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SIERRA CLUB

April 26, 2022

VIA ELECTRONIC FILING

Jasmine Kirkland
Public Utility Commission of Texas
Central Records
P.O. Box 13326
Austin, Texas 78711
512-936-7180

Re: PUCT Docket No. 52485, Application of Southwestern Public Service Company to Amend Its Certificate of Convenience and Necessity to Convert Harrington Generating Station from Coal to Natural Gas.

Dear Ms. Kirkland:

In accordance with the Administrative Law Judge's direction please find attached for filing, Errata Pages to Direct Testimony of Devi Glick on Behalf of Sierra Club, admitted at the at the April 26, 2022 Hearing. As explained by Ms. Glick on the record, edits were made to bates stamped pages 0002-04, 0010, 0043-44, 0049-57. Thank you.

Respectfully submitted,

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PUC DOCKET NO 52485

APPLICATION OF SOUTHWESTERN PUBLIC SERVICE COMPANY TO AMEND ITS CERTIFICATE OF CONVENIENCE AND NECESSITY TO CONVERT HARRINGTON GENERATING STATION FROM COAL TO NATURAL GAS	§ § § § § § § §	**PUBLIC UTILITY COMMISSION OF TEXAS**

ERRATA PAGES
TO
DIRECT TESTIMONY OF
DEVI GLICK
ON BEHALF OF SIERRA CLUB

March 25, 2022

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DG-4:	SPS, 2021 Integrated Resