2016 Southeastern Florida Study: Results To-Date

Corporate Real Estate, EMT, Engineering & Construction, Environmental Services, Power Delivery, Project Development, and Resource Assessment & Planning

December 15, 2016

Presentation Overview

- **Background and Scope, Key Assumptions, and Analysis Approach**
- **Analysis Iteration # 1: Fossil Generation Outside of SE Florida Region *(Discussed in this presentation)***
- **Analysis Iteration # 2: Fossil Generation Inside SE Florida Region *(Discussed in this presentation)***
- **Analysis Iteration # 3: Renewable & Storage Options Inside SE Florida Region *(Resource plans for this Iteration are briefly discussed in this presentation)***
- **Analysis Iteration # 4: Incorporates Retirements**
- **Conclusions**

Background and Scope

- FPL's typical integrated resource planning (IRP) process identifies the timing and magnitude of resource needs for the entire FPL system, then determines the most economical way to meet those system needs while keeping in mind various system concerns
- One of these system concerns is maintaining a balance between load, generation, and transmission import capability in Miami-Dade and Broward counties (i.e., the "SE Florida region")
- This balance can be maintained in 3 ways: (1) building new generation in SE Florida, (2) building new transmission lines to import power from north of the region into SE Florida, and/or (3) lowering SE Florida load
- Previous generation additions (Turkey Point 5, WCEC 1-3, Turkey Point nuclear uprates, etc.) have addressed the SE Florida imbalance issue enough to defer the concern for a number of years
- However, based on the 2016 TYSP assumptions, SE Florida load and generation were projected to be out of balance as early as 2023 and FPL's total system need requires resources by 2024

Consequently, FPL began analyses in mid-2016 to examine resource plans that could simultaneously address the resource needs for both the FPL system overall and the SE Florida region

Key Assumptions

- A "simultaneous solution" analysis is more complex, and more time consuming, than typical IRP analyses
- This requires a "freezing" of assumptions for the duration of the study
- Most of the assumptions are identical to those in FPL's 2016 TYSP including: (i) load forecast, (ii) fuel cost forecast, (iii) CO2 compliance cost forecast, (iv) DSM projections, (v) the 2016 PV and 2019 CC additions, and (vi) financial parameters (ROE, discount rate, etc.)
- In addition, the following new assumptions were used:
  - Regarding nuclear, Turkey Point Units 6 & 7 are assumed not to enter service prior to 2030*
  - Regarding solar, approximately 1,700 MW (Nameplate) of new PV is assumed to be added by 2023 with all of it at specific sites outside the SE Florida region *(this encompasses the 300 MW shown in the 2016 TYSP plus 1,400 MW more)*
  - All CC additions, including the 2019 Okeechobee CC, are assumed to be 1,751 MW (unless otherwise noted)

* This assumption is based on : (i) the 2016 NCR filing information regarding a "pause" before preconstruction begins, and (ii) the desire to examine the SE Florida imbalance issue without TP 6 & 7 because these units would fully address the issue for a number of years once the units are in-service

The assumption of 1,700 MW of additional PV delays the FPL system resource need

- The incremental PV delays FPL's system need from 2024 to 2025 (and results in a total system need of approx. 3,500 MW thru 2030)

SE Florida Study: Reserve Margin Projections

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
						Total Reserve Margin			Generation Only Reserve Margin		
Year	Unit Additions	Total Firm Capacity Available MW	Total Peak Demand MW	DSM MW	Firm Summer Peak Demand MW	Reserves MW	%	MWs Above / (Below) Total RM MW	Reserves MW	%	MWs Above / (Below) 10% Gen-Only MW
2019	Okeechobee CC	28,551	24,893	2,041	22,852	5,699	24.9	1,129	3,658	14.7	1,169
2020	300 MW Solar	27,995	25,206	2,088	23,117	4,877	21.1	254	2,789	11.1	268
2021		28,142	25,316	2,136	23,180	4,962	21.4	326	2,825	11.2	294
2022	OCEC Inc MW *	28,272	25,540	2,185	23,355	4,916	21.1	245	2,732	10.7	178
2023	1,414 MW Solar *	28,898	25,833	2,234	23,599	5,299	22.5	579	3,065	11.9	482
2024		28,895	26,180	2,284	23,896	4,999	20.9	220	2,715	10.4	97
2025		28,892	26,572	2,334	24,238	4,654	19.2	(194)	2,320	8.7	(337)
2026		28,889	27,068	2,384	24,684	4,206	17.0	(731)	1,822	6.7	(885)
2027		28,883	27,665	2,434	25,231	3,652	14.5	(1,394)	1,218	4.4	(1,549)
2028		28,880	28,225	2,484	25,741	3,140	12.2	(2,008)	656	2.3	(2,167)
2029		28,878	28,805	2,534	26,271	2,607	9.9	(2,647)	73	0.3	(2,808)
2030		28,875	29,398	2,584	26,814	2,061	7.7	(3,301)	(523)	-1.8	(3,462)

* These capacity changes are presented in a way to facilitate comparison to FPL's 2016 TYSP

Therefore, the analyses assumed FPL's 1st system need is in 2025 and the analyses address subsequent needs through the year 2030

The need to simultaneously solve for both FPL system and SE Florida region requires a new analysis approach

- FPL knows of no existing planning model that can simultaneously solve for two such needs; therefore a new approach with 4 analysis iterations was used:

  Iteration # 1:

  - Examines CCs and CTs outside SE Florida to meet system needs and transmission facilities needed for system integration and/or to address the regional imbalance

  Iteration # 2:

  - Expands to examine CCs and CTs sited inside the SE Florida region and resulting changes in needed transmission facilities

  Iteration # 3:

  - Further expands to examine smaller-scale (PV, batteries, DSM etc.) options sited within the SE Florida region and resulting changes in needed transmission facilities

  Iteration # 4:

  - Incorporates potential retirements of existing units

This approach also accounted for projected gas pipeline expansions that would be needed to serve new generating units

Each iteration involves work by multiple departments that is partly sequential, partly in parallel

- The general work flow for each iteration consists of 5 economic analysis steps:
  1. CRE, EMT, E&C, Power Delivery, ENV, DSM, Operations, Project Development, and RAP identifies resource options appropriate for the specific iteration
  2. RAP develops resource plans that consist of these resource options, identifies the most promising resource plans, and provides these plans to Power Delivery and EMT
  3. Power Delivery performs load flow analyses of these plans to determine needed transmission integration facilities for each plan, then develops cost projections for these facilities
  4. EMT develops costs for needed expansion of gas pipelines
  5. RAP incorporates the transmission and pipeline costs with its own projections of resource plan costs (fuel, emissions, generation capital, etc.) to create a Total Cost projection for each resource plan
- The plans are also reviewed from a non-economic or risk perspective

The best resource plan(s) from each iteration will be retained and will help guide the work for subsequent iterations

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- Analysis Iteration # 4: Incorporates retirements
- Conclusions

8 candidate sites located outside of the SE Florida region were initially considered for Iteration # 1 analyses

- Of these 8 candidates, 3 sites were selected for the analyses: (i) Okeechobee, (ii) Martin, and (iii) Hendry *(the 5 other sites - Putnam, Sanford, DeSoto, Ft. Myers, and the ICL Martin site – were not analyzed for various reasons)*
- One new CC (1,751 MW) and several pairs of CTs (469 MW per pair) were assumed to be feasible at the Okeechobee and Martin sites
- Due to the Hendry land agreement with the Seminole tribe, a maximum of only 2,200 MW of new generation (equivalent to one CC and only one pair of CTs) was assumed at Hendry
- The projected costs for the CCs at each site are similar except for gas pipelines; a Hendry CC requires a new pipeline costing approx. $300 million (overnight cost) while the other two sites require only low cost laterals
- Due to the need for a new pipeline to Hendry, the team assumed no CTs would be sited at Hendry unless a CC unit was built there first

Capacity at Hendry has the potential to lower SE Florida regional transmission costs, thus it has the potential to partially offset the pipeline costs to Hendry

