



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](mailto: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 21<sup>st</sup> day of June, 2021, to the following:

|  |  |
|--|--|
| Florida Power & Light Company<br>Ken Hoffman<br>134 West Jefferson Street<br>Tallahassee FL 32301-1713<br>ken.hoffman@fpl.com  | Florida Power & Light Company<br>Wade Litchfield/John Burnett/Maria Moncada<br>700 Universe Boulevard<br>Juno Beach FL 33408-0420<br>wade.litchfield@fpl.com<br>john.t.burnett@fpl.com<br>maria.moncada@fpl.com  |
| Bianca Lherisson/Jennifer Crawford/<br>Shaw Stiller/Suzanne Brownless<br>Public Service Commission<br>Office of General Counsel<br>2540 Shumard Oak Blvd.<br>Tallahassee, FL 32399-0850<br>BLheriss@psc.state.fl.us<br>jcrawfor@psc.state.fl.us<br>sstiller@psc.state.fl.us<br>sbrownl@psc.state.fl.us | Gulf Power Company<br>Russell A. Badders<br>One Energy Place<br>Pensacola FL 32520-0100<br>Russell.Badders@nexteraenergy.com   |
| Jon C. Moyle, Jr./Karen Putnal/Ian Waldick<br>Florida Industrial Power Users Group<br>118 N. Gadsden Street<br>Tallahassee, FL 32301<br>jmoyle@moylelaw.com<br>kputnal@moylelaw.com<br>iwaldick@moylelaw.com   | T. Jernigan/Maj. H. Buchanan/Capt. R.<br>Friedman/TSgt. A. Braxton/E. Payton 139<br>Barnes Drive, Suite 1<br>Tyndall AFB FL 32403<br><a href="mailto:Ebony.payton.ctr@us.af.mil">Ebony.payton.ctr@us.af.mil</a><br><a href="mailto:Thomas.jernigan.3@us.af.mil">Thomas.jernigan.3@us.af.mil</a><br>ULFSC.Tyndall@us.af.mil<br>Holly.buchanan.1@us.af.mil<br><a href="mailto:Robert.Friedman.5@us.af.mil">Robert.Friedman.5@us.af.mil</a><br><a href="mailto:Arnold.braxton@us.af.mil">Arnold.braxton@us.af.mil</a> |
| Bradley Marshall/Jordan Luebke<br>Earthjustice<br>111 S. Martin Luther King Jr. Blvd.<br>Tallahassee, Florida 32301<br>bmarshall@earthjustice.org<br>jluebke@earthjustice.org  | George Cavros<br>Southern Alliance for Clean Energy<br>120 E. Oakland Park Blvd., Suite 105<br>Fort Lauderdale, FL 33334<br><a href="mailto:george@cavros-law.com">george@cavros-law.com</a>   |

|  |  |
|--|--|
| <p>James Brew/Laura Baker/Joseph Briscar<br/> 1025 Thomas Jefferson St., NW, Ste. 800 W<br/> Washington, DC. 20007<br/> jbrew@smxblaw.com<br/> jwb@smxblaw.com<br/> <a href="mailto:jrb@smxblaw.com">jrb@smxblaw.com</a></p>   | <p>Office of the Public Counsel<br/> Charles Rehwinkel<br/> Patty Christensen<br/> 111 W. Madison Street, Room 812<br/> Tallahassee FL 32399<br/> (850) 488-9330<br/> <a href="mailto:rehwinkel.charles@leg.state.fl.us">rehwinkel.charles@leg.state.fl.us</a><br/> <a href="mailto:Christensen.patty@leg.state.fl.us">Christensen.patty@leg.state.fl.us</a></p> |
| <p>Nathan A. Skop, Esq.<br/> 420 NW 50th Blvd.<br/> Gainesville, FL 32607<br/> <a href="mailto:n_skop@hotmail.com">n_skop@hotmail.com</a></p>  | <p>Stephanie U. Eaton<br/> Barry A. Naum<br/> SPILMAN THOMAS &amp; BATTLE, PLLC<br/> 110 Oakwood Drive, Suite 500<br/> Winston-Salem, NC 27103<br/> Phone: (336) 631-1062<br/> <a href="mailto:seaton@spilmanlaw.com">seaton@spilmanlaw.com</a><br/> <a href="mailto:bnaum@spilmanlaw.com">bnaum@spilmanlaw.com</a></p>  |
| <p>Robert Scheffel Wright<br/> John T. LaVia, III<br/> Gardner, Bist, Bowden, Dee, LaVia, Wright<br/> &amp; Perry, P.A.<br/> 1300 Thomaswood Drive<br/> Tallahassee, Florida 32308<br/> Telephone (850) 385-0070<br/> <a href="mailto:schef@gbwlegal.com">schef@gbwlegal.com</a><br/> <a href="mailto:jlavia@gbwlegal.com">jlavia@gbwlegal.com</a></p> |  |

*/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**

## Table of Contents

|    |  |    |
|----|--|----|
| 1. | <u>INTRODUCTION AND QUALIFICATIONS .....</u>                               | 3  |
| 2. | <u>OVERVIEW OF TESTIMONY AND CONCLUSIONS .....</u>                         | 5  |
| 3. | <u>FPL’S PLANNING PROCESS IS BIASED TOWARD GAS-FIRED RESOURCES.....</u>    | 8  |
|    | <u>A. FPL SHOULD CONSIDER INCREMENTAL DSM AS A REPLACEMENT RESOURCE</u>    |    |
|    | <u>WHEN DOING RESOURCE PLANNING .....</u>                                  | 9  |
|    | <u>B. FPL LOCKED IN SPECIFIC GAS RESOURCES RATHER THAN ALLOW ITS MODEL</u> |    |
|    | <u>TO SELECT THE OPTIMAL RESOURCE PORTFOLIO .....</u>                      | 15 |
| 4. | <u>POTENTIAL FOR NEW GAS UNITS TO BECOME STRANDED ASSETS .....</u>         | 24 |
| 5. | <u>SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS .....</u>                    | 30 |

**1. INTRODUCTION AND QUALIFICATIONS**

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

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

5 **Q. Please describe Synapse Energy Economics.**

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

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

14 **Q. Please summarize your work experience and educational background.**

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

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

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

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

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

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

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

17 **Q. Have you previously testified before the Florida Public Service Commission**  
18 **(“FPSC” or “Commission”)?**

