak.

22

1 In addition, because these third party generators would be located outside
2 Miami-Dade and Broward Counties, they would not contribute to mitigating
3 the growing imbalance in that area, and FPL would have to incur the cost of
4 approximately \$638 million in 2016 dollars, in transmission upgrades to
5 increase electricity imports into the area. Therefore, all else equal, from the
6 perspective of FPL and its customers, offers from such third party combined
7 cycle generators would be burdened by an incremental cost of approximately
8 \$638 million in 2016 dollars mentioned above, compared to PEEC.

9 **Q. Could a third party overcome the advantages described above for the**
10 **PEEC Project in 2016 to the extent that such offer would be FPL's best,**
11 **most cost-effective alternative?**

12 A. FPL does not believe any third party could overcome these substantial
13 economic advantages of the PEEC Project to offer FPL a power purchase on
14 terms that would be competitive. It is unrealistic to expect that a third party
15 could reduce the cost of any generator by an amount sufficient to offset the
16 inherent advantages of PEEC. Therefore, FPL has concluded that the PEEC
17 Project is more cost effective than any viable alternative that could be offered
18 by a third party.

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1 **SUMMARY OF RESULTS OF ALTERNATIVE ANALYSES**

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Q. Is the PEEC Project the most cost-effective alternative to meet FPL’s customers’ needs for new resources?

A. Yes. As discussed earlier in my testimony and further explained in the testimony of FPL witness Enjamio, the PEEC Project is the best, most cost-effective self-build option available to meet the needs of FPL’s customers in 2016. Specifically, this Project was determined to be the best, most cost-effective alternative compared to returning to service older units now in inactive reserve, adding a new combined cycle unit at a greenfield site, or delaying PEEC by adding CTs. Also, because of the significant unmatched advantages of the PEEC Project, FPL’s evaluation of other possible resource alternatives that could be offered by a third party indicates that the Project would result in far lower costs to FPL’s customers.

Furthermore, none of these alternatives offered any non-economic advantages over the PEEC Project. Therefore, FPL has established that the Project in 2016 is by far the best, most cost-effective alternative to meet FPL customers’ needs for additional resources.

1 **VIII. ADVERSE CONSEQUENCES OF DENYING FPL'S REQUEST FOR A**
2 **DETERMINATION OF NEED FOR THE PEEC PROJECT**

3
4 **Q. Would there be any adverse consequences to FPL and its customers if the**
5 **Commission were to not grant determinations of need for the PEEC**
6 **Project in 2016?**

7 A. Yes. If the Commission were to not grant the determination of need sought in
8 this proceeding, FPL's customers will face significant adverse consequences
9 related to the cost of electricity, air emissions, and other factors.

10 **Q. Please describe the adverse consequences of denying FPL's petition in**
11 **this proceeding.**

12 A. FPL's analysis shows that without the PEEC Project in 2016 FPL's customers
13 would incur higher costs. Through the analyses described above of the
14 various alternatives, FPL has estimated the incremental cost to FPL's
15 customers to range from at least \$425 million to \$838 million (CPVRR).
16 Moreover, if natural gas prices and/or environmental compliance costs were to
17 be higher than currently projected, the cost penalty to FPL's customers could
18 be even greater. In other words, because of the very high fuel efficiency and
19 low emission rates of the resource plan with PEEC, not approving the PEEC
20 Project would remove a very effective hedge that would protect FPL's
21 customers in the event that future environmental compliance costs or natural
22 gas costs are higher than currently projected. Delaying the PEEC Project
23 would also result in higher costs to FPL's customers.

1 Not granting a determination of need for the PEEC Project would result in
2 higher system emissions of CO₂ (22 million tons), SO₂ (41 thousand tons)
3 and NO_x (33 thousand tons) if FPL were to then meet its 2016 resource need
4 by returning to service units that are now on Inactive Reserve. Rejecting the
5 Project would also result in lower system fuel and/or system transmission
6 efficiency and consequently much greater use of fuel oil and natural gas in the
7 future.

8
9 In addition, if instead of proceeding with the PEEC Project, FPL were to build
10 a new unit at a greenfield site, FPL would have to utilize new land and new
11 Florida water resources and obtain new rights-of-way for transmission and gas
12 pipeline facilities to achieve, with such new generation additions and at much
13 higher costs, the same generation capacity increase that could be achieved
14 without using new land or new Florida water resources, with PEEC.
15 Furthermore, unless new generation is added in the Miami-Dade and Broward
16 County area, FPL would have to implement very costly transmission upgrades
17 to mitigate the growing imbalance between generation and load in that area.
18 As I discussed previously, this would add approximately \$638 million in 2016
19 dollars.

20
21 In summary, it is clear that FPL's customers would not benefit if the
22 Commission were to deny an affirmative determination of need for the PEEC
23 Project with a planned in-service date of June 2016 in this proceeding.

1 **CONCLUSION**

2

3 **Q. What is your conclusion about the PEEC Project?**

4 A. Building the PEEC Project to go into service in 2016 presents a unique
5 opportunity to add generating capacity cost-effectively, with societal benefits,
6 in the area of FPL's service territory with the greatest electrical load
7 concentration. FPL has demonstrated that this Project is clearly the most
8 beneficial choice among the available alternatives to meet FPL's customers'
9 resource needs in 2016.

10

11 Because of these significant benefits, the Commission should grant an
12 affirmative determination of need for the PEEC Project with a target in-
13 service date of June 2016, based on a finding that this Project is the best, most
14 cost-effective alternative to meet the needs of FPL's customers in 2016.

15 **Q. Does this conclude your direct testimony?**

16 A. Yes.



Summary of Benefits of PEEC Project

- **Best, most cost-effective alternative to ensure system reliability**
- **Compared to returning to service old steam units from inactive reserve:**
 - **Customer savings of \$469 Million (CPVRR);**
 - **Reduced air emissions through 2047: CO₂ by 22 million tons, SO₂ by 41 thousand tons, NO_x by 33 thousand tons;**
 - **Improved FPL system average heat rate, the measure of fuel efficiency, by more than 1.3%; and**
 - **Reduced use of fuel oil by 5.3 million barrels and natural gas by 48 million MMBtu in 2017 through 2026 alone.**
- **Compared to a new CC unit at a greenfield site:**
 - **Customer savings of \$838 million (CPVRR) vs. CC unit;**
 - **Avoids need for \$638 million (2016 dollars) in transmission upgrades into the Miami-Dade and Broward County area by 2020;**
 - **Avoids the need for new land, new water resource allocation, and new rights-of-way for transmission and gas pipelines; and**
 - **Provides option to deliver backup fuel via waterborne transportation, thus enhancing system reliability.**
- **Compared to adding new CTs that defer PEEC to 2019:**
 - **Customer savings of \$425 Million (CPVRR) vs. CT; and**
 - **Avoids likely increase in the cost of PEEC if deferred.**