June 21, 2021

VIA ELECTRONIC FILING
Adam Teitzman, Commission Clerk
Division of the Commission Clerk
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, FL 32399

Re: Docket No. 20210015-EI
Petition by FPL for Bate Rate Increase and Rate Unification

Dear Mr. Teitzman:

Attached for filing on behalf of the CLEO Institute and Vote Solar in the above-referenced docket are the testimony and exhibits of Rachel Wilson.

Thank you for your assistance in this matter. Please let me know if you should have questions regarding this submission.

Sincerely,

Katie Chiles Ottenweller
Attorney for Vote Solar
838 Barton Woods Road NE
Atlanta, GA 30307
(706)224-8017
katie@votesolar.org

CERTIFICATE OF SERVICE
Docket No. 20210015-EI

I HEREBY CERTIFY that a true and correct copy of the testimony and exhibits of Rachel Wilson filed on behalf of The CLEO Institute and Vote Solar have been furnished by electronic mail on this 21st day of June, 2021, to the following:

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/s/ ***Katie Chiles Ottenweller***

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Petition for rate increase by Florida Power and Light Company	**DOCKET NO. 20210015-EI**

DIRECT TESTIMONY OF
RACHEL WILSON

ON BEHALF OF
THE CLEO INSTITUTE AND VOTE SOLAR

June 21, 2021

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1. INTRODUCTION AND QUALIFICATIONS

Q. Please state your name, business address, and position.

A. My name is Rachel Wilson, and I am a Principal Associate with Synapse Energy Economics, Incorporated (Synapse). My business address is 485 Massachusetts Avenue, Suite 3, Cambridge, Massachusetts 02139.

Q. Please describe Synapse Energy Economics.

A. Synapse is a research and consulting firm specializing in energy and environmental issues, including electric generation, transmission and distribution system reliability, ratemaking and rate design, electric industry restructuring and market power, electricity market prices, stranded costs, efficiency, renewable energy, environmental quality, and nuclear power.

Synapse's clients include state consumer advocates, public utilities commission staff, attorneys general, environmental organizations, federal government agencies, and utilities.

Q. Please summarize your work experience and educational background.

A. At Synapse, I conduct analysis and write testimony and publications that focus on a variety of issues relating to electric utilities, including: integrated resource planning; power plant economics; federal and state clean air policies; emissions from electricity generation; environmental compliance technologies, strategies, and costs; electrical system dispatch; and valuation of environmental externalities from power plants.

I also perform modeling analyses of electric power systems. I am proficient in the use of spreadsheet analysis tools, as well as optimization and electricity dispatch models to conduct analyses of utility service territories and regional energy markets. I have direct experience running the Strategist, PROMOD IV, PROSYM/Market Analytics, PLEXOS, EnCompass, and PCI Gentrader models, and have reviewed input and output data for several other industry models.

Prior to joining Synapse in 2008, I worked for the Analysis Group, Inc., an economic and business consulting firm, where I provided litigation support in the form of research and quantitative analyses on a variety of issues relating to the electric industry.

I hold a Master of Environmental Management from Yale University and a Bachelor of Arts in Environment, Economics, and Politics from Claremont McKenna College in Claremont, California.

A copy of my current resume is attached as Exhibit RW-1.

Q. On whose behalf are you testifying in this proceeding?

A. I am testifying on behalf of Vote Solar and The CLEO Institute Inc.

Q. Have you previously testified before the Florida Public Service Commission ("FPSC" or "Commission")?

A. No.

Q. Have you previously testified before other regulatory commissions?

A. Yes. I have submitted expert testimony in electric utility dockets related to integrated resource planning, advance prudence determination, and rate cases in

Minnesota, Kentucky, Indiana, Oklahoma, Missouri, Texas, Virginia, Washington, Georgia, Mississippi, Alabama, North Carolina, South Carolina, and West Virginia.

Q. Are you providing any exhibits with your testimony?

A. Yes. I am sponsoring the following exhibits:

Exhibit RW-1: Statement of Qualifications and Experience

Exhibit RW-2: Carbon Reduction Commitments of US Electric Utilities

2. OVERVIEW OF TESTIMONY AND CONCLUSIONS

Q. What is the purpose of your testimony?

A. My testimony reviews the sufficiency of FPL's resource planning process and evaluates the prudence of FPL's recent and proposed gas investments within that context. Specifically, I note the lack of consideration given to demand side management (DSM) measures as a replacement resource in FPL's resource planning process. I describe the deficiencies in FPL's analysis related to both the coal-to-gas conversion project at Crist Units 6 and 7 and the new combustion turbine units added at the Crist site. I also review the stranded asset risk posed to FPL ratepayers through the Company's continued reliance on gas-fired resources, whether by proposing to extend the useful lives of existing assets from 40 to 50 years, or its various additions that are planned or currently under construction.

Q. Please summarize your conclusions.

A. I conclude that FPL's resource planning process contains several flaws that could increase costs to Florida ratepayers. First, it does not allow adequate consideration

of DSM measures during its resource planning process, when third-party analysis has shown that Florida leads the other states in the United States in cost-effective energy efficiency potential. Second, FPL's resource planning approach is further flawed in that it locks down the conversion of the coal-fired Crist Units 6 and 7 units to gas without evaluating their retirement and replacement with alternative capacity. Similarly, FPL made the decision to proceed with new gas-fired combustion turbines at the Crist site, locking this decision in place even when updating its modeling analysis with new forecasts and input assumptions could have changed the ultimate resource portfolio selected by the Aurora model. Lastly, I conclude that FPL's continued reliance on gas puts its customers at sizable stranded asset risk, where they must continue to pay for generating assets that are no longer used to produce power. In that case, FPL customers pay twice – once for assets that remain on FPL's books but are no longer used and useful, and once for the replacement capacity that FPL must bring online when retiring assets that no longer provide economic value.

Q. Please provide a brief summary of your recommendations.

A. The Commission has several options that would protect ratepayers from imprudently incurred resource costs and stranded asset risk. Based on my findings, I offer the following recommendations:

1. The Commission should disallow the costs associated with the coal-to-gas conversion of Crist Units 6 and 7 until FPL presents an analysis demonstrating that the cost to convert the units is less than the cost to retire and replace them with an alternative clean energy portfolio.

2. Similarly, the Commission should disallow the costs associated with the addition of four new combustion turbines (CTs) at the Crist site until FPL presents evidence that it was necessary to accelerate their in-service dates from 2023/2024 to the end of 2021/start of 2022. Alternatively, the Commission could disallow the $60 million increase in cumulative present value of revenue requirements (CPVRR) associated with the acceleration of the CTs.

3. The Commission should not approve the requested extension of life at FPL's existing CC units to 50 years. To the extent that FPL is building new gas-fired units, the Commission should condition the determination of prudence for these new gas units with the provision that, in the event the units become stranded assets, FPL's shareholders will bear the risks and costs rather than customers. The Company should be willing to accept this risk if it is confident that these new assets will be used and useful.

4. If FPL is committed to reducing the amount of climate risk unique to Florida utilities, it should join its peer utilities in establishing a zero or net-zero CO_2 target for a date no later than 2050. Decisions around future resource additions should then be made with this goal in mind, and the Company can set interim emissions reduction goals both on a system-wide and individual unit basis to ensure it can meet its long-term goal.

5. The Commission should require FPL to incorporate its currently approved levels of DSM savings into the Company's load forecasts over its long-term planning horizon (rather than assume proposed goals or zero incremental DSM in later years) and should also require FPL to model DSM as an alternative in all future generation resource decisions.

3. FPL'S PLANNING PROCESS IS BIASED TOWARD GAS-FIRED RESOURCES

Q. Witness Sim presents the results of FPL analyses that focus on near-term resource changes and additions for the Gulf generation system. What were the results of that analysis?

A. That analysis identified as economic the following changes and additions to the Gulf system: 1) an upgrade of approximately 80 MW to the Lansing Smith combined cycle (CC) unit, 2) the conversion of the Crist Units 6 and 7 from coal to gas, 3) the addition of four CT units of 235 MW each at the Crist site, and 4) the addition of three 74.5 MW solar facilities.[1]

Q. What evidence does FPL provide in support of the resource decisions for which it is requesting a determination of prudence in this docket?