19 A. No.

20 **Q. Have you previously testified before other regulatory commissions?**

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

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

4 **Q. Are you providing any exhibits with your testimony?**

5 A. Yes. I am sponsoring the following exhibits:

6 Exhibit RW-1: Statement of Qualifications and Experience

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

8 **2. OVERVIEW OF TESTIMONY AND CONCLUSIONS**

9 **Q. What is the purpose of your testimony?**

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

20 **Q. Please summarize your conclusions.**

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



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

16 **Q. Please provide a brief summary of your recommendations.**

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

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

- 1           2. Similarly, the Commission should disallow the costs associated with the  
2           addition of four new combustion turbines (CTs) at the Crist site until FPL  
3           presents evidence that it was necessary to accelerate their in-service dates  
4           from 2023/2024 to the end of 2021/start of 2022. Alternatively, the  
5           Commission could disallow the \$60 million increase in cumulative present  
6           value of revenue requirements (CPVRR) associated with the acceleration  
7           of the CTs.
- 8           3. The Commission should not approve the requested extension of life at  
9           FPL's existing CC units to 50 years. To the extent that FPL is building  
10          new gas-fired units, the Commission should condition the determination of  
11          prudence for these new gas units with the provision that, in the event the  
12          units become stranded assets, FPL's shareholders will bear the risks and  
13          costs rather than customers. The Company should be willing to accept this  
14          risk if it is confident that these new assets will be used and useful.
- 15          4. If FPL is committed to reducing the amount of climate risk unique to  
16          Florida utilities, it should join its peer utilities in establishing a zero or net-  
17          zero CO<sub>2</sub> target for a date no later than 2050. Decisions around future  
18          resource additions should then be made with this goal in mind, and the  
19          Company can set interim emissions reduction goals both on a system-wide  
20          and individual unit basis to ensure it can meet its long-term goal.

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

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

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

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

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

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

---

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

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

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

12  
13 **Q. Did FPL exclude any potential resources from consideration as part of its**  
14 **resource planning analysis?**

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

---

<sup>2</sup> Sim Direct at page 11, lines 4-8.

<sup>3</sup> *Id.* at page 12, lines 6-11.

<sup>4</sup> Sim Direct at page 12, line 18 to page 13, line 1.

<sup>5</sup> *Id.* at page 44, lines 2-4.

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

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

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

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

---

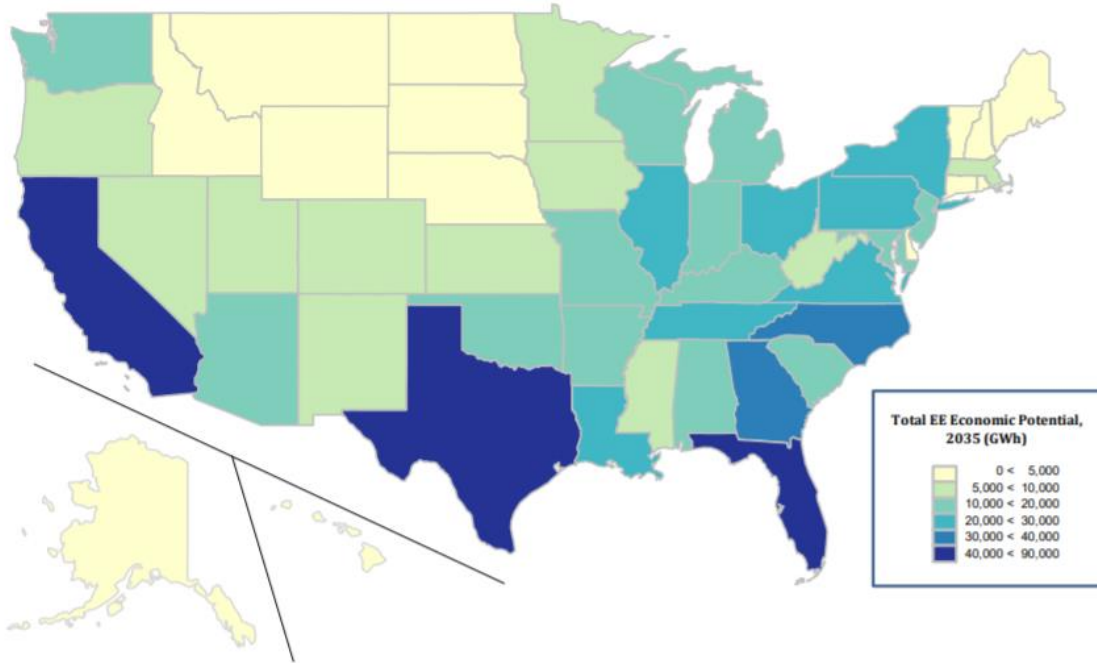
<sup>6</sup> See FPSC Docket No. 20190015-EG, Post-Hearing Brief of SACE and LULAC (filed Sept. 20, 2019), at p. 2 (stating that FPL proposed a goal of 1.023 GWh, which is equivalent of less than 10 residential homes, out of more than 10 million people served).

<sup>7</sup> 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>.

<sup>8</sup> NextEra Energy. 2021. *Environmental, Social and Governance*. Available at: [https://www.nexteraenergy.com/content/dam/nee/us/en/pdf/2021\\_NEE\\_ESG\\_Report.pdf](https://www.nexteraenergy.com/content/dam/nee/us/en/pdf/2021_NEE_ESG_Report.pdf).

1 Electric Power Research Institute (EPRI), Florida’s state-level EE potential is a  
2 whopping 21 percent in 2035 relative to the adjusted baseline sales.<sup>9</sup> A map of  
3 Florida’s potential relative to other states is shown in Figure 1.

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



5  
6 *Source: Electric Power Research Institute. 2017. State Level Electric Energy Efficiency Potential*  
7 *Estimates. Available at:*  
8 [https://www.energy.gov/sites/prod/files/2017/05/f34/epri\\_state\\_level\\_electric\\_energy\\_efficiency](https://www.energy.gov/sites/prod/files/2017/05/f34/epri_state_level_electric_energy_efficiency_potential_estimates_0.pdf)  
9 [potential\\_estimates\\_0.pdf](https://www.energy.gov/sites/prod/files/2017/05/f34/epri_state_level_electric_energy_efficiency_potential_estimates_0.pdf).

10

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

---

<sup>9</sup> 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](https://www.energy.gov/sites/prod/files/2017/05/f34/epri_state_level_electric_energy_efficiency_potential_estimates_0.pdf).

1 displaced, resulting in cost savings to customers. According to FPL, even the  
2 Company’s minimal efforts through year-end 2018 have eliminated “the need to  
3 construct the equivalent of approximately 15 new 400 MW generating units,”<sup>10</sup>  
4 and increasing the amount of EE on FPL’s system could further avoid  
5 construction of costly new supply-side resources.