72 resource plans were created and initially analyzed

- RAP's EGEAS optimization model was used to create, and perform preliminary economic analyses of, resource plans consisting of CCs and CTs at these 3 sites through 2030
- 53 resource plans were created which focused on addressing FPL's system resource needs which begin in 2025; thus these plans first added new generation in 2025
- Because new generation at Hendry was projected to have the potential to assist the SE Florida imbalance,19 additional plans assuming a Hendry CC was added in 2023 were created
- The preliminary economic analyses performed with the EGEAS model established an economic ranking of each of the two sets of plans
- Based partly on the results from these preliminary economic analyses, and partly on their potential for reducing SE Florida regional transmission costs, RAP and Power Delivery identified 12 of these plans as the most promising

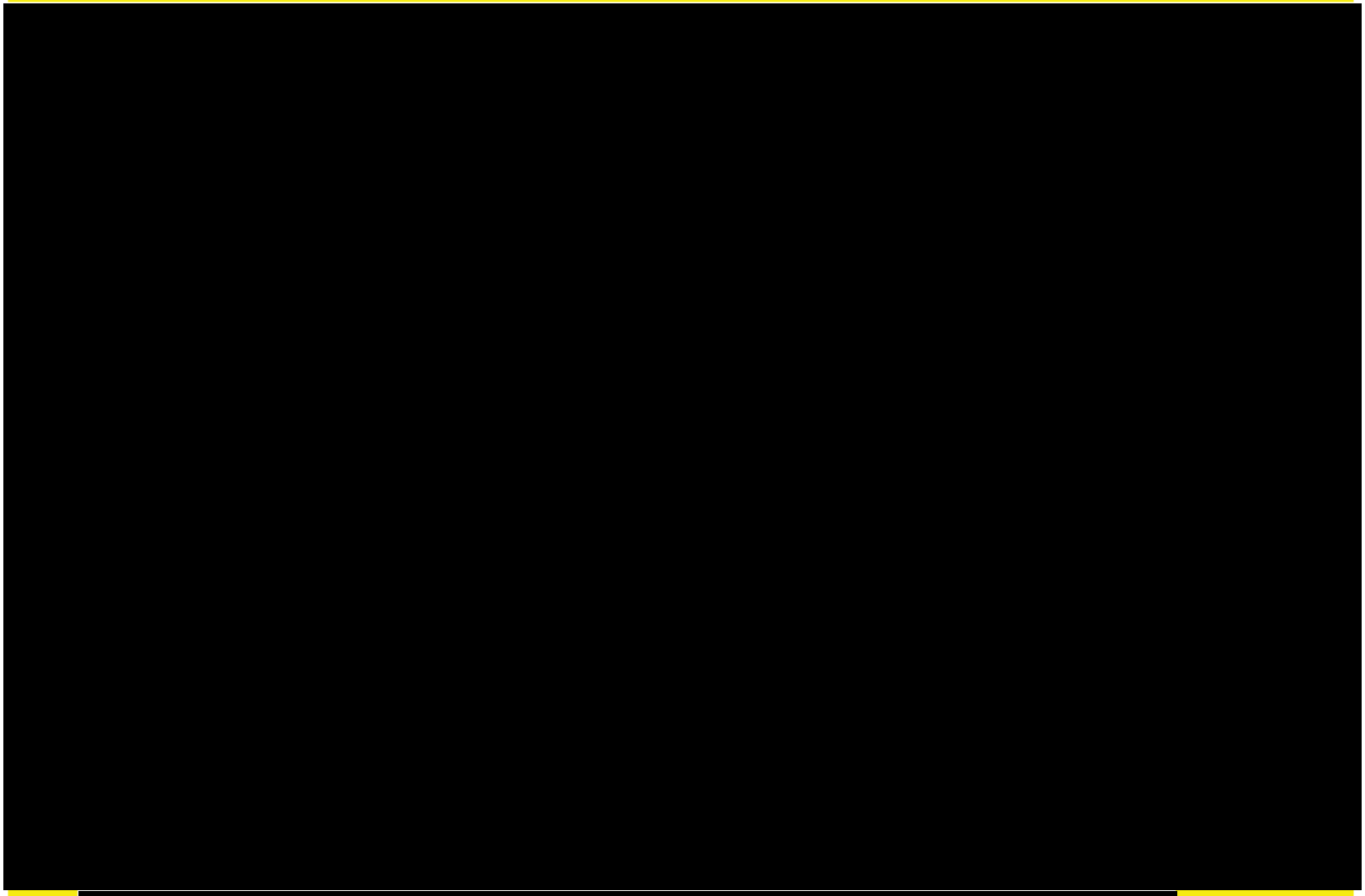
Analyses then continued for these 12 resource plans

9 of the 12 plans have new generation beginning in 2025 and 3 plans have new generation at Hendry beginning in 2023

Southeastern Florida Study Resource Plans: Analysis Iteration #1

Year	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7	Plan 8	Plan 9	Plan 10	Plan 11	Plan 12
2023										Hendry CC	Hendry CC	Hendry CC
2024												
2025	Martin CC	Okee CC	Martin CC	Okee CC	Hendry CC	Hendry CC	Martin CC	Okee CC	Hendry CC			
2026												
2027												
2028	Okee CC	Martin CC	Hendry CC	Hendry CC	Martin CC	Okee CC	Okee 2 CT	Okee 2 CT	Hendry 2 CT	Martin CC	Okee CC	Hendry 2 CT
2029							Okee 4 CT	Okee 4 CT	Okee 4 CT			Okee 4 CT
2030							Okee 2 CT	Okee 2 CT	Okee 2 CT			Okee 2 CT

These 12 plans were then sent to Power Delivery for load flow analyses and transmission costing work while RAP continued its economic analyses



Summary of Transmission Planning findings for the 12 resource plans to meet needs through 2030 (Iteration # 1):

- Pre-established assumptions for PV and viable fossil sites for combined cycle and simple cycle CTs affected needs of both Resource Planning (RAP) and Power Delivery
- Previously stated transmission need in 2023 (+/- 1yr) deferred to 2025 time frame coinciding with RAP need for system needs
  - Due to solar at Hendry and changes in dispatch with additional solar
- Projects identified are variations of familiar major projects such as Terrytown, Sheridan, and Andytown-Quarry
- Nine (9) individual transmission projects were developed for cost estimating to provide input for CPVRR calculation of each Resource Plan
- Preferred resource plans analyzed include those that construct the Corbett-Sugar-Quarry 500 kV project (CSQ) with the 2025 generation (OCEC #2 or MR #9 CC) to increase transfer capability into Miami-Dade and Broward and gain additional benefit to CIP-014 station(s)

Transmission projects have been developed to address the SE Florida imbalance in all 12 resource plans for Iteration #1

Several types of costs were calculated for each of these 12 resource plans

- A Generation & Fuel Cost was developed by RAP, using its UPLAN model and Fixed Cost Spreadsheet, to account for system fuel costs, system emission costs, new generation fixed and variable costs, and transmission interconnection capital costs
- A gas Pipeline Cost was developed by EMT and/or E&C
- A Transmission Integration Cost was developed by Power Delivery/RAP to account for various types of transmission costs
- These transmission costs accounted for: (i) integrating the new generation into the transmission system, (ii) addressing any remaining imbalance in SE Florida by increasing import capability into the region, and, as needed, (iii) modifying the transmission interconnection costs for new generation that had been initially provided to RAP
- Then the three types of costs mentioned above were summed to develop a Resource Plan Total Cost value for each resource plan
- This Resource Plan Total Cost accounts for the years 2017 through 2061 and is expressed as CPVRR costs in millions of dollars, discounted back to 2017

The next three slides present the projected costs and rankings of the plans as each type of cost is accounted for

The economic ranking of resource plans based solely on the Generation & Fuel Costs is shown below

SE Florida Study: Economic Results for Iteration #1: Without Pipeline or Transmission Integration Costs
(CPVRR, millions, 2017$, 2017-2061)

At this stage, the economics of at least 6 plans are relatively close

After accounting for Pipeline Costs, the relative economics of the resource plans change significantly