A. FPL Witness Sim describes the Company's planning process in his direct testimony. FPL performed an "initial" analysis, performed in late 2018/early 2019

[1] FPSC Docket No. 20210015-EI, FPL Witness Sim Direct Testimony (filed March 12, 2021), at page 12, lines 6-11 (hereinafter "Sim Direct").

that led to decisions on near-term unit additions and retirements on Gulf's system.[2] This was done in three steps. Step 1 examined the Gulf system on a standalone basis, while Step 2 examined the economics of the NRFC transmission line linking the Gulf and FPL systems. At that point, it was determined that Gulf would move forward with the four resource additions listed above.[3] FPL then performed its "current" analysis in the second half of 2020/early 2021, assuming that these four changes (Lansing upgrade, Crist 6 and 7 conversion, new Crist CTs, and new solar) were a "given," while also updating "numerous forecasts (load, fuel cost, etc.) and assumptions (cost of capital, discount rate, etc.)."[4]

A. FPL SHOULD CONSIDER INCREMENTAL DSM AS A REPLACEMENT RESOURCE WHEN DOING RESOURCE PLANNING

Q. Did FPL exclude any potential resources from consideration as part of its resource planning analysis?

A. Yes, FPL excluded incremental DSM as a potential resource alternative in its planning analysis. The Company's analysis assumed the amount of DSM approved by the FPSC in its most recent DSM Goals proceeding for both Gulf and FPL.[5] These are five-year goals, and thus the assumed amount of DSM was incorporated for 2020 to 2024. After 2024, Gulf is assumed to have zero

[2] Sim Direct at page 11, lines 4-8.
[3] *Id*. at page 12, lines 6-11.
[4] Sim Direct at page 12, line 18 to page 13, line 1.
[5] *Id*. at page 44, lines 2-4.

incremental energy efficiency, while FPL assumes the numbers it *proposed* in the DSM Goals proceeding, which are equivalent to savings for less than ten residential homes out of the more than ten million people served.[6] Zero incremental DSM was assumed for FPL beyond 2029.

Q. Was FPL correct to exclude incremental DSM as a resource option in its planning analysis?

A. No. Energy efficiency and other DSM measures have historically been the most cost-effective component of a utility's resource portfolio, when considering both supply- and demand-side measures. An analysis from Lawrence Berkeley National Laboratory examined the cost performance of 8,790 electricity efficiency programs between 2009 and 2015 for 116 investor-owned utilities and other program administrators in 41 states, finding that the average cost of kWh saved by energy efficiency (EE) programs funded by electricity customers is 2.5 cents per kilowatt-hour (kWh).[7] In contrast, NextEra (FPL's parent company) projects a range of 3.0 to 4.5 cents per kWh for new combined cycle units.[8]

Florida has been shown to have one of the highest potentials for cost-effective energy efficiency in the United States. According to a 2017 analysis done by the

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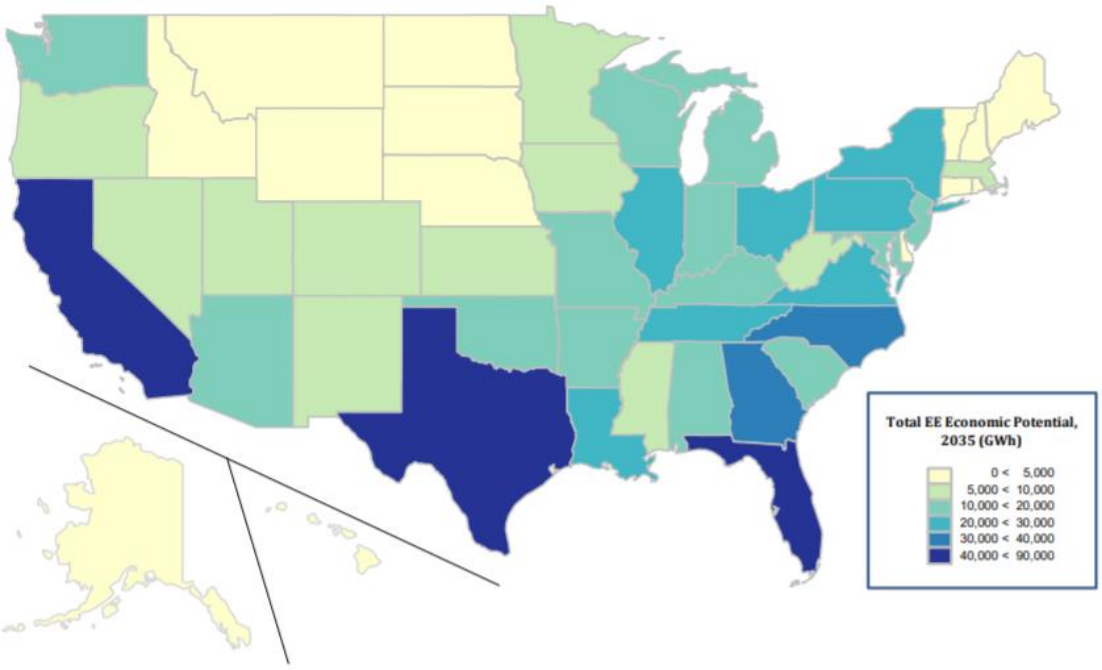
[6] *See* FPSC Docket No. 20190015-EG, Post-Hearing Brief of SACE and LULAC (filed Sept. 20, 2019), at p. 2 (stating that FPL proposed a goal of 1.023 GWh, which is equivalent of less than 10 residential homes, out of more than 10 million people served).

[7] Hoffman, et al. 2018. *The Cost of Saving Electricity Through Energy Efficiency Programs Funded by Utility Customers: 2009-2015.* Lawrence Berkeley National Laboratory. Available at: https://emp.lbl.gov/publications/cost-saving-electricity-through.

[8] NextEra Energy. 2021. *Environmental, Social and Governance.* Available at: https://www.nexteraenergy.com/content/dam/nee/us/en/pdf/2021_NEE_ESG_Report.pdf.

Electric Power Research Institute (EPRI), Florida's state-level EE potential is a whopping 21 percent in 2035 relative to the adjusted baseline sales.[9] A map of Florida's potential relative to other states is shown in Figure 1.

Figure 1. Total energy efficiency economic potential by state (GWh), 2035



Source: Electric Power Research Institute. 2017. State Level Electric Energy Efficiency Potential Estimates. Available at: https://www.energy.gov/sites/prod/files/2017/05/f34/epri_state_level_electric_energy_efficiency_potential_estimates_0.pdf.

Energy efficiency programs reduce peak load and annual energy requirements accumulate over time such that more expensive supply-side resources can be

[9] Electric Power Research Institute. 2017. *State Level Electric Energy Efficiency Potential Estimates.* Available at: https://www.energy.gov/sites/prod/files/2017/05/f34/epri_state_level_electric_energy_efficiency_potential_estimates_0.pdf.

displaced, resulting in cost savings to customers. According to FPL, even the Company's minimal efforts through year-end 2018 have eliminated "the need to construct the equivalent of approximately 15 new 400 MW generating units,"[10] and increasing the amount of EE on FPL's system could further avoid construction of costly new supply-side resources.

Q. Are there any examples of other utilities that are leading with respect to the inclusion of DSM as part of their resource planning analyses?

A. Yes, there are several recent examples of utilities increasing their DSM portfolios as part of their resource plans. Xcel Energy's most recent integrated resource plan in Minnesota proposes annual energy efficiency saving levels of approximately 2.5 percent, which equates to annual energy savings of 780 GWh for each year between 2020 and 2034. Xcel's prior resource plan had been approved with 1.5 percent annual savings from EE, but Xcel was able to improve its amount of planned EE based on a 2018 Minnesota Energy Efficiency Technical Potential Study.[11] Annual EE savings of 2.5 percent is a significant number—by contrast, the average annual EE savings in the 2020 ACEEE scorecard was 1.03 percent (by comparison, FPL achieved annual EE savings of **0.06 percent**).[12] In addition

[10] FPSC Docket No. 20190015-EG, Direct Testimony of FPL witness Thomas R. Koch (filed April 12, 2019), at page 13, lines 3-7.
[11] Xcel Energy. 2019. *Upper Midwest Integrated Resource Plan 2020-2034.* Docket No. E002/RP-19-368. Available at: https://www.xcelenergy.com/staticfiles/xe-responsive/Company/Rates%20&%20Regulations/The-Resource-Plan-No-Appendices.pdf.
[12] ACEEE. 2020. *State Energy Efficiency Scorecard.* Available at: https://www.aceee.org/state-policy/scorecard.

to EE, Xcel also plans for 400 MW of incremental demand response (DR) resources by 2023 in its modeling, based on a Minnesota Public Service Commission order. This DR deployment illustrates both the overall potential of DR and the ability to deploy these resources in the near-term.[13]

In developing its EE projections, Xcel modeled EE as a supply-side resource. This is important because it allows the capacity expansion model to optimize for EE/DR, instead of just manually forecasting an assumed level of EE adoption.[14] To accomplish this, Xcel created EE/DR resource "bundles" that could be selected and optimized by the model. Each bundle represented a portfolio of EE/DR averages at an assumed average cost, and Xcel analyzed multiple capacity optimization runs to create the most cost-effective combination of resources for each bundle. According to Xcel, modeling EE/DR in this way "[allowed] these resources to compete with traditional supply-side resources such as large-scale renewables or gas resources."[15]

Portland General Electric offers a second good example employing a different methodology for optimizing DSM in resource planning. Although they did not model EE on the supply-side in their 2019 IRP, PGE is working with stakeholders to "explore the potential for PGE's portfolio modeling to select incremental

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[13] Xcel Energy. 2019. *Upper Midwest Integrated Resource Plan 2020-2034.* Docket No. E002/RP-19-368. Available at: https://www.xcelenergy.com/staticfiles/xe-responsive/Company/Rates%20&%20Regulations/The-Resource-Plan-No-Appendices.pdf.
[14] *Id.*
[15] *Id*.

energy efficiency that is least cost, least risk, beyond [the] baseline forecast."[16] PGE also intends to explore the addition of an energy efficiency capacity value modifier, which would capture an additional benefit that EE/DR can provide to a portfolio of energy resources. PGE models EE on as a load modifier on the demand-side, but it includes EE/DR contributions in every single IRP scenario. In addition, the EE/DR forecasts that it models as load modifier are developed outside of the utility—PGE tasks the Energy Trust of Oregon, an independent non-profit that is responsible for identifying the state's EE potential and providing funding to EE projects, with developing a 20-year EE forecast that becomes an input into PGE's IRP. The role of the Energy Trust in developing PGE's EE forecast improves transparency and enhances stakeholder engagement.

