

PUBLIC SERVICE COMMISSION OF SOUTH CAROLINA

**In re: 2023 Integrated Resource Plan for the South
Carolina Public Service Authority**

Docket No. 2023-154-E

SURREBUTTAL TESTIMONY of

DEVI GLICK

ON BEHALF OF

SIERRA CLUB

November 17, 2023

1. INTRODUCTION AND PURPOSE OF TESTIMONY

1 **Q Please state your name and occupation.**

2 **A**My name is Devi Glick. I am a Senior Principal at Synapse Energy Economics, Inc.
3 (Synapse). My business address is 485 Massachusetts Avenue, Suite 3, Cambridge,
4 Massachusetts 02139.

5 **Q Are you the same Devi Glick who previously filed direct testimony in this**
6 **doCKET?**

7 **A**Yes.

8 **Q What is the purpose of your surrebuttal testimony?**

9 **A**The purpose of my surrebuttal testimony is to respond to the rebuttal testimony of
10 Company Witnesses Davis, Kushner, Painter, and Nunes. My surrebuttal can
11 broadly be broken into three parts.

12 First, I discuss the supplemental modeling that Santee Cooper prepared in
13 response to the requests made by the South Carolina Office of Regulatory Staff
14 (“ORS”).

15 Second, I respond to criticisms the Company presents to the Synapse
16 analysis. Specifically, I (1) explain why I modeled the U.S. Environmental
17 Protection Agency’s (EPA) proposed Greenhouse Gas Standards and Guidelines
18 for Fossil-Fuel-Fired Power plants issued under Section 111 of the Clean Air Act
19 (“Section 111 Rules”), (2) respond to critiques about my input assumptions for
20 battery storage resources, market energy purchases costs assumptions, and
21 renewable cost assumptions for my sensitivities portfolios, and (3) explain the
22 optimization period I used for the capacity expansion modeling.

1 Third, I respond to the Company's defense of specific modeling decisions
2 it made in completing its own analysis. I focus on Santee Cooper's defense of its
3 failure to model the proposed Section 111 Rules, its project build limits, combined
4 cycle capital costs assumptions, and its decision not to let the model make
5 endogenous retirement decisions.

2. SANTEE COOPER'S SUPPLEMENTAL MODELING RESULTS

6 **Q Have you had an opportunity to review Santee Cooper's supplemental**
7 **modeling and the Company's discussion of the results in the rebuttal testimony**
8 **of Company Witnesses Davis and Painter?**

9 **A** Yes.

10 **Q Do the supplemental modeling results that Santee Cooper prepared impact**
11 **your findings or recommendations related to Santee Cooper's Preferred**
12 **Portfolio?**

13 **A** No. I found that none of my concerns or recommendations were addressed in the
14 supplemental modeling runs. In fact, some of these runs further exacerbated
15 concerns I raised in my direct testimony, including locking in Winyah's retirement
16 date and increasing constraints on solar PV additions. Therefore, my findings and
17 recommendations remain unchanged relative to my direct testimony. The
18 Commission should continue to consider my modeling results in evaluating how
19 Santee Cooper can reasonably retire Winyah and Cross earlier than it proposes in
20 its Preferred Plan, while still meeting all its resource and reliability needs and
21 reducing the risks to ratepayers from heavy reliance on fossil fuels.

1 **Q Did any of Santee Cooper’s supplemental modeling runs address the major**
2 **concerns you highlighted in your direct testimony, including the impact of the**
3 **proposed Section 111 Rules and the lack of an optimized portfolio that allowed**
4 **for endogenous retirements?**

5 **A No.** I appreciate that Santee Cooper took the time to conduct supplemental
6 modeling runs as requested by ORS, but I am concerned that the Company did not
7 incorporate my recommendations into any of its supplemental modeling runs.
8 Santee Cooper missed a critical opportunity to evaluate the proposed Section 111
9 Rules and endogenous economic retirement decisions for its coal plants as part of
10 its supplemental modeling. As I will discuss in more detail below, the Section 111
11 rules serve as a valuable proxy for increased regulation of carbon-emitting
12 resources. Failing to plan around increased regulations won’t make those
13 regulations less likely to happen—it will simply make Santee Cooper less prepared
14 to comply.

15 Santee Cooper’s portfolios continue to rely on a large quantity of volatile
16 fossil fuel resources. High reliance on natural gas resources can subject ratepayers
17 to high fuel costs if prices rise overall. Even more concerning, it exposes ratepayers
18 to fuel price volatility for which ratepayers cannot plan. Natural gas is a global
19 commodity, which means that both domestic and global market forces can impact
20 the price and demand for the resource. After roughly doubling from 2019 to 2022,
21 North American liquid natural gas export capacity is projected to double again, by

1 2027, from current levels to more than 24 billion cubic feet per day.¹ To put this in
2 perspective, US total natural gas consumption in 2022 averaged roughly 88 billion
3 cubic feet per day;² thus the global market consumption effect on prices in the US
4 will continue to increase significantly over even just the next few years.

