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| **APPLICATION OF SOUTHWESTERN PUBLIC SERVICE COMPANY TO AMEND ITS CERTIFICATE OF CONVENIENCE AND NECESSITY TO CONVERT HARRINGTON GENERATING STATION FROM COAL TO NATURAL GAS** | **§ § § § § § § §** | **BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS** |

# REBUTTAL TESTIMONY
*of*
**BEN R. ELSEY**

*on behalf of*

**SOUTHWESTERN PUBLIC SERVICE COMPANY**

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## GLOSSARY OF ACRONYMS AND DEFINED TERMS

| Acronym/Defined Term | Meaning |
|---|---|
| ATB | Annual Technology Baseline |
| AXM | Alliance of Xcel Municipalities |
| BESS | Battery Energy Storage System |
| CCN | Certificate of Convenience and Necessity |
| $CO_2$ | carbon dioxide |
| Commission | Public Utility Commission of Texas |
| CTG | combustion turbine generator |
| DISIS | Definitive Interconnection System Impact Study |
| GI | Generator Interconnection |
| GIA | Generator Interconnection Agreement |
| Harrington | Harrington Generating Station |
| IRP | Integrated Resource Plan |
| ITC | Investment Tax Credit |
| kW | kilowatt |
| MW | megawatt |
| NMPRC | New Mexico Public Regulation Commission |
| NPV | net present value |
| NREL | National Renewable Energy Laboratory |
| O&M | operations and maintenance |
| OPUC | Office of Public Utility Counsel |
| PNM | Public Service Company of New Mexico |

| Acronym/Defined Term | Meaning |
|---|---|
| RFI | Request for Information |
| RFP | Request for Proposal |
| R&D | Research and Development |
| SPS | Southwestern Public Service Company, a New Mexico corporation |
| TCEQ | Texas Commission on Environmental Quality |
| Tolk | Tolk Generating Station |
| WACC | weighted average cost of capital |

**REBUTTAL TESTIMONY**
**OF**
**BEN R. ELSEY**

## I. WITNESS IDENTIFICATION

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

A. My name is Ben R. Elsey. My business address is 1800 Larimer Street, Denver, Colorado 80202.

**Q. By whom are you employed and in what position?**

A. I am employed by Xcel Energy Inc. as Manager, Resource Planning & Bidding.

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

A. I am testifying on behalf of Southwestern Public Service Company, a New Mexico corporation ("SPS").

**Q. Are you the same Ben R. Elsey who filed direct testimony on behalf of SPS in this docket?**

A. Yes.

## II. SUMMARY OF TESTIMONY

**Q. What is the scope of your rebuttal testimony?**

A. My rebuttal testimony responds to certain issues raised and recommendations proposed by Devi Glick, who testifies on behalf of Sierra Club and recommends that SPS be authorized to convert two Harrington Generating Station ("Harrington") units and retire one unit. I also respond to Scott Norwood, who testifies on behalf of the Alliance of Xcel Municipalities ("AXM") who recommends denial of the Certificate of Convenience and Necessity ("CCN") amendment and retirement and replacement of the existing Harrington units with new combustion turbine generators ("CTG"). Both of these witnesses rely on inaccurate assumptions related to and interpretations of SPS's economic modeling results. For these reasons, I address overarching concerns with their positions related to issues such as cost impacts, feasibility, and SPS's capacity and reliability needs. I also address specific aspects of the modeling inputs or results that either Ms. Glick or Mr. Norwood question or that Ms. Glick revised in her own erroneous modeling analysis.

**Q. Please summarize your rebuttal testimony and overall recommendations in this case.**

A. Sierra Club witness Glick has submitted extensive testimony in support of converting two Harrington Units to operate on natural gas, so the issue Sierra Club's position raises is whether to retire or convert Harrington Unit 1. Conversion of all units continues to be the best path forward. Converting two units requires SPS to construct the same size gas pipeline that is required to serve all three

converted units, and Mr. Lytal indicates in his rebuttal testimony that the incremental upfront capital cost to convert Harrington Unit 1 is approximately $2.6M. In addition, Ms. Glick's alternative modeling and her unfounded criticisms of SPS's modeling should be rejected. The glaring problems with her positions on behalf of Sierra Club are simple: Ms. Glick's recommendations are the result of critical modeling mistakes that undermine the creditability of her alternative analysis, a skewed understanding of SPS's economic analysis, flawed and biased modeling practices, and a complete disregard of the potential cost and reliability impacts of retiring Harrington Unit 1. Also, a large component of Ms. Glick's analysis relies on faulty assumptions related to denying SPS the ability to recover accelerated depreciation costs for Harrington, which SPS witness William A. Grant addresses in his rebuttal testimony.

AXM witness Norwood's recommendation for the Public Utility Commission of Texas ("Commission") to deny SPS's requested amendment for its CCN for Harrington and thereby force the retirement of 1,050 megawatts ("MW") of firm and dispatchable capacity is an unreasonable and unnecessary risk to the reliability of SPS's entire system. Further, SPS's analysis shows that, even under modeling conditions that favor an early retirement of the units, retiring the Harrington units is not economical.

Throughout my rebuttal testimony, I address those issues and emphasize that SPS must take modeling results into account while also considering the very real implications of continuing to need all the capacity available at Harrington to meet customer demand combined with the goals of doing so in a cost-effective and

timely manner. SPS is required to cease coal operations at Harrington by December 31, 2024;[1] that is not negotiable. SPS is also required to provide reliable service and meet customer demand; that is also not negotiable. SPS has requested approval of a CCN amendment that will allow it to meet both of those requirements.

SPS has demonstrated that converting all of the Harrington units to operate on natural gas is the least-cost, most risk-averse and reliable compliance solution to meet the deadline for ceasing coal operations at Harrington in a cost-effective manner. SPS requests that the Commission approve its request for the related CCN amendments that will allow for the conversion.

**Q. How is your rebuttal testimony structured?**

A. My testimony is structured as follows:

- In Section III, I describe the incremental benefit and cost of converting Harrington Unit 1 to show that conversion of all three units is cost-effective and produces substantial benefits.

- In Section IV, I explain that SPS fully evaluated retirement of two or three Harrington units and was clear about the challenges of procuring replacement resources if any units are required to cease operation by the end of 2024.

- In Section V, I provide additional clarity on the current state of the Southwest Power Pool's Generator Interconnection ("GI") process and describe how these issues would affect the timing and cost of obtaining replacement capacity and the value of SPS issuing another Request for Information ("RFI") or Request for Proposal ("RFP").

- In Section VI, I describe how the 2021 updated Harrington Analysis was intentionally favorable to the early retirement of one or more Harrington units to "stress test" the modeling scenarios, which shows that even under favorable conditions, retirement of all Harrington units is not economical.

[1] West Direct at Exhibit JLW-1.

- In Section VII, I explain that replacing Harrington with new CTGs is not economical, would still require construction of a new pipeline, and would create risks to system reliability.

- In Section VIII, I respond to concerns about the capacity factor of the converted Harrington units.

- In Section IX, I address the major flaws that undermine the credibility of Ms. Glick's alternative modeling analysis as well as address other modeling issues Ms. Glick identifies.

## III. BENEFITS AND COST OF CONVERTING HARRINGTON UNIT 1

**Q. What topic do you discuss in this section of your testimony?**

A. In this section, I address Sierra Club witness Devi Glick's recommendation that the Commission should approve the conversion of two units to operate on gas but require the retirement of Harrington Unit 1. I explain why it would be unreasonable to retire Unit 1 when the cost to convert it is only $2.6 million in incremental conversion costs, especially when doing so allows SPS to retain 340 MW of much needed capacity. This is particularly true because in section IX of my testimony, I address the major and minor mistakes in Ms. Glick's alternative modeling that undermine the credibility of her assertions of savings associated with retiring one unit.

Considered along with SPS's request to convert all three units, I will demonstrate that:

1. Converting Harrington Unit 1 and preserving 340 MW of firm and dispatchable capacity requires an exceptionally low incremental upfront capital cost, is the lowest cost option in the short-term, and results in no material long-term cost increase.

2. Converting Harrington Unit 1 to gas will provide substantial benefits to SPS's customers, some of which are not captured in SPS's or Sierra Club's economic analysis.

**Q. How do you respond to Sierra Club's concern that the results of SPS's economic modeling do not definitively show that converting Harrington to operate on gas costs less than retiring one or more of the units?**

A. I do not dispute the results of the economic modeling. In fact, I addressed this issue in my direct testimony at pages 33 through 37. It is worth noting that the results of the economic analysis do not definitively show that converting two units and

retiring Harrington Unit 1 is lower cost compared to converting all three units. In this situation, where the economic modeling results are essentially the same, a prudent utility should consider the cost and benefits of converting Harrington Unit 1 – including qualitative benefits and risks of not converting all three units that are not captured in a purely economic analysis. The proximity of the economic modeling results shows why SPS must consider the real-world needs and implications of any replacement resource for coal-fired units at Harrington.

**Q. Can you describe the incremental upfront capital cost of converting Harrington Unit 1?**

A. Yes. As Mr. Lytal noted in his direct testimony, the same size pipeline is required to convert two or three Harrington units. Therefore, there is no additional pipeline cost for converting Harrington Unit 1. Put simply, the cost of preserving 340 MW of firm and dispatchable capacity is $2.6M or $7.65/kilowatt ("kW"). To provide some context for how cost effective it is to spend that incremental amount to maintain 340 MW of firm and dispatchable capacity, two new combustion turbines providing approximately 400 MW of firm and dispatchable capacity will cost at least $200 million or $500/kW.

**Q. Does converting Harrington Unit 1 result in any material cost increase compared to retiring the unit?**

A. No. As shown in Table BRE-2 of my direct testimony, SPS's 2021 updated analysis shows, over a 20-year period, the incremental cost of converting Harrington unit 1 is $5 million, on a net present value ("NPV") basis. To be clear, although $5 million may appear to be a substantial amount, SPS's 2021 updated

analysis evaluates the entire SPS system-wide NPV cost, which is billions of dollars, over a 20-year period. A difference of $5 million between converting three units compared to only two is statistically insignificant and within the margin of error. Furthermore, as I describe in Section VI of my rebuttal testimony, SPS's 2021 updated analysis contains several aggressive assumptions in favor of retiring the Harrington units. This means it is likely that the true cost of replacing one or more Harrington units is greater than SPS evaluated.

**Q. What is your response to Ms. Glick's assertion that SPS does not need the capacity of Harrington Unit 1 to try to support Sierra Club's position that Unit 1 should be retired?**

A. This is simply not true, as shown below in Table 1. If the Commission accepts Ms. Glick's recommendation to retire Harrington Unit 1, SPS would need new capacity resources as soon as 2025 or 2026, depending on load growth, to meet its planning reserve margin requirements and preserve system reliability. It is also worth noting that the capacity shortfalls in 2025 and 2026 are not small and would be challenging to replace. It would appear Sierra Club is downplaying SPS's capacity need, knowing very well that retiring Harrington Unit 1 will force SPS to need to acquire new, presumably renewable resources, whether they are economical or not.

**Table 1**

| Capacity Position | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|---|---|---|---|---|---|---|
| Planning Forecast | (192) | (476) | (604) | (904) | (1,098) | (1,170) |
| Financial Forecast | 180 | (60) | (125) | (379) | (533) | (564) |

**Q. Does the capacity position you show above in Table 1 match the capacity position Ms. Glick shows in her direct testimony?**

A. No. Ms. Glick states the source of Table 3 in her direct testimony as Exhibit SPS-SC 1-13, but the data in the table *does not* match Exhibit SPS-SC 1-13. It appears Ms. Glick relied upon Exhibit SPS-SC 1-13 in the corresponding New Mexico Case No. 21-00200-UT. This is significant because SPS has fewer commission-approved generating resources in Texas than it does New Mexico. Table 1 above shows that once this is corrected, Ms. Glick's Table 3 would show a capacity need between 2025 and 2026, as I describe above.