Q. Can DSM resources be brought online quickly enough to be relevant to the resource selection during the 2020-2024 time period?

A. Yes, absolutely. The Hawaii Public Utilities Commission recently approved an "emergency demand response program" in response to possible resource shortfalls that could occur after a 180 MW coal plant retires in September 2022. The approved program would implement a 50 MW scheduled dispatch program, open to existing and new customers that can add new battery storage charged from their existing PV system, and elevate an existing fast demand response

[16] Portland General Electric Company. 2019. *Integrated Resource Plan: Updated*. Available at: https://assets.ctfassets.net/416ywc1laqmd/1PO8IYJsHee3RCPYsjbuaL/b80c9d6277e678a845451eb89f4ade2e/2019-IRP-update.pdf.

program to full capacity (7 MW) in which customers are financially incentivized to proactively conserve energy.[17]

B. *FPL LOCKED IN SPECIFIC GAS RESOURCES RATHER THAN ALLOW ITS MODEL TO SELECT THE OPTIMAL RESOURCE PORTFOLIO*

Q. Does FPL present any evidence that the conversion of the Crist Units 6 and 7 from coal to gas was an economic choice for ratepayers?

A. FPL's analysis around the Crist conversion only compares that option to continuing to operate the units on coal. The Company did not examine an option in which the Crist Units were retired and replaced with a portfolio of alternative resources that might include additional DSM, solar, and battery storage.

Q. Why do you suggest that a portfolio of alternative resources might have been more economic for ratepayers than the coal-to-gas conversion?

A. We can compare the lack of analysis around the Crist conversion to the analysis that FPL did do for the Manatee 1 and 2 units. FPL's analysis of the Manatee retirement compared two scenarios: in the first, the Manatee units (800 MW each, for a total of 1,600 MW) operate until 2029, and in the second, they are retired at the end of 2021. FPL examined a number of potential replacement resources, including new gas generation, upgrades to the CT portion of existing CC units, new

[17] Balaraman, Kavya. 2021. *Hawaii Oks emergency demand response to avoid energy shortfalls following AES coal plant closure.* Utility Dive. Available at: https://www.utilitydive.com/news/hawaii-emergency-demand-energy-shortfalls-aes-coal/601573/.

solar, battery storage, and transmission projects in or near the Manatee area.[18] FPL determined that early retirement was the most economic option for ratepayers with a CPVRR savings of $101 million, [19] replacing their capacity with a nominal 400 MW battery storage facility at the site, as well as the acceleration of solar and CC projects. FPL did not even analyze the possibility of retirement and replacement of Crist Units 6 and 7, however, and have provided little analysis that the coal-to-gas conversion was in the best interest of ratepayers.

FPL should have analyzed two scenarios: one in which the Crist conversion is selected, and another in which the units are retired and replaced with an alternative clean energy portfolio. Notably, FPL had to construct a 39-mile gas pipeline to supply gas to the converted plant. This additional cost should have also been considered as part of the cost of the units' conversion.

Q. How did FPL determine that four new CTs, totaling approximately 940 MW, were needed at the Crist site?

A. FPL's Initial Step 2 modeling analysis determined that there was a need for 469 MW of new CTs in Gulf territory in 2023 and again in 2024.[20] Witness Sim's direct testimony states that the decision was made to accelerate the units to an in-service date of late 2021/early 2022, which was then the earliest projected in-service date for the North Florida Resiliency Connection (NFRC) line, to provide

[18] Sim Direct at page 37, lines 3-7.
[19] *Id*. at page 10, lines 1-5.
[20] Sim Direct, Exhibit SRS-7, page 2 of 2.

fast-start/fast ramp capability if either the NRFC line or the upgraded Lansing Smith CC unit was lost.[21] This acceleration was estimated by FPL to result in a cost of $60 million in CPVRR.[22]

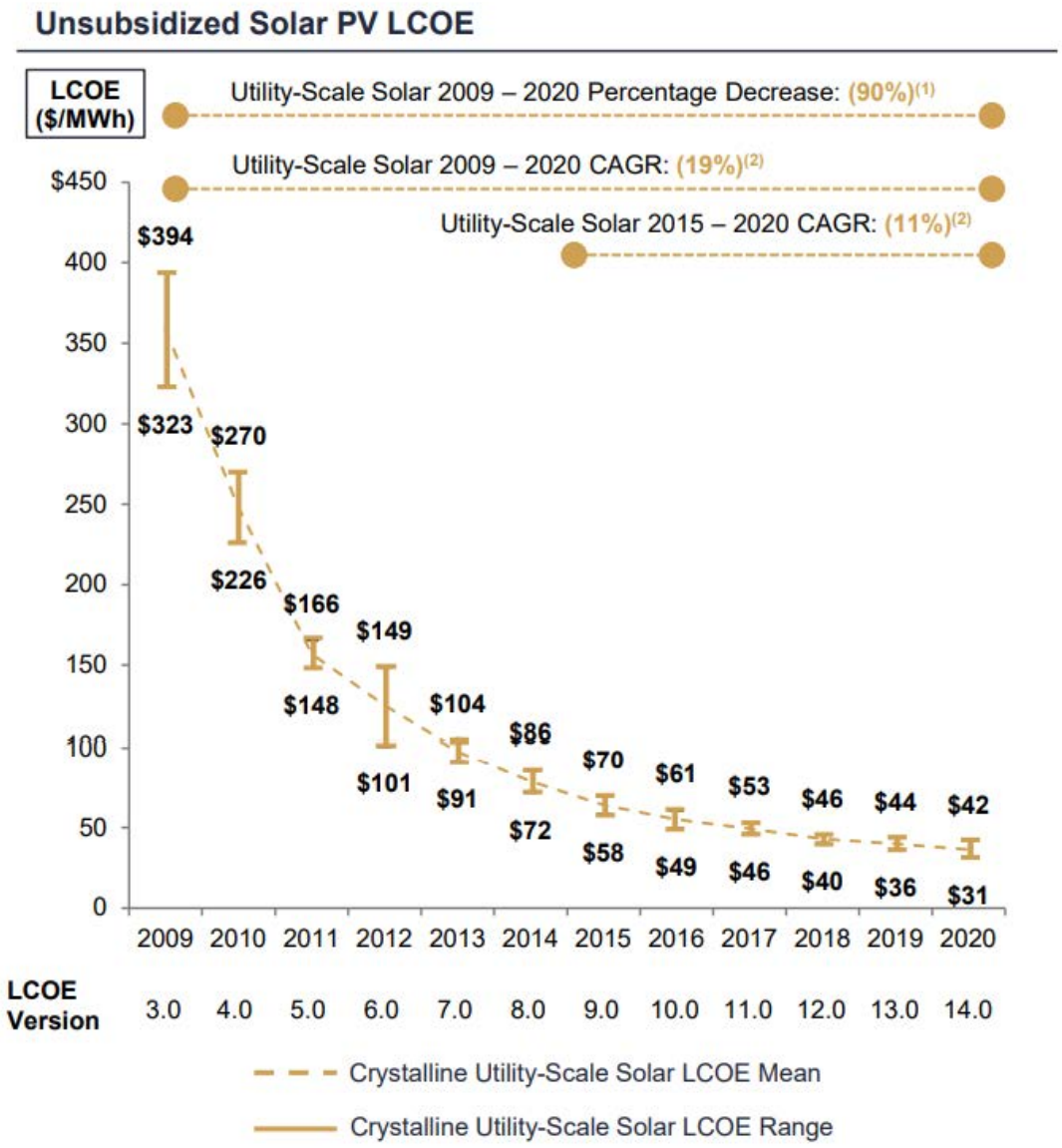
Q. Are there any flaws in this analysis?