5 When the market is constrained and prices spike, those costs are passed on
6 directly to ratepayers. For example, DTE Electric Company in Michigan just filed
7 its 2022 Fuel Reconciliation Docket and noted that natural gas spending was 74
8 percent higher than planned. These higher-than-expected prices resulted in large
9 part from the war in Ukraine. As a result, DTE is requesting to recover an additional
10 \$154 million for 2022 alone.³ Absent action from the Michigan Commission, DTE
11 and its shareholders are not impacted by these gas price spikes—these costs are
12 entirely passed on to ratepayers. While this is in a different region of the country,
13 the same phenomenon could happen just as easily in South Carolina and Santee
14 Cooper should explicitly consider the value in avoiding gas price volatility in its
15 integrated resource plan (IRP) modeling.

¹ Zaretskaya, Victoria and Max Ober. 2023. “LNG export capacity from North American is likely to more than double through 2027.” *United States Energy Information Administration*. November 13. Available at <https://www.eia.gov/todayinenergy/detail.php?id=60944>.

² *Natural Gas Consumption by End Use*. United States Energy Information Administration. October 2023. Available at https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_nus_a.htm.

³ In the matter of the application of DTE Electric Company for reconciliation of its power supply cost recovery Case No. U-21051 (Case No. U-21050) for the we months ended December 31, 2022. Exhibit A-7. MPSC Case No. U-21051. March 31, 2023.

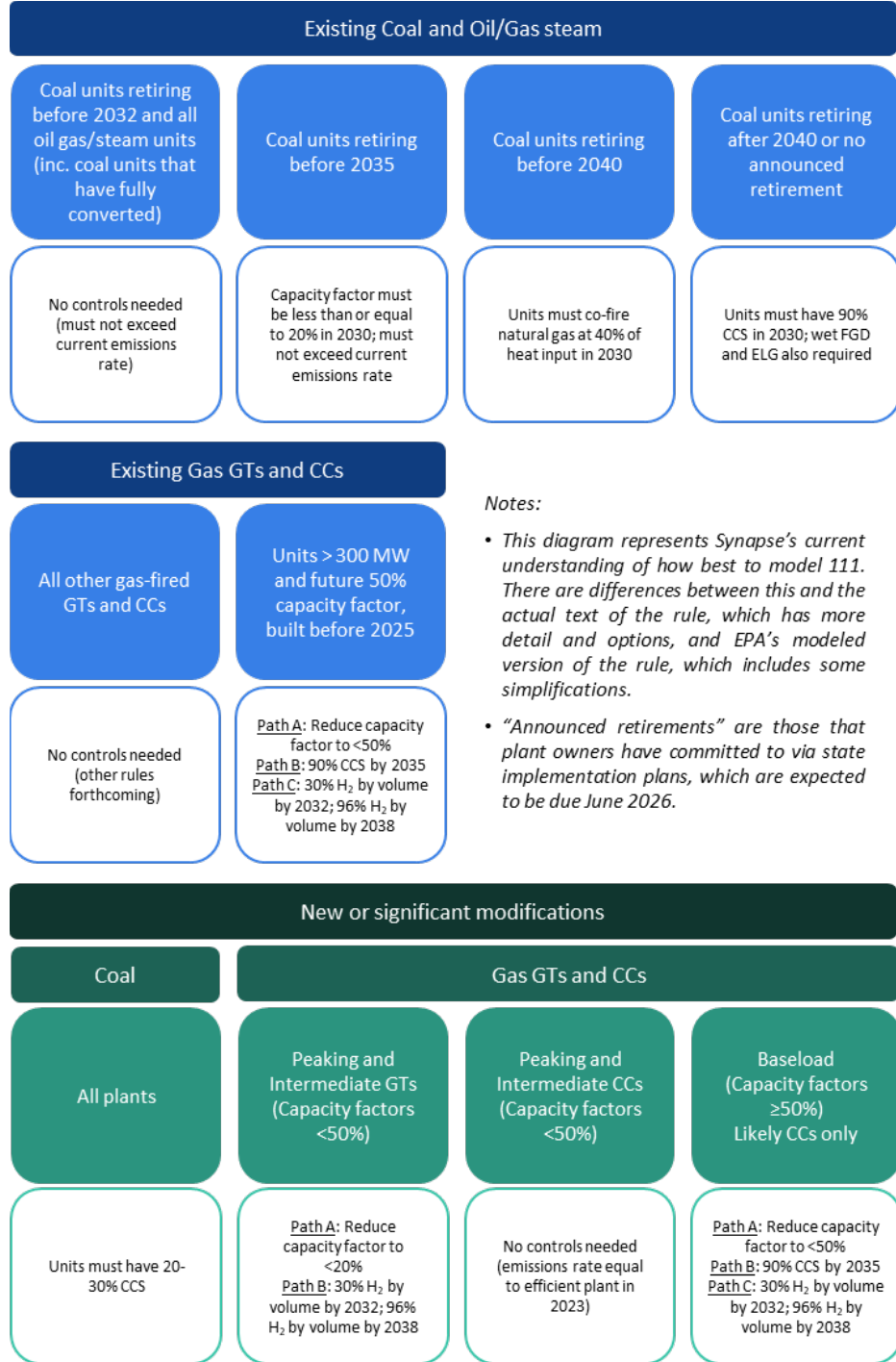
3. SANTEE COOPER'S CRITIQUES OF THE SYNAPSE MODELING ANALYSIS

1 **Q** Do you agree with Witness Davis's claims on page 63 and throughout his
2 rebuttal that, because the Synapse analysis modeled compliance with the
3 Section 111 Rules, the scope of your testimony is too narrow and not an
4 assessment from which the Commission can make determinations about the
5 reasonableness and prudence of the Company's Preferred Portfolio?

6 **A** I do not agree. Even if the final Section 111 Rules are implemented differently than
7 currently proposed (as outlined in Figure 1 below), my modeling provides a
8 valuable proxy for what a future with increased regulation of carbon-emitting
9 resources will look like. It is very likely there will increasingly be more regulation
10 of the operations and waste streams resulting from fossil-fuel-based generation
11 (regulation of air emissions, water use and discharge, fuel inputs, and solid waste
12 streams). The market is trending towards investment in more renewables and clean
13 energy resources. Santee Cooper needs to consider this in its analysis before it
14 commits its customers to a large gas plant that may require either costly controls or
15 a substantial reduction in utilization to legally operate.

1
2

Figure 1. Synapse's understanding of EPA's Proposed Rule under Section 111 of the Clean Air Act



3

1 **Q On page 74 of his rebuttal, Witness Davis suggests that you incorrectly applied**
2 **Section 111 Rules compliance at the Rainey Generating Station. How do you**
3 **respond?**

4 **A** I disagree with Witness Davis’s characterization that I incorrectly applied the
5 Section 111 Rules to the Rainey Generating Station (“Rainey”). Santee Cooper and
6 I have interpreted a section of the proposed Section 111 Rules differently, where it
7 is well acknowledged that the EPA needs to provide additional clarity.

8 EPA states in its proposed Section 111 Rules that baseload units over 300
9 MW would be subject to regulation. According to Table 5 of the IRP, Rainey
10 includes a Combined Cycle (CC) plant with a 520 MW capacity in winter and 460
11 MW capacity in summer. The CC is composed of two Combustion Turbines (CTs)
12 and one steam turbine. Santee Cooper interprets the rule as applying to each CT
13 individually; and because the CTs themselves are each less than 300 MW, Santee
14 Cooper believes Rainey is exempt from compliance. But because the CTs are not
15 operated individually, but rather as part of a single plant, I interpret the rule as
16 applying to the entirety of the Rainey CC. I found that reducing the annual capacity
17 factor below 50 percent at Rainey was likely to be the most economical compliance
18 path for this plant, and therefore applied a capacity factor cap to the unit. I applied
19 no binding constraints to the stand-alone Rainey CTs that were not part of the
20 Rainey CC.

21 **Q How do you respond to Witness Davis’s defense of Santee Cooper’s decision**
22 **not to model long-duration battery energy storage systems (BESS) based on**
23 **the assertion that it is an unproven technology, and therefore it would be**

1 **imprudent to rely on it when making near- to medium-term planning**
2 **decisions?**

3 **A** I understand that long-duration energy storage (LDES) (I modeled 50-hour battery
4 storage) is not currently commercially available. But there are a number of 100-
5 hour BESS pilot projects being pursued around the country. Specifically, Form
6 Energy has 100-hour BESS pilot projects either proposed or already underway
7 (many with regulated utilities) in the states of Georgia,⁴ Virginia,⁵ New York,⁶
8 Colorado, and Minnesota (where there are actually two pilot projects).⁷ Some of
9 these pilots are already demonstrating several critical advancements that were
10 identified as necessary by a U.S. Department of Energy report in order for LDES
11 to become commercially available as soon as the early 2030’s.⁸ Witness Davis is
12 correct that the technology is still in pilot project phases, but it is not accurate to

⁴ Plautz, Jason. 2022. “Form Energy announces partnership with Georgia Power to test 100-hour iron-air battery.” *Utility Dive*, February 10. Available at <https://www.utilitydive.com/news/form-energy-announces-partnership-with-georgia-power-to-test-100-hour-iron-/618626/>.

⁵ Paullin, Charlie. 2023. “Dominion proposes pilot to test longer-lasting battery storage.” *Virginia Mercury*, September 26. Available at <https://www.virginiamercury.com/2023/09/26/dominion-proposes-pilot-to-test-longer-lasting-battery-storage/>.

⁶ New York State Energy Research and Development Authority (NYSERDA). 2023. *Nearly \$15 Million Awarded to Four Demonstration Projects to Advance Long Energy Duration Energy Storage Technology Solutions*, August 17. Available at <https://www.nyserda.ny.gov/About/Newsroom/2023-Announcements/2023-08-17-Governor-Hochul-Announces-Nearly-15-Million-in-Long-Duration-Energy-Storage>.

⁷ Colthroe, Andy. 2023. “US utility Xcel to put Form Energy’s 100-hour iron-air battery at retiring coal power plant sites.” *Energy Storage News*, January 27. Available at <https://www.energy-storage.news/us-utility-xcel-to-put-form-energys-100-hour-iron-air-battery-at-retiring-coal-power-plant-sites/>; Marohn, Kristi. 2023. “Xcel Energy to add iron-air battery system to store electricity in Becker.” *MPR News*, January 26. Available at <https://www.mprnews.org/story/2023/01/26/xcel-energy-to-add-iron-battery-to-store-electricity-in-becker>; Jossi, Frank. 2021. “Minnesota utility co-op sees big battery as piece of grid reliability puzzle.” *Energy News Network*, September 10. Available at <https://energynews.us/2021/09/10/minnesota-utility-co-op-sees-big-battery-as-piece-of-grid-reliability-puzzle/>.