SE Florida Study: Economic Results for Iteration #1: Without Transmission Integration Costs
(CPVRR, millions, 2017$, 2017-2061)

Economic Rank:	1	2	3	4	5	6	7	8	9	10	11	12
Year	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 10	Plan 11	Plan 7	Plan 8	Plan 9	Plan 12
2023							Hendry CC	Hendry CC				Hendry CC
2024												
2025	Martin CC	Okee CC	Martin CC	Okee CC	Hendry CC	Hendry CC			Martin CC	Okee CC	Hendry CC	
2026												
2027												
2028	Okee CC	Martin CC	Hendry CC	Hendry CC	Martin CC	Okee CC	Martin CC	Okee CC	Okee 2 CT	Okee 2 CT	Hendry 2 CT	Hendry 2 CT
2029									Okee 4 CT	Okee 4 CT	Okee 4 CT	Okee 4 CT
2030									Okee 2 CT	Okee 2 CT	Okee 2 CT	Okee 2 CT
(1) Generation & Fuel Costs	94,902	94,901	94,943	94,936	94,948	94,942	95,012	95,006	95,425	95,418	95,455	95,519
(2) Pipeline Costs *	20	23	232	255	268	288	295	315	24	47	292	319
(3) Transmission Integration Costs *	0	0	0	0	0	0	0	0	0	0	0	0
(4) Resource Plan Total Costs	**94,922**	**94,924**	**95,174**	**95,190**	**95,216**	**95,230**	**95,307**	**95,321**	**95,450**	**95,466**	**95,747**	**95,838**
(5) Difference from Lowest Cost Plan	0	2	253	268	294	308	385	399	528	544	825	916

** Pipeline and tranmission integration costs are only for the new units identified in each plan (not for filler units)*

Plans with CCs at Martin & Okeechobee are now the most economic

The addition of Transmission Integration Costs does not significantly change the economic ranking of the resource plans

SE Florida Study: Economic Results for Iteration #1
(CPVRR, millions, 2017$, 2017-2061)

Economic Rank:	1	2	3	4	5	6	7	8	9	10	11	12
Year	**Plan 1**	**Plan 2**	**Plan 3**	**Plan 5**	**Plan 4**	**Plan 6**	**Plan 10**	**Plan 11**	**Plan 7**	**Plan 8**	**Plan 9**	**Plan 12**
2023							Hendry CC	Hendry CC				Hendry CC
2024												
2025	Martin CC	Okee CC	Martin CC	Hendry CC	Okee CC	Hendry CC			Martin CC	Okee CC	Hendry CC	
2026												
2027												
2028	Okee CC	Martin CC	Hendry CC	Martin CC	Hendry CC	Okee CC	Martin CC	Okee CC	Okee 2 CT	Okee 2 CT	Hendry 2 CT	Hendry 2 CT
2029									Okee 4 CT	Okee 4 CT	Okee 4 CT	Okee 4 CT
2030									Okee 2 CT	Okee 2 CT	Okee 2 CT	Okee 2 CT
(1) Generation & Fuel Costs	94,902	94,901	94,943	94,948	94,936	94,942	95,012	95,006	95,425	95,418	95,455	95,519
(2) Pipeline Costs *	20	23	232	268	255	288	295	315	24	47	292	319
(3) Transmission Integration Costs *	319	317	466	425	453	425	430	430	319	486	434	438
(4) Resource Plan Total Costs	**95,241**	**95,241**	**95,641**	**95,641**	**95,643**	**95,655**	**95,737**	**95,750**	**95,769**	**95,952**	**96,181**	**96,276**
(5) Difference from Lowest Cost Plan	0	0	400	400	402	414	496	509	528	711	940	1,035

** Pipeline and tranmission integration costs are only for the new units identified in each plan (not for filler units)*

For Iteration # 1, the most economic resource plans have a CC at both Martin and Okeechobee

Several conclusions were drawn from the results of the Iteration # 1 analyses

- After the resource plans were developed, Power Delivery's analyses found that the assumption of 1,700 MW (Nameplate) of additional PV, including three 75 MW projects in Hendry county whose sites have the PV connecting to 500 kV lines, defers the SE Florida regional imbalance
- As a result, the originally projected start date for the imbalance was delayed from 2023 to 2025, thus eliminating any advantage that could have been gained by siting a CC at Hendry in 2023
- Thus resource plans with a Hendry CC, whether in 2023 or 2025, were significantly disadvantaged in Iteration # 1 analyses due to the need for a new gas pipeline to that site plus significant transmission costs for the greenfield site
- The most economic resource plan from Iteration # 1 has CC units at Martin and Okeechobee
- As shown on the prior slide, transmission costs – while significant – were not the determining factor among these resource plans

Having identified the most economic plans in which all new generation is sited outside of SE Florida, the analysis shifted to examine new CC & CT generation inside the SE Florida region in Iteration # 2

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- **Conclusions**

4 sites inside the SE Florida region were selected as potential sites for new CC and CT generation in Iteration # 2

- The 4 sites are: (i) Turkey Point, (ii) Andytown, (iii) Miami-Dade Limestone Producers Association Site (MDLPAS)* and (iv) Fort Lauderdale (for a potential repowering)
- Regarding the Turkey Point site, significant questions from an NRC “nuclear hazard” perspective exist regarding whether new gas-fired capacity utilizing a new gas pipeline and additional gas could be permitted at this site
- However, for this specific study these questions were ignored in order to perform a “what if” economic analysis of new gas-fired capacity at this site
- In addition to the 4 SE Florida sites listed above, the Hendry site was retained for further analyses in Iteration # 2 because: (i) new capacity sited at Hendry will help address the SE Florida imbalance issue, and (ii) the site is near the assumed pipeline route for other options
- The resource options examined in Iteration # 2 were new CCs and CTs

Most of the combinations of technology and site will require additional gas provided by a new gas pipeline

* The MDLPAS site is not owned by FPL

[redacted]

These assumptions relate to environmental permitting of CCs and CTs, particularly in Miami-Dade county

- The first assumption is that a total of only 2,250 MW of new CC and/or CT capacity at the selected sites in Miami-Dade county (the equivalent of 1 CC and 2 CTs) is likely able to be permitted in the county
  - This assumption is primarily due to impact of particulate emissions on Everglades National Park
- The second assumption is that it appears to be possible to permit, both in Miami-Dade and Broward counties, oil-fired CTs that run up to approximately 3,000 hours/year if a CO catalyst is installed
  - The possibility of oil-fired CTs was looked at in order to examine the possibility of whether a meaningful amount of capacity could be sited in the SE Florida region without having to build a new pipeline down from Martin to Broward and/or Miami-Dade
  - The oil-fired CTs were examined in conjunction with a possible repowering of the Fort Lauderdale site that would use FGT gas

Based on these assumptions, 14 resource plans were developed for analysis in Iteration # 2

Four of the 14 plans (# 4, 5, 13, & 14) add capacity earlier than 2025 to prepare for a repowering of Ft. Lauderdale

SE Florida Study: Resource Plans for Iteration # 2

Year	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7	Plan 8	Plan 9	Plan 10	Plan 11	Plan 12	Plan 13	Plan 14
2023	---	---	---	---	---	---	---	---	---	---	---	---	2 CTs at Andytown & 2 CTs at Turkey Point. * (Remove Lauderdale CCs)	---
2024	---	---	---	2 CTs at Andytown & 2 CTs at Turkey Point. * (Remove Lauderdale CCs)	2 CTs at Andytown & 2 CTs at Turkey Point. ** (Remove Lauderdale CCs)	---	---	---	---	---	---	---	---	2 CTs at Andytown and 2 CTs at Turkey Point.** (Remove Lauderdale CCs)
2025	Hendry CC	Hendry CC	Hendry CC	Hendry CC	Hendry CC	Turkey Point CC	Turkey Point CC	Andytown CC	Andytown CC	Andytown CC	MDLPAS CC	MDLPAS CC	---	Hendry CC & Hendry 2 CTs
2026	---	---	---	---	---	---	---	---	---	---	---	---	Ft Lauderdale Repower (1,751 MW)	---
2027	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2028	Andytown CC	Turkey Point CC	MDLPAS CC	Ft Lauderdale Repower (1,751 MW)	Ft Lauderdale Repower (1,200 MW) & 2 CTs at Hendry	Andytown CC	Hendry CC	Turkey Point CC	MDLPAS CC	Hendry CC	Andytown CC	Hendry CC	Hendry CC	Ft Lauderdale Repower (1,200 MW)
2029	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2030	---	---	---	---	---	---	---	---	---	---	---	---	---	---

* Both pairs of CTs will run oil until a new pipeline is built from Hendry to a repowered Fort Lauderdale CC (1,751 MW). At that time the CTs will run on gas.