**Q. Do any other parties in this case provide an opinion on SPS's capacity need?**

A. Yes. AXM witness, Mr. Scott Norwood, agrees that "SPS has a need to for 1,050 MW of firm generating capacity that would be provided by the [Harrington] Conversion Project." Office of Public Utility Counsel witness Karl Nalepa does not dispute SPS's need for the capacity at Harrington and recommends approval of the full conversion (with conditions).[2]

**Q. If converted to gas, will Harrington Unit 1 continue to provide firm and dispatchable capacity?**

A. Yes. Harrington Unit 1 will continue to provide year-round firm and dispatchable capacity until its retirement and this will become increasingly important as SPS retires other gas steam plants. The retirement of SPS's other gas steam plants is one of the main drivers for the increasing capacity need through 2030, as shown above in Table 1.

[2] Nalepa Direct at 6-8.

**Q. Does Ms. Glick's alternative analysis recognize SPS's growing need for firm and dispatchable capacity resources?**

A. Yes, surprisingly her alternative analysis recognizes this need even though she does not acknowledge it in her testimony. Specifically, Ms. Glick's workpapers show that Sierra Club's recommendation to retire Harrington Unit 1 relies upon SPS acquiring four new CTGs to meet SPS's growing need for firm and dispatchable capacity resources in the early 2030s. Considering Sierra Club's general position on encouraging the retirement of gas generation in favor of renewable resources, it is implausible for Ms. Glick to rely upon the economic and reliability benefits of new firm and dispatchable gas generation in her supporting analysis to justify the early retirement of a firm and dispatchable capacity gas resource. Stated differently, it is not logical for Ms. Glick's modeling runs to rely on new gas generation at the same time that Sierra Club is opposing SPS's request to convert Harrington into three gas-fired units.

**Q. How does Ms. Glick attempt to justify the new gas generation included in her modeling to support retirement of Harrington Unit 1?**

A. Ms. Glick assumes any new gas generation is simply a placeholder for firm and dispatchable capacity resources that SPS may need in the future.[3] In other words, her analysis assumes an unspecified technology with unknown costs and operating parameters will fulfill SPS's undisputed need for firm and dispatchable capacity resources. If Ms. Glick had excluded new gas generation beyond 2030, it would

[3] Glick Direct at 49.

demonstrate that Ms. Glick's recommendation to retire Harrington Unit 1 is more expensive than she leads us to believe.

**Q. Why do you conclude that excluding new gas generation beyond 2030 would show that retiring Harrington Unit 1 is more expensive than Ms. Glick presents in her testimony?**

A. The EnCompass model selects the most cost-effective portfolio of generating resources. In other words, the gas CTGs were selected as part of the most cost-effective portfolio of resources. If new gas generation was excluded beyond 2030, EnCompass would be forced to selected a less cost-effective, and therefore more expensive, portfolio of resources to replace the 1,050 MW at Harrington.

**Q. How would SPS meet its capacity need if Harrington Unit 1 is retired?**

A. Compared to AXM witness Norwood's recommendation to retire all three Harrington units, the capacity need is much lower if only one unit is retired. However, SPS would still immediately seek new resources to fulfill the growing capacity need. Based on current market conditions, there are considerable challenges and risks that SPS would need to address.

**Q. Please elaborate on the challenges and risks with acquiring new resources.**

A. As I describe in Section V, and in my direct testimony, the Southwest Power Pool's GI process is extremely backlogged to the point that the 2017-01 Definitive Interconnection System Impact Study ("DISIS") is still active – five years after projects were first requested in 2017. Furthermore, presumably, because of the extremely high cost of transmission upgrades that have been identified, most of the projects from the 2017-01 DISIS have subsequently withdrawn. The Southwest

Power Pool has recently published the results of the 2017-02 first phase study, but it is highly improbable that this study will be concluded in time for new capacity resources to be online before the Summer of 2025 or 2026.

**Q. Aside from Southwest Power Pool's problematic GI process, are there currently any other challenges with acquiring new resources?**

A. Yes. Various external factors such as COVID-19, high inflation, and import tariffs have contributed to increasing supply chain problems. Solar panels have been particularly impacted by these supply chain issues. As a result, SPS is aware of several instances where developers have withdrawn or delayed their proposed projects – sometimes late in the procurement process.

**Q. Does this mean it is infeasible to retire Harrington Unit 1?**

A. No. Retirement is feasible, but SPS would need to find replacement capacity to meet its planning reserve margin requirement. As I stated in my direct testimony, to achieve commercial operation of that new capacity before 2025 or 2026, SPS would almost certainly have to "restrict replacement generation to generators that already possess, or that do not require, a new GIA." Restricting generator replacement options in this way could potentially negatively impact SPS's customers. For example, at most, there are likely only a handful of projects that already possess a Generation Interconnection Agreement ("GIA") and these projects could command a substantial premium that is not captured in SPS's economic analysis. Retiring Harrington Unit 1 could potentially force SPS into accepting unfavorable or uneconomical projects to meet its planning reserve margin requirements. Again, this is not captured in SPS's economic analysis. Converting

Harrington Unit 1, on the other hand, provides SPS the optionality to acquire new projects only when they are cost-effective and in the best interest of its customers.

**Q. Would the challenges of acquiring new generating resources have been avoided if retirement of Harrington Unit 1 was considered earlier?**

A. No. As I stated previously, Southwest Power Pool's 2017-01 DISIS is still active. Put simply, even if SPS decided to retire Harrington Unit 1 as far back as 2017, the replacement generating projects would still be in the 2017-01 DISIS and the challenges of acquiring new generation would remain the same. I address the delays in Southwest Powers Pool's GI process in more detail in Section V of my testimony.

**Q. Will a converted Harrington Unit 1 continue to provide energy benefits to SPS's customers?**

A. Yes, converting Harrington Unit 1 will preserve 340 MW of firm and dispatchable energy. Even though Harrington Unit 1 will likely operate less after the conversion to gas, it will provide energy when needed, such as during times of high demand, low renewable generation output or for reliability reasons. I will address concerns about Harrington Unit 1's capacity factor in Section VIII of my testimony.

**Q. Do you agree with Ms. Glick's assertion that retiring Harrington Unit 1 is a 'no-regrets' decision[4]?**

A. Absolutely not. As I describe above, converting Harrington Unit 1 preserves 340 MW of firm and dispatchable capacity resource for over a decade at an incremental upfront capital cost of just $2.6M. In addition, SPS's analysis shows that retiring

[4] Glick Direct at 8, 53.

Harrington Unit 1 provides no meaningful savings over a 20-year period, on an NPV basis, and substantially *increases* costs in the near term.

To be clear, without any reliable economic justification, Sierra Club witness Glick's recommendation to retire Harrington Unit 1 would put SPS in a precarious capacity position and require SPS to immediately seek new resources at a time when (1) projects are withdrawing *en masse* from Southwest Power Pool's GIA process because they are being assigned cost-prohibitive transmission network upgrade costs, and (2) developers are failing to deliver projects due to commodity price increases and supply chain issues.

## IV. SPS FULLY EVALUATED RETIREMENT OF TWO OR THREE HARRINGTON UNITS

**Q. What do you address in this section of your rebuttal testimony?**

A. In this section of my testimony, I dispute Sierra Club's assertion that SPS did not consider retiring two or three Harrington units in a meaningful way and address the fact that SPS fully explained the challenges of obtaining replacement capacity.[5]

**Q. First, did SPS's 2019 analysis support retiring two or three Harrington units?**

A. No. SPS's 2019 analysis demonstrated that retiring two or three Harrington units was more expensive than converting all Harrington units to operate on natural gas.

**Q. Do the results of SPS's 2021 updated analysis support retiring two or three Harrington units?**

A. No. As shown in Table BRE-2 of my direct testimony, retiring two or three Harrington units is $62 million and $123 million more expensive, respectively, on an NPV basis, than converting all three Harrington units to operate on natural gas. In addition to being more costly, there are considerable challenges with acquiring the replacement resources necessary to replace the capacity of the Harrington units. I address these challenges in Sections V and VI of this testimony and also in my direct testimony.

[5] Glick Direct at 23-24.

**Q. Have any of the other parties conducted their own analysis evaluating the retirement of two or three Harrington units?**

A. Yes. Sierra Club submitted their own economic analysis evaluating the retirement of two or three Harrington units in the corresponding New Mexico proceeding (Case No. 21-00200-UT).

**Q. Did Sierra Club's analysis support retiring two or three Harrington units?**

A. No. Sierra Club's own analysis in New Mexico showed retiring all three Harrington units is $183 million *more expensive*, on an NPV basis, than converting all three Harrington units to operate on natural gas. This is $60 million *more expensive*, on an NPV basis, than the amount calculated by SPS.[6] Sierra Club's analysis also showed that, over a 20-year planning period, retiring two units was essentially the same cost as converting all three units. However, Sierra Club's analysis also showed that retiring two units resulted in $109 million of additional costs, on an NPV basis, between now and 2024. When one considers the challenges with acquiring the needed replacement resources, retiring two or three units should be considered a non-starter.

**Q. Did Ms. Glick's direct testimony in New Mexico Case No. 21-00200-UT reflect the results you described above?**

A. No. Ms. Glick's direct testimony presented modeling results showing that the early retirement of all three Harrington units was the *lowest* cost option and

[6] *See* Elsey Direct at 32. Table BRE-2 shows a difference of $123 million for retiring all three Harrington units compared to the requested scenario to convert all units. Sierra Club's $183 million amount minus SPS's $123 million amount results in a $60 million difference.

recommended the Commission should deny SPS's request for an order amending its CCN.

**Q. Did Sierra Club change its position in New Mexico Case No. 21-00200-UT?**

Yes, but only after Ms. Glick reviewed my rebuttal testimony, which identified critical mistakes in Ms. Glick's modeling that, when corrected, resulted in the early retirement of all three Harrington units being the *highest* cost scenario. In other words, the revised modeling results directly contradicted Sierra Club's initial position presented in Ms. Glick's direct testimony. Later in post-hearing briefs in the New Mexico case, Sierra Club supported the same position it is presenting now in Texas, which is to convert two units to gas and retire Harrington Unit 1. This is very concerning, as I have identified additional critical mistakes in Ms. Glick's alternative modeling that undermine the credibility of Sierra Club's position in this case.

**Q. Do these changes in Sierra Club's position concern you as it relates to the issues Sierra Club raises in Texas?**

A. Yes. Ms. Glick states that SPS did not consider the retirement of one or more units at Harrington and replacement with alternative resources in a meaningful way and she unfairly criticizes SPS for not being clear about the viability of obtaining replacement resources if two or three units are retired.[7] But the fact of the matter is, no analysis has shown that retiring any number of the three units is an economical solution. This includes Sierra Club's own analysis in New Mexico, which it is not presenting in this case. In addition, Mr. Grant and I were clear in

[7] Glick Direct at 25-26.

our direct testimony in this case that it would be challenging to promptly obtain replacement capacity given the backlogged Southwest Power Pool GI process and the risk that replacement resources might not be available at all, let alone at a reasonable cost.

**Q. Sierra Club alleges that SPS decided in 2019 (or earlier), based on its Strategist modeling, that it was going to convert Harrington to operate on gas.[8] Do you agree?**

A. No. I do not recall the exact dates SPS conducted its Harrington analysis in Strategist (the modeling software prior to EnCompass), but I do recall that the analysis began in the fall of 2019 and carried over into 2020. SPS then entered into the agreement with the Texas Commission on Environmental Quality ("TCEQ") to cease burning coal in October 2020. Therefore, Sierra Club's claims that, "[n]o later than mid-2019, SPS made the decision to convert Harrington to operate on [gas]" is unfounded. As I described above, SPS's 2019 analysis demonstrated that retiring two or three units is not an economical solution.