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

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

---

<sup>10</sup> FPSC Docket No. 20190015-EG, Direct Testimony of FPL witness Thomas R. Koch (filed April 12, 2019), at page 13, lines 3-7.

<sup>11</sup> Xcel Energy. 2019. *Upper Midwest Integrated Resource Plan 2020-2034*. Docket No. E002/RP-19-368. Available at: <https://www.xcelenergy.com/staticfiles/xcel-responsive/Company/Rates%20&%20Regulations/The-Resource-Plan-No-Appendices.pdf>.

<sup>12</sup> ACEEE. 2020. *State Energy Efficiency Scorecard*. Available at: <https://www.aceee.org/state-policy/scorecard>.

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

5 In developing its EE projections, Xcel modeled EE as a supply-side resource. This  
6 is important because it allows the capacity expansion model to optimize for  
7 EE/DR, instead of just manually forecasting an assumed level of EE adoption.<sup>14</sup>

8 To accomplish this, Xcel created EE/DR resource “bundles” that could be  
9 selected and optimized by the model. Each bundle represented a portfolio of  
10 EE/DR averages at an assumed average cost, and Xcel analyzed multiple capacity  
11 optimization runs to create the most cost-effective combination of resources for  
12 each bundle. According to Xcel, modeling EE/DR in this way “[allowed] these  
13 resources to compete with traditional supply-side resources such as large-scale  
14 renewables or gas resources.”<sup>15</sup>

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

---

<sup>13</sup> Xcel Energy. 2019. *Upper Midwest Integrated Resource Plan 2020-2034*. Docket No. E002/RP-19-368. Available at: <https://www.xcelenergy.com/staticfiles/xcel-responsive/Company/Rates%20&%20Regulations/The-Resource-Plan-No-Appendices.pdf>.

<sup>14</sup> *Id.*

<sup>15</sup> *Id.*



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

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

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

---

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

1 program to full capacity (7 MW) in which customers are financially incentivized  
2 to proactively conserve energy.<sup>17</sup>

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

5  
6 **Q. Does FPL present any evidence that the conversion of the Crist Units 6 and 7**  
7 **from coal to gas was an economic choice for ratepayers?**

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

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

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

---

<sup>17</sup> Balaraman, Kavya. 2021. *Hawaii Ok's 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/>.

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

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

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

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

---

<sup>18</sup> Sim Direct at page 37, lines 3-7.

<sup>19</sup> *Id.* at page 10, lines 1-5.

<sup>20</sup> Sim Direct, Exhibit SRS-7, page 2 of 2.

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

4 **Q. Are there any flaws in this analysis?**

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

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

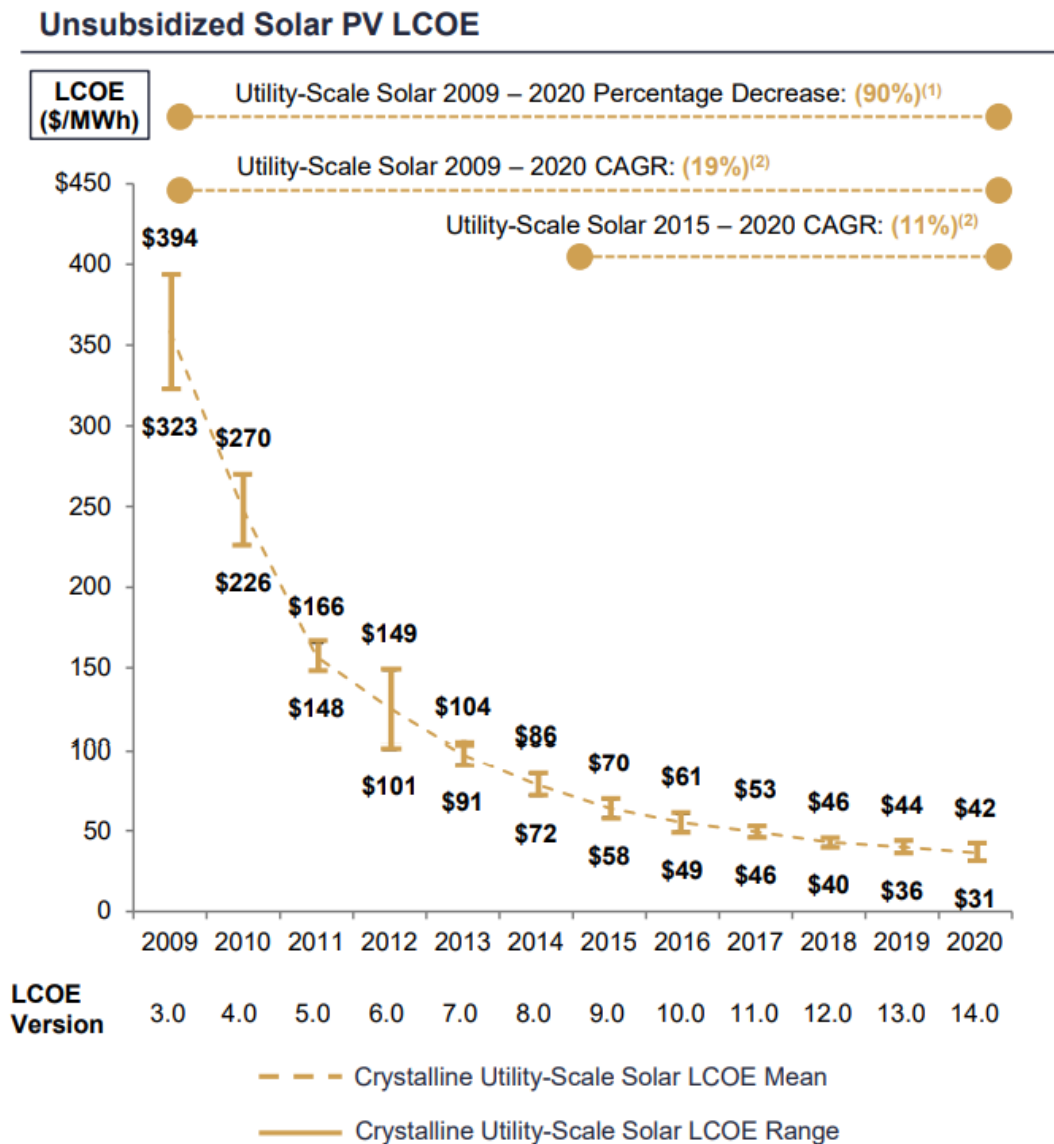
---

<sup>21</sup> Sim Direct at page 57, lines 1-6.