⁸ *Pathways to Commercial Liftoff: Long Duration Energy Storage*. U.S. Department of Energy. March 2023.

1 classify it as in an initial research and development phase. Half a dozen utilities and
2 resource authorities have found the technology to be advanced and commercially
3 developed enough to deploy pilots as part of their grid. Santee Cooper should also
4 have allowed the model to select long-duration BESS as part of its resource
5 portfolio at least starting in the mid 2030's.

6 Additionally, Santee Cooper did include Small Modular Nuclear Reactors
7 (SMR) in its model as a resource option beginning in 2040. While 2040 is further
8 out in the planning period than I modeled long-duration storage, it is odd that Santee
9 Cooper didn't choose to model LDES at that same time. SMRs are arguably less
10 likely to be commercially available than long-duration battery storage.⁹ To be
11 consistent, Santee Cooper should have at least allowed LDES as a resource at the
12 same time as SMRs.

13 **Q How do you respond to Witness Davis's concerns on page 72 about the source**
14 **of your long-duration BESS capital cost assumptions, and his inability to**
15 **validate them?**

16 **A** The input assumptions for the long-duration BESS that I modeled in EnCompass
17 came from a report created by McKinsey & Company.¹⁰ I provided this report to
18 the Company in discovery, as well as a description of how I modeled the resource
19 in EnCompass. The report develops capital cost assumptions based on averaging
20 across 12 key LDES technology types. Mr. Davis finds this concerning because he
21 is unable to validate the estimates presented in the report and therefore cannot

⁹ Pearl, Larry, NuScale. 2023. "UAMPS terminate small modular reactor project in Idaho." *Utility Dive*, November 9. Available at <https://www.utilitydive.com/news/nuscale-uamps-terminate-small-modular-nuclear-reactor-smr-project-idaho/699281/>.

¹⁰ McKinsey & Company. 2001. *Net-zero power: Long duration energy storage for a renewable grid*.

1 determine whether the cost estimates are reasonable for the simulation of LDES in
2 my analysis. I appreciate Mr. Davis' desire to validate the results and understand
3 that adjustments to the assumptions could materially affect the results. But this
4 McKinsey report is one that other utilities around the country, including Southwest
5 Public Service Company (SPS/Xcel) in New Mexico, have relied on as the basis of
6 their LDES modeling.¹¹ While it is correct that my portfolios add between 1,510
7 MW and 1,890 MW of this resource over the study period, the majority is built after
8 2035. Therefore, the impact of any major deviations in cost assumptions on
9 decisions that need to be made in the near term for the Short-Term Action Plan is
10 minimal and should not negate the report's usefulness in providing a baseline
11 assumption for modeling LDES.

12 **Q On pages 68, 69, and 71, Witness Davis responds to your recommendation to**
13 **revise Santee Cooper's effective load-carrying capability (ELCC) assumptions**
14 **for 8-hour BESS, stating that you ignored the interrelated impact that prior**
15 **additions of 4-hour BESS resources may have on the ELCC value for**
16 **subsequent 8-hour BESS resources and that this is a fundamental error. How**
17 **do you respond?**

18 **A** I don't disagree with Witness David that there may be some interrelated impact on
19 an 8-hour ELCC from all prior additions of 4-hour BESS. This is something I
20 considered and thought about when setting up my model. But the use cases and
21 charge and discharge patterns of 8-hour and 4-hour BESS are very different. In fact,

¹¹ Southwest Public Service Company 2023 IRP, Pg. 110. Available at <https://www.xcelenergy.com/staticfiles/xcel-responsive/Company/Rates%20&%20Regulations/Resource%20Plans/2023%20SPS-IRP%20Plan.pdf>.

1 they are different enough that the incremental effects should be smaller than the
2 impacts within a tranche of the same duration of BESS. And in the Synapse
3 portfolio, the model only adds 4-hour BESS over the next decade—it doesn't select
4 add 8-hour BESS until 2035.

5 Additionally, the incremental capacity contribution of each megawatt
6 (MW) of 4- and 8-hour BESS is also dependent on the load shape and resources on
7 the grid at that time. As shown in Table 1 below, in the Synapse Clean Energy
8 Portfolio, the model added 600 MW of 4-hour BESS between now and 2034. Then,
9 in 2034 and 2035 it added 8-hour and 50-hour BESS to replace Cross. The addition
10 of the 50-hour BESS concurrent with the 8-hour BESS will itself change the value
11 that the 8-hour BESS provides to the grid. So, it's true that the incremental
12 contribution to the grid of 8-hour BESS may be slightly reduced by the presence of
13 4-hour BESS already on the grid relative to what it would be with zero MW of 4-
14 hour BESS on the grid. It's also true that the incremental contribution of the 8-hour
15 BESS will be increased by the addition of 50-hour BESS relative to the ELCC of
16 the system with the Cross coal plant that it is replacing.