A. Yes. The Initial Step 1/Step 2 analyses were done in late 2018/early 2019. FPL then updated its analysis in late 2020/early 2021, referred to as the "Current Analysis," updating various forecasts and assumptions. It did not, however, reevaluate the decision to add the new CTs, instead locking those resources down as common amongst all cases analyzed. Solar prices declined over that time period, making them a more cost-competitive resource addition.

Historical solar prices are shown in Figure 2, below, and the levelized cost of energy declines from $4-$9/MWh from 2018 to 2020.

[21] Sim Direct at page 57, lines 1-6.
[22] *Id*.

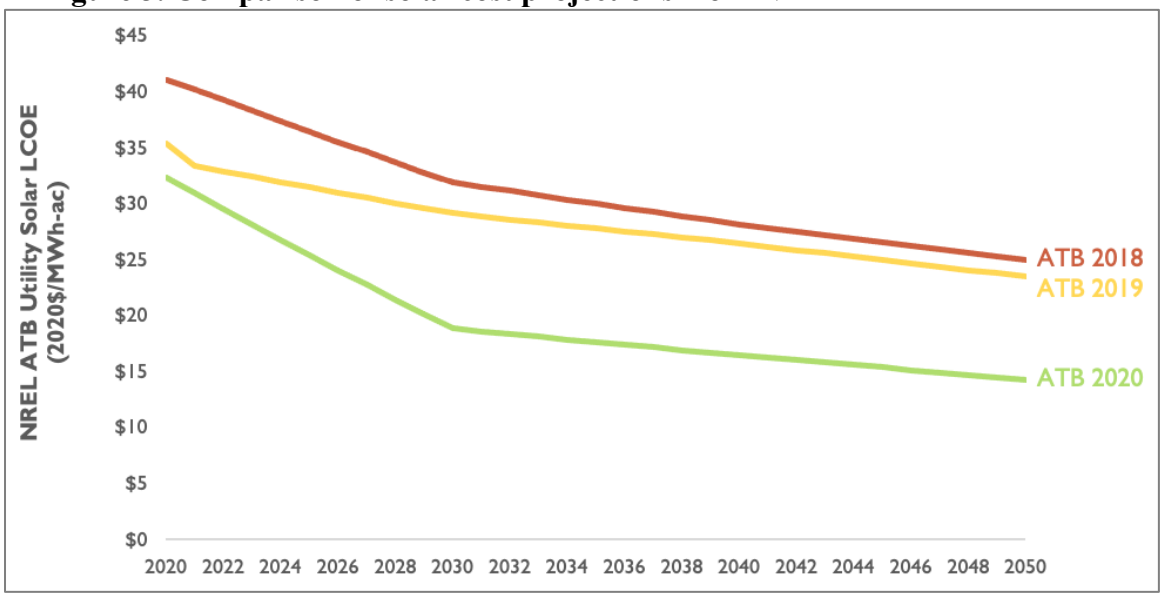
Figure 2. Historical levelized cost of solar declines



Source: Lazard. 2020. Levelized Cost of Energy Analysis—Version 14.0, available at: https://www.lazard.com/media/451419/lazards-levelizedcost-of-energy-version-140.pdf.

Projections from the National Renewable Energy Laboratory's Advanced Technology Baseline (NREL ATB) publications show that projections of storage costs also decrease.

Figure 3. Comparison of solar cost projections from NREL ATB



Source: National Renewable Energy Laboratory. 2018/2019/2021 Annual Technology Baseline.

Battery storage costs have dropped dramatically over the past decade and continue to decline each year.[23] Updating these particular assumptions dictates a reassessment of the decision to add almost 940 MW of new gas-fired capacity, but FPL chose not to update its analysis.

Q. Could battery storage also have been a cost-effective replacement for the Crist units?

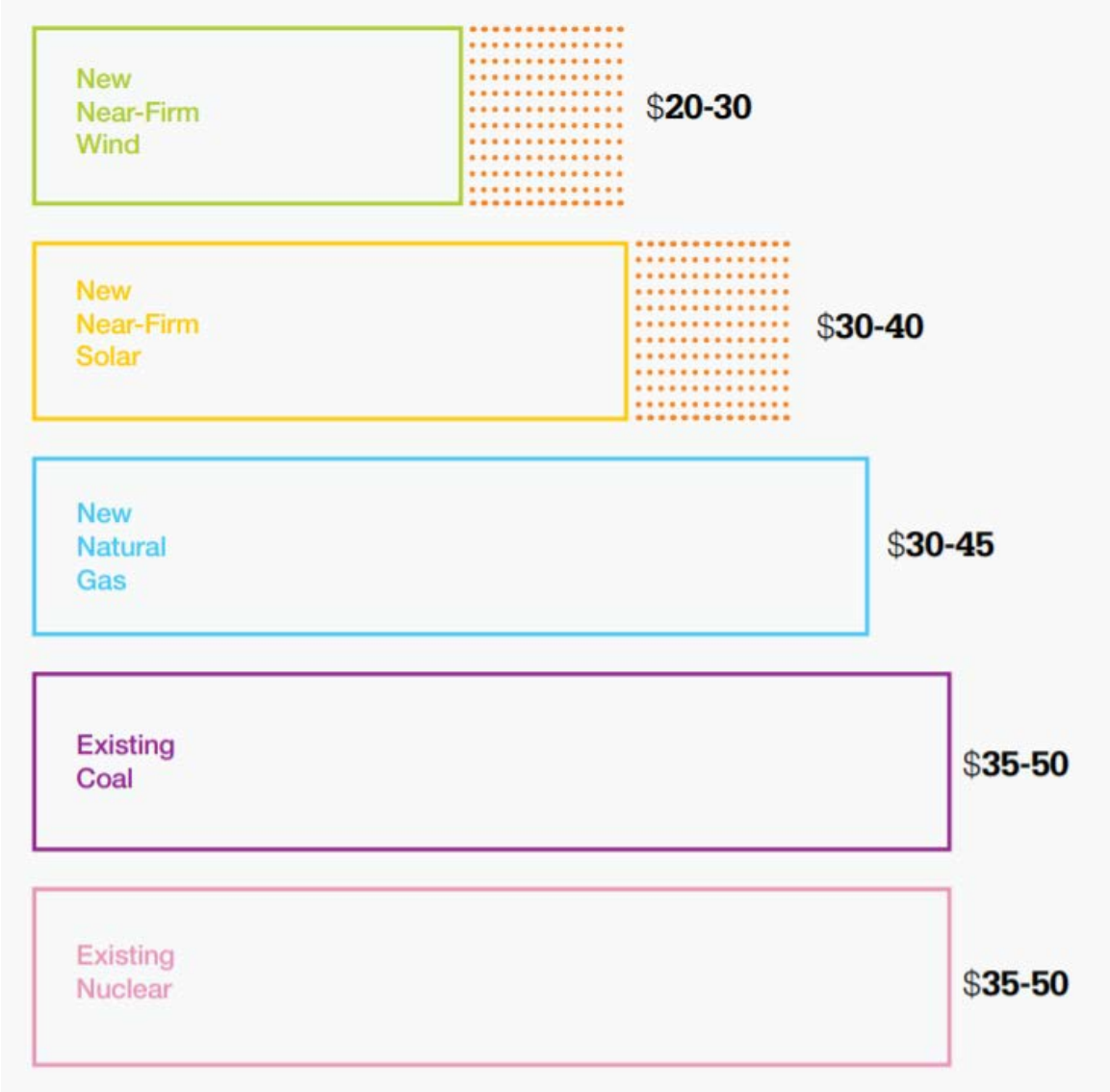
A. Yes, it is very likely that storage could have been a cost-effective replacement. In addition to its cost competitiveness, it can provide the same fast start/fast ramp

[23] Bloomberg New Energy Finance. December 16, 2020. *Battery Pack Prices Cited Below $100/kWh for the First Time in 2020, while Market Average Sits at $137/kWh.* Available at: https://about.bnef.com/blog/battery-pack-prices-cited-below-100-kwh-for-the-first-time-in-2020-while-market-average-sits-at-137-kwh/.

capability cited as the reason for the acceleration of the CT units. According to Witness Sim, the CTs at the Crist run at very low capacity factors, at a high point of five percent in only one or two years, but otherwise at approximately two percent per year, with the primary purpose of providing capacity and fast start capability for the Gulf system either as a standalone or in the event that the NFRC line were to be lost. Standalone battery storage, or storage paired with solar, could have provided the same capacity, and likely more energy, than the new CTs.

NextEra's own projections of costs indicate that solar and storage are more cost-effective resources than new gas-fired generation, as shown in Figure 4. New near-firm solar represents solar paired with battery storage, which is priced in the range of $30-40/MWh, compared to new gas generation at $30-45/MWh.