** Both pairs of CTs will run on oil throughout. The repowered Fort Lauderdale CC (1,200 MW) will use FGT gas.

Two plans (#5 & #14) do not require a new pipeline into SE Florida

[redacted]

[redacted]

A ranking based solely on generation & fuel appears below

SE Florida Study: Economic Results for Iteration #2: Without Pipeline or Transmission Integration Costs
(CPVRR, millions, 2017$, 2017-2061)

Economic Rank:	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Year	Plan 3	Plan 1	Plan 12	Plan 10	Plan 9	Plan 11	Plan 13 [1]	Plan 4 [1]	Plan 2	Plan 7	Plan 8	Plan 6	Plan 5 [1]	Plan 14 [1]
2023	---	---	---	---	---	---	2 CTs at Andytown & 2 CTs at Turkey Point. [2] (Remove Lauderdale CCs)	---	---	---	---	---	---	---
2024	---	---	---	---	---	---	---	2 CTs at Andytown & 2 CTs at Turkey Point. [2] (Remove Lauderdale CCs)	---	---	---	---	2 CTs at Andytown & 2 CTs at Turkey Point. [3] (Remove Lauderdale CCs)	2 CTs at Andytown and 2 CTs at Turkey Point.[3] (Remove Lauderdale CCs)
2025	Hendry CC	Hendry CC	MDLPAS CC	Andytown CC	Andytown CC	MDLPAS CC	---	Hendry CC	Hendry CC	Turkey Point CC	Andytown CC	Turkey Point CC	Hendry CC	Hendry CC & Hendry 2 CTs
2026	---	---	---	---	---	---	Ft Lauderdale Repower (1,751 MW)	---	---	---	---	---	---	---
2027	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2028	MDLPAS CC	Andytown CC	Hendry CC	Hendry CC	MDLPAS CC	Andytown CC	Hendry CC	Ft Lauderdale Repower (1,751 MW)	Turkey Point CC	Hendry CC	Turkey Point CC	Andytown CC	Ft Lauderdale Repower (1,200 MW) & 2 CTs at Hendry	Ft Lauderdale Repower (1,200 MW)
2029	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2030	---	---	---	---	---	---	---	---	---	---	---	---	---	---
(1) Generation & Fuel Costs	95,045	95,046	95,057	95,060	95,128	95,129	95,165	95,171	95,321	95,372	95,406	95,444	95,508	95,539
(2) Pipeline Costs *	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(3) Transmission Integration Costs *	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(4) Resource Plan Total Costs	**95,045**	**95,046**	**95,057**	**95,060**	**95,128**	**95,129**	**95,165**	**95,171**	**95,321**	**95,372**	**95,406**	**95,444**	**95,508**	**95,539**
(5) Difference from Lowest Cost Plan	-	1	13	15	83	84	121	127	277	328	362	399	463	494

** Pipeline and transmission integration costs are only for the new units identified in each plan (not for filler units)*

[1] Includes projected annual operational costs for existing Lauderdale units 4 & 5 as avoided costs from retiring these units

[2] Both pairs of CTs will run oil until a new pipeline is built from Hendry to a repowered Fort Lauderdale CC (1,751 MW). At that time the CTs will run on gas.

[3] Both pairs of CTs will run on oil throughout. The repowered Fort Lauderdale CC (1,200 MW) will use FGT gas.

At this stage, at least 6 plans are reasonably close to each other

The order of the best 6 plans is rearranged with pipeline costs

SE Florida Study: Economic Results for Iteration #2: Without Transmission Integration Costs
(CPVRR, millions, 2017$, 2017-2061)

Economic Rank:	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Year	Plan 1	Plan 11	Plan 9	Plan 10	Plan 3	Plan 12	Plan 14[1]	Plan 13[1]	Plan 4[1]	Plan 5[1]	Plan 8	Plan 2	Plan 6	Plan 7
2023	---	---	---	---	---	---	---	2 CTs at Andytown & 2 CTs at Turkey Point. [2] (Remove Lauderdale CCs)	---	---	---	---	---	---
2024	---	---	---	---	---	---	2 CTs at Andytown and 2 CTs at Turkey Point.[3] (Remove Lauderdale CCs)	---	2 CTs at Andytown & 2 CTs at Turkey Point. [2] (Remove Lauderdale CCs)	2 CTs at Andytown & 2 CTs at Turkey Point. [3] (Remove Lauderdale CCs)	---	---	---	---
2025	Hendry CC	MDLPAS CC	Andytown CC	Andytown CC	Hendry CC	MDLPAS CC	Hendry CC & Hendry 2 CTs	---	Hendry CC	Hendry CC	Andytown CC	Hendry CC	Turkey Point CC	Turkey Point CC
2026	---	---	---	---	---	---	---	Ft Lauderdale Repower (1,751 MW)	---	---	---	---	---	---
2027	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2028	Andytown CC	Andytown CC	MDLPAS CC	Hendry CC	MDLPAS CC	Hendry CC	Ft Lauderdale Repower (1,200 MW)	Hendry CC	Ft Lauderdale Repower (1,751 MW)	Ft Lauderdale Repower (1,200 MW) & 2 CTs at Hendry	Turkey Point CC	Turkey Point CC	Andytown CC	Hendry CC
2029	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2030	---	---	---	---	---	---	---	---	---	---	---	---	---	---
(1) Generation & Fuel Costs	95,046	95,129	95,128	95,060	95,045	95,057	95,539	95,165	95,171	95,508	95,406	95,321	95,444	95,372
(2) Pipeline Costs *	496	440	454	544	575	585	268	641	650	373	655	780	662	826
(3) Transmission Integration Costs *	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(4) Resource Plan Total Costs	**95,542**	**95,569**	**95,581**	**95,604**	**95,620**	**95,642**	**95,807**	**95,807**	**95,822**	**95,881**	**96,062**	**96,102**	**96,106**	**96,198**
(5) Difference from Lowest Cost Plan	-	26	39	61	78	100	264	264	279	338	519	559	563	656

** Pipeline and transmission integration costs are only for the new units identified in each plan (not for filler units)*

[1] Includes projected annual operational costs for existing Lauderdale units 4 & 5 as avoided costs from retiring these units

[2] Both pairs of CTs will run oil until a new pipeline is built from Hendry to a repowered Fort Lauderdale CC (1,751 MW). At that time the CTs will run on gas.

[3] Both pairs of CTs will run on oil throughout. The repowered Fort Lauderdale CC (1,200 MW) will use FGT gas.