<sup>22</sup> *Id.*

1

Figure 2. Historical leveled cost of solar declines



2

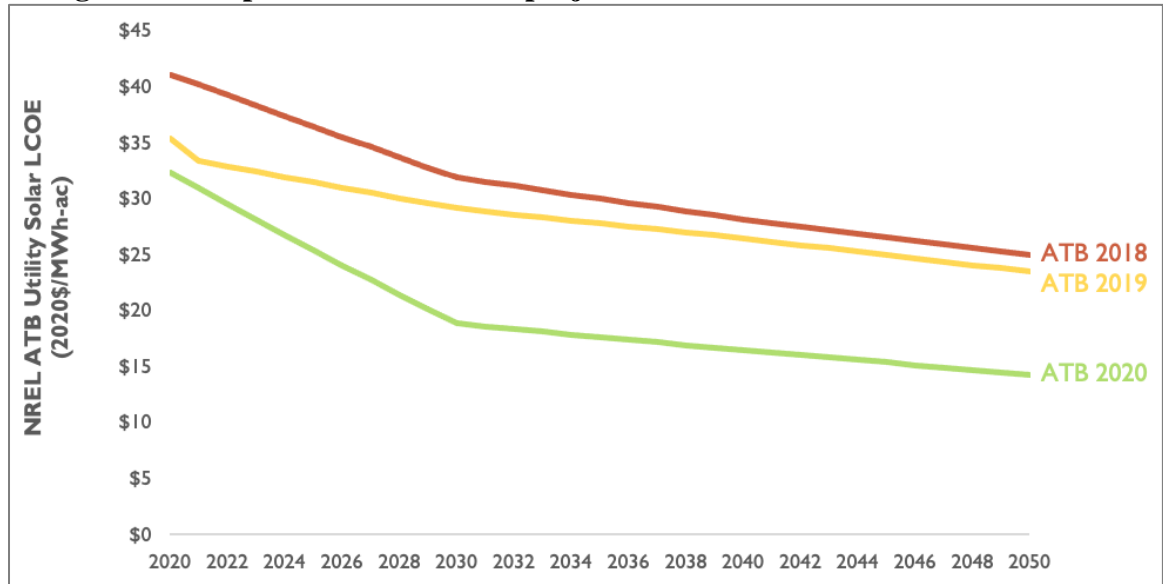
3 Source: Lazard. 2020. Levelized Cost of Energy Analysis—Version 14.0, available at:  
4 <https://www.lazard.com/media/451419/lazards-levelizedcost-of-energy-version-140.pdf>.

5

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

1

**Figure 3. Comparison of solar cost projections from NREL ATB**



2

3

4

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

5

6

Battery storage costs have dropped dramatically over the past decade and

7

continue to decline each year.<sup>23</sup> Updating these particular assumptions dictates a

8

reassessment of the decision to add almost 940 MW of new gas-fired capacity, but

9

FPL chose not to update its analysis.

10 **Q.**

**Could battery storage also have been a cost-effective replacement for the Crist**

11

**units?**

12 **A.**

Yes, it is very likely that storage could have been a cost-effective replacement. In

13

addition to its cost competitiveness, it can provide the same fast start/fast ramp

---

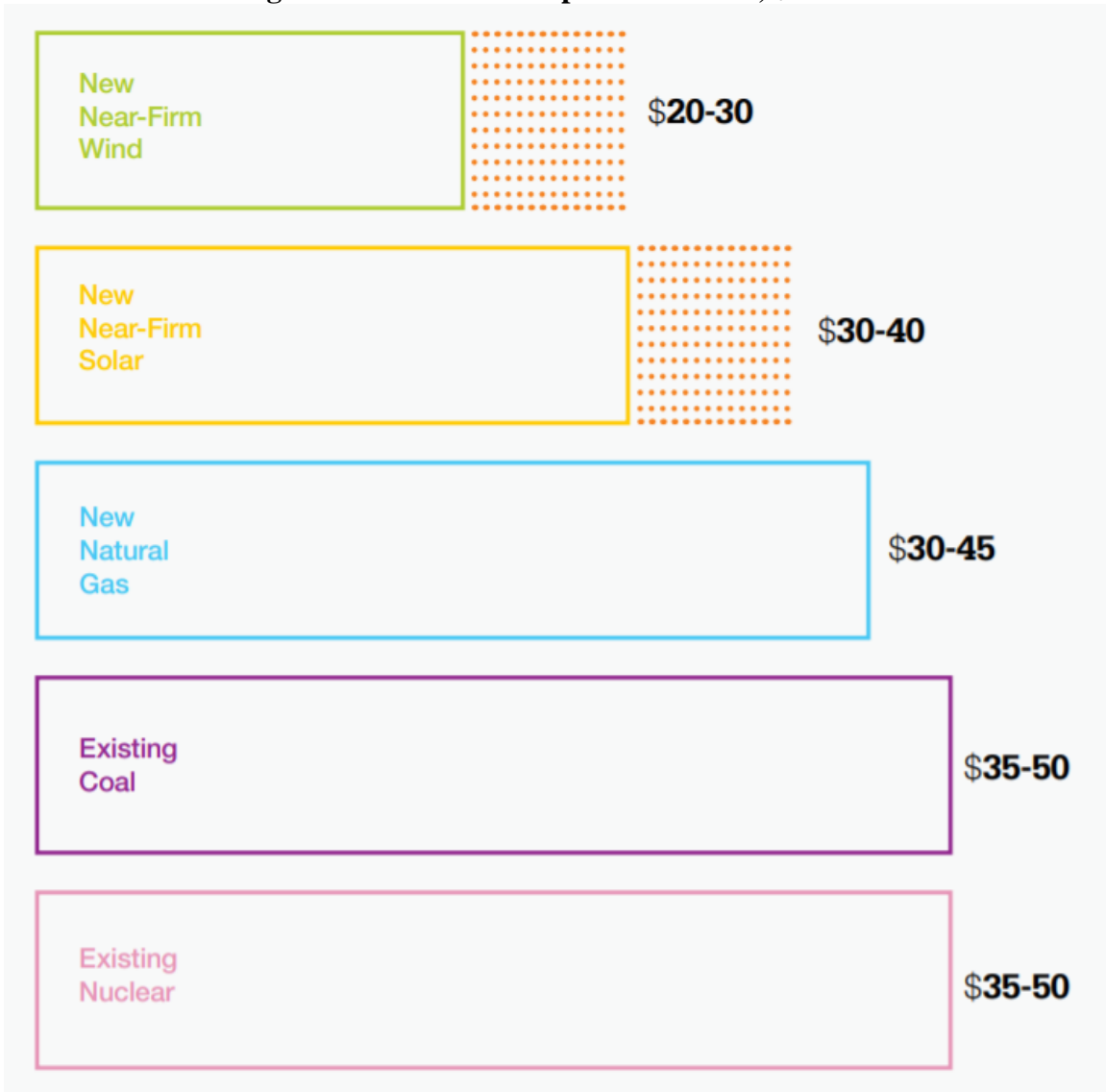
<sup>23</sup> Bloomberg New Energy Finance. December 16, 2020. *Battery Pack Prices Cited Below \$100/kWh for the First Time in 2020, while Market Average Sits at \$137/kWh*. Available at: <https://about.bnef.com/blog/battery-pack-prices-cited-below-100-kwh-for-the-first-time-in-2020-while-market-average-sits-at-137-kwh/>.