**Q. Sierra Club states that because of the Strategist analysis, SPS took no action to issue an RFP or RFI to decide whether to convert the units to operate on gas.[9] Is this correct?**

A. No. Around the same time SPS conducted the 2019 Strategist analysis, SPS entered an uncontested comprehensive stipulation in SPS's 2019 New Mexico Rate Case (Case No. 19-00170-UT). The stipulation, dated January 13, 2020, required SPS to issue an RFP or RFI to evaluate the cost of replacement resources for SPS's coal

[8] Glick Direct at 26.
[9] Glick Direct at 26.

generating units, including Harrington. As a result of the stipulation, SPS decided to leverage the results of the all-source solicitation to update the pricing contained in the Harrington analysis.

**Q. Did SPS incorporate the results of the RFI into its 2021 updated Harrington analysis?**

A. Yes, and as I described above, the results of the 2021 updated Harrington analysis do not support the retirement of either two or three Harrington units. Sierra Club also relied upon the results of SPS's RFI and ultimately reached the same conclusion as SPS.

**Q. How do you respond to Ms. Glick's assertion that SPS could not have modeled the cost of retiring the Harrington Units without first testing the market[10]?**

A. This assertion is incorrect and inconsistent with Sierra Club's own alternative analysis in this case. SPS relied upon its own internally developed cost data and external sources such as the National Renewable Energy Laboratory ("NREL") to develop the cost assumptions for alternative resources in the 2019 Strategist analysis. Not only is it standard practice in the industry, but Sierra Club also relied upon the same data from NREL to develop its own cost estimates for solar and battery energy storage resources to support retiring Harrington Unit 1.

**Q. Does the October 2020 agreement with the TCEQ prevent SPS from retiring two or three Harrington units?**

A. No.

[10] Glick Direct at 26.

**Q. Is it infeasible to retire two or more Harrington units?**

A. No, but it is extremely challenging to replace the capacity of two or three Harrington units with the most cost-effective portfolio of resources selected by EnCompass. For example, in New Mexico Case No. 21-00200-UT, Ms. Glick's errata analysis for retiring all three Harrington units showed the most cost-effective portfolio of resources included an additional 2,558 MW of wind, 925 MW of solar, and 230 MW of battery energy storage before the end of 2025. Acquiring and integrating this amount of renewable generation in a little more than three years is difficult at the best of times and it is extremely challenging given the current state of Southwest Power Pool's GI process.

**Q. How do you respond to Ms. Glick's assertion that if SPS had started pursuing alternatives earlier, it is more likely that SPS would be able to procure replacement resources by the end of 2024?**

As I described earlier in my testimony, even if SPS started pursuing alternatives in 2019, the options for replacement resources would still be stuck in the 2017-01 DISIS. It is very frustrating that Sierra Club continues to make assertions such as these without understanding how Southwest Power Pool's GI process works.

## V. SOUTHWEST POWER POOL'S GENERATOR INTERCONNECTION PROCESS ADDS CONSIDERABLE TIME AND EXPENSE

**Q. What topic do you address in this section of your rebuttal testimony?**

A. In this section of my testimony, I address the Southwest Power Pool's GI process that is a required part of connecting new generation to the existing transmission grid. This issue is directly related to the positions AXM and Sierra Club take that would require SPS to retire all three units or one Harrington unit, respectively, because both positions would require SPS to find replacement resources to provide the capacity SPS needs to meet its planning reserve margin requirements and reliably serve customers.

In addition, AXM witness Norwood recommends SPS be required to conduct a new competitive bid process to obtain information regarding replacement capacity options.[11] In taking that position, Nr. Norwood states that a delay of that type due to a new bidding process would give SPS time to refine its current estimates of interconnection costs for new plants.[12] Mr. Norwood's testimony shows a lack of understanding of how the interconnection process works and the fact that Southwest Power Pool, not SPS, controls the timeline for new projects and determines interconnection costs. Ms. Glick also suggests SPS should be required to issue a new RFP to determine which resources are still available and their timeline for availability,[13] which is simply not necessary.

For these reasons, in this section of my rebuttal testimony, I:

1) provide additional clarity on the current issues with Southwest Power Pool's

[11] Norwood Direct at 9.
[12] Norwood Direct at 9.
[13] Glick Direct at 9.

GI process;

2) describe the impact these issues had on SPS's 2020 RFI;

3) describe the impact these issues would likely have if SPS were required to issue another RFI or RFP; and

4) describe the impact these issues could have if the Commission accepts Sierra Club's recommendation to retire Harrington Unit 1 or AXM's recommendation for SPS to retire and replace all Harrington units.

**Q. Can you provide a brief overview of Southwest Power Pool's GI process?**

A. Yes. The Southwest Power Pool describes the GI Queue process as a

> means for generation planners and developers to submit new generation interconnection projects into the queue for validation, study, analysis and, ultimately, execution of a Generator Interconnection Agreement.[14]

Previously when Southwest Power Pool received a new GI request, it was entered into a DISIS, and each year, there were two study windows or clusters. The Southwest Power Pool studies all the projects in the DISIS and assigns the estimated transmission network upgrade costs required to interconnect the new generation. The studies are evaluated sequentially, meaning the 2017-02 study cannot commence until the 2017-01 study is complete (or near completion). Currently the 2017-01 DISIS is still active, but near completion, and the 2017-02 DISIS has commenced. Based on the most recent DISIS, it takes approximately five years to complete the study process, which is much longer than desirable.

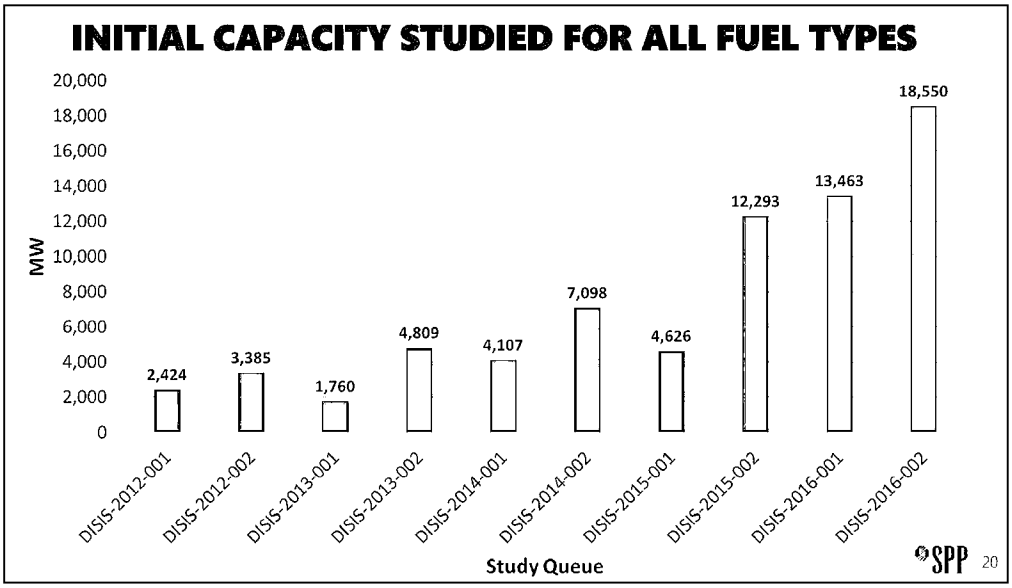
**Q. What is causing the delays to Southwest Power Pool's GI process?**

A. The volume of requests is one of the main drivers. As shown below in Figure 1, the initial capacity studied across Southwest Power Pool's entire footprint has

[14] https://spp.org/engineering/generator-interconnection/.

increased from 2,424 MW in the 2012-01 DISIS to 18,550 MW in the 2016-02 DISIS.[15]

**Figure 1: Initial Capacity Studied for All Fuel Types**




This large increase is almost entirely driven by requests for new renewable generating resources. Furthermore, each project in the DISIS is dependent upon all the other projects. Therefore, if one project decides to withdraw, because it is assigned high transmission network upgrade costs (as an example), then the DISIS needs to be restudied and the assigned costs recalculated, which in turn may result in another project withdrawing, and so on.

**Q. Are projects currently being assigned high transmission network upgrade costs?**

A. Yes. SPS's service territory is in the far Southwest corner of Southwest Power Pool's footprint and is relatively transmission constrained. This geographic

[15] Figure 1 can be found here: https://spp.org/documents/60683/gi%20three%20phase%20education%20session%20presentation.pdf at 20.

situation results in potential new generators often requiring a large and expensive transmission build-out. As I describe on page 40 of my direct testimony,

> new generators in SPS's territory are currently being assigned extremely high transmission network upgrade costs. For example, for the 1st and 2nd phase study of the 2017-01 DISIS, Southwest Power Pool assigned an average of $934/kW in network upgrade costs. To put this in context, construction of a new solar generating facility is approximately $1,000/kW.

At this pricing, the transmission network upgrade costs for replacing the existing 1,050 MW at Harrington with new generation would cost approximately $981 million if all of the replacement resources required a new GIA. In reality, developers are aware that projects assigned anywhere close to $934/kW will not be economical and often withdraw their projects before they have to invest substantial capital to proceed.

**Q. Are projects withdrawing from the GI process because of the high transmission network upgrade costs being assigned?**

A. Almost certainly. As I describe on pages 40 - 41 of my direct testimony,

> as a result of the extremely high transmission network upgrade costs, when the projects in the 2017-01 DISIS were required to put down a 20% deposit, all but one 200 MW project [in SPS's area] withdrew.

For context, in the Texas Panhandle and New Mexico area there were originally 3,795 MW of new projects in the 2017-01 1st Phase Study. This highlights how few projects successfully navigated the 5-year long 2017-01 DISIS.

Furthermore, as projects withdraw, the transmission network upgrades are not avoided; they are simply deferred for the next group of projects in the subsequent DISIS, which starts the problem all over again. These issues make it

extremely challenging for SPS to acquire replacement resources if one or more of the Harrington units is retired.

**Q. Did developers incorporate the costs you describe above when responding to SPS's 2020 RFI seeking replacement resources for SPS's coal assets?**

A. No. Most developers simply ignored the problem and excluded the cost of transmission network upgrades from their proposals. Therefore, SPS was faced with two options to assess the costs of new projects: exclude proposals that did not include transmission network upgrade costs or evaluate the proposals using a range of estimated costs. SPS chose the latter approach and evaluated all proposals requiring a new GI agreement at $200/kW, $400/kW, and $600/kW. All of those amounts are far less than the $934/kW average cost assigned in the 2017-01 DISIS 1st and 2nd Phase studies.

**Q. Mr. Norwood suggests that a new competitive bid process would allow SPS time to refine its current estimates of interconnection costs.[16] Do you believe bidders would have included binding transmission network upgrade costs if SPS issued an RFP in 2020, instead of an RFI?**

A. No. As I describe above, projects that are assigned, on average, $934/kW are extremely unlikely to proceed through the GI process. Therefore, if SPS issued a binding RFP in 2020, instead of an RFI, bidders would have a choice of: (1) either submit the transmission network upgrade costs assigned with their project, or (2) take a risk and submit lower transmission network upgrade costs. The first option is a non-starter as bidders know it is extremely unlikely their project would be

[16] Norwood Direct at 9.

selected with this level of transmission network upgrade costs. If developers did submit estimates based on estimated lower transmission network upgrade costs, it is almost impossible for SPS to hold developers to their proposals if they eventually are assigned costs that are higher than what was included in the bid.

**Q. Why in its economic modeling in EnCompass did SPS use amounts for interconnection costs that are less than were assigned in the 2017-01 DISIS at the time?**

A. In theory, if some projects withdrew from the 2017-01 DISIS, there is a possibility that fewer transmission network upgrades could be required, and the remaining projects might be assigned lower costs. SPS decided to "stress-test" converting Harrington to gas by evaluating interconnection costs that are far less than the $934/kW assigned in the 2017-01 DISIS at the time. To be clear, transmission network upgrade costs for replacement resources could be significantly higher than SPS evaluated in its updated Harrington analysis.