Pipeline cost inclusion results in wider separation between the best 6 plans and the remaining plans

Inclusion of integration costs clarify the best Iteration # 2 plan

SE Florida Study: Economic Results for Iteration #2
(CPVRR, millions, 2017$, 2017-2061)

Economic Rank:	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Year	Plan 11	Plan 12	Plan 1	Plan 9	Plan 10	Plan 3	Plan 13[1]	Plan 4[1]	Plan 14[1]	Plan 6	Plan 5[1]	Plan 8	Plan 7	Plan 2
2023	---	---	---	---	---	---	2 CTs at Andytown & 2 CTs at Turkey Point. [2] (Remove Lauderdale CCs)	---	---	---	---	---	---	---
2024	---	---	---	---	---	---	---	2 CTs at Andytown & 2 CTs at Turkey Point. [2] (Remove Lauderdale CCs)	2 CTs at Andytown and 2 CTs at Turkey Point.[3] (Remove Lauderdale CCs)	---	2 CTs at Andytown & 2 CTs at Turkey Point. [3] (Remove Lauderdale CCs)	---	---	---
2025	MDLPAS CC	MDLPAS CC	Hendry CC	Andytown CC	Andytown CC	Hendry CC	---	Hendry CC	Hendry CC & Hendry 2 CTs	Turkey Point CC	Hendry CC	Andytown CC	Turkey Point CC	Hendry CC
2026	---	---	---	---	---	---	Ft Lauderdale Repower (1,751 MW)	---	---	---	---	---	---	---
2027	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2028	Andytown CC	Hendry CC	Andytown CC	MDLPAS CC	Hendry CC	MDLPAS CC	Hendry CC	Ft Lauderdale Repower (1,751 MW)	Ft Lauderdale Repower (1,200 MW)	Andytown CC	Ft Lauderdale Repower (1,200 MW) & 2 CTs at Hendry	Turkey Point CC	Hendry CC	Turkey Point CC
2029	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2030	---	---	---	---	---	---	---	---	---	---	---	---	---	---
(1) Generation & Fuel Costs	95,129	95,057	95,046	95,128	95,060	95,045	95,165	95,171	95,539	95,444	95,508	95,406	95,372	95,321
(2) Pipeline Costs *	440	585	496	454	544	575	641	650	268	662	373	655	826	780
(3) Transmission Integration Costs *	56	82	183	162	157	186	203	203	337	56	314	162	82	186
(4) Resource Plan Total Costs	**95,625**	**95,724**	**95,726**	**95,743**	**95,760**	**95,806**	**96,010**	**96,025**	**96,143**	**96,162**	**96,195**	**96,223**	**96,280**	**96,288**
(5) Difference from Lowest Cost Plan	-	98	101	118	135	181	384	400	518	537	570	598	655	662

** Pipeline and transmission integration costs are only for the new units identified in each plan (not for filler units)*

[1] Includes projected annual operational costs for existing Lauderdale units 4 & 5 as avoided costs from retiring these units

[2] Both pairs of CTs will run oil until a new pipeline is built from Hendry to a repowered Fort Lauderdale CC (1,751 MW). At that time the CTs will run on gas.

[3] Both pairs of CTs will run on oil throughout. The repowered Fort Lauderdale CC (1,200 MW) will use FGT gas.

The plan with CCs at MDLPAS and Andytown emerges as the most economic resource plan for Iteration # 2

The following conclusions can be drawn from the analyses of the Iteration # 2 resource plans

- The most economic resource plan from the Iteration # 2 analyses, consisting of one new CC at MDLPAS and another CC at Andytown, has a projected CPVRR cost of $95,625 million
- This projected CPVRR cost is $384 million more expensive than the most economic plan from Iteration # 1: a CC at Martin followed by a CC at Okeechobee (or vice versa)
- The primary reason for this is that the most economic plan from Iteration # 2 - plus 11 of the other 13 resource plans analyzed in Iteration # 2 - require an expensive new gas pipeline that would be built from Martin into the SE Florida region
- In other words, the analyses show that it is more economic to build new generation outside of the SE Florida region – and address the regional imbalance with new transmission (primarily the Corbett-Sugar-Quarry line) – than it is to build new fossil generation inside the SE Florida region which requires an expensive new gas pipeline

The focus of the analyses now shifts to examine the economics of solar and/or batteries that might be sited in the SE Florida region

Presentation Overview

- **Background and Scope, Key Assumptions, and Analysis Approach**
- **Analysis Iteration # 1: Fossil Generation Outside of SE Florida Region *(Discussed in this presentation)***
- **Analysis Iteration # 2: Fossil Generation Inside SE Florida Region *(Discussed in this presentation)***
- **Analysis Iteration # 3: Renewable & Storage Options Inside SE Florida Region *(Resource plans for this Iteration are briefly discussed in this presentation)***
- **Analysis Iteration # 4: Incorporates retirements**
- **Conclusions**

Iteration # 3 examined a variety of solar and battery options

- Two general types of solar options and two general types of battery options, were utilized in the Iteration # 3 analyses:
  - **Large solar:** Two FPL-owned sites (Turkey Point-Homestead at 60 MW and Krome at 74.5 MW), plus 4 hypothetical sites in SE Florida of 74.5 MW each, for a total of ~ 433 MW (nameplate)
  - **Small solar:** Individual PV projects ranging from 0.25-to-2.0 MW each, sited on commercial and industrial rooftop and parking canopies, in amounts ranging from 50-to-100 MW per year
  - **Large battery:** 4-hour duration projects from 20-to-150 MW each at a number of (mostly) FPL-owned sites, for a maximum of ~ 1,200 MW
  - **Small battery:** Unsited generic 4-hour duration projects between 10-to-30 MW each connected to distribution feeders/substations for a maximum of ~ 1,800 MW
- In addition, a variety of assumptions were made in the Iteration # 3 analyses

Some assumptions were specific to the type of project, including (but not limited to) the following:

- **For Large Solar:**
  - Potential unsited large solar projects were limited to a total of 4 due to uncertainties around acquiring suitable land in SE Florida
  - The $18 million land cost at the Krome site was considered a sunk cost and was not included in the analyses
- **For Small Solar:**
  - No land purchases are assumed; costs for 30-year leases of parking and rooftop space are included in the analyses
- **For Large Batteries:**
  - Specific sites were selected for large projects
  - The Andytown site would host three 150 MW battery projects; if implemented this would eliminate the site as a potential CC site
- **For Large and Small Batteries:**
  - A roundtrip battery efficiency of 90% was assumed
  - Battery benefits include capacity deferral & variable cost (fuel, VOM, emissions, etc.) savings (including fuel savings sensitivity)
  - 30-year replenishment costs were assumed

Other assumptions were more general in nature

- **Re Firm Capacity:**
  - Each battery MW is considered as 100% firm (100 MW of batteries was assumed to be 100 MW of firm capacity)
  - However, due to FPL's current projection of declining firm contribution for PV as PV levels increase, 100 MW nameplate of PV was assumed to range from 41 to 33 MW of firm capacity
- **Re Distribution Benefits:**
  - Small batteries, because they are integrated into the distribution system, are credited with distribution benefits of $118/kW if sited in Miami-Dade and $67/kW if sited in Broward (based on DSM values)
  - Solar is assumed to get no distribution benefits due to its intermittent output
- **Re Meeting Remaining Capacity Needs:**
  - Any new CC capacity additions that would be needed to meet the capacity need that remained after the solar and/or battery additions were assumed to be the Okeechobee CC unit first, followed by the Martin CC unit

Portfolios of the solar and battery options were developed first, then resource plans were created around the portfolios

- Three different types of portfolios of solar and/or battery options were developed:
  - Battery only (or battery intensive)
  - Solar only
  - Battery and solar
- Certain portfolios were primarily designed to address the ~ 1,200 MW SE Florida regional need; however, solar and/or batteries' firm capacity contributions served to defer CC additions that were needed to meet the remaining system need
- Other portfolios (consisting of higher levels of solar and batteries) were designed to not only address the SE Florida regional need, but to address much, if not all, of the FPL system need