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

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

1

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



2

3

4

5

Source: NextEra. 2021. Environmental, Social, and Governance. Available at: [https://www.nexteraenergy.com/content/dam/nee/us/en/pdf/2021\\_NEE\\_ESG\\_Report.pdf](https://www.nexteraenergy.com/content/dam/nee/us/en/pdf/2021_NEE_ESG_Report.pdf)



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

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

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

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

---

<sup>24</sup> 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>.

1 retiring coal with wind, solar, large-scale battery storage, and existing gas  
2 generators.<sup>25</sup>

3 Monopoly utilities have incentives for over-procurement and self-building of new  
4 resources, and all-source, technology neutral, bidding processes can result in  
5 better outcomes for utility ratepayers.<sup>26</sup>

6 **Q. Does FPL’s modeling further bias the results toward the addition of gas-fired**  
7 **resources?**

8 A. Yes. FPL modeled a useful life of gas assets of 40 years in its analysis. This is a  
9 longer useful life than is modeled by many utilities. Engineering firm Sargent &  
10 Lundy expects that the useful life of a new combined cycle unit is approximately  
11 30 years,<sup>27</sup> and I often see utilities model useful lives consistent with this  
12 expectation. The effect of modeling a useful life of 40 years rather than 30 is that  
13 the costs to build a new unit are then spread out over a longer period of time, and  
14 the cost stream is then discounted to present dollars. The same costs, spread out  
15 over a longer useful life, will then be less expensive from a CPVRR perspective,  
16 the Company’s metric for making resource decisions. This will be further

---

<sup>25</sup> 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](https://www.michigan.gov/documents/mpsc/Feb_18_Competative_Procurement_Presentation_716684_7.pdf).

<sup>26</sup> *Id.*

<sup>27</sup> Sargent & Lundy, LLC. *Combined Cycle Plant Life Assessments*. Available at: <https://sargentlundy.com/wp-content/uploads/2017/05/Combined-Cycle-PowerPlant-LifeAssessment.pdf>.

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

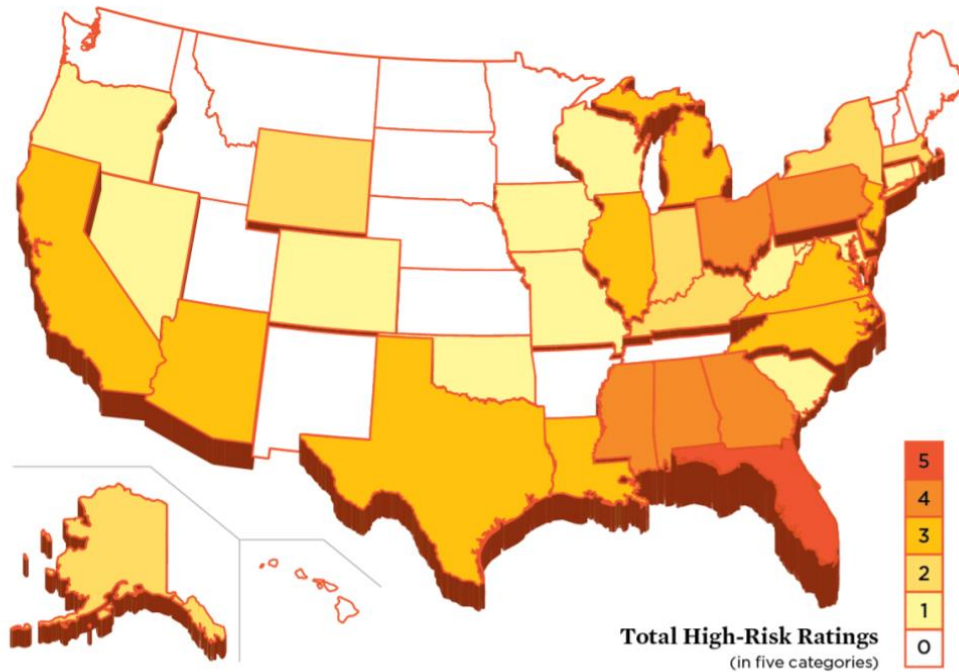
3 **4. POTENTIAL FOR NEW GAS UNITS TO BECOME STRANDED ASSETS**

4 **Q. Does FPL’s continued reliance on gas-fired generation put its customers at**  
5 **risk?**

6 A. Yes. A 2015 report from the Union of Concerned Scientists examined states’ risks  
7 of overreliance on gas in five categories, rating each on a scale of low, moderate,  
8 or high. According to this report, Florida is already over reliant on gas and is  
9 subjecting its customers to risks associated with gas price volatility, potential  
10 supply shortages during winter events, and costs associated with the cost of CO<sub>2</sub>  
11 emissions allowances or controls. Indeed, Florida was the only state to earn a  
12 “high” rating in all five categories of risk and is the state at the highest risk for gas  
13 overreliance, as shown in Figure 5, below.

1

**Figure 5. States at Highest Risk of Natural Gas Overreliance**



2

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

7

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

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

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

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

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

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

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

14 **Q. What is a stranded asset?**

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

---

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

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

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

3 **Q. Can any of FPL’s current generating assets be considered stranded, under this**  
4 **definition?**

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

7 **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               |

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

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

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

12 A. Yes. FPL’s *Form 10-K*, filed with the Securities and Exchange Commission in  
13 2020, states that its business could be negatively affected by laws or regulations  
14 that mandate new or addition limits on the production of greenhouse gases, which  
15 could make its electric generation units uneconomical to operate in the long term,  
16 require substantial capital investments to comply with new regulations, or create

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

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

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

---

<sup>30</sup> 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/>.