**Q. Are the GI backlog and uncertainty around actual transmission network upgrade costs reasons why SPS issued an RFI instead of an RFP?**

A. Yes, those are some of the reasons SPS issued an RFI. The RFI was designed to attract a wide range of bidders who had an interest in providing replacement capacity. SPS wanted to see what all of the potential options were, and an RFI allowed SPS to do just that. An RFP, on the other hand, would have required SPS to request bids to meet a specific need and would have limited the number and types of bids. Mr. Norwood indicates that obtaining binding bids for replacement options

at Harrington would have been better than the RFI SPS issued, but that is not the case for the reasons I just described.

**Q. Do you expect different results regarding transmission network upgrade costs if SPS were to now issue an RFP?**

A. No. As I described above, almost all the projects withdrew from the 2017-01 DISIS and it will likely be several years before projects in the 2017-02 DISIS have firm transmission network upgrade cost estimates. If SPS were to issue an RFP today, I expect bidders of projects in the 2017-02 or later DISIS will simply not know how much transmission network upgrade costs they will be assigned from Southwest Power Pool and SPS will be in the same position it was in when it issued the 2020 RFI. As I stated in my direct testimony, SPS would almost certainly have to limit any RFP to projects that already possess, or do not require, a GI agreement. This severely reduces the number of viable projects and likely drives up the cost of any project because there are fewer to choose from.

**Q. Do you agree with AXM's assertion that a new competitive bidding process or issuing an RFP would allow SPS to refine its current estimates of interconnection for new plants?**

A. No. First, as I describe above, it is Southwest Power Pool's responsibility to assign transmission network upgrade costs, not SPS's. SPS does not control the level of costs that are assigned to new resources. Second, as I describe above, it is extremely unlikely the 2017-02 DISIS will be finalized before the Harrington units must cease burning coal at the end of 2024. Again, if SPS were to issue an RFP or other request

for bids, it would almost certainly have to limit projects to those that all contain or do not require a new GIA.

**Q. Can SPS retire the Harrington units if replacement resources are not available?**

A. No. SPS cannot retire the Harrington units if replacement resources are unavailable. Doing so would leave SPS without the capacity it needs to serve customers, meet the required 12% reserve margin, and maintain voltage support.

## VI. REPLACEMENT RESOURCES – FAVORABLE MODELING TREATMENT COMPARED TO REAL WORLD CHALLENGES

**Q. What topic do you address in this section of your rebuttal testimony?**

A. In this section of my testimony, I describe several modeling inputs and assumptions SPS incorporated into its 2021 updated Harrington analysis that were intentionally favorable for an early retirement of the Harrington Units. As a result, SPS's analysis tests whether an early retirement could be economical, even under the extremely favorable, unlikely, and aggressive assumptions for replacement resources. Even with those favorable assumptions, retiring all three Harrington units by the end of 2024 is not an economical option, which is responsive to Mr. Norwood's positions on behalf of AXM.

Furthermore, if I had not taken an aggressive approach in the modeling, the analysis would have shown that, based on current market conditions, the early retirement of one or more Harrington units is, at best, more costly and challenging than reflected in SPS's Harrington analysis, and at worst, infeasible. Through this testimony, I respond to both Mr. Norwood and Ms. Glick.

**Q. How was SPS's Harrington analysis intentionally favorable for an early retirement of Harrington?**

A. I set aside the serious concerns I describe above in Section V related to interconnecting new generation and allowed the EnCompass model to add an impractical amount of renewable generation between 2023 and 2025. This approach also allowed the renewable generation to qualify for existing federal tax credits that step down or expire after 2025. Specifically, the most cost-effective portfolio of resources in SPS's base analysis for the 2024 retirement of all

Harrington units included an additional 2,558 MW of new wind generation, 925 MW of new solar generation, and a new CTG between 2023 and 2025. To put that in context, SPS currently has 2,451 MW of wind generation on its system. If SPS were to add an additional 2,558 MW of wind, SPS would have over 5,000 MW of wind on a 4,000 MW peak system.

**Q. Are there other ways in which SPS's Harrington analysis was intentionally favorable for an early retirement of the Harrington units?**

A. Yes. As I described in Section V, I evaluated the cost of transmission network upgrades for new resources requiring a GIA at $200/kW, $400/kW, and $600/kW. Each of those sensitivities, however, is far lower than the actual $934/kW assigned to new generating resources in the 1st and 2nd phase of Southwest Power Pool's 2017-01 DISIS. Even if replacement resources are available in less than three years, it is unclear how much transmission network upgrade costs will be assigned by the Southwest Power Pool and passed on to SPS's customers. As such, this is a significant cost risk associated with retiring the Harrington units. Neither Ms. Glick nor Mr. Norwood acknowledge the risk that transmission network upgrade costs could far exceed the amount SPS used in its analysis.

**Q. Did SPS assume any other favorable conditions for the cost of transmission network upgrades?**

A. Yes. As I describe on page 41 of my direct testimony, combustion turbines and battery energy storage resources were exempt from the additional network upgrade costs on the assumption they would utilize generator replacement rules. SPS also assumed that new renewable generation could be co-located at SPS's Tolk

Generating Station ("Tolk") and Harrington sites using surplus interconnection rules and without requiring transmission network upgrades. For example, SPS's 2021 Harrington analysis includes 1,000 MW of wind interconnected at Harrington without any cost for transmission network upgrades.

**Q. Did SPS's analysis demonstrate it was economical to retire the Harrington units under these favorable conditions?**

A. No. Using this favorable study approach, SPS's analysis shows retiring all three units increases costs by $123 million, on a "NPV basis compared to converting all units, and retiring two units increases costs by $62 million, on a NPV basis. SPS's analysis did show that, under favorable conditions, retiring one Harrington unit could potentially produce negligible savings of $5 million, on a NPV basis, over a 20-year planning period. However, the potential for negligible long-term savings would come at the expense of $39 million of additional costs, on a NPV basis, between 2022 – 2024. Considering the favorable treatment given to replacement resources in the EnCompass modeling, the cost to replace one or more Harrington Units is likely *understated*.

**Q. Do Sierra Club or AXM acknowledge the favorable conditions you describe above when advocating for retirement of one or more Harrington Units?**

A. No. Sierra Club's analysis and recommendation ignores the concerns created by the presumed favorable conditions and instead relies upon critically flawed updates to SPS's analysis that bias Sierra Club's modeling towards favoring the early retirement of Harrington Unit 1.

AXM did not produce any of their own analysis and instead relied upon Mr. Norwood's flawed interpretation of the results of SPS's analysis. However, as I will describe in Section VII, it is clear AXM witness Scott Norwood is unaware of many of the favorable conditions SPS incorporates into the Harrington analysis.

**Q. Did Sierra Club test its modeling against less favorable conditions for replacement resources like SPS did?**

A. No. Sierra Club did not conduct any analysis in which SPS would not acquire all of the new resources from the RFI, which were selected by EnCompass in their analysis. Sierra Club also did not conduct any analysis in which the cost of transmission network upgrades exceeded $400/kW.

**Q. Can you summarize your concerns with Sierra Club's analysis?**

A. Yes. Ms. Glick refers to her recommendation to retire Harrington Unit 1 as a "no-regrets" decision, yet her testimony is almost entirely devoted to the world of hypothetical computer modeling that relies on erroneous assumptions and provides little-to-no consideration of the feasibility and consequences of her recommendations. I am not taking the position that computer modeling is not an extremely important tool for resource planning decisions – it absolutely is essential, as my own testimony shows. However, prudent resource planners also need to consider the feasibility, risk, and potential reliability impacts of their recommendations. Ms. Glick has failed to adequately address these considerations as part of her recommendations. This is particularly alarming because the retirement of Harrington Unit 1 by the end of 2024 will create an expedited need for replacement resources. SPS must address that issue even if Sierra Club wants

to ignore or downplay it. Obtaining those necessary resources is challenging and potentially costly due to the Southwest Power Pool's extremely back logged GI process. In addition, robust analyses require a resource planner to objectively test their analyses against different critical modeling assumptions. Sierra Club witness Glick has conducted no such analysis. Instead, her sensitivity analyses are intentionally designed to portray the early retirement of Harrington Unit 1 in the best possible light.

## VII. AXM'S RECOMMENDATION FOR RETIREMENT OF ALL UNITS IS NOT ECONOMICAL, UNNECESSARILY INCREASES RISK TO SPS'S CUSTOMERS, AND DOES NOT AVOID THE NEED FOR THE NEW NATURAL GAS PIPELINE

**Q. What topic do you discuss in this section of your testimony?**

A. In this section, I address AXM's recommendation to retire all three Harrington units and replace them with new CTGs.[17] I demonstrate that AXMs recommendation is (1) not economical, (2) does not avoid the need for a new natural gas pipeline, and (3) unnecessarily increases risk to system reliability.

**Q. Before addressing your concerns with AXM's recommendation, how do you respond to Mr. Norwood's description of the operational benefits of new CTGs compared to the converted Harrington units?**

A. I would argue that the efficiency of the current or converted Harrington units is comparable to CTGs, but other than that, I tend to agree with Mr. Norwood's descriptions. CTGs do provide operational benefits, such as quicker start times and faster ramp rates. However, these benefits are not free or fast. The cost of converting the Harrington units to gas and preserving over 1,000 MW of firm and dispatchable capacity is approximately $65 to $75 million, with the new gas pipeline representing most of this cost. The cost of replacing the Harrington units with new CTGs will easily exceed $500 million. That amount does not include any transmission network upgrade costs. In addition, CTGs would still require the construction of a new gas pipeline. Given these cost estimates, it is hard to understand how Mr. Norwood can refer to new gas-fired combustion turbines as

[17] Norwood Direct at 9-10.

"slightly more costly in the near-term" than conversion of the units.[18] It could also take several years to bring new CTGs online, likely leaving SPS in a position where it cannot meet its planning reserve margin requirements.

**Q. Does AXM provide any economic modeling or analysis to support retiring the Harrington units and replacing them with new CTGs?**

A. No. AXM's recommendation appears to rely solely upon Mr. Norwood's faulty interpretation of the results of SPS's 2021 economic analysis and a misunderstanding of some of the favorable conditions I describe in Section VI.

**Q. What makes you think AXM misunderstood some of the favorable conditions SPS incorporated into its economic analysis?**

A. On page 16 of his direct testimony, Mr. Norwood offers potential advantages for retiring the Harrington units to try to support his recommendation for retiring and replacing all three units. While Mr. Norwood's observations are astute, they are already captured in SPS's 2021 economic analysis.

**Q. Can you provide an example?**

A. Yes. On page 16, Mr. Norwood states:

> SPS could use the existing Harrington Station infrastructure and transmission interconnection facilities for new gas-fired combustion turbines which SPS plans to add by 2030 according to the Company's July 2021 IRP. This would likely reduce the forecasted cost of Scenario 1 from what was assumed in SPS's 2021 Economic Analysis, which assumes that other replacement resources incur an interconnection cost of $400/kW, which equates to approximately $420 Million of additional cost that is added to the evaluated costs of such resources.[19]

However, as I describe on page 41 of my direct testimony:

[18] *See* Norwood Direct at 9.

[19] Scenario 1 is retire and replace all three Harrington units.

> Future generic combustion turbines and battery energy storage resources were exempt from the additional network upgrade costs on the assumption they would utilize generator replacement rules.

Stated differently, SPS's 2021 updated Harrington analysis assumed exactly what Mr. Norwood is suggesting and did not assign any transmission network upgrade costs to new CTGs. Therefore, the cost of Scenario 1 cannot be reduced by approximately $420 million as Mr. Norwood claims.