17 **Table 1. Battery Storage additions by duration 2026–2035**

Year	BESS duration	MW
2026	4-hour	50 MW
2029	4-hour	550 MW
2034	50-hour	170 MW
2035	4-hour	550 MW
	8-hour	650 MW
	50-hour	1000 MW

1 **Q On page 70, Witness Davis responds to your suggestion that it would be**
2 **reasonable for Santee Cooper to plan to receive between 10 to 15 percent of its**
3 **energy needs from the market by stating that this would cause Santee Cooper**
4 **to have a less reliable system that is more exposed to market risk. How do you**
5 **respond?**

6 **A** I recognize Mr. Davis’s concerns about relying on market energy and I am not
7 suggesting that Santee Cooper should plan its system in an irresponsible manner.
8 My recommendation to rely on the market to a *limited* extent to provide low-cost
9 energy is a reasonable strategy with quantifiable benefits for ratepayers. First, I am
10 not asking Santee Cooper to rely on the market any more than it did last year.
11 According to page 39 of the IRP, Santee Cooper met 26 percent of its 2022 load
12 with market purchases.

13 **Q How do you respond to Witness Davis’s concerns on pages 73 and 74 about the**
14 **market price assumptions you used?**

15 **A** Witness Davis is correct that I mistakenly relied on the end use energy costs from
16 Cambium as a forecast for market prices in EnCompass. But retail prices represent
17 a more conservative assumption, as retail prices are typically higher than wholesale
18 prices. If I had instead used the energy costs at the busbar level, the market prices
19 would have been 7 percent lower on average. This conservative assumption
20 counteracts the impacts of transmission wheeling, losses, and the 0.3 percent
21 inflation difference that Davis points out in rebuttal. If anything, the costs of my
22 Clean Energy Portfolio are likely overstated as a result of using retail prices making
23 it an even better option for ratepayers.

1 **Q Do you agree with Witness Davis’s critique on pages 75–76 of his rebuttal**
2 **testimony that the optimization period you used was unreasonable?**

3 **A** I do not agree. First, to clarify, I did conduct capacity expansion modeling for the
4 full 30-year planning period, I simply broke the problem down into three-year
5 periods and allowed to model to essentially solve multiple smaller, 3-year planning
6 period exercises rather than solve a single 30-year problem.

7 While there are benefits to increasing the optimization period of the
8 analysis, using a full 30 period optimization also has drawbacks. Using a long
9 optimization period increases the problem size (relative to a smaller optimization
10 period) and can be very time and resource intensive to model. To reduce the
11 problem size to something the computer can reasonably solve, the user often has to
12 program in many resource addition and retirement options, thereby reducing the
13 choices the computer has to make. This is a tradeoff a modeler has to sometimes
14 make between optimization period and level of optimization allowed. Santee
15 Cooper programed in many resource options, and thus reduced the optimized
16 decisions that the model was allowed to make over the 30-year time period. I
17 removed many of the programed in decisions, thereby increasing the number of
18 decisions the model had to make and reduced the optimization period. This was
19 necessary because with the increased complexity of modeling 111 compliance, the
20 problem size was too large for the model to reasonable solve when I tried to use a
21 30-year optimization period. A 3-year period was the longest I was able to
22 reasonably use in the version of EnCompass that Santee Cooper relied on.

1 Additionally, by setting the optimization period to cover the entire 30-year
2 study period, Santee Cooper is essentially weighing long-term decisions and
3 forecasts as much as near-term factors in making its near-term resource decision.
4 While the costs of resource decisions further out are discounted by the model, the
5 level of uncertainty inherent further out in a planning period isn't captured in the
6 model, as it has perfect foresight across the entire planning horizon.

7 While optimizing over a full study period can be useful for some purposes,
8 when the study period is as long as 30 years, it can be reasonable to use a shorter
9 optimization period (say 5-10 years) to separate out short-term decisions from long-
10 term decisions. There is inherently greater certainty around assumptions in the near
11 term relative to assumptions further out. In the case of Santee Cooper, the majority
12 of major retirement and replacement decisions occur within the first 15 years of the
13 study period. Therefore, looking out 30 years, while useful in some ways, is not in
14 any way essential to evaluating the reasonableness of Santee Cooper's resource
15 plan.

16 **Q Witness Nunes makes a series of comments about your levelized cost**
17 **comparisons for renewables on pages 4–5 of his rebuttal testimony. How do**
18 **you respond?**

19 **A**First, to clarify, in the Synapse 111-Compliant Baseline Portfolio and the Synapse
20 Clean Energy Portfolio I made no changes to Santee Cooper's renewable cost
21 assumptions. I used Santee Cooper's cost to ensure a valid comparison between my
22 modeling results and the Company's. Santee Cooper developed its renewable cost

1 assumptions based on the National Renewable Energy Laboratory’s Annual
2 Technology Baseline (NREL ATB), with some substantial modifications.