1 identified need by committing that any stranded costs resulting from these units  
2 would be borne by Alabama Power's shareholders rather than its customers.<sup>31</sup>

3 **Q. Is there anything that FPL could do to reduce both the stranded asset risk to**  
4 **customers and CO<sub>2</sub> risk with respect to new gas-fired generators?**

5 A. Yes. The majority of electric utilities in the United States have a CO<sub>2</sub> emissions  
6 reduction goal, and many of these reduce emissions to either zero or net-zero by  
7 2050 at the latest. A list of utilities and their current carbon reduction commitments  
8 is attached as Exhibit RW-2. NextEra, FPL's parent company, has a company-wide  
9 carbon reduction goal based on CO<sub>2</sub> emissions rate, which is related to improving  
10 the amount of CO<sub>2</sub> generated per MWh across the generating fleet, but is not a  
11 mass-based reduction goal.<sup>32</sup> FPL Witness Silagy stated that this goal does not  
12 influence FPL's planning decisions in this proceeding, however. If FPL is  
13 committed to reducing the amount of climate risk unique to Florida utilities, it  
14 should join its peer utilities in committing to a zero or net-zero CO<sub>2</sub> target by no  
15 later than 2050. Decisions around future resource additions should then be made  
16 with this goal in mind, and the Company can set interim emissions reduction goals  
17 both on a system-wide and individual unit basis in order to ensure it can meet its  
18 long-term goal.

---

<sup>31</sup> Direct Testimony of John A. Putnam before the Alabama Public Service Commission. Docket No. 26115. Page 13, line 7.

<sup>32</sup> 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](https://www.nexteraenergy.com/content/dam/nee/us/en/pdf/2021_NEE_ESG_Report.pdf).



1 **5. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS**

2 **Q. Please summarize your conclusions.**

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

13 **Q. Please summarize your recommendations.**

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

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

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

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

12 4. If FPL is committed to reducing the amount of climate risk unique to  
13 Florida utilities, it should join its peer utilities in establishing a zero or net-  
14 zero CO<sub>2</sub> target for a date no later than 2050. Decisions around future  
15 resource additions should then be made with this goal in mind, and the  
16 Company can set interim emissions reduction goals both on a system-wide  
17 and individual unit basis to ensure it can meet its long-term goal.

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

6   **Q.    Does this conclude your testimony?**

7   A.    Yes.

**Rachel Wilson, Principal Associate**

---

Synapse Energy Economics | 485 Massachusetts Avenue, Suite 3 | Cambridge, MA 02139 | 617-453-7044  
rwilson@synapse-energy.com

**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.

## PUBLICATIONS

Bhandari, D., M. Chang, P. Eash-Gates, J. Frost, S. Letendre, J. Litynski, C. Roberto, A. Takasugi, J. Taberner. R. Wilson. 2021. *Exelon Illinois Nuclear Fleet Audit*. Synapse Energy Economics for Illinois Environmental Protection Agency.

Wilson, R., E. Camp, N. Garner, T. Vitolo. 2020. *Obsolete Atlantic Coast Pipeline Has Nothing to Deliver: An examination of the dramatic shifts in the energy, policy, and economic landscape in Virginia and North Carolina since 2017 shows there is little need for new gas generation*. Synapse Energy Economics for Southern Environmental Law Center.

Wilson, R., E. Camp, J. Frost. 2020. *Impacts of the PennEast and Adelpia Gateway Pipelines on Gas Drilling in Pennsylvania*. Synapse Energy Economics for Delaware Riverkeeper Network.

Eash-Gates, P., D. Glick, S. Kwok. R. Wilson. 2020. *Orlando's Renewable Energy Future: The Path to 100 Percent Renewable Energy by 2020*. Synapse Energy Economics for the First 50 Coalition.

Biewald, B., D. Glick, J. Hall, C. Odom, C. Roberto, R. Wilson. 2020. *Investing In Failure: How Large Power Companies are Undermining their Decarbonization Targets*. Synapse Energy Economics for Climate Majority Project.

Wilson, R., D. Bhandari. 2019. *The Least-Cost Resource Plan for Santee Cooper: A Path to Meet Santee Cooper's Customer Electricity Needs at the Lowest Cost and Risk*. Synapse Energy Economics for the Sierra Club, Southern Environmental Law Center, and Coastal Conservation League.

Wilson, R., N. Peluso, A. Allison. 2019. *North Carolina's Clean Energy Future: An Alternative to Duke's Integrated Resource Plan*. Synapse Energy Economics for the North Carolina Sustainable Energy Association.

Wilson, R., N. Peluso, A. Allison. 2019. *Modeling Clean Energy for South Carolina: An Alternative to Duke's Integrated Resource Plan*. Synapse Energy Economics for the South Carolina Solar Business Alliance.

Camp, E., B. Fagan, J. Frost, D. Glick, A. Hopkins, A. Napoleon, N. Peluso, K. Takahashi, D. White, R. Wilson, T. Woolf. 2018. *Phase 1 Findings on Muskrat Falls Project Rate Mitigation*. Synapse Energy Economics for Board of Commissioners of Public Utilities, Province of Newfoundland and Labrador.

Allison, A., R. Wilson, D. Glick, J. Frost. 2018. *Comments on South Africa 2018 Integrated Resource Plan*. Synapse Energy Economics for Centre for Environmental Rights.

Hall, J., R. Wilson, J. Kallay. 2018. *Effects of the Draft CAFE Standard Rule on Vehicle Safety*. Synapse Energy Economics on behalf of Consumers Union.

Whited, M., A. Allison, R. Wilson. 2018. *Driving Transportation Electrification Forward in New York: Considerations for Effective Transportation Electrification Rate Design*. Synapse Energy Economics on behalf of the Natural Resources Defense Council.

Wilson, R., S. Fields, P. Knight, E. McGee, W. Ong, N. Santen, T. Vitolo, E. A. Stanton. 2016. *Are the Atlantic Coast Pipeline and the Mountain Valley Pipeline Necessary? An examination of the need for additional pipeline capacity in Virginia and Carolinas*. Synapse Energy Economics for Southern Environmental Law Center and Appalachian Mountain Advocates.

Wilson, R., T. Comings, E. A. Stanton. 2015. *Analysis of the Tongue River Railroad Draft Environmental Impact Statement*. Synapse Energy Economics for Sierra Club and Earthjustice.