**Q. Can you provide another example?**

A. Yes. Again, on page 16, Mr. Norwood states:

> [U]nder Scenario 1, SPS may be able to take advantage of tax credits offered for new solar and wind resources, which the Company's 2021 Harrington economic analysis indicates would be added to replace a portion of the 1,050MW capacity loss caused by the planned retirement of the Harrington coal units at the end of 2024.

However, as I describe on page 37 of my direct testimony:

> The updated analysis assumes SPS will add significant amounts of renewable generation to the system between the end of 2023 and the end of 2025. It is doubtful whether SPS could acquire this generation in the timeframe analyzed.

In other words, SPS's 2021 updated Harrington analysis already assumed SPS would be able to take advantage of tax credits offered for new wind and solar resources. In fact, SPS's analysis intentionally favored an early retirement of the Harrington units by allowing more renewable generation that would qualify for federal tax credits than could likely be added to the system before the end of 2025. As I described earlier in my testimony, SPS's Scenario 1 included an additional 2,558 MW of new wind generation and 925 MW of new solar generation within this timeframe. Furthermore, SPS went above and beyond Mr. Norwood's observations and also allowed EnCompass to include 1,000 MW of aforementioned

new wind generation to replace the Harrington units without assigning any transmission network upgrade costs – again SPS assumed this wind generation would qualify for Production Tax Credits.

**Q. Do you agree with Mr. Norwood's interpretation of the results of SPS's 2021 economic analysis, which he uses to support his position that all units should be retired and replaced with new CTGs?**

A. No. Mr. Norwood states that "Scenarios 1, 2, 5, and 6 are essentially equal" because the cost difference between the cases is only 1% or less.[20] Although this calculation is factually correct in terms of the math, the outcome is not surprising given the scale of the calculation. Specifically, the denominator in this calculation is $12 billion, which is SPS's total system wide cost, on an NPV basis, over a 20-year period. Therefore, the percentage difference between most scenarios is relatively small. To be clear, SPS's analysis shows the early retirement of all Harrington units is $123 million *more expensive,* on an NPV basis, and this is likely *understated* for the reasons I describe in Section VI. Mr. Koujak also addresses this issue in his rebuttal testimony.

**Q. Are the resources included in Scenario 1 (Retire and Replace All Units) of SPS's Harrington analysis the same as the new CTGs that Mr. Norwood recommends for replacing all three Harrington units?**

A. No. The EnCompass model selects the most cost-effective portfolio of resources to meet SPS's capacity and energy needs over the 20-year planning period. Scenario 1 includes a combination of new wind, solar, and gas resources to fulfill

[20] Norwood Direct at 12.

SPS's system needs. Scenario 1 does not include the new CTGs in the timeframe Mr. Norwood suggests, despite the fact that Mr. Norwood discusses Scenario 1 as if it includes all new CTGs.

**Q. Have you evaluated the cost of retiring the Harrington units and replacing with new CTGs?**

A. Yes. Upon receiving Mr. Norwood's direct testimony, I reran Scenario 1 with four new CTGs immediately replacing the retiring Harrington Units at the end of 2024. To be conservative:

(1) only four CTGs with a 200 MW summer rating were forced into the model (not five CTGs that would be required to replace the full capacity of Harrington),

(2) SPS *excluded* the cost of a new gas pipeline,

(3) no transmission network upgrade costs were included for the new CTGs,

(4) SPS used its WAHA gas forecast, which is lower than SPS would use for new generation on the northern portion of its system,

(5) new economic renewable energy resources were available, and

(6) SPS assumed the CTGs could be added by the end of 2024, without the need for extending the retirement of existing gas steam units or purchasing capacity.

**Q. What were the results of the analysis?**

A. Even with all the favorable assumptions described above, the results of the analysis, shown below in Table 2, show that Mr. Norwood's recommendation to retire all Harrington units and replace with new CTGs is $160 million *more expensive,* on an NPV basis than converting all Harrington units to operate on natural gas between 2022 and 2024. This represents a 6.1% cost increase between 2022 and 2024 when compared to converting all three Harrington units. Over a 20-year period, retiring

and replacing with new CTGs is $119 million *more expensive,* on an NPV basis than converting all Harrington units to operate on natural gas. This is comparable to the results of Scenario 1 in SPS's 2021 updated Harrington analysis; however, this does not include any costs for a new gas pipeline, which will be required if four new CTGs are located at Harrington to avoid transmission network upgrade costs.

**Table 2**

| PVRR Production Cost | Delta ($M) | NPV ($M) 2022-2024 | Delta ($M) | NPV ($M) 2022-2041 |
|---|---|---|---|---|
| Convert All Harrington Units | $0 | $2,450 | $0 | $11,949 |
| Retire & Replace with new CTGs | $160 | $2,610 | $119 | $12,068 |

**Q. Would SPS still need a new gas pipeline if the Harrington units are replaced with new CTGs?**

A. Yes, any gas-fired generation located at Harrington will require a new gas pipeline. If the CTGs are not located at Harrington, the CTGs could also need a new GIA, which would likely necessitate expensive transmission network upgrade costs. Therefore, the additional cost to replace the Harrington units with CTGs in Table 2 is almost certainly *understated.*

**Q. Given the analysis you have performed about the cost of new CTGs, what is your response to Mr. Norwood's speculation that it may be economically feasible to accelerate the in-service dates of new CTGs at the Harrington site[21]?**

A. I disagree. The costs of new CTGs far exceed the cost to convert all three units. In addition, Mr. Norwood seems to rely on the inaccurate assumption that the cost of the CTGs could avoid interconnection costs included in SPS's analysis; however, I have already explained that SPS's modeling did not add any interconnection costs for any new CTGs. Mr. Norwood also tries to rely on the fact that new CTGs are included in SPS's July 2021 Integrated Resource Plan ("IRP") filed in New Mexico. In the New Mexico IRP, SPS assumed all three Harrington units would be converted to natural gas *and* SPS would still need new CTGs in the future. The new CTGs would not displace the converted Harrington units.

**Q. How does AXM's recommendation increase risk to SPS's customers?**

A. Mr. Norwood acknowledges SPS needs the capacity of the Harrington units, yet he still recommends SPS retire all three Harrington units at the end of 2024 resulting in an immediate capacity need of 902 MW, as explained later in my testimony.

Mr. Norwood speculates:

> SPS could potentially still defer the need for replacement of the Harrington coal units in 2025 for several years by deferring its current plans to retire approximately 650 MW of capacity supplied from other SPS gas-fired units over the next several years or perhaps relying on short-term capacity purchase as it has in the past.[22]

[21] Norwood Direct at 16.
[22] Norwood Direct at 9.

This approach would increase risk to SPS and its customers because even if SPS could delay retirement of 650 MW of capacity supplied from other SPS gas-fired units (which it cannot do), SPS would still need to purchase 252 MW of short-term capacity just to meet its planning reserve margin requirement in 2025.

**Q. How do you respond to Mr. Norwood's suggestion that SPS could defer its current plans to retire approximately 650 MW of capacity[23]?**

A. I am not sure how Mr. Norwood determined SPS has 650 MW of capacity to defer because SPS only has 374 MW of gas steam generation scheduled to retire before 2025. While it is possible to delay the retirement of Nichols Units 1 and 2 (223 MW), it is likely cost-prohibitive to continue to operate Plant X Units 1 and 2 (109 MW) and Cunningham Unit 1 (42 MW) through 2025 and beyond. Mr. Lytal also addresses this issue in his rebuttal testimony.

As a result, to delay the need for replacement resources, SPS would need to purchase at least 679 MW of short-term capacity (902 MW capacity need less 223 MW if Nichols 1 and 2 are extended) to fulfill its planning reserve margin requirements for the Summer 2025.

**Q. What issues would SPS face if it was required to purchase 679 MW of capacity to meet its resource needs in 2025?**

Mr. Norwood offers no guarantee this amount of capacity is available and if so, at what cost. However, to provide some context, SPS has previously modeled the estimated cost of short-term capacity at $2.40/kW-month, or $28.80/kW-year. Therefore, the cost of purchasing 679 MW of short-term capacity is approximately

[23] Norwood Direct at 9.

$20 million per year. As described above, the cost of short-term capacity is not included above in Table 2. Of course, sellers could take advantage of SPS's precarious capacity position and demand substantially higher costs for short-term capacity.

**Q. What is the consequence of SPS not maintaining the existing 1,050 MW of capacity at Harrington and being unable to meet its planning reserve margin requirements?**

A. If SPS is put in that position, SPS may not be able to serve its customers' load requirements. SPS's neighboring utility in New Mexico, Public Service Company of New Mexico ("PNM"), is a case-in-point. PNM recently retired the San Juan Generating Station and has been unable to acquire replacement resources or purchase short-term capacity. As a result, PNM is unable to meet its planning reserve margin requirements and has warned customers of rotating outages this summer.

## VIII. PROJECTED CAPACITY FACTOR OF THE HARRINGTON UNITS

**Q. What do you address in this section of your testimony?**

A. In this section of my testimony, I address Ms. Glick's misplaced concerns that the Harrington units operate at a very low-capacity factor and Harrington Unit 1 will never run, which she identifies as a reason to question SPS's investment in converting the Harrington units to natural gas.[24] Mr. Norwood takes a similar position in his testimony.[25]

**Q. How do you respond to Ms. Glick's and Mr. Norwood's apparent concerns about investment of significant capital into a plant with a low projected capacity factor?**

A. Their concerns are misplaced, particularly if one considers the entire landscape of generation resources available to a utility. Utilities have an obligation to provide reliable service to their customers each hour of the day, week, month, and year. To ensure reliability, utilities require firm and dispatchable resources to meet customers' electricity demands at all times – especially when intermittent resources, such as wind and solar, are not generating electricity. Indeed, the need for firm and dispatchable resources such as Harrington is demonstrated in Sierra Club's own base analysis, which includes 933 MW of new CTGs in the next 11 years.

[24] Glick Direct at 24-25.
[25] Norwood Direct at 8.

**Q. How do you respond to Ms. Glick's and Mr. Norwood's concerns that Harrington units will operate only minimally after the units are converted to gas?**

A. Based on current projections, SPS anticipates the Harrington units will operate at a relatively low-capacity factor after they are converted to operate on natural gas. Along those lines, I do not necessarily disagree with their observations about the extent to which SPS will rely on the Harrington units. However, Ms. Glick downplays the degree to which the converted Harrington units will continue to play a critical role in SPS's ability to meet forecasted capacity needs *and* provide system reliability, even with a lower capacity factor than Harrington baseload coal units.

**Q. Do you believe the Harrington units will operate with a capacity factor as low as the projections shown in SPS's 2021 economic analysis?**

A. No, I believe the units will run more than shown in SPS's 2021 economic analysis, even though the converted units will likely operate less than their historical capacity factors when operated as a baseload coal unit.

**Q. Why do you believe the units will run more frequently than included in SPS's analysis?**

A. There are several reasons I think the units will run more frequently. First, as I discussed in Section VI of my rebuttal testimony, SPS's 2021 economic analysis incorporates an aggressive amount of new renewable generation between 2023 and 2025, as part of SPS's conservative approach to favor potential retirement, that suppresses the capacity factor of SPS's entire thermal generation fleet. If this

additional renewable generation is not acquired, the Harrington units will likely run more frequently.

Second, of this new generation, 1,000 MW of new wind generation would be co-located at Harrington. This new wind generation was proposed as part of SPS's 2020 RFI, and SPS assumed this generation would avoid all transmission network upgrade costs by utilizing surplus interconnection rights that currently exist at Harrington. With surplus interconnection, the new wind generation could avoid transmission network upgrade costs by "sharing" Harrington's interconnection capability, although this would restrict the combined total output of the new wind generation and the Harrington units to the current interconnection capabilities of the Harrington units. In other words, the total output of the Harrington gas units and the 1,000 MW of new wind generation could not exceed approximately 1,050 MW, which is the existing output at Harrington. As wind has no modeled operating costs, it will always be dispatched in the EnCompass model first, and the Harrington units will be curtailed to ensure the interconnection capability is not exceeded. Therefore, the presence of 1,000 MW of speculative wind causes the model to reduce the capacity factor of the Harrington units. This of course ignores many real-life operational conditions and contingencies that SPS must be prepared for.