3 Witness Nunes is correct that the renewable costs I modeled in Figures 1
4 and 2 of my direct testimony came from the NREL ATB Model’s R&D cost
5 forecast. However, I only modeled these costs in my two lower-cost sensitivity
6 portfolios— the Synapse 111-Compliant Clean Energy Sensitivity and 111-
7 Compliant Baseline Portfolio. Witness Nunes is also correct that these sensitivities
8 omitted the *Inflation Reduction Act* tax credits. This means that my sensitivity
9 results are overly conservative. Stated another way, if I re-ran the sensitivity
10 portfolio using the *Inflation Reduction Act* tax credits it would make the solar and
11 wind costs more conservative than they are likely to be; this would result in an even
12 lower cost net present value revenue requirement for my sensitivity portfolios.

4. SANTEE COOPER’S DEFENSE OF ITS OWN MODELING DECISIONS

13 **Q On page 61 of his rebuttal, Witness Davis claims that you have**
14 **mischaracterized the IRP analysis prepared by Santee Cooper by suggesting**
15 **that the Company plans to delay the retirement of Winyah despite its own**
16 **analysis showing that retirement by the end of 2028 is the more economic**
17 **option. How do you respond?**

18 **A** I stand by my original statement. Santee Cooper’s own analysis shows that the
19 “Economically Optimized” portfolio, which retired Winyah at year end 2028, is
20 lower cost than the Preferred Portfolio, which retired Winyah by year end 2030. I
21 understand that there are factors the utility has to consider other than just economics

1 in making a resource planning decision, and I would never suggest Santee Cooper
2 retire Winyah without adequate replacement resources. But when the rationale for
3 delay is transmission constraints and replacement resource limitations, the
4 Company should begin efforts to procure replacement resources and address the
5 transmission constraints immediately. Santee Cooper should not keep Winyah
6 online longer than necessary, and thereby subject ratepayers to the ongoing
7 operational costs, simply because it wants to build a shared resource with another
8 utility that doesn't need the capacity for several additional years.

9 **Q On page 62, Witness Davis responds to your recommendation that the**
10 **Company update its modeling to reflect the proposed Section 111 Rules. How**
11 **do you respond?**

12 **A** I understand that the Company cannot update its IRP every time a new regulation
13 is proposed. But the proposed Section 111 Rules, like the *Inflation Reduction Act*
14 that came before it, are not just incremental regulations; they are unique,
15 transformational rules. Their impacts are expected to be wide-reaching to drive
16 important changes across the power sector. Therefore, while it is understandable
17 that Santee Cooper didn't include the rule in its initial IRP, the impact of the
18 proposed Section 111 Rules is significant enough to warrant the Company updating
19 its IRP or providing a supplemental sensitivity to evaluate its impacts. Santee
20 Cooper just completed a set of supplemental modeling runs in response to
21 suggestions by ORS and could have done an additional run to incorporate the
22 Section 111 Rules. The Company instead, without any explanation or discussion,

1 chose not to conduct this additional run and indicated that it intends to wait until a
2 future IRP filing.¹²

3 Waiting to model the Section 111 Rules until a future IRP, or until the rule
4 is finalized, will not make it any less likely that Santee Cooper has to comply with
5 the rule. But it could make it harder for the Company to comply, and it could reduce
6 the Company's compliance options. Stated another way, the longer Santee Cooper
7 waits to evaluate what compliance looks like, and to begin taking no-regrets
8 decisions towards compliance, the more expensive it may be to comply.

9 **Q On pages 63 through 65 of his rebuttal testimony, Witness Davis responds to**
10 **your critique that the Company's modeling was not economically optimized**
11 **by claiming there is no industry standard for modeling. How do you respond?**

12 **A** I do not agree with Witness Davis that there is no industry standard for modeling
13 resource retirement decisions in resource planning. Best practices in resource
14 planning are to test a number of scenarios, at least some of which are fully
15 optimized, and test endogenous, economic retirement decisions. As I state in my
16 direct testimony,¹³ it may be reasonable for a utility's ultimately preferred portfolio
17 to differ from an optimized portfolio after factoring in logistical constraints and
18 realities outside the model, but critically, all deviations from the economically
19 optimized solution should be carefully justified. Santee Cooper didn't provide that
20 justification in this IRP.

¹² Rebuttal Testimony of Company Witness Davis, Pg. 62.

¹³ Corrected Direct Testimony of Devi Glick, Pg. 11.

1 **Q** **On pages 63 to 64 of his rebuttal testimony, Witness Davis also references the**
2 **testimony of CCEBA Witness Olson to support his claim that there is no**
3 **industry standard for evaluating unit retirements. How do you respond?**

4 **A** I am confused by Witness Davis quoting Witness Olson’s testimony and the
5 implication that Mr. Olson’s testimony conflicts with my own. At best, Mr. Davis
6 is oversimplifying Mr. Olson’s testimony. At worst, Mr. Davis is attempting to pit
7 resource planning experts against each other to distract from the fact that Santee
8 Cooper has not utilized industry best practices to evaluate the retirement of its
9 existing fossil resources. I agree with Witness Olson that retirement decisions made
10 by a model should be considered advisory and that modeling results are subject to
11 evaluation and not blindly taken as the final say without considering additional
12 nuance. It is also true that modeling different retirement dates and allowing capacity
13 expansion models to endogenously retire units provide important information to be
14 considered when making retirement decisions. These two concepts are not in
15 conflict.