Wilson, R., M. Whited, S. Jackson, B. Biewald, E. A. Stanton. 2015. *Best Practices in Planning for Clean Power Plan Compliance*. Synapse Energy Economics for the National Association of State Utility Consumer Advocates.

Luckow, P., E. A. Stanton, S. Fields, B. Biewald, S. Jackson, J. Fisher, R. Wilson. 2015. *2015 Carbon Dioxide Price Forecast*. Synapse Energy Economics.

Stanton, E. A., P. Knight, J. Daniel, B. Fagan, D. Hurley, J. Kallay, E. Karaca, G. Keith, E. Malone, W. Ong, P. Peterson, L. Silvestrini, K. Takahashi, R. Wilson. 2015. *Massachusetts Low Gas Demand Analysis: Final Report*. Synapse Energy Economics for the Massachusetts Department of Energy Resources.

Fagan, B., R. Wilson, D. White, T. Woolf. 2014. *Filing to the Nova Scotia Utility and Review Board on Nova Scotia Power's October 15, 2014 Integrated Resource Plan: Key Planning Observations and Action Plan Elements*. Synapse Energy Economics for the Nova Scotia Utility and Review Board.

Wilson, R., B. Biewald, D. White. 2014. *Review of BC Hydro's Alternatives Assessment Methodology*. Synapse Energy Economics for BC Hydro.

Wilson, R., B. Biewald. 2013. *Best Practices in Electric Utility Integrated Resource Planning: Examples of State Regulations and Recent Utility Plans*. Synapse Energy Economics for Regulatory Assistance Project.

Fagan, R., P. Luckow, D. White, R. Wilson. 2013. *The Net Benefits of Increased Wind Power in PJM*. Synapse Energy Economics for Energy Future Coalition.

Hornby, R., R. Wilson. 2013. *Evaluation of Merger Application filed by APCo and WPCo*. Synapse Energy Economics for West Virginia Consumer Advocate Division.

Johnston, L., R. Wilson. 2012. *Strategies for Decarbonizing Electric Power Supply*. Synapse Energy Economics for Regulatory Assistance Project, Global Power Best Practice Series, Paper #6.

Wilson, R., P. Luckow, B. Biewald, F. Ackerman, E. Hausman. 2012. *2012 Carbon Dioxide Price Forecast*. Synapse Energy Economics.

Hornby, R., R. Fagan, D. White, J. Rosenkranz, P. Knight, R. Wilson. 2012. *Potential Impacts of Replacing Retiring Coal Capacity in the Midwest Independent System Operator (MISO) Region with Natural Gas or Wind Capacity*. Synapse Energy Economics for Iowa Utilities Board.

Fagan, R., M. Chang, P. Knight, M. Schultz, T. Comings, E. Hausman, R. Wilson. 2012. *The Potential Rate Effects of Wind Energy and Transmission in the Midwest ISO Region*. Synapse Energy Economics for Energy Future Coalition.

Fisher, J., C. James, N. Hughes, D. White, R. Wilson, and B. Biewald. 2011. *Emissions Reductions from Renewable Energy and Energy Efficiency in California Air Quality Management Districts*. Synapse Energy Economics for California Energy Commission.

Wilson, R. 2011. *Comments Regarding MidAmerican Energy Company Filing on Coal-Fired Generation in Iowa*. Synapse Energy Economics for the Iowa Office of the Consumer Advocate.

Hausman, E., T. Comings, R. Wilson, and D. White. 2011. *Electricity Scenario Analysis for the Vermont Comprehensive Energy Plan 2011*. Synapse Energy Economics for Vermont Department of Public Service.

Hornby, R., P. Chernick, C. Swanson, D. White, J. Gifford, M. Chang, N. Hughes, M. Wittenstein, R. Wilson, B. Biewald. 2011. *Avoided Energy Supply Costs in New England: 2011 Report*. Synapse Energy Economics for Avoided-Energy-Supply-Component (AESC) Study Group.

Wilson, R., P. Peterson. 2011. *A Brief Survey of State Integrated Resource Planning Rules and Requirements*. Synapse Energy Economics for American Clean Skies Foundation.

Johnston, L., E. Hausman., B. Biewald, R. Wilson, D. White. 2011. *2011 Carbon Dioxide Price Forecast*. Synapse Energy Economics.

Fisher, J., R. Wilson, N. Hughes, M. Wittenstein, B. Biewald. 2011. *Benefits of Beyond BAU: Human, Social, and Environmental Damages Avoided Through the Retirement of the US Coal Fleet*. Synapse Energy Economics for Civil Society Institute.

Peterson, P., V. Sabodash, R. Wilson, D. Hurley. 2010. *Public Policy Impacts on Transmission Planning*. Synapse Energy Economics for Earthjustice.

Fisher, J., J. Levy, Y. Nishioka, P. Kirshen, R. Wilson, M. Chang, J. Kallay, C. James. 2010. *Co-Benefits of Energy Efficiency and Renewable Energy in Utah: Air Quality, Health and Water Benefits*. Synapse Energy Economics, Harvard School of Public Health, Tufts University for State of Utah Energy Office.

Fisher, J., C. James, L. Johnston, D. Schlissel, R. Wilson. 2009. *Energy Future: A Green Alternative for Michigan*. Synapse Energy Economics for Natural Resources Defense Council (NRDC) and Energy Foundation.

Schlissel, D., R. Wilson, L. Johnston, D. White. 2009. *An Assessment of Santee Cooper's 2008 Resource Planning*. Synapse Energy Economics for Rockefeller Family Fund.

Schlissel, D., A. Smith, R. Wilson. 2008. *Coal-Fired Power Plant Construction Costs*. Synapse Energy Economics.

## TESTIMONY

**West Virginia Public Service Commission (Case No. 20-1040-E-CN):** Direct testimony of Rachel Wilson evaluating the application of Appalachian Power Company and Wheeling 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, Mountaineer, and Mitchell coal plants. On behalf of Sierra Club. May 6, 2021.

**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.

**Texas Public Utilities Commission (SOAH Docket No. 473-17-1764, PUC Docket No. 46449):** Direct 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. April 25, 2017.

**Virginia State Corporation Commission (Case No. PUE-2015-00075):** Direct testimony evaluating the petition for a Certificate of Public Convenience and Necessity filed by Virginia Electric and Power Company to construct and operate the Greensville County Power Station and to increase electric rates to recover the cost of the project. On behalf of Environmental Respondents. November 5, 2015.