Third, SPS initially evaluated the Harrington units using Jones Unit 2's minimum up-time of 72 hours for the modeling. However, this was a conservative performance estimate because the current minimum up-time for the converted Harrington units is 18 hours. Although it would appear lowering the minimum up-

time of the Harrington units would reduce the number of hours the Harrington units operate, the increased flexibility of a lower minimum up-time likely will ultimately result in the Harrington units operating more frequently than SPS analyzed in the analysis presented in my direct testimony as they will be more available to the system for commitment in operation.

Finally, in my experience, long-term purely economic analyses often understate the capacity factors of peaking type resources such as the converted Harrington gas units. Long-term economic analyses rely upon long-term projections for inputs such as load forecasts, market prices, renewable generation profiles and other factors. Many of these long-term projections do not include the short-term volatility that can occur in real-time operations. For example, load forecasts are weather normalized and wind generation profiles are often created using historical *average* wind profiles and do not necessarily reflect the highs and lows of real-time operation. In these instances, firm and dispatchable resources, such as the Harrington units that have a total operating range of between 125 MW and 1,050 MW, are required to maintain system reliability.

**Q. Was it appropriate to model the Harrington units with a capacity factor that is lower than you anticipate under real-world operational circumstances?**

A. Yes. In doing so, one can conclude that, even when placing a minimal value on Harrington's potential energy benefits, it is still more economical to maintain the capacity value and dispatchable benefits of the Harrington units by converting them to natural gas than it is to retire the units.

**Q. Do you agree with Ms. Glick's concerns that understating the capacity factor of the Harrington units is somehow also understating the costs?**

A. No. The Harrington units are predominately dispatched only when it is economical to do so. In other words, if the Harrington units are operated more frequently than modeled, it is almost certainly because it is *more* economical to do so. Therefore, while it is technically accurate that the costs to operate the Harrington units will increase if the capacity factor increases, the units are operated based on overall economics. This means that the Harrington units will be dispatched when their operation results in an overall cost decrease to SPS's total system costs.

**Q. Have you performed any updated analysis to demonstrate how the Harrington units will operate if 1,000 MW of new wind generation is not co-located at Harrington and if the minimum up-time is set to Harrington's current duration of 18 hours?**

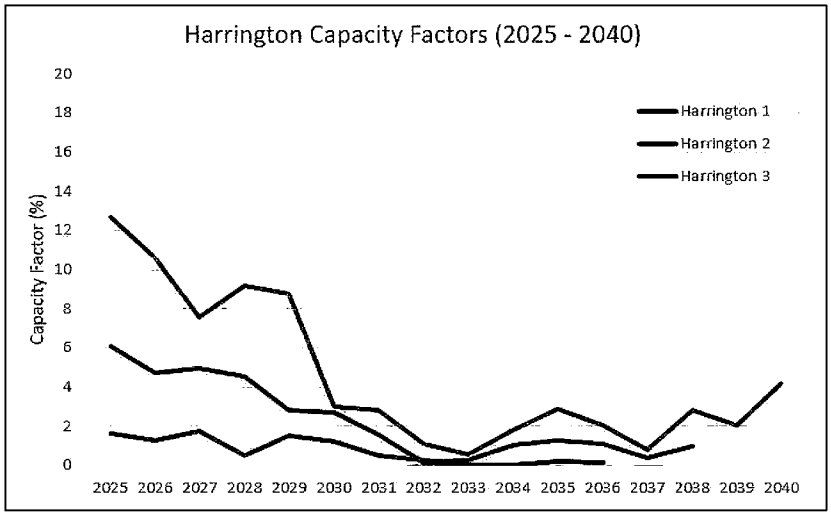
A. Yes. As shown below in Figure 2, the EnCompass modeling shows the Harrington units would operate more often than shown in SPS's original analysis between 2025 and 2030:

- Harrington Unit 3 operates at a 3% to 12.7% capacity factor,
- Harrington Unit 2 operates at a 2.7% to 6.1% capacity factor, and
- Harrington Unit 1 operates at 0.5% to a 1.8% capacity factor.

This assumes all other renewable generation included in SPS's original analysis is constructed. The projected capacity factor of each unit tails off after 2030, which coincides with new CTGs being added in EnCompass. If the new CTGs are not added, the capacity factor of the Harrington units will likely remain higher beyond

2030. Finally, these capacity factors are calculated in EnCompass, which means there is a very real possibility that real-world conditions will influence the capacity factors or actual operation of Harrington in ways EnCompass may not calculate. That reality, along with the capacity factor calculation shown above, means that Ms. Glick's and Mr. Norwood's assertions that Unit 1 will never run is not accurate.

**Figure 2: Updated Harrington Capacity Factors**




**Q. Please summarize your comments on Harrington's projected capacity factor.**

A. Even though I believe the Harrington units will ultimately operate more than projected in the modeling, SPS's economic analysis demonstrates that even with suppressed capacity factors, it is still more economical to convert the Harrington units to natural gas than to invest potentially hundreds of millions of dollars in other firm and dispatchable resources, such as CTGs or battery energy storage. For these reasons, Ms. Glick's and Mr. Norwood's concerns about Harrington's potentially low-capacity factor should not stand in the way of the Commission approving SPS's request to amend the CCNs to convert the units to operate using natural gas.

## IX. SIERRA CLUB'S ALTERNATIVE MODELING IS ERRONEOUS AND SHOULD BE REJECTED

**Q. What do you address in this section of your rebuttal testimony?**

A. In this section, I explain how Sierra Club's updates to generic solar, wind, and particularly battery energy storage capital costs contain critical mistakes that completely undermine the validity of Sierra Club's alternative analysis. I also address other modeling issues Ms. Glick identifies in her testimony.

### *Sierra Club's Critical Modeling Mistakes*

**Q. How do the results of SPS's analysis compare to Sierra Club's alternative analysis?**

A. The cost delta between each scenario in both SPS's and Sierra Club's analyses is relatively similar. However, Sierra Club's total system cost over the 20-year study period is substantially lower. SPS's analysis shows the total system wide cost to convert all three units is $11,949 million, on an NPV basis, whereas in Sierra Club's alternative analysis the total cost is $11,534 million – approximately $500 million less.

**Table 3**

| | 2022-2024 | | 2022-2041 | |
|---|---|---|---|---|
| | Delta | NPV | Delta | NPV |
| **SPS Modeling Results** | | | | |
| Convert all Harrington Units | $0 | $2,450 | $0 | $11,949 |
| Retain 2 Gas Harrington / Retire 1 | $39 | $2,490 | ($5) | $11,944 |
| **Sierra Club Alternative Analysis** | | | | |
| Convert all Harrington Units | $0 | $2,428 | $0 | $11,534 |
| Retain 2 Gas Harrington / Retire 1 | $40 | $2,468 | ($62) | $11,472 |

Although Ms. Glick presents extensive testimony detailing her concerns with SPS's analysis and justifying her alternative analysis, as I explain later in this section, I

find that many of Ms. Glick's concerns have marginal, if any, impact to the total system NPV cost or the cost delta between scenarios. Instead, I find Sierra Club's updated assumptions for the generic cost of solar, wind, and battery energy storage, (which Ms. Glick spends very little time addressing), are the only changes significant enough to lower the total system cost by approximately $500 million. After a detailed review of Sierra Club's EnCompass modeling input and output files, I discovered three critical mistakes that completely undermine the validity of Sierra Club's analysis:

1. Sierra Club severely underestimated the cost of new battery energy storage by erroneously excluding any financing costs. This is very important as Sierra Club's alternative analysis relies heavily upon battery energy storage as a replacement for the Harrington units.

2. Sierra Club further underestimated the cost of new battery energy storage by showing recovery of the cost of the batteries over a 30-year period, despite using NREL data that supports a 15-year life.

3. Sierra Club relied upon NREL's research and development financial assumptions, which includes a very low weighted average cost of capital ("WACC") and resulted in severely underestimated costs of new solar and wind resources.

**Q. Is this the first time you have discovered significant modeling errors in analysis presented by Ms. Glick on behalf of Sierra Club?**

A. No. In the corresponding New Mexico proceeding (Case No. 21-00200-UT), I also identified errors in Ms. Glick's modeling runs. The errors were significant enough that Ms. Glick revised her modeling analysis just days before the New Mexico hearing. As a result, I provided live rebuttal testimony during the hearing in which I addressed new problems I found in Ms. Glick's revisions to her original modeling in that case.

**Q. Why did Sierra Club update the generic cost of battery energy storage?**

A. Ms. Glick claims this was necessary because SPS

> models new generic battery energy storage resources with a single fixed cost stream that includes all capital costs, fixed costs, financing costs and returns into one single value. This makes it very challenging to evaluate the reasonableness of SPS's individual cost stream and assumptions regarding new battery energy storage costs.[26]

**Q. What information did Sierra Club rely on to update the generic cost of battery energy storage?**

Sierra Club relied upon the NREL's Annual Technology Baseline ("ATB") to update the cost of generic battery energy storage – which is the same data source SPS used. However, it is important to note, the NREL ATB data contains only capital cost and fixed costs; it *does not* contain financing costs. This is exactly why SPS has a more complex and "challenging" methodology for calculating the true levelized cost of battery energy storage. When updating the EnCompass model, Sierra Club only captured the initial capital cost to install the battery and the fixed cost to maintain it. In other words, if SPS acquired $1 billion of new battery energy storage resources, Sierra Club's analysis includes only $1 billion of capital cost recovery. It does not include, for example, any return on equity, or cost of debt. To provide a comparison, it is the equivalent of calculating your home mortgage payment without including the interest. Without including any cost of financing, Sierra Club is severely understating the cost of battery energy storage. This mistake explains why, in the SPS's base case analysis where two units are converted to gas, the EnCompass model only adds 100 MW of new battery energy storage by 2041;

[26] Glick Direct at 46 (emphasis added).

whereas, in Sierra Club's alternative analysis, the EnCompass model add 2,690 MW (nearly 27 times the amount).

**Q. Are there any other ways in which Sierra Club severely understated the estimated cost of battery energy storage?**

A. Yes. According to Ms. Glick's supporting workpapers, NREL ATB data assumes batteries have a 15-year life. However, Sierra Club's analysis recovers the capital cost of each battery over a 30-year period. In other words, Sierra Club depreciate sthe battery over 30 years and not the batteries' anticipated 15-year service life. This results in half the depreciation expense (cost) per year. Considering the Harrington analysis only incorporates a 20-year study period, much of the cost of each battery is never accounted for in Sierra Club's analysis. Additionally, because of the time-value-of-money, erroneously depreciating the battery over 30 years artificially lowers the cost on an NPV basis.

**Q. Can you quantify the impact Sierra Club's mistake has on their analysis?**

A. No, not without Sierra Club re-running the analysis. However, as I describe above, Sierra Club's preferred scenario contains 2,690 MW of new battery energy storage with a total capital investment of approximately $2.9 billion – none of which has any associated financing costs, which likely run into the range of hundreds of millions of dollars. Considering Sierra Club only shows $62 million of savings over a 20-year period, the addition of the missing financing costs and correction of other modeling errors, could very well eliminate any savings Sierra Club shows for retiring Harrington Unit 1.

**Q. Why did Sierra Club update the generic cost of solar and wind resources?**

A. Ms. Glick asserts this was necessary because SPS models new generic solar PV project additions assuming that the Investment Tax Credit ("ITC") expires.[27] Ms. Glick did not provide any explanation for why she updated the cost of generic wind resources.