Figure 4. Potential costs post-2023/2024, $/MWh



Source: NextEra. 2021. Environmental, Social, and Governance. Available at: https://www.nexteraenergy.com/content/dam/nee/us/en/pdf/2021_NEE_ESG_Report.pdf

Q. FPL is proposing to add solar during the period from 2022 to 2025. Does this not refute your argument about its bias toward gas-fired resources?

A. No. FPL models all of its potential solar projects at 74.5 MW. If you assume that solar projects require between five and 10 acres of land per MW,[24] FPL needs to acquire 372 to 745 acres of land for each of its projects. One of the benefits of solar is that it is modular in nature and can be sized to meet the space available to it. By focusing on only large projects, and purchasing the land needed for these projects rather than leasing it, FPL is missing a large opportunity to integrate more solar onto the grid using smaller-sized projects.

Q. Are FPL's solar costs competitive with the market?

A. It is difficult to confirm that FPL's solar costs are the lowest that could be achieved, as FPL chooses to self-build its solar projects, and so we do not have data on possible power purchase agreements for solar to which we can compare. Previous experience from several different utilities has shown, however, that competitive market solicitations, in the form of all-source resource procurements, have resulted in lower costs for replacement resources. In the experience of Public Service Company of Colorado, its 2017 all-source procurement resulted in 417 total bids, a low bid price for solar of $22.53/MWh, and the ability to replace

[24] Solar Energy Industries Association. *Siting, Permitting & Land Use for Utility-Scale Solar.* Available at: https://www.seia.org/initiatives/siting-permitting-land-use-utility-scale-solar.

retiring coal with wind, solar, large-scale battery storage, and existing gas generators.[25]

Monopoly utilities have incentives for over-procurement and self-building of new resources, and all-source, technology neutral, bidding processes can result in better outcomes for utility ratepayers.[26]

Q. Does FPL's modeling further bias the results toward the addition of gas-fired resources?

A. Yes. FPL modeled a useful life of gas assets of 40 years in its analysis. This is a longer useful life than is modeled by many utilities. Engineering firm Sargent & Lundy expects that the useful life of a new combined cycle unit is approximately 30 years,[27] and I often see utilities model useful lives consistent with this expectation. The effect of modeling a useful life of 40 years rather than 30 is that the costs to build a new unit are then spread out over a longer period of time, and the cost stream is then discounted to present dollars. The same costs, spread out over a longer useful life, will then be less expensive from a CPVRR perspective, the Company's metric for making resource decisions. This will be further

[25] MI Power Grid Phase II: Advanced Planning Evaluator and All-Source Meeting. Michigan Public Service Commission. Available at: https://www.michigan.gov/documents/mpsc/Feb_18_Competative_Procurement_Presentation__716684_7.pdf.
[26] *Id.*
[27] Sargent & Lundy, LLC. *Combined Cycle Plant Life Assessments.* Available at: https://sargentlundy.com/wp-content/uploads/2017/05/Combined-Cycle-PowerPlant-LifeAssessment.pdf.

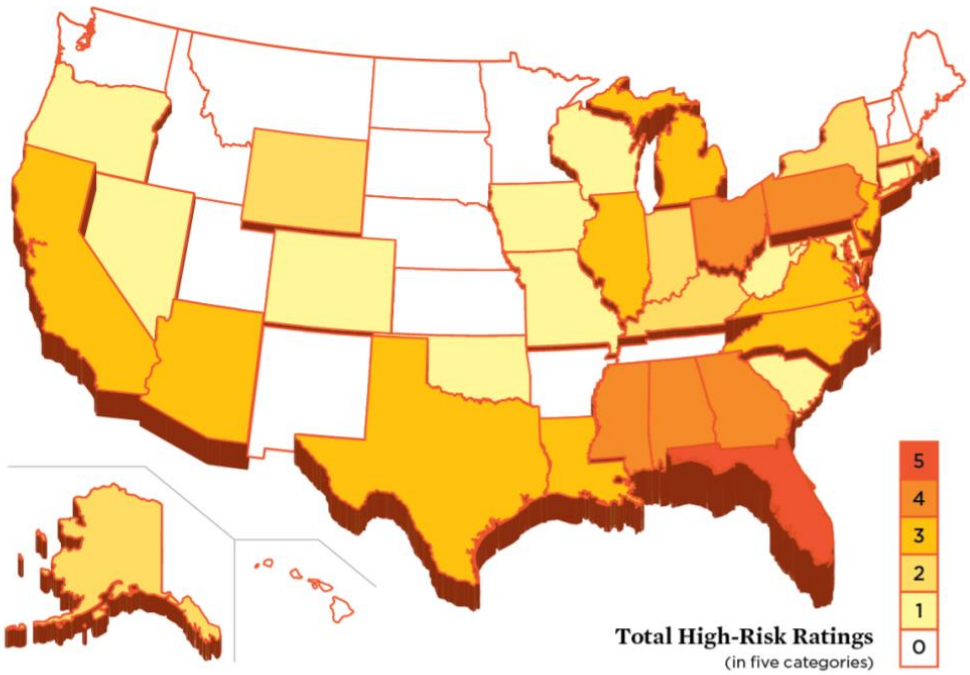
exacerbated by FPL's proposal to increase useful lives of assets to 50 years, if this assumption is also applied to new resources.

4. POTENTIAL FOR NEW GAS UNITS TO BECOME STRANDED ASSETS

Q. Does FPL's continued reliance on gas-fired generation put its customers at risk?

A. Yes. A 2015 report from the Union of Concerned Scientists examined states' risks of overreliance on gas in five categories, rating each on a scale of low, moderate, or high. According to this report, Florida is already over reliant on gas and is subjecting its customers to risks associated with gas price volatility, potential supply shortages during winter events, and costs associated with the cost of CO_2 emissions allowances or controls. Indeed, Florida was the only state to earn a "high" rating in all five categories of risk and is the state at the highest risk for gas overreliance, as shown in Figure 5, below.

Figure 5. States at Highest Risk of Natural Gas Overreliance



Source: Union of Concerned Scientists. 2015. Rating the States on their Risk of Natural Gas Overreliance. Available at: https://www.ucsusa.org/sites/default/files/attach/2015/12/natural-gas-overreliance-analysis-document.pdf.

Q. Do the assets for which FPL is requesting a prudence determination in this docket mitigate any over reliance on gas?

A. No, while FPL does add some solar, it also exacerbates its reliance on gas via conversions of generators from coal to gas, upgrades at an existing combined cycle generator, and the addition of 940 MW of new combustion turbines.

Q. Can we expect that FPL's use of gas for generation will continue in both the short and long-term?

A. Yes. Not only is FPL adding additional gas-fired generators to its system, but the Company is also requesting an increase in the useful life for its combined cycle

units from 40 to 50 years as part of its request to adjust depreciation rates and continue the use of the Reserve Surplus Amortization Mechanism (RSAM).[28] With this request, FPL assumes that its combined cycle units will operate for an additional ten years and spreads the depreciation over a longer period of time.

Q. Are there any risks associated with a longer useful life for these gas assets?

A. Yes. The cost of generation from gas assets is tied directly to both the capital cost to build the unit as well as the fuel cost for gas, which rises and falls. Generation from renewable energy has zero fuel cost, and the technology costs have been declining over time and will continue to do so. Recent trends show that it can be cheaper today to build new renewable-plus-storage units than to build ***new*** gas plants. Forecasts suggest that in the future, it will be cheaper to build new renewable-plus-storage units than to continue operating ***existing*** gas plants.[29] This means that new and existing gas plants are likely to become stranded assets.

Q. What is a stranded asset?

A. A stranded asset is one that no longer has value or produces income. It is important to consider the stranded asset risk for power plants because the costs to construct these assets are recovered by utilities at ratepayer expense over many decades. If conditions in the electric sector cause this plant to no longer be "used and useful,"

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[28] FPSC Docket No. 20210015-EI, Direct Testimony of FPL Witness Ferguson (filed March 12, 2021) at page 5, lines 5-18.

[29] Rocky Mountain Institute. 2019. *The Growing Market for Clean Energy Portfolios.* Available at: https://rmi.org/insight/clean-energy-portfolios-pipelines-and-plants/.

ratepayers will be burdened with the costs of a non-performing unit for the remainder of its depreciable life.

Q. Can any of FPL's current generating assets be considered stranded, under this definition?

A. Yes. FPL has several steam generating assets that it either has or plans to retire that still have undepreciated plant balances. Those generators are shown in Table 1.

Table 1. Unrecovered generating investments

Unit	Retirement Date	Fuel Type	Undepreciated Plant Balance
Martin 1/2	Dec-18	Gas/Oil	$365 million
Lauderdale 4/5	Dec-18	Gas	$328 million
Crist 4-7	Oct-20	Coal	$462 million
Manatee 1/2	Jan-22	Gas	$231 million
Scherer 4	Jan-22	Coal	$831 million
Daniel 1/2	2024	Coal	$136 million

Source: Ferguson Direct at page 18, line11 to page 20, line 9.