Five resource plans were eventually developed for analysis in Iteration # 3

The following 5 resource plans were developed for analysis in Iteration # 3

	Plan 1: Large Battery			Plan 2: Small Battery Only			Plan 3: Large & Small Solar			Plan 4: Solar & Batteries			Plan 5: Solar & Batteries		
Year	Battery MW	Solar MW	CC MW	Battery MW	Solar MW	CC MW	Battery MW	Solar MW	CC MW	Battery MW	Solar MW	CC MW	Battery MW	Solar MW	CC MW
2020	0	0	---	0	0	---	0	50	---	0	50	---	0	0	---
2021	0	0	---	0	0	---	0	125	---	0	125	---	0	0	---
2022	0	0	---	0	0	---	0	110	---	0	110	---	0	0	---
2023	0	0	---	0	0	---	0	100	---	0	50	---	0	0	---
2024	0	0	---	0	0	---	0	100	---	0	50	---	0	0	---
2025	200	135	---	200	0	---	0	398	---	0	348	---	200	135	---
2026	150	0	1,751	200	0	1,751	0	100	1,751	600	50	---	575	0	---
2027	200	0	---	300	0	---	0	0	---	605	50	---	0	0	1,751
2028	350	0	---	200	0	---	0	0	---	600	50	---	0	0	---
2029	200	0	---	200	0	---	0	0	1,751	600	50	---	270	0	---
2030	225	0	1,751	300	0	1,751	0	0	---	590	50	---	450	298	---
MW (Nameplate) =	**1,325**	**135**	**3,502**	**1,400**	**0**	**3,502**	**0**	**983**	**3,502**	**2,995**	**983**	**0**	**1,495**	**433**	**1,751**

Plans 1 – 3 are primarily focused on the SE Florida regional need; Plans 4 & 5 also address system needs

A ranking of these 5 plans based solely on generation and fuel appears below

SE Florida Study: Economic Results for Iteration #3: Without Pipeline or Transmission Integration Costs
(CPVRR, millions, 2017$, 2017-2061)

	Plan 1: Large Battery Intensive			Plan 2: Small Battery Only			Plan 3: Large & Small Solar Only			Plan 4: Solar & Batteries			Plan 5: Solar & Batteries		
Year	Battery MW	Solar MW	CC MW	Battery MW	Solar MW	CC MW	Battery MW	Solar MW	CC MW	Battery MW	Solar MW	CC MW	Battery MW	Solar MW	CC MW
2020	0	0	---	0	0	---	0	50	---	0	50	---	0	0	---
2021	0	0	---	0	0	---	0	125	---	0	125	---	0	0	---
2022	0	0	---	0	0	---	0	110	---	0	110	---	0	0	---
2023	0	0	---	0	0	---	0	100	---	0	50	---	0	0	---
2024	0	0	---	0	0	---	0	100	---	0	50	---	0	0	---
2025	200	135	---	200	0	---	0	398	---	0	348	---	200	135	---
2026	150	0	1,751	200	0	1,751	0	100	1,751	600	50	---	575	0	---
2027	200	0	---	300	0	---	0	0	---	605	50	---	0	0	1,751
2028	350	0	---	200	0	---	0	0	---	600	50	---	0	0	---
2029	200	0	---	200	0	---	0	0	1,751	600	50	---	270	0	---
2030	225	0	1,751	300	0	1,751	0	0	---	590	50	---	450	298	---
MW (Nameplate) =	**1,325**	**135**	**3,502**	**1,400**	**0**	**3,502**	**0**	**983**	**3,502**	**2,995**	**983**	**0**	**1,495**	**433**	**1,751**
(1) Generation & Fuel Costs (w/o solar & battery fixed costs)	$94,537			$94,722			$93,629			$93,388			$94,125		
(1a) Battery fixed costs	$928			$1,162			$0			$2,260			$1,088		
(1b) Solar fixed costs	$132			$0			$1,575			$1,538			$428		
(2) Pipeline Costs *	---			---			---			---			---		
(3) Transmission Integration Costs *	---			---			---			---			---		
(4) Resource Plan Total Costs	$95,597			$95,884			$95,204			$97,186			$95,641		
(5) Difference from Lowest Cost Plan	$393			$680			$0			$1,982			$437		

** Pipeline and transmission integration costs are only for the new units identifided in each plan (not for filler units)*

The "all solar" plan, Plan 3, is the most economic of these 5 plans at this stage

Inclusion of pipeline costs does not significantly change the picture

SE Florida Study: Economic Results for Iteration #3: Without Transmission Integration Costs
(CPVRR, millions, 2017$, 2017-2061)

	Plan 1: Large Battery			Plan 2: Small Battery Only			Plan 3: Large & Small Solar			Plan 4: Solar & Batteries			Plan 5: Solar & Batteries		
Year	Battery MW	Solar MW	CC MW	Battery MW	Solar MW	CC MW	Battery MW	Solar MW	CC MW	Battery MW	Solar MW	CC MW	Battery MW	Solar MW	CC MW
2020	0	0	---	0	0	---	0	50	---	0	50	---	0	0	---
2021	0	0	---	0	0	---	0	125	---	0	125	---	0	0	---
2022	0	0	---	0	0	---	0	110	---	0	110	---	0	0	---
2023	0	0	---	0	0	---	0	100	---	0	50	---	0	0	---
2024	0	0	---	0	0	---	0	100	---	0	50	---	0	0	---
2025	200	135	---	200	0	---	0	398	---	0	348	---	200	135	---
2026	150	0	1,751	200	0	1,751	0	100	1,751	600	50	---	575	0	---
2027	200	0	---	300	0	---	0	0	---	605	50	---	0	0	1,751
2028	350	0	---	200	0	---	0	0	---	600	50	---	0	0	---
2029	200	0	---	200	0	---	0	0	1,751	600	50	---	270	0	---
2030	225	0	1,751	300	0	1,751	0	0	---	590	50	---	450	298	---
MW (Nameplate) =	**1,325**	**135**	**3,502**	**1,400**	**0**	**3,502**	**0**	**983**	**3,502**	**2,995**	**983**	**0**	**1,495**	**433**	**1,751**
(1) Generation & Fuel Costs (w/o solar & battery fixed costs)	$94,537			$94,722			$93,629			$93,388			$94,125		
(1a) Battery fixed costs	$928			$1,162			$0			$2,260			$1,088		
(1b) Solar fixed costs	$132			$0			$1,575			$1,538			$428		
(2) Pipeline Costs *	$22			$22			$22			$0			$21		
(3) Transmission Integration Costs *	-			-			-			-			-		
(4) Resource Plan Total Costs	$95,619			$95,906			$95,226			$97,186			$95,662		
(5) Difference from Lowest Cost Plan	$393			$680						$1,960			$436		

** Pipeline and transmission integration costs are only for the new units identifided in each plan (not for filler units)*

Plan 3 remains the most economic of these 5 plans at this point

The "all solar" Plan 3 emerges as the best plan from Iteration # 3

SE Florida Study: Economic Results for Iteration #3
(CPVRR, millions, 2017$, 2017-2061)

	Plan 1: Large Battery			Plan 2: Small Battery Only			Plan 3: Large & Small Solar			Plan 4: Solar & Batteries			Plan 5: Solar & Batteries		
Year	Battery MW	Solar MW	CC MW	Battery MW	Solar MW	CC MW	Battery MW	Solar MW	CC MW	Battery MW	Solar MW	CC MW	Battery MW	Solar MW	CC MW
2020	0	0	---	0	0	---	0	50	---	0	50	---	0	0	---
2021	0	0	---	0	0	---	0	125	---	0	125	---	0	0	---
2022	0	0	---	0	0	---	0	110	---	0	110	---	0	0	---
2023	0	0	---	0	0	---	0	100	---	0	50	---	0	0	---
2024	0	0	---	0	0	---	0	100	---	0	50	---	0	0	---
2025	200	135	---	200	0	---	0	398	---	0	348	---	200	135	---
2026	150	0	1,751	200	0	1,751	0	100	1,751	600	50	---	575	0	---
2027	200	0	---	300	0	---	0	0	---	605	50	---	0	0	1,751
2028	350	0	---	200	0	---	0	0	---	600	50	---	0	0	---
2029	200	0	---	200	0	---	0	0	1,751	600	50	---	270	0	---
2030	225	0	1,751	300	0	1,751	0	0	---	590	50	---	450	298	---
MW (Nameplate) =	**1,325**	**135**	**3,502**	**1,400**	**0**	**3,502**	**0**	**983**	**3,502**	**2,995**	**983**	**0**	**1,495**	**433**	**1,751**
(1) Generation & Fuel Costs (w/o solar & battery fixed costs)	$94,537			$94,722			$93,629			$93,388			$94,125		
(1a) Battery fixed costs	$928			$1,162			$0			$2,260			$1,088		
(1b) Solar fixed costs	$132			$0			$1,575			$1,538			$428		
(2) Pipeline Costs *	$22			$22			$22			$0			$21		
(3) Transmission Integration Costs *	$11			$11			$264			$0			$0		
(4) Resource Plan Total Costs	$95,630			$95,917			$95,490			$97,186			$95,662		
(5) Difference from Lowest Cost Plan	$140			$427			$0			$1,696			$172		