**Q. Is Ms. Glick's assertion on how SPS models new generic solar PV projects correct?**

A. No. SPS assumed all generic solar PV projects would continue to qualify for a 10% ITC. This is reflective of the current ITC schedule.

**Q. What information did Sierra Club rely on to update the generic wind and solar resources?**

A. Again, Sierra Club relied upon the NREL ATB data to update the cost of generic wind and solar resources. Ms. Glick claims that NREL ATB assumes that the ITC is extended beyond 2025. To be clear, SPS also used NREL ATB data for generic solar resources, so it is unclear exactly what Ms. Glick was trying to achieve with her updates.

**Q. If SPS also used NREL ATB data to calculate the cost of generic wind and solar resources, how did Sierra Club calculate substantially lower cost estimates?**

A. To calculate the levelized cost of energy for wind and solar resources, the NREL ATB dataset provides two different financial assumptions options, (1) Market Factor Financials, or (2) Research and Development ("R&D") Financials. As both

[27] Glick Direct at 46.

options are relatively low, SPS actually uses its own WACC. Specifically, SPS used an approximate 7.0% WACC throughout the Harrington analysis including for all replacement resources. If Sierra Club were to choose one of the NREL ATB options, it would be more appropriate to use the Market financial assumptions instead of the R&D financial assumptions. However, Sierra Club chose to use the R&D financial assumptions and modeled wind assuming a 5.0% WACC and solar assuming a 4.3% WACC. It is very concerning that Ms. Glick provides no support or testimony for evaluating such a low WACC for replacement renewable resources. By taking this approach, Ms. Glick understates the cost of renewable resources as a replacement resource.

**Q. Are there other issues related to the cost or benefits of renewable energy or solar and Battery Energy Storage System ("BESS") resources that should be considered when assessing the reasonableness of Ms. Glick's positions?**

A. Yes. Beginning in 2023, Southwest Power Pool will implement a new methodology for accrediting capacity to renewable energy and BESS resources. The new methodology will negatively impact renewable energy and BESS resources in two ways. First, the accredited capacity received from SPS's existing resources will be up to 250 MW lower than SPS evaluated in its analysis. Therefore, SPS's capacity need will be greater than modeled. Second, Southwest Power Pool's new methodology will assign declining capacity accreditation to existing or new renewable energy resources and BESS as more and more of these resources are added to the Southwest Power Pool's footprint. As a result, SPS will need more renewable energy and/or BESS to replace the Harrington units than were

assumed in SPS's original EnCompass modeling (which would also be true for Ms. Glick's modeling). Again, this represents a potential significant cost increase associated with retiring the Harrington units that is not accounted for in her analysis. Using Southwest Power Pool's current methodology, BESS would receive 100% capacity accreditation. Under the Southwest Power Pool's new BESS accreditation methodology, the assigned capacity will continue to decline as additional batteries are added to Southwest Power Pool's footprint. Furthermore, BESS will receive a substantially lower accredited capacity value during the winter season. This is especially impactful to Sierra Club's alternative analysis, which includes 2,690 MW of new BESS.

***Other Modeling Issues Raised by Ms. Glick***

**Q. What issues do you address in this subsection of your testimony?**

A. I respond to issues Ms. Glick identified as follows:

(1) sustaining or ongoing capital expenditure amounts are overstated due to an error in her own workpapers and are modeled incorrectly in Sierra Club's alternative analysis;

(2) new gas pipeline costs have no impact on Sierra Club's alternative analysis;

(3) fixed operations and maintenance ("O&M") has no impact on Sierra Club's alternative analysis; and

(4) carbon dioxide pricing ("$CO_2$") has an immaterial impact on Sierra Club's alternative sensitivity analysis.

In their rebuttal testimonies, Mr. Lytal also addresses new gas pipeline costs and Mr. Grant addresses Ms. Glick's positions on SPS's recovery of the Harrington undepreciated plant balance. I have already discussed interpretation of the modeling results and SPS's capacity need earlier in my testimony.

**Q. Do you believe the above concerns raised by Ms. Glick are defining issues in this case?**

A. No. Despite Ms. Glick's extensive testimony, I find these concerns have marginal, if any, impact to her alternative analysis; therefore, I do not believe they rise to the same level of seriousness as the challenges I describe in Sections V and VI of my testimony related to feasibility and cost of replacement resources and Ms. Glick's critical modeling mistakes I describe above.

**On-Going Capital Expenditure**

**Q. Can you summarize your findings on Ms. Glick's updates to on-going capital expenditure?**

A. Yes. I determined that (1) Table 5 of Ms. Glick's direct testimony is incorrect and overstates the impact of on-going capital expenditure, (2) Ms. Glick modeled the wrong on-going capital expenditure in her alternative analysis, and (3) Ms. Glick's methodology for calculating alternative capital expenditure is extremely flawed.

**Q. Please elaborate on your assertion that Table 5 in Ms. Glick's direct testimony in incorrect.**

A. According to Table 5 of her direct testimony, Sierra Club alleges that SPS:

- Understated sustaining capital expenditure by $42.8 million on an NPV basis in the scenario in which one unit is converted to gas. However, upon reviewing Ms. Glick's workpapers, I discovered Ms. Glick was mistakenly comparing the on-going capital cost of converting two gas units to the cost of converting one gas unit.

- Understated sustaining capital expenditure by $51.7 million in the scenario in which two gas units are converted. However, upon reviewing Ms. Glick's workpapers, I discovered Ms. Glick was mistakenly comparing the on-going capital cost of converting three gas units to the cost of converting two gas units.

- Understated sustaining capital expenditure by $58.0 million in the scenario in which three gas units are converted. However, upon reviewing Ms. Glick's workpapers I discovered Ms. Glick was mistakenly comparing the on-going capital cost of converting three gas units to a fictional scenario in which Harrington Units 1 and 2 continue to incur capital expenditures *after* their retirement. I am not sure why Sierra Club would evaluate such a scenario.

**Q. Please elaborate on Ms. Glick modeling the wrong on-going capital expenditure.**

A. After reviewing Sierra Club's EnCompass input files, it appears Sierra Club modeled the wrong on-going capital forecast for Harrington Unit 0 in the updated analysis. Harrington Unit 0 represents the common facilities of the Harrington plant that are not directly assigned to a generating unit, for example, warehouses, control room, parking lots, etc. Although these costs are for the entire plant, SPS did assume there would be some reduction in costs if one unit is retired and further reductions if two units are retired. Ms. Glick continued this approach. However, Ms. Glick appears to have mistakenly included the capital forecast for Harrington Unit 0 if only *one* unit is converted to gas, not *two* units. As a resulte, she understated the capital cost of converting two units by several million dollars.

**Q. Please briefly describe why Ms. Glick's decided to update SPS's on-going capital expenditure forecast.**

A. Ms. Glick's believes SPS's $3.75 million cost forecast for sustaining capital expenditure for conversion of all three Harrington units is "implausibly low."[28]

[28] Glick Direct at 40.

**Q. What is your response to Ms. Glick's characterization?**

A. Ms. Glick's assertion is based on a flawed benchmarking calculation that does not accurately represent the likely sustaining capital expenditure of a single gas-steam plant, operated at a relatively low capacity factor. Specifically, Sierra Club used the historical capital expenditure for all of SPS's gas steam plants to project the future capital expenditure of the converted Harrington units. SPS witness Mr. Lytal also addresses this topic in his rebuttal testimony.

**Q. Do you agree with her approach?**

A. Absolutely not. As I will discuss later, using the combined expense of five individual gas-steam plants, scaled to Harrington's nameplate capacity of 1,080 MW represents an inappropriate forecast of future sustaining capital expenditure amounts for Harrington. For example, the historical expenditure Ms. Glick relied upon included significant expenditures for planned maintenance at Maddox Station. This included approximately $530,000 on replacing the high-pressure feed water heater. If this was scaled to Harrington's capacity, the cost of this project would be over $5 million. However, when SPS last replaced a high-pressure feed water heater at Harrington, the cost was approximately $1 million – or roughly five times less than the amount calculated using her scaling approach. This demonstrates how inappropriate it is to simply scale-up historical expenditures at other smaller SPS gas-steam plants to estimate future Harrington costs.

**Q. Briefly setting aside your concerns about the appropriateness of her approach, do you at least agree with how Ms. Glick performed her calculation?**

A. No. As shown below in Table 4, based on her workpapers, SPS spent a total of $9,112,599 of capital across its entire gas-steam generation fleet. Ms. Glick calculated the total capacity of the gas-steam generating facilities to be 1,783 MW, which equates to historical capital expenditure of $5.11/kW. Even if it was appropriate to use historical expense scaled to Harrington's capacity, I calculate the historical capital expenditure to be $5,519,698, using the same 1,080 MW of capacity Sierra Club used for Harrington ($5.11/kW * 1,080 MW).

**Table 4: Historical Expenditure – SPS Gas Steam Plants**

| | |
|---|---|
| Historical Expenditure | $9,112,599 |
| Nameplate Capacity of All Gas Steam Plants Other Than Harrington | 1,783 MW |
| Cost per kW based on fleet average | $5.11 |

**Q. How did Sierra Club witness Glick calculate approximately $3 million more in sustaining capital expenditure compared to your calculation?**

A. I used the weighted average, i.e., total capital expenditure of all units divided by total capacity of all units ($9.1 million divided by 1,783 MW = $5.11/kW), and then scaled this value to the capacity of Harrington ($5.11/kW * 1,080 MW). Ms. Glick, however, performed her calculation using a straight average of each gas steam plant's historical capital expenditure. In other words, she first divided the total expenditure for each of SPS's five gas-steam plants by the total capacity for each plant and then calculated the straight average of these five amounts. Ms. Glick then used this average, scaled to Harrington's capacity, to calculate the estimates for capital expenditures.

**Q. Why is it more appropriate to use a weighted average rather than a straight average of each gas steam plant's historical capital expenditure?**

A. As I will discuss next, by using a straight average, Ms. Glick's calculation is severely and unfairly influenced by outlier data that is given equal weighting to the other data used in the calculation.

**Q. Do you have concerns with Ms. Glick's calculation?**

A. Yes. Using this methodology, Ms. Glick believes Harrington will incur annual capital expense of $8,238,655, or 90% of SPS's entire gas-steam fleet expenditure. This is very concerning because, as shown in Table 5, the historical capital expenditure of Maddox Station (specifically, Maddox Unit 1) is clearly an outlier that significantly increases the straight average she uses. For context, Maddox Unit 1 is an approximately 115 MW unit that incurred higher-than-usual annual capital expense due to planned maintenance. When the capital expenditure amount for Maddox Station is scaled up to Harrington's capacity, it results in capital expenditures of nearly $22 million for that single plant, which Ms. Glick then gives equal weighting when calculating the average. It is also important to note, her calculations show Plant X and Jones both incurred lower capital expenditures on a $/kW basis and the median expenditure of $4.41/kW, all of which are in line with SPS's calculations. Despite disagreeing with this approach, I would argue the components of Ms. Glick's analysis are actually supportive of SPS's projections. Table 5 illustrates the issues I just explained and shows the calculation of the cost per kW on each plant scaled to Harrington's capacity and the resulting amount Ms. Glick calculated.