These generators have been or will be converted to regulatory assets in order for FPL to recover these undepreciated plant balances.

Q. Is FPL aware of the stranded asset risk to its existing generators?

A. Yes. FPL's *Form 10-K*, filed with the Securities and Exchange Commission in 2020, states that its business could be negatively affected by laws or regulations that mandate new or addition limits on the production of greenhouse gases, which could make its electric generation units uneconomical to operate in the long term, require substantial capital investments to comply with new regulations, or create

increased costs in the form of taxes or emissions allowances.[30] The Company also states that it can provide no assurance that "…FPL would be able to completely recover any such costs or investments, which could have a material adverse effect on (its) business, financial condition, results of operations and prospects."

Q. Is there anything the Florida Public Service Commission could do to reduce the stranded asset risk to customers with respect to new gas-fired generators?

A. Yes. First, the Commission can deny FPL's request to extend the lives of existing assets from 40 to 50 years. Second, the Commission could condition the determination of prudence for any new gas units with the provision that, in the event the units become stranded assets, FPL's shareholders will bear the risks and costs rather than customers. While not yet a common practice, precedent for such action has occurred in the past. For example, Alabama Power requested a predetermination of prudence via a certificate of convenience and necessity for combined-cycle units Barry 7 and 8 in docket 26115. Citing concerns about stranded asset risk, Witness John A. Putnam of Alabama Power submitted Direct Testimony stating that the Company was willing offer additional assurance that its proposed new capacity was both a cost-effective and competitive means of meeting

[30] Florida Power & Light Company. Form 10-K. *Annual Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934.* For the fiscal year ended December 31, 2020. Available at: https://sec.report/Document/0000753308-21-000014/.

identified need by committing that any stranded costs resulting from these units would be borne by Alabama Power's shareholders rather than its customers.[31]

Q. Is there anything that FPL could do to reduce both the stranded asset risk to customers and CO_2 risk with respect to new gas-fired generators?

A. Yes. The majority of electric utilities in the United States have a CO_2 emissions reduction goal, and many of these reduce emissions to either zero or net-zero by 2050 at the latest. A list of utilities and their current carbon reduction commitments is attached as Exhibit RW-2. NextEra, FPL's parent company, has a company-wide carbon reduction goal based on CO_2 emissions rate, which is related to improving the amount of CO_2 generated per MWh across the generating fleet, but is not a mass-based reduction goal.[32] FPL Witness Silagy stated that this goal does not influence FPL's planning decisions in this proceeding, however. If FPL is committed to reducing the amount of climate risk unique to Florida utilities, it should join its peer utilities in committing to a zero or net-zero CO_2 target by no later than 2050. Decisions around future resource additions should then be made with this goal in mind, and the Company can set interim emissions reduction goals both on a system-wide and individual unit basis in order to ensure it can meet its long-term goal.

[31] Direct Testimony of John A. Putnam before the Alabama Public Service Commission. Docket No. 26115. Page 13, line 7.
[32] NextEra Energy 2021 Environmental, Social and Governance Report, at page 6, available at https://www.nexteraenergy.com/content/dam/nee/us/en/pdf/2021_NEE_ESG_Report.pdf.

5. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Q. Please summarize your conclusions.

A. My testimony reviews the sufficiency of FPL's resource planning process and evaluates the prudence of FPL's recent and proposed gas investments within that context. Specifically, I note the lack of consideration given to demand side management (DSM) measures as a replacement resource in FPL's resource planning process. I describe the deficiencies in FPL's analysis related to both the coal-to-gas conversion project at Crist Units 6 and 7 and the new combustion turbine units added at the Crist site. I also review the stranded asset risk posed to FPL ratepayers through the Company's continued reliance on gas-fired resources, whether by proposing to extend the useful lives of existing assets from 40 to 50 years, or its various additions that are planned or currently under construction.

Q. Please summarize your recommendations.

A. The Commission has several options that would protect ratepayers from imprudently incurred resource costs and stranded asset risk. Based on my findings, I offer the following recommendations:

1. The Commission should disallow the costs associated with the coal-to-gas conversion of Crist Units 6 and 7 until FPL presents an analysis demonstrating that the cost to convert the units is less than the cost to retire and replace them with an alternative clean energy portfolio.
2. Similarly, the Commission should disallow the costs associated with the addition of four new combustion turbines (CTs) at the Crist site until FPL presents evidence that it was necessary to accelerate their in-service dates

from 2023/2024 to the end of 2021/start of 2022. Alternatively, the Commission could disallow the $60 million increase in cumulative present value of revenue requirements (CPVRR) associated with the acceleration of the CTs.

3. The Commission should not approve the requested extension of life at FPL's existing CC units to 50 years. To the extent that FPL is building new gas-fired units, the Commission should condition the determination of prudence for these new gas units with the provision that, in the event the units become stranded assets, FPL's shareholders will bear the risks and costs rather than customers. The Company should be willing to accept this risk if it is confident that these new assets will be used and useful.

4. If FPL is committed to reducing the amount of climate risk unique to Florida utilities, it should join its peer utilities in establishing a zero or net-zero CO_2 target for a date no later than 2050. Decisions around future resource additions should then be made with this goal in mind, and the Company can set interim emissions reduction goals both on a system-wide and individual unit basis to ensure it can meet its long-term goal.

5. The Commission should require FPL to incorporate its currently approved levels of DSM savings into the Company's load forecasts over its long-term planning horizon (rather than assume proposed goals or zero incremental DSM in later years) and should also require FPL to model DSM as an alternative in all future generation resource decisions.

Q. Does this conclude your testimony?

A. Yes.

Rachel Wilson, Principal Associate

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PROFESSIONAL EXPERIENCE

Synapse Energy Economics Inc., Cambridge, MA. *Principal Associate*, April 2019 – present*, Senior Associate*, 2013 – 2019, *Associate*, 2010 – 2013, *Research Associate*, 2008 – 2010.

Provides consulting services and expert analysis on a wide range of issues relating to the electricity and natural gas sectors including: integrated resource planning; federal and state clean air policies; emissions from electricity generation; electric system dispatch; and environmental compliance technologies, strategies, and costs. Uses optimization and electricity dispatch models, including Strategist, PLEXOS, EnCompass, PROMOD, and PROSYM/Market Analytics to conduct analyses of utility service territories and regional energy markets.

Analysis Group, Inc., Boston, MA.

Associate, 2007 – 2008, *Senior Analyst Intern*, 2006 – 2007.

Provided litigation support and performed data analysis on various topics in the electric sector, including tradeable emissions permitting, coal production and contractual royalties, and utility financing and rate structures. Contributed to policy research, reports, and presentations relating to domestic and international cap-and-trade systems and linkage of international tradeable permit systems. Managed analysts' work processes and evaluated work products.

Yale Center for Environmental Law and Policy, New Haven, CT. *Research Assistant*, 2005 – 2007.

Gathered and managed data for the Environmental Performance Index, presented at the 2006 World Economic Forum. Interpreted statistical output, wrote critical analyses of results, and edited report drafts. Member of the team that produced *Green to Gold*, an award-winning book on corporate environmental management and strategy. Managed data, conducted research, and implemented marketing strategy.

Marsh Risk and Insurance Services, Inc., Los Angeles, CA. *Risk Analyst*, Casualty Department, 2003 – 2005.

Evaluated Fortune 500 clients' risk management programs/requirements and formulated strategic plans and recommendations for customized risk solutions. Supported the placement of $2 million in insurance premiums in the first year and $3 million in the second year. Utilized quantitative models to create loss forecasts, cash flow analyses and benchmarking reports. Completed a year-long Graduate Training Program in risk management; ranked #1 in the western region of the US and shared #1 national ranking in a class of 200 young professionals.

EDUCATION

Yale School of Forestry & Environmental Studies, New Haven, CT
Master of Environmental Management, concentration in Law, Economics, and Policy with a focus on energy issues and markets, 2007

Claremont McKenna College, Claremont, California
Bachelor of Arts in Environment, Economics, Politics (EEP), 2003. *Cum laude* and EEP departmental honors.

School for International Training, Quito, Ecuador
Semester abroad studying Comparative Ecology. Microfinance Intern – Viviendas del Hogar de Cristo in Guayaquil, Ecuador, Spring 2002.

ADDITIONAL SKILLS AND ACCOMPLISHMENTS

- Microsoft Office Suite, Lexis-Nexis, Platts Energy Database, Strategist, PROMOD, PROSYM/Market Analytics, EnCompass, and PLEXOS, some SAS and STATA.
- Competent in oral and written Spanish.
- Hold the Associate in Risk Management (ARM) professional designation.

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Washington Utilities and Transportation Commission (Docket Nos. UE-200900 and UG-200901): Direct testimony of Rachel Wilson evaluating Avista's treatment of the costs that it plans to incur for both integration with the Western Energy Imbalance Market (EIM) and ongoing operational support. On behalf of the Public Counsel Unit of the Washington Attorney General's Office. April 21, 2021.