** Pipeline and transmission integration costs are only for the new units identifided in each plan (not for filler units)*

The addition of batteries in 4 of these plans contributed to significantly higher net costs

The following conclusions can be drawn from the analyses of the Iteration # 3 resource plans

- The most economic resource plan from the Iteration # 3 analyses, Plan 3, consisting of 983 MW of PV (but no batteries) sited in the SE Florida region, plus delayed Okeechobee and Martin CC units, has a projected CPVRR cost of $95,490 million
- This projected CPVRR cost is $249 million more expensive than the most economic plan from Iteration # 1: a CC at Martin followed by a CC at Okeechobee (or vice versa)
- In addition, the PV-based plan requires the addition of the CSQ transmission line that addresses the SE Florida imbalance issue for virtually all of the 10-year study period, thus negating the need to site the PV in the SE Florida region where land costs are high
- This suggests that if the same amount of PV could be sited outside of SE Florida at a $249 million CPVRR lower cost, such a plan might be competitive with the most economic plan
- In regard to batteries only, Plan 2 from this iteration adds small batteries (but no PV) and is much more expensive: $676 million CPVRR more expensive than the most economic plan

Presentation Overview

- **Background and Scope, Key Assumptions, and Analysis Approach**
- **Analysis Iteration # 1: Fossil Generation Outside of SE Florida Region *(Discussed in this presentation)***
- **Analysis Iteration # 2: Fossil Generation Inside SE Florida Region *(Discussed in this presentation)***
- **Analysis Iteration # 3: Renewable & Storage Options Inside SE Florida Region *(Resource plans for this Iteration are briefly discussed in this presentation)***
- **Analysis Iteration # 4: Incorporates retirements**
- **Conclusions**

Two questions were raised during executive review of the results of Iterations # 1 and # 2

- The first question is:
  1) *If the Corbett-Sugar-Quarry (CSQ) 500 kV transmission line is put into service as soon as possible, do the economics of the best plan improve by repowering the existing Lauderdale CC units?*

- Relevant considerations for this question include:
  - The earliest the CSQ line can be brought into service is likely the end of 2018, so removal of the existing Lauderdale CC units could not begin until the beginning of 2019
  - Due to space considerations, the existing Lauderdale CC units must be removed prior to construction of a new CC unit
  - Because the existing units comprise 884 MW, their removal will require roughly 250 MW of new capacity be added to the system in 2020, then maintained at 100 MW until mid-2022 *(the earliest practical date for a Lauderdale repowering),* by PPAs

A modified version of Plan 2 from Iteration # 1 was used to address the first question

	Early Fort Lauderdale Retirement Question	
	(1)	(2)
	Resource Plan 2 (from Iteration # 1)	Modified Plan 2 to Address Early PFL Retirement Question
Year	Unit Additions	Unit Additions
2018	---	CSQ line in-service 12/31/2018
2019	OCEC	OCEC; Lauderdale 4 & 5 retired 1/1/2019
2020	300 MW Solar	250 MW PPA; 300 MW Solar
2021	---	100 MW PPA
2022	OCEC Incremental MW	OCEC Incremental MW; Ft. Lauderdale 2x1 CC (1,163 MW)
2023	1,414 MW Solar	1,414 MW Solar
2024	---	---
2025	Okeechobee CC; CSQ line in-service 1/01/2025	100 MW PPA
2026	---	Okeechobee CC
2027	---	---
2028	Martin CC	Martin CC
2029	---	---
2030	---	---

The other question relates to potential early retirement of existing 800 MW units

- The second question is:
  2) Again assuming that the CSQ line is brought in-service as soon as possible, are the economics of the best plan improved by retiring both of the 800 MW units at either the Martin or Manatee sites (but not at both sites)?

- Relevant considerations for this question include:
  - The total capacity lost by retiring either pair of units – 1,626 MW at Martin or 1,618 MW at Manatee – is roughly equivalent to a new CC unit of 1,751 MW)
  - The Martin site has an advantage over the Manatee site because of its easy access to all three natural gas pipelines
  - Conversely, a repowering of the Manatee site may have negative transmission implications for 3rd parties
  - Because there is sufficient space at the Martin site, a new CC could be built before Martin 1 & 2 are retired and removed

A modified version of Plan 1 from Iteration # 1 was used to address this second question

	Retirement of Two 800 MW Units Question	
	(1)	(2)
	Resource Plan 1 (from Iteration # 1)	**Modified Plan 1 to Address Retirement of Two 800 MW Units**
Year	**Unit Additions**	**Unit Additions**
2018	---	CSQ line in-service 12/31/2018
2019	OCEC	OCEC
2020	300 MW Solar	300 MW Solar
2021	---	Martin 1 & 2 retired; new Martin CC # 1 added
2022	OCEC Incremental MW	OCEC Incremental MW
2023	1,414 MW Solar	1,414 MW Solar
2024	---	---
2025	Martin CC; CSQ line in-service 1/01/2025	Martin CC
2026	---	---
2027	---	---
2028	Okeechobee CC	Okeechobee CC
2029	---	---
2030	---	---

The analyses results of these plans are as follows:

SE Florida Study: Economic Results for Iteration # 4
(CPVRR, millions, 2017$, 2017-2061)

	Early Fort Lauderdale Retirement Question	
	(1)	(2)
	Resource Plan 2 (from Iteration # 1)	Modified Plan 2 to Address Early PFL Retirement Question
Year	Unit Additions	Unit Additions
2018	---	CSQ line in-service 12/31/2018
2019	OCEC	OCEC; Lauderdale 4 & 5 retired 1/1/2019
2020	300 MW Solar	250 MW PPA; 300 MW Solar
2021	---	100 MW PPA
2022	OCEC Incremental MW	OCEC Incremental MW; Ft. Lauderdale 2x1 CC (1,163 MW)
2023	1,414 MW Solar	1,414 MW Solar
2024	---	---
2025	Okeechobee CC; CSQ line in-service 1/01/2025	100 MW PPA
2026	---	Okeechobee CC
2027	---	---
2028	Martin CC	Martin CC
2029	---	---
2030	---	---
(1) Generation & Fuel Costs	**94,902**	**94,964**
(2) Pipeline Costs	**20**	**22**
(3) Transmission Integration Costs	**319**	**401**
(4) Resource Plan Total Costs	**95,241**	**95,387**
(5) Difference from Lowest Cost Plan	**0**	**146**

	Retirement of Two 800 MW Units Question	
	(1)	(2)
	Resource Plan 1 (from Iteration # 1)	Modified Plan 1 to Address Retirement of Two 800 MW Units
Year	Unit Additions	Unit Additions
2018	---	CSQ line in-service 12/31/2018
2019	OCEC	OCEC
2020	300 MW Solar	300 MW Solar
2021	---	Martin 1 & 2 retired; new Martin CC # 1 added
2022	OCEC Incremental MW	OCEC Incremental MW
2023	1,414 MW Solar	1,414 MW Solar
2024	---	---
2025	Martin CC; CSQ line in-service 1/01/2025	Martin CC
2026	---	---
2027	---	---
2028	Okeechobee CC	Okeechobee CC
2029	---	---
2030	---	---
(1) Generation & Fuel Costs	**94,901**	**95,275**
(2) Pipeline Costs	**23**	**19**
(3) Transmission Integration Costs	**317**	**502**
(4) Resource Plan Total Costs	**95,241**	**95,796**
(5) Difference from Lowest Cost Plan	**0**	**555**

Assuming the CSQ line in 2018 for all 4 cases would lower the CPVRR differentials shown above to ~ $74M and $473M, respectively