**Missouri Public Service Commission (Case No. ER-2014-0370):** Direct and surrebuttal testimony evaluating the prudence of environmental retrofits at Kansas City Power & Light Company's La Cygne Generating Station. On behalf of Sierra Club. April 2, 2015 and June 5, 2015.

**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.

**Michigan Public Service Commission (Case No. U-17087):** Direct testimony before the Commission discussing Strategist modeling relating to the application of Consumers Energy Company for the authority to increase its rates for the generation and distribution of electricity. On behalf of the Michigan Environmental Council and Natural Resources Defense Council. February 21, 2013.

**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*

## Electric Utilities' Carbon Emission Reduction Goals

## Exhibit RW-2, Page 1 of 7

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

## Electric Utilities' Carbon Emission Reduction Goals

## Exhibit RW-2, Page 2 of 7

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

## Electric Utilities' Carbon Emission Reduction Goals

## Exhibit RW-2, Page 3 of 7

|  |                 |               |      |   |
|--|-----------------|---------------|------|---|
|  |                 |               |      |   |
|  |                 |               |      |   |
|  |                 |               |      |   |
| <b>WEC Energy Group</b>                      | 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. |
| <b>Puget Sound Energy</b>                    | Investor Owned  | Washington    | 2045 | Beyond net-zero by 2045, which includes: a carbon neutral electric system by 2030 and 100% clean electricity by 2045.   |
| <b>Public Service Electric &amp; Gas</b>     | Investor Owned  | New Jersey    | 2050 | 80% reduction in carbon emissions from 2005 levels by 2046, and net-zero carbon emissions by 2050.  |
| <b>National Grid (US)</b>                    | Holding Company | Massachusetts | 2050 | 45% reduction in GHG emissions by 2020, and net-zero carbon emissions by 2050.  |
| <b>Tampa Electric Company</b>                | 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.  |
| <b>Lincoln Electric System</b>               | Public Power    | Nebraska      | 2040 | Net-zero CO2 emissions by 2040.   |
| <b>Alliant Energy</b>                        | Investor Owned  | Wisconsin     | 2050 | 50% reduction in carbon dioxide emissions by 2030. Net-zero carbon dioxide emissions by 2050.   |
| <b>Sacramento Municipal Utility District</b> | Public Power    | California    | 2030 | Carbon neutral by 2030.   |
| <b>Idaho Power Co.</b>                       | 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.  |

## Electric Utilities' Carbon Emission Reduction Goals

## Exhibit RW-2, Page 4 of 7

|  |                |           |      |   |
|--|----------------|-----------|------|---|
|  |                |           |      |   |
|  |                |           |      |   |
|  |                |           |      |   |
| <b>Entergy Corporation</b>                           | 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 |
| <b>Green Mountain Power</b>                          | Investor Owned | Vermont   | 2025 | 100% carbon free energy by 2025.  |
| <b>Colorado Springs Utilities</b>                    | Public Power   | Colorado  | 2050 | 80% reduction in carbon emissions from 2005 levels by 2030. 90% reduction in carbon emissions from 2005 levels by 2050.                                     |
| <b>Xcel Energy</b>                                   | Investor Owned | Colorado  | 2050 | 85% reduction in carbon dioxide emissions from 2005 levels by 2030, and 100% carbon free electricity by 2050.   |
| <b>Consolidated Edison Company of New York, Inc.</b> | Investor Owned | New York  | 2040 | 100% clean energy by 2040.  |
| <b>Tennessee Valley Authority</b>                    | 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.  |
| <b>Dominion Virginia Power</b>                       | Investor Owned | Virginia  | 2050 | Net-zero emissions by 2050. 65% reduction in methane emissions by 2030 and 80% by 2040, by 2010 levels.   |
| <b>Duke Energy</b>                                   | Investor Owned | New York  | 2050 | At least a 50% reduction in CO2 emissions from 2005 levels by 2030. Net-zero CO2 emissions by 2050.   |
| <b>Hawaiian Electric</b>                             | Investor Owned | Hawaii    | 2045 | Carbon neutral by 2045  |
| <b>El Paso Electric</b>                              | 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.                               |

## Electric Utilities' Carbon Emission Reduction Goals

## Exhibit RW-2, Page 5 of 7

|  |                  |            |      |   |
|--|------------------|------------|------|---|
|  |                  |            |      |   |
|  |                  |            |      |   |
| <b>Orlando Utilities Commission</b>                      | Public Power     | Florida    | 2050 | 50% reduction in carbon emissions from 2005 levels by 2030. Net-zero carbon emissions by 2050.  |
| <b>Evergy, Inc.</b>                                      | Holding Company  | Kansas     | 2045 | 70% reduction in carbon emissions from 2005 levels by 2030. Net-zero carbon emissions by 2045.  |
| <b>Pacific Gas &amp; Electric</b>                        | Investor Owned   | Michigan   | 2045 | 100% zero carbon electricity by 2045.   |
| <b>FirstEnergy Corp.</b>                                 | Holding Company  | Ohio       | 2050 | 30% reduction in greenhouse gas (GHG) emissions from 2019 levels by 2030. Carbon neutral by 2050.   |
| <b>Tri-State Generation and Transmission Association</b> | 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. |
| <b>Great River Energy</b>                                | Power Agency/G&T | Minnesota  | 2023 | 95% CO2 free by 2023.   |
| <b>DTE Energy</b>  | 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.   |
| <b>Southern Company</b>                                  | 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.   |
| <b>Consumers Energy</b>                                  | Investor Owned   | Michigan   | 2040 | Net-zero carbon emissions by 2040.  |
| <b>Los Angeles Dept of Water and Power</b>               | Public Power     | California | 2050 | 100% net-zero emissions by 2050   |
| <b>Cobb EMC</b>  | Cooperative      | Georgia    | 2030 | 75% reduction in carbon emissions by 2030.  |



## Electric Utilities' Carbon Emission Reduction Goals

## Exhibit RW-2, Page 6 of 7

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

|                                |                 | <b>Electric Utilities' Carbon Emission Reduction Goals</b> |      |  |
|--------------------------------|-----------------|--|------|--|
|                                |                 |  |      | <b>Exhibit RW-2, Page 7 of 7</b>   |
| <b>Salt River Project</b>      | 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.                      |
| <b>CPS Energy</b>              | Public Power    | Texas  | 2050 | 80% reduction in net carbon emissions by 2040. Carbon neutral by 2050.   |
| <b>Black Hills Corporation</b> | 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. |
| <b>Santee Cooper</b>           | Public Power    | South Carolina   | 2030 | 43% less carbon emissions from 2005 levels on average during 2030s   |