South Carolina Public Service Commission (Docket Nos. 2019-224-E and 2019-225-E): Surrebuttal testimony of Rachel S. Wilson providing alternative resource modeling in the Duke Energy Carolinas and Duke Energy Progress Integrated Resource Planning dockets. On behalf of Carolinas Clean Energy Business Association, Natural Resources Defense Council, Sierra Club, Southern Alliance for Clean Energy, South Carolina Coastal Conservation League, and Upstate Forever. April 15, 2021.

Virginia State Corporation Commission (Case No. PUR-2020-00258): Direct testimony of Rachel Wilson evaluating the application of Appalachian Power Company for approval of a rate adjustment clause for

capital investments and operations and maintenance expenses to comply with the federal Coal Combustion Residuals and Effluent Limitation Guidelines regulations in lieu of retirement of the Amos and Mountaineer. On behalf of the Sierra Club. April 9, 2021.

West Virginia Public Service Commission (Case No. 20-0065-E-ENEC): Direct testimony of Rachel Wilson evaluating coal unit commitment decisions by Monongahela Power Company and the impact on ratepayers. On behalf of Sierra Club. November 16, 2020.

Virginia State Corporation Commission (Case No. PUR-2020-00035): Direct testimony of Rachel Wilson evaluating Dominion's 2020 Integrated Resource Plan and providing independent capacity optimization modeling. On behalf of the Sierra Club. September 15, 2020.

Virginia State Corporation Commission (Case No. PUR-2020-00015): Direct testimony of Rachel Wilson examining the economics of the coal units owned by Appalachian Power Company as part of the rate case. On behalf of the Sierra Club. July 30, 2020.

North Carolina Utilities Commission (Docket No. E-2, SUB 1219): Direct testimony of Rachel Wilson examining the economics of the coal units owned by Duke Energy Progress as part of the rate case. On behalf of the Sierra Club. April 13, 2020.

North Carolina Utilities Commission (Docket No. E-2, SUB 1219): Direct testimony of Rachel Wilson examining the economics of the coal units owned by Duke Energy Carolinas as part of the rate case. On behalf of the Sierra Club. February 25, 2020.

North Carolina Utilities Commission (Docket No. EMP-105, SUB 0): Rebuttal testimony of Rachel Wilson evaluating the application of Friesian Holdings, LLC for a Certificate of Public Convenience and Necessity. On behalf of Friesian Holdings, LLC. December 12, 2019.

Alabama Public Service Commission (Docket No. 32953): Direct testimony of Rachel Wilson regarding Alabama Power Company's petition for a Certificate of Convenience and Necessity. On behalf of the Sierra Club. December 4, 2019.

North Carolina Utilities Commission (Docket No. EMP-105, SUB 0): Direct testimony of Rachel Wilson evaluating the application of Friesian Holdings, LLC for a Certificate of Public Convenience and Necessity. On behalf of Friesian Holdings, LLC. November 26, 2019.

Georgia Public Service Commission (Docket No. 42516): Direct testimony of Rachel Wilson regarding coal ash spending in Georgia Power's 2019 Rate Case. On behalf of the Sierra Club. October 17, 2019.

Mississippi Public Service Commission (Docket No. 2019-UA-116): Direct testimony of Rachel Wilson regarding Mississippi Power Company's petition to the Mississippi Public Service Commission for a Certification of Public Convenience and Necessity for ratepayer-funded investments required to meet Coal Combustion Residuals regulations at the Victor J. Daniel Electric Generating Facility. On behalf of the Sierra Club. October 16, 2019.

Georgia Public Service Commission (Docket No. 42310 & 42311): Direct testimony of Rachel Wilson regarding various components of Georgia Power's 2019 Integrated Resource Plan. On behalf of the Sierra Club. April 25, 2019.

Washington Utilities and Transportation Commission (Dockets UE-170485 & UG-170486): Response testimony regarding Avista Corporation's production cost modeling. On behalf of Public Counsel Unit of the Washington Attorney General's Office. October 27, 2017.

Texas Public Utilities Commission (SOAH Docket No. 473-17-1764, PUC Docket No. 46449): Cross-rebuttal testimony evaluating Southwestern Electric Power Company's application for authority to change rates to recover the costs of investments in pollution control equipment. On behalf of Sierra Club and Dr. Lawrence Brough. May 19, 2017.

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Oklahoma Corporation Commission (Cause No. PUD 201400229): Direct testimony evaluating the modeling of Oklahoma Gas & Electric supporting its request for approval and cost recovery of a Clean Air Act compliance plan and Mustang modernization, and presenting results of independent Gentrader modeling analysis. On behalf of Sierra Club. December 16, 2014.

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Indiana Utility Regulatory Commission (Cause No. 44217): Direct testimony before the Commission discussing PROSYM/Market Analytics modeling relating to the application of Duke Energy Indiana for Certificates of Public Convenience and Necessity. On behalf of Citizens Action Coalition, Sierra Club, Save the Valley, and Valley Watch. November 29, 2012.

Kentucky Public Service Commission (Case No. 2012-00063): Direct testimony before the Commission discussing upcoming environmental regulations and electric system modeling relating to the application

of Big Rivers Electric Corporation for a Certificate of Public Convenience and Necessity and for approval of its 2012 environmental compliance plan. On behalf of Sierra Club. July 23, 2012.

Kentucky Public Service Commission (Case No. 2011-00401): Direct testimony before the Commission discussing STRATEGIST modeling relating to the application of Kentucky Power Company for a Certificate of Public Convenience and Necessity, and for approval of its 2011 environmental compliance plan and amended environmental cost recovery surcharge. On behalf of Sierra Club. March 12, 2012.

Kentucky Public Service Commission (Case No. 2011-00161 and Case No. 2011-00162): Direct testimony before the Commission discussing STRATEGIST modeling relating to the applications of Kentucky Utilities Company, and Louisville Gas and Electric Company for Certificates of Public Convenience and Necessity, and approval of its 2011 compliance plan for recovery by environmental surcharge. On behalf of Sierra Club and Natural Resources Defense Council (NRDC). September 16, 2011.

Minnesota Public Utilities Commission (OAH Docket No. 8-2500-22094-2 and MPUC Docket No. E-017/M-10-1082): Rebuttal testimony before the Commission describing STRATEGIST modeling performed in the docket considering Otter Tail Power's application for an Advanced Determination of Prudence for BART retrofits at its Big Stone plant**.** On behalf of Izaak Walton League of America, Fresh Energy, Sierra Club, and Minnesota Center for Environmental Advocacy. September 7, 2011.

Resume updated May 2021

Source: SEPA Utility Data Tracker_downloaded June 14, 2021, available at https://sepapower.org/utility-transformation-challenge/utility-carbon-reduction-tracker/

Name	Utility Type	State	Final Emission Reduction Target Year	Emission Reduction Goal
Minnesota Power	Investor Owned	Minnesota	2050	100% carbon-free energy by 2050.
Public Service Company of New Mexico	Investor Owned	New Mexico	2040	70% emissions free energy by 2032, and 100% emissions free energy by 2040.
Concord Municipal Light Board	Public Power	Massachusetts	2030	100% carbon-free electricity source by 2030.
Lansing Board of Water and Light	Public Power	Michigan	2040	Carbon neutral by 2040.
Platte River Power Authority	Power Agency/G&T	Colorado	2030	100% non-carbon energy mix by 2030.
Pasadena Water and Power	Public Power	California	2030	75% reduction in GHG emissions from 1990 levels by 2030.
New York Power Authority	Public Power	New York	2035	Carbon free electricity by 2035.
Portland General Electric	Investor Owned	Oregon	2040	80% reduction in GHG emissions from 2010 levels by 2030. Net-zero GHG emissions by 2040.
East Kentucky Power Cooperative, Inc	Cooperative	Kentucky	2050	70% reduction in CO2 emissions from 2010 levels by 2050.
PPL Corp	Holding Company	Pennsylvania	2050	80% reduction in CO2 emissions from 2010 levels by 2050.
UGI Utilities, Inc	Investor Owned	Pennsylvania	2025	55% reduction in Scope 1 GHG emissions from 2020 levels by 2025.
North Carolina Electric Membership Corporation	Power Agency/G&T	North Carolina	2050	50% reduction in CO2 emissions from 2005 levels by 2030 and net-zero carbon emissions by 2050.
Northern Indiana Public Service Company	Investor Owned	Indiana	2028	90% reduction in CO2 emissions from 2005 levels by 2028. All coal plants closed by 2028.