Presentation Overview

- **Background and Scope, Key Assumptions, and Analysis Approach**
- **Analysis Iteration # 1: Fossil Generation Outside of SE Florida Region *(Discussed in this presentation)***
- **Analysis Iteration # 2: Fossil Generation Inside SE Florida Region *(Discussed in this presentation)***
- **Analysis Iteration # 3: Renewable & Storage Options Inside SE Florida Region *(Resource plans for this Iteration are briefly discussed in this presentation)***
- **Analysis Iteration # 4: Incorporates retirements**
- **Conclusions**

The key conclusions from the SE Florida Study are:

1. The most economic way to address the SE Florida regional need is to construct the CSQ transmission line (which is projected to address this need through at least 2028) and to address FPL's

- With the CSQ line in place, the most economic way using fossil generation to


FPL

Appendix

Economic Results Summary for Iteration #1
(CPVRR, millions, 2017$, 2017-2061)

	Generation Capital FPL (Millions)	Generation Fixed O&M (Millions)	TX Interconnection Capital FPL (Millions)	Capital Replacement Charges (Millions)	Short Term Purchase (Millions)	Total Fuel/VOM/Startup/ Emission Costs (Millions)	(1) Generation & Fuel Costs (Millions)	(2) Pipeline Capital Costs * (Millions)	Total Generation & Fuel + Pipeline Costs (Millions)	(3) Transmission Integration Costs * (Millions)	(4) Resource Plan Total Costs (Millions)	(5) Difference from Lowest Cost Plan (Millions)
Plan 1	$5,846	$386	$378	$838	$12	$87,443	$94,902	$20	$94,922	$319	95,241	0
Plan 2	$5,845	$386	$378	$838	$12	$87,443	$94,901	$23	$94,924	$317	95,241	0
Plan 3	$5,853	$409	$390	$838	$12	$87,443	$94,943	$232	$95,174	$466	95,641	400
Plan 4	$5,845	$407	$391	$838	$12	$87,443	$94,936	$255	$95,190	$453	95,643	402
Plan 5	$5,853	$412	$392	$838	$12	$87,443	$94,948	$268	$95,216	$425	95,641	400
Plan 6	$5,846	$411	$393	$838	$12	$87,443	$94,942	$288	$95,230	$425	95,655	414
Plan 7	$5,552	$385	$432	$743	$12	$88,302	$95,425	$24	$95,450	$319	95,769	528
Plan 8	$5,544	$384	$433	$743	$12	$88,302	$95,418	$47	$95,466	$486	95,952	711
Plan 9	$5,552	$410	$435	$743	$12	$88,302	$95,455	$292	$95,747	$434	96,181	940
Plan 10	$5,971	$420	$399	$856	$12	$87,356	$95,012	$295	$95,307	$430	95,737	496
Plan 11	$5,964	$419	$400	$856	$12	$87,356	$95,006	$315	$95,321	$430	95,750	509
Plan 12	$5,670	$418	$443	$761	$12	$88,215	$95,519	$319	$95,838	$438	96,276	1,035

** Pipeline and tranmission integration costs are only for the new units identified in each plan (not for filler units)*

Economic Results Summary for Iteration #2
(CPVRR, millions, 2017$, 2017-2061)

	Generation and Land Capital (Millions)	Generation Fixed O&M (Millions)	TX Interconnection Capital FPL (Millions)	Capital Replacement Charges (Millions)	Short Term Purchase (Millions)	Total Fuel/VOM/ Startup/Emission Costs (Millions)	(1) Generation & Fuel Costs (Millions)	(2) Pipeline Capital Costs * (Millions)	Total Generation + Pipeline Costs (Millions)	(3) Transmission Integration Costs * (Millions)	(4) Resource Plan Total Costs (Millions)	(5) Difference from Lowest Cost Plan (Millions)
Plan 1	$5,924	$434	$389	$838	$12	$87,449	$95,046	$496	$95,542	$183	$95,726	$101
Plan 2	$5,884	$434	$704	$838	$12	$87,449	$95,321	$780	$96,102	$186	$96,288	$662
Plan 3	$5,852	$434	$416	$838	$12	$87,493	$95,045	$575	$95,620	$186	$95,806	$181
Plan 4	$6,216	$363	$399	$684	$12	$87,498	$95,171	$650	$95,822	$203	$96,025	$400
Plan 5	$6,217	$372	$416	$664	$12	$87,826	$95,508	$373	$95,881	$314	$96,195	$570
Plan 6	$5,968	$434	$723	$838	$12	$87,469	$95,444	$662	$96,106	$56	$96,162	$537
Plan 7	$5,897	$434	$738	$838	$12	$87,454	$95,372	$826	$96,198	$82	$96,280	$655
Plan 8	$5,972	$434	$682	$838	$12	$87,469	$95,406	$655	$96,062	$162	$96,223	$598
Plan 9	$5,940	$434	$393	$838	$12	$87,511	$95,128	$454	$95,581	$162	$95,743	$118
Plan 10	$5,941	$434	$381	$838	$12	$87,454	$95,060	$544	$95,604	$157	$95,760	$135
Plan 11	$5,928	$434	$399	$838	$12	$87,518	$95,129	$440	$95,569	$56	$95,625	$0
Plan 12	$5,857	$434	$413	$838	$12	$87,504	$95,057	$585	$95,642	$82	$95,724	$98
Plan 13	$6,191	$354	$392	$663	$17	$87,547	$95,165	$641	$95,807	$203	$96,010	$384
Plan 14	$6,243	$373	$420	$666	$12	$87,825	$95,539	$268	$95,807	$337	$96,143	$518

Economic Results Summary for Iteration #3
(CPVRR, millions, 2017$, 2017-2061)

	Generation and Land Capital (Millions)	Generation Fixed O&M (Millions)	TX Interconnection Capital FPL (Millions)	Capital Replacement Charges (Millions)	Short Term Purchase (Millions)	Firm Gas Transport Costs (Millions)	Total Fuel/VOM/Startup/ Emission Costs (Millions)	(1) Generation & Fuel Costs (Millions)	(2) Pipeline Capital Costs (Millions)	Total Generation & Fuel + Pipeline Costs (Millions)	(3) Transmission Integration Costs (Millions)	(4) Resource Plan Total Costs (Millions)	(5) Difference from Lowest Cost Plan (Millions)
Plan 1	$6,419	$405	$368	$851	$12	$28	$87,514	$95,597	$22	$95,619	$11	$95,630	$140
Plan 2	$6,607	$396	$355	$760	$12	$37	$87,717	$95,884	$22	$95,906	$11	$95,917	$427
Plan 3	$6,956	$600	$410	$803	$12	($63)	$86,486	$95,204	$22	$95,226	$264	$95,490	$0
Plan 4	$7,367	$587	$308	$648	$12	$28	$88,236	$97,186	$0	$97,186	$0	$97,186	$1,696
Plan 5	$6,249	$396	$354	$751	$12	$28	$87,851	$95,641	$21	$95,662	$0	$95,662	$172

Economic Results Summary for Iteration #4
(CPVRR, millions, 2017$, 2017-2061)

	Generation and Land Capital (Millions)	Generation Fixed O&M (Millions)	TX Interconnection Capital FPL (Millions)	Capital Replacement Charges (Millions)	Short Term Purchase (Millions)	Total Fuel/VOM/Star Emission Costs (Millions)	(1) Generation & Fuel Costs (Millions)	(2) Pipeline Capital Costs * (Millions)	Total Generation + Pipeline Costs (Millions)	(3) Transmission Integration Costs * (Millions)	(4) Resource Plan Total Costs (Millions)	(5) Difference from Lowest Cost Plan (Millions)
Iteration#4 Plan - Lauderdale Retirement	$6,500	$332	$390	$634	$23	$87,084	$94,964	$22	$94,986	$401	$95,387	$0
Iteration#4 Plan - Martin Retirement	$7,066	$332	$453	$931	$12	$86,480	$95,275	$19	$95,294	$502	$95,796	$409