**Table 5: Sierra Club's Calculation of Historical Capital Expense Scaled for Harrington**

| Plant | Nameplate (MW) | Actual Expenditure ($) | $/kW | Scaled Expenditure ($) | $Million |
|---|---|---|---|---|---|
| Cunningham Steam | 265 | 1,997,798 | 7.54 | 8,141,969 | $ 8.14 |
| Jones Steam | 495 | 1,356,484 | 2.74 | 2,959,602 | $ 2.96 |
| Maddox Steam | 114 | 2,309,911 | 20.33 | 21,960,419 | $ 21.96 |
| Nichols Steam | 475 | 2,094,593 | 4.41 | 4,765,454 | $ 4.77 |
| Plant X Steam | 434 | 1,353,813 | 3.12 | 3,365,832 | $ 3.37 |
| **Total** | **1,783** | **9,112,599** | | | |
| **Average** | | | **7.63** | **8,238,655** | **$ 8.24** |
| Harrington on gas | | | 3.47 | 3,750,000 | $ 3.75 |

**Q. Have you recalculated Ms. Glick's calculations excluding the outlier, Maddox Station?**

A. Yes. As shown below in Table 6, historical capital expenditures decrease from her calculation of $8,238,655 to $4,808,214, or an average of $4.45/kW if the outlier Maddox Station is removed from the calculation.

**Table 6: Historical Capital Expenditure – SPS Gas Steam Units Excluding Maddox Station**

| Plant | Nameplate (MW) | Actual Expenditure ($) | $/kW | Scaled Expenditure ($) | $Million |
|---|---|---|---|---|---|
| Cunningham Steam | 265 | 1,997,798 | 7.54 | 8,141,969 | $ 8.14 |
| Jones Steam | 495 | 1,356,484 | 2.74 | 2,959,602 | $ 2.96 |
| Nichols Steam | 475 | 2,094,593 | 4.41 | 4,765,454 | $ 4.77 |
| Plant X Steam | 434 | 1,353,813 | 3.12 | 3,365,832 | $ 3.37 |
| **Total** | **1,669** | **6,802,688** | | | |
| **Average** | | | **4.45** | **4,808,214** | **$ 4.81** |
| Harrington on gas | | | 3.47 | 3,750,000 | $ 3.75 |

**Q. How do your calculations using Ms. Glick's approach compare to the capital expenditures SPS included in the Harrington analysis?**

A. SPS included $3.75 million for annual capital expenditures after the Harrington units are converted to gas. In comparison, using the weighted average approach, I calculate total capital expenditures of $5.5 million per year. In addition, if the outlier, Maddox Station, is excluded from the straight average calculation, that results in $4.8 million per year.

**Q. What conclusions do you draw from these calculations?**

A. Even if this approach was appropriate, it demonstrates that SPS's forecast is relatively close to the historical average of SPS's entire gas steam generation fleet. However, simply assuming the projected capital expenditure of a single large gas-steam plant is directly scalable to the historical capital expenditure of four or five much smaller, individual gas-steam facilities is extremely flawed. Such a calculation does not account for any savings due to economies of scale, nor does it account for the low projected net capacity factor of the units.

**Q. Ms. Glick believes SPS's failure to consider future environmental compliance costs is driving the large gap between SPS's assumptions around future sustaining capital expenditure and her updated assumptions. How do you respond?**

A. This statement is completely unfounded. As described above, Ms. Glick used SPS's historical capital expenditure spending on gas steam plants. During the year Ms. Glick relied upon, none of the gas steam plants incurred any material environmental compliance costs. Therefore, it is simply not true to suggest that environmental compliance costs have any impact on the large gap between SPS's assumptions and her assumptions for future capital expenditures. The large gap is entirely driven by her flawed calculations. SPS witness Jeffrey L. West describes in his rebuttal testimony that there are no current scenarios or final actions or requirements where new environmental controls will be required for the converted Harrington units.

**Q. Ms. Glick is concerned the forecasted capital expenditure for the gas Harrington units is considerably less than historical capital expenditure when operated on coal. How do you respond?**

A. This is an apples-to-oranges comparison that is not relevant. The cost of operating a historically baseload coal plant is not comparable to the costs of operating a gas-steam plant with a relatively low-capacity factor.

**Q. Ms. Glick also expresses concerns with SPS's incremental reduction in sustaining capital expenditures when retiring one and two units. How do you respond?**

A. Again, Ms. Glick's calculations are misleading as she erroneously included most of the one-time cost to construct the new gas pipeline in her calculations of ongoing capital costs. If Ms. Glick truly wanted to evaluate the incremental reduction in sustaining capital expenditure when one or two units is retired, she should have removed the cost of the new pipeline from her calculations, including the costs that carry-over into 2025, because the pipeline costs are one-time costs rather than sustaining capital costs. When the one-time pipeline costs are removed from the sustaining capital cost calculation, SPS reasonably assumed a 25% and 50% reduction in ongoing capital expenditure, respectively, when one or two units are retired.

Ms. Glick acknowledges that some economies of scale will be lost with reducing the plant size. In other words, it is not expected that retiring one or two units will lower sustaining capital expenditures by Sierra Club's amounts of 33.3%

and 66.6%, respectively. Instead, SPS's calculations of a 25% or 50% reduction in sustaining capital costs for the retirement of one or two units is reasonable.

**Gas Pipeline Cost Estimates**

**Q. How do you respond to Ms. Glick's concerns that SPS did not conduct a robust analysis if only one unit was converted?**

A. Mr. Lytal addresses the cost of the pipeline in his rebuttal testimony. However, unlike in the corresponding CCN case in New Mexico (Case No. 21-00200-UT), in which Sierra Club recommended retirement of all units, Ms. Glick's recommendation in this Texas proceeding is to convert two units to operate on natural gas. Therefore, the cost of the pipeline if only one unit is converted has *no impact* on the alternative analysis described in Section 6 of Ms. Glick's testimony.

**Fixed O&M**

**Q. What is your response to Ms. Glick's statement that SPS appears to model the wrong fixed O&M stream in EnCompass between 2022 – 2024[29]?**

A. Ms. Glick appears to have misunderstood SPS's discovery response. To clarify, SPS originally created a slightly higher O&M cost forecast for the years 2022 – 2024, if the Harrington units continued to operate on coal compared to conversion to operate on natural gas. However, it soon became apparent that all scenarios in which coal operations were continued beyond 2024 were extremely uneconomical. Therefore, it was determined that applying marginally higher fixed O&M was an unnecessary complication. In other words, the coal units were so much more expensive and therefore uneconomical, applying slightly more fixed O&M for

[29] Glick Direct at 45.

years 2022 - 2025 was an unnecessary modeling complexity that had almost no impact on the results of the analysis. However, considering Sierra Club did not model any scenarios in which the Harrington units continue to operate on coal, this point is completely moot and would have *zero impact* on any of the scenarios Sierra Club evaluated.

**Q. Did Sierra Club raise similar concerns regarding SPS's fixed O&M projections in New Mexico Case No. 21-00200-UT?**

A. Yes. Although in the New Mexico case Sierra Club referred to SPS's fixed O&M projections as *incorrect*, whereas in Ms. Glick's Texas testimony, she refers to SPS's fixed O&M projections as *inconsistent*.[30] The change in language appears to be an attempt to correct Sierra Club's misunderstanding in New Mexico, while continuing to raise an issue that Sierra Club should be fully aware does not exist.

**Q. Can you confirm if Ms. Glick's update to the fixed O&M amount had any impact on her analysis?**

A. Yes. After reviewing Ms. Glick's workpapers, I can confirm this update had zero impact on its analysis. Despite this, Ms. Glick continues to emphasize this issue in at least three places in her direct testimony.

On page 8 of her direct testimony, Ms. Glick states, SPS:

> Model[ed] the wrong fixed operation and maintenance cost streams for the units after they convert to operate on gas.

On page 45 of her direct testimony, Ms. Glick states:

> the Company appears to have used the FOM cost stream intended for units that continue to operate on coal instead of using the intended ones with reduced FOM for units that convert to gas.

[30] Case No. 21-00200-UT, Direct Testimony of Devi Glick at 28; Glick Direct at 35.

On page 49, when discussing the modeling updates, Ms. Glick adds:

> we updated the FOM assumptions for the Harrington units between 2022–2024...We used the cost stream that was $1.5 million lower for all units that SPS planned to retire in 2024, and the higher cost stream for all units that SPS planned to convert to operate on gas.

Ironically, Ms. Glick's assertions are inconsistent and have absolutely no impact on her analysis.

## $CO_2$ Pricing

**Q. Ms. Glick states SPS erred by not including a carbon price in its analysis. Do you agree?**

A. No. To be clear, neither SPS, nor its ratepayers, are currently required to directly pay a price adder for $CO_2$ emissions. In addition, at this time, there is no policy that imposes such costs nor is there any such proposal pending before an authority to impose such costs on SPS. Despite Ms. Glick's unsupported claims that a carbon price is likely, policies appear more likely to follow a clean energy standard approach. For example, in New Mexico, the Legislature enacted the Energy Transition Act to have an escalating Renewable Portfolio Standard requirement leading to a 100% zero carbon requirement rather than applying a carbon price adder.

**Q. How do you respond to her concerns regarding carbon pricing?**

A. There is no requirement in Texas that would require SPS to model a speculative $CO_2$ price in this case. In addition, despite her attempts to overstate the impact of a speculative carbon price, her own analysis shows that even if a speculative carbon price is applied, it does not have a large material impact on the Harrington analysis. Nevertheless, Ms. Glick believes not modeling a speculative carbon price is

concerning because "SPS did evaluate carbon sensitivities as part of its most recent IRP in [New Mexico] Case No. 21-00168-UT, and the carbon price has a large impact on the IRP results." Setting aside the fact that she is focused on a New Mexico issue, this statement is also misleading. First, in New Mexico, SPS is required by rule to evaluate carbon sensitivities as part of its IRP. In addition, SPS did not include a speculative carbon price in its Tolk Analysis (which was filed in New Mexico in conjunction with the IRP). In reply comments, New Mexico Public Regulation Commission Staff agreed "that such a speculative future carbon price is not a reason to close a facility now and should not be preferred over an analysis that accounts for existing and anticipated legislative conditions."

**Q. How does Ms. Glick overstate the impact of a speculative carbon price?**

A. She states that if a carbon price is implemented, according to their analysis, converting two units is $65 million lower cost than converting all three units. Ms. Glick shows this in Table 11 of her direct testimony. However, as shown in Table 8 of her direct testimony, $62 million of the purported $65 million of savings are the result of other updates in her analysis. Put simply, including a speculative carbon price does not fundamentally change the results of the analysis.

**Q. Are any of her other comments on a carbon price inconsistent?**

A. Yes. First, Ms. Glick states the Harrington units emit a substantial quantity of $CO_2$, and then in the next paragraph, she remarks on Harrington's projected low-capacity factor. Of course, units that operate at a low-capacity factor will not emit substantial quantities of $CO_2$.

**Q. How do you respond to Ms. Glick's recommendation that SPS should model a carbon price sensitivity?**

A. Neither SPS, nor its ratepayers, are currently required to directly pay a price adder for $CO_2$ emissions and as I describe above, she conducted this analysis, and it did not make a material impact on the results.

**Q. Does this conclude your pre-filed rebuttal testimony?**

A. Yes.

**AFFIDAVIT**

STATE OF COLORADO )
)
COUNTY OF DENVER )

BEN R. ELSEY first being sworn on his oath, states:

I am the witness identified in the preceding rebuttal testimony. I have read the testimony and the accompanying attachment(s) and am familiar with the contents. Based upon my personal knowledge, the facts stated in the testimony are true. In addition, in my judgment and based upon my professional experience, the opinions and conclusions stated in the testimony are true, valid, and accurate.

BEN R. ELSEY

Subscribed and sworn to before me this 12th day of April, 2022 by BEN R. ELSEY

RYAN S. ATTIG
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20194030682
MY COMMISSION EXPIRES AUGUST 13, 2023

Notary Public, State of Colorado

My Commission Expires: Aug. 13, 2023

## CERTIFICATE OF SERVICE

I certify that, unless otherwise ordered by the presiding officer, notice of the filing of this document was provided to all parties of record via electronic mail on April 13, 2022, in accordance with the Order Suspending Rules, issued in Project No. 50664.

Mark A. Santos