Tucson Electric Power	Investor Owned	Arizona	2035	80% reduction in CO2 emissions from 2005 levels by 2035.
La Plata Electric Association, Inc.	Cooperative	Colorado	2030	50% reduction in carbon footprint from 2018 levels by 2030.
Arizona Public Service	Investor Owned	Arizona	2050	100% carbon-free power by 2050. 65% clean energy by 2030.
Seattle City Light	Public Power	Washington	2005	Net-zero GHG emissions achieved in 2005.
Madison Gas & Electric Company	Investor Owned	Wisconsin	2050	Net-Zero Carbon Electricity by 2050.
Otter Tail Power Company	Investor Owned	Minnesota	2022	40% reduction in carbon emissions from 2005 levels by 2022.
Omaha Public Power District	Public Power	Nebraska	2050	Net-zero carbon emissions by 2050.
PacifiCorp	Investor Owned	Oregon	2030	60% reduction in GHG emissions from 2005 levels by 2030.
Old Dominion Electric Cooperative	Power Agency/G&T	Virginia	2050	50% reduction in carbon intensity from 2005 levels by 2030. Net-zero carbon dioxide emissions by 2050.
Oklahoma Gas & Electric	Investor Owned	Oklahoma	2030	50% reduction in CO2 emissions from 2005 levels by 2030
West Boylston Town of	Public Power	Massachusetts	2050	Net-zero greenhouse gas emissions by 2050.
Ameren Corporation	Holding Company	Missouri	2050	50% reduction in carbon emissions from 2005 levels by 2030, 85% reduction in carbon emissions from 2005 levels by 2040 and net-zero carbon emissions by 2050.
Vectren Corporation	Investor Owned	Indiana	2023	60% reduction in carbon emissions by 2023 - via retiring three coal plants and terminating ownership of another.
NextEra Energy, Inc.	Other	Florida	2025	67% reduction in CO2 emissions rate from 2005 levels by 2025.

WEC Energy Group	Holding Company	Wisconsin	2050	60% reduction in carbon emissions from electric generation from 2005 levels by 2025; 80% reduction in carbon emissions from electric generation from 2005 levels by 2030. Net-zero carbon emissions from electric generation by 2050.
Puget Sound Energy	Investor Owned	Washington	2045	Beyond net-zero by 2045, which includes: a carbon neutral electric system by 2030 and 100% clean electricity by 2045.
Public Service Electric & Gas	Investor Owned	New Jersey	2050	80% reduction in carbon emissions from 2005 levels by 2046, and net-zero carbon emissions by 2050.
National Grid (US)	Holding Company	Massachusetts	2050	45% reduction in GHG emissions by 2020, and net-zero carbon emissions by 2050.
Tampa Electric Company	Investor Owned	Florida	2050	55% reduction in carbon emissions from 2005 levels by 2025. 80% reduction in carbon emissions from 2005 levels by 2040. Net-zero carbon emissions by 2050.
Lincoln Electric System	Public Power	Nebraska	2040	Net-zero CO2 emissions by 2040.
Alliant Energy	Investor Owned	Wisconsin	2050	50% reduction in carbon dioxide emissions by 2030. Net-zero carbon dioxide emissions by 2050.
Sacramento Municipal Utility District	Public Power	California	2030	Carbon neutral by 2030.
Idaho Power Co.	Investor Owned	Idaho	2045	Average CO2 emissions intensity of energy sources from 2010 to 2020 is 15% to 20% lower than 2005 levels. 100% clean energy by 2045.

Entergy Corporation	Investor Owned	Louisiana	2050	50% reduction in CO2 intensity from 2000 levels by 2030. Target specific to Entergy New Orleans: 70% clean power by 2030. Net-zero carbon emissions by 2050
Green Mountain Power	Investor Owned	Vermont	2025	100% carbon free energy by 2025.
Colorado Springs Utilities	Public Power	Colorado	2050	80% reduction in carbon emissions from 2005 levels by 2030. 90% reduction in carbon emissions from 2005 levels by 2050.
Xcel Energy	Investor Owned	Colorado	2050	85% reduction in carbon dioxide emissions from 2005 levels by 2030, and 100% carbon free electricity by 2050.
Consolidated Edison Company of New York, Inc.	Investor Owned	New York	2040	100% clean energy by 2040.
Tennessee Valley Authority	Federal	Tennessee	2050	70% reduction in carbon emissions from 2005 levels by 2030; 80% reduction in carbon emissions from 2005 levels by 2035. Net-zero carbon emissions by 2050.
Dominion Virginia Power	Investor Owned	Virginia	2050	Net-zero emissions by 2050. 65% reduction in methane emissions by 2030 and 80% by 2040, by 2010 levels.
Duke Energy	Investor Owned	New York	2050	At least a 50% reduction in CO2 emissions from 2005 levels by 2030. Net-zero CO2 emissions by 2050.
Hawaiian Electric	Investor Owned	Hawaii	2045	Carbon neutral by 2045
El Paso Electric	Investor Owned	Texas	2035	25% reduction in carbon footprint from 2015 levels by 2025, and a 40% reduction in carbon footprint from 2015 levels by 2035.

Orlando Utilities Commission	Public Power	Florida	2050	50% reduction in carbon emissions from 2005 levels by 2030. Net-zero carbon emissions by 2050.
Evergy, Inc.	Holding Company	Kansas	2045	70% reduction in carbon emissions from 2005 levels by 2030. Net-zero carbon emissions by 2045.
Pacific Gas & Electric	Investor Owned	Michigan	2045	100% zero carbon electricity by 2045.
FirstEnergy Corp.	Holding Company	Ohio	2050	30% reduction in greenhouse gas (GHG) emissions from 2019 levels by 2030. Carbon neutral by 2050.
Tri-State Generation and Transmission Association	Cooperative	Arkansas	2030	50% clean energy by 2024. 70% clean energy by 2030. 90% reduction in CO2 emissions across generation we own or operate in Colorado by 2030. 80% reduction in CO2 emissions associated with wholesale electricity sales in Colorado by 2030.
Great River Energy	Power Agency/G&T	Minnesota	2023	95% CO2 free by 2023.
DTE Energy	Investor Owned	New York	2050	32% reduction in carbon emissions by 2023, 50% reduction in carbon emissions by 2030, 80% reduction in carbon emissions by 2040. Net zero carbon emissions by 2050.
Southern Company	Holding Company	Alabama	2050	Net-zero carbon emissions by 2050 with an intermediate goal of a 50% reduction of GHG emissions from 2007 levels by 2030.
Consumers Energy	Investor Owned	Michigan	2040	Net-zero carbon emissions by 2040.
Los Angeles Dept of Water and Power	Public Power	California	2050	100% net-zero emissions by 2050
Cobb EMC	Cooperative	Georgia	2030	75% reduction in carbon emissions by 2030.

AVANGRID	Holding Company	New York	2035	Reduce the intensity of Scope 1 greenhouse gas emissions of our generation capacity by 35% from 2015 levels by the 2025. Scope 1 carbon neutral by the year 2035.
Vermont Electric Cooperative	Cooperative	Vermont	2023	100% carbon-free power supply by 2023.
Poudre Valley Rural Electric Association, Inc.	Cooperative	Colorado	2030	80% carbon-free energy by 2030.
Holy Cross Energy	Cooperative	Colorado	2030	100% carbon-free electricity by 2030.
Avista Utilities	Investor Owned	Washington	2045	Carbon neutral electricity supply by the end of 2027. 100% clean energy by 2045.
American Electric Power	Holding Company	Ohio	2050	80% reduction in carbon dioxide emissions from 2000 levels by 2030. Net-zero carbon dioxide emissions by 2050.
AES Corporation	Holding Company	Virginia	2040	Net-zero carbon emissions from electricity sales by 2040. Net-zero carbon emissions for all business scopes by 2050.
Southern Minnesota Municipal Power Agency	Power Agency/G&T	Minnesota	2030	90% reduction in CO2 emissions from 2005 levels and 80% carbon-free energy by 2030.
Southern California Edison	Investor Owned	California	2045	100% carbon-free power by 2045.
NorthWestern Energy LLC	Investor Owned	South Dakota	2045	90% reduction of carbon intensity by 2045 from 2010 levels for its Montana service territory.
Austin Energy	Public Power	Texas	2035	100% carbon-free electricity by 2035.
Long Island Power Authority	Power Agency/G&T	Texas	2040	100% carbon-free electric grid by 2040.
San Diego Gas & Electric	Investor Owned	California	2045	100% zero-carbon energy by 2045.

Salt River Project	Public Power	Arizona	2050	62% reduction in CO2 emissions from 2005 levels by 2035, and 90% reduction in CO2 emissions from 2005 levels by 2050.
CPS Energy	Public Power	Texas	2050	80% reduction in net carbon emissions by 2040. Carbon neutral by 2050.
Black Hills Corporation	Holding Company	South Dakota	2040	40% reduction in GHG emissions intensity from 2005 levels by 2030 and a 70% reduction in GHG emissions intensity from 2005 levels by 2040.
Santee Cooper	Public Power	South Carolina	2030	43% less carbon emissions from 2005 levels on average during 2030s