16 Here, Santee Cooper is proposing a retirement date that is both later than
17 previously planned, and more costly than an earlier option. It is doing so with little
18 justification and almost no acknowledgement that it is not the lowest cost option.
19 Santee Cooper has also provided no indication, as I have seen in other utility IRPs
20 where the justification for a delayed retirement is concerns around procuring

1 replacement resources,¹⁴ that the Preferred Portfolio does not contain the lowest
2 cost option and therefore the Company will continue to look for ways to procure
3 replacement resources and accelerate the units' retirement.

4 **Q Company Witnesses Davis (page 66) and Painter (pages 4–5 and 8–21) both**
5 **respond to your, and other intervenors, recommendation to relax the annual**
6 **build limits on solar, discussing the impracticality of adding over 2,000 MW**
7 **of solar in a single year, and explaining Santee Cooper's justifications for the**
8 **300 MW per year limit it imposed. How do you respond?**

9 **A** I agree that adding 2.2 GW of solar in the single year of 2029 alone is likely
10 infeasible, and that staggering it across multiple years is likely to be more practical.
11 However, the choice of 300 MW a year before 2030, which Company Witness
12 Painter also defends on pages 4–5 and 8–21 and of his rebuttal testimony, is
13 arbitrary and low and leads to the Company only building 1.2 GW of solar by the
14 beginning of 2030 in its Preferred Portfolio and Preferred Portfolio Adjusted. If 300
15 MW is just an illustrative model limit, and Santee Cooper actually issues RFPs for
16 far more solar than 300 MW a year, then my concerns will be alleviated. I am
17 concerned that by limiting the model to 300 MW a year Santee Cooper is sending

¹⁴ Arizona Public Service (APS) 2023 IRP, Pg. 80. APS is in a similar position to Santee Cooper in planning for the retirement of an existing coal plant. Like Santee Cooper, in its 2023 IRP, APS hard-coded in the retirement date of 2031 for the Four Corners coal plant in its Preferred Portfolio. And like Santee Cooper, APS defended this decision, siting concerns with procuring replacement resources, and stating that maintaining the 2031 retirement date was necessary for reliability. But *unlike* Santee Cooper, APS also undertook a detailed analysis of the impacts of an earlier retirement for the plant, testing four alternative, earlier exit dates within the EnCompass model. Some of these showed savings from an earlier retirement, relative to the 2031 retirement date. And APS stated in its IRP that “based on the learnings associated with the cost-savings drivers in the Four Corners early exit portfolio, APS will continue to evaluate the feasibility of exiting Four Corners prior to 2031.” Santee Cooper tested no such earlier retirements and has provided no indication that it will attempt to pursue an earlier retirement to provide savings to ratepayers.

1 a signal to project developers that it only needs 300 MW of solar a year, when it
2 actually needs essentially as much solar as it can economically procure.

3 **Q On page 14, Witness Painter discusses the challenges that Santee Cooper and**
4 **Central have faced in bringing online 500 MW of solar PV capacity that it**
5 **procured in 2020. He uses this example to justify the low, 300 MW per year**
6 **build limit for solar PV. How do you respond?**

7 **A** I acknowledge that there have been significant supply chain challenges over the
8 past few years stemming back to the beginning of the Covid pandemic. Therefore,
9 it is not surprising that Santee Cooper and Central faced a series of challenges in
10 bringing online solar PV projects on time and budget between 2020 and now.
11 Fortunately, there are many indications that the supply chain challenges that took
12 over the market in 2022 and the beginning of 2023 are starting to ease up. As I
13 discuss in my direct testimony, a report by LevelTen Energy earlier this year found
14 that in the second quarter of 2023, renewable PPA prices declined after three years
15 of price increases.¹⁵ Additionally, the Federal Energy Regulatory Commission
16 (FERC) issued an order earlier this year aimed at alleviating interconnection
17 backlogs and speeding up project approval timelines.¹⁶

18 **Q Witnesses Davis (page 67) and Painter (pages 16–17) defend Santee Cooper’s**
19 **limit of 1,500 MW of solar PV prior to 2031, stating this limit was based on the**
20 **results of the Cost of Solar Integration Study prepared for Santee Cooper by**

¹⁵ Emma Penrod. 2023. “Solar PPA prices drop for first time since onset of COVID-19: LevelTen.” *Utility Dive*, July 18. Available at <https://tinyurl.com/bdcy4u98>.

¹⁶ Federal Energy Regulatory Commission. 2023. *Fact Sheet: Improvements to Generators Interconnection Procedures and Agreements*, July 27. Available at <https://tinyurl.com/nhjhhjpc>.

1 **Astrapé Consulting, which indicated significantly higher costs for solar**
2 **integration above this threshold. How do you respond?**

3 **A** The limitation that the study found on solar PV additions prior to 2031 is not based
4 on some inherent system condition that only occurs in 2031—the limitation is
5 Winyah itself. The solar integration study modeled the retirement of Winyah and
6 the addition of the new combined cycle Shared Resource in 2031. Coal plants like
7 Winyah are incredibly inflexible and therefore poorly compatible with a high
8 penetration of renewables. Any firm replacement resource, including the new
9 Shared Resource, is better able to integrate renewables than Winyah. What the
10 study actually shows is that the solar integration “limit” increases when Winyah is
11 retired and a new CC resource comes online. Witness Painter does explicitly
12 acknowledge on pages 16–17 of his rebuttal testimony that integration costs for
13 Solar PV above 1,500 MW will increase until a new CC is in place to facilitate solar
14 integration.

15 **Q** **On pages 42–45, Witness Painter claims that the recommendations of many**
16 **the intervenors generally biases the results towards renewable- and BESS-**
17 **intensive portfolios, and that Santee Cooper has intentionally used optimistic**
18 **cost and operational assumptions for renewables that it expects will result in**
19 **optimistically low project costs. How do you respond?**

20 **A** First, I don’t disagree with Witness Painter that at least some of my, and other
21 intervenors, analysis is more “biased” towards renewables and BESS. The
22 sensitivity portfolios I tested do evaluate lower renewable costs. These sensitivities
23 are reasonable for evaluating what an economic resource mix would look like for

1 Santee Cooper assuming renewable costs fell in line with industry projections. But
2 for my baseline and Clean Energy Portfolios, by and large I rely on Santee Cooper's
3 resource assumptions. Any changes I made to reduce the constraints on renewable
4 additions were simply intended to reverse the bias against renewables that Santee
5 Cooper programed into its modeling.

6 Second, Santee Cooper's cost assumptions for its new conventional
7 resources were biased in favor of the CC resources. The Company's modeled cost
8 for the new Shared Resource is much lower than industry standard estimates, and
9 far below the cost estimates used by Dominion South Carolina (26 percent below,
10 as discussed below), its proposed partner in building the Shared Resource.

11 **Q On pages 11–12 of his rebuttal testimony, Witness Kushner defends his use of**
12 **the use of capital cost estimate for the Santee Cooper 2x1 CC that are 26**
13 **percent lower than Dominion South Carolina's cost estimate for the same 2x1**
14 **resource. How do you respond?**

15 **A** Witness Kushner defends Santee Cooper's use of a CC cost estimates that is 26
16 percent lower than Dominion South Carolina's estimates citing potential
17 differences due to the location of the project site, costs for interconnection, and gas
18 infrastructure, among other things. This argument is perplexing and illogical, as
19 these dramatically different estimates are for the exact same proposed CC facility,
20 located in the same place in South Carolina. He goes on to state that "Future
21 resource planning activities are expected to allow Santee Cooper and DESC to
22 better align their capital cost estimates for similar resources." That is concerning
23 because this IRP is likely the most important resource planning exercise for Santee

Cooper to chart its retirement and replacement path for Winyah, and therefore the most important for Santee Cooper to rely on accurate cost data for replacement resources options.

Based on my own modeling, this 26 percent difference in the capital cost results in Santee Cooper forecasting a project capital cost that is \$557 million dollars less than it would be if it instead relied on Dominion South Carolina’s cost estimate for the Shared Resource (\$1.4 billion total project cost for Santee Cooper vs \$1.9 billion for Dominion South Carolina).¹⁷ As I show in Table 2 below, the total NPVRR difference, that is the savings to ratepayers from the Clean Energy Portfolio relative to the Synapse 111-Compliant Baseline Portfolio, increases from \$166 Million (as reported in my direct testimony) to approximately \$720 million if I use Dominion South Carolina’s capital costs for the new shared CC instead of Santee Cooper’s.

Table 2: Total Portfolio NPVRR impact of Shared Resource cost assumptions

	NPV, 2052 (\$B)	Delta (\$B)
Santee Cooper cost assumptions for New Shared Resource		
111-Compliant Baseline Portfolio	\$ 26.14	\$ -
Clean Energy Portfolio	\$ 25.98	\$ (0.166)
Dominion South Carolina cost assumptions for New Shared Resource		
111-Compliant Baseline Portfolio	\$ 26.69	\$ -
Clean Energy Portfolio	\$ 25.98	\$ (0.721)

¹⁷ See Kushner Rebuttal page 12, at lines 11-13 for the in-service year cost estimates from Santee Cooper and Dominion in \$/kW. My number assumes a 1,360 MW NGCC, per the IRP.

1 In other words, Santee Cooper relied on unreasonably low capital cost
2 assumptions for its new CC to make its Preferred Portfolio look hundreds of
3 millions cheaper than it is likely to be. But in reality, the Clean Energy Portfolio is
4 likely to save ratepayers over \$700 million while accelerating the retirement of the
5 Company's coal plants and moving Santee Cooper to a less risky and less volatile
6 clean energy future.

7 **Q Does this conclude your surrebuttal testimony?**

8 **A Yes.**

BEFORE
THE PUBLIC SERVICE COMMISSION OF
SOUTH CAROLINA
DOCKET NO. 2023-154-E

In re:
South Carolina Public Service
Authority's (Santee Cooper) 2023
Integrated Resource Plan (IRP)

CERTIFICATE OF SERVICE

I hereby certify that I have served the persons listed on the official service list for Docket No. 2023-154-E, listed below, a copy of the Surrebuttal Testimony of Devi Glick on behalf of Sierra Club via electronic mail on this day, November 17, 2023.

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Respectfully submitted this 17th day of November 2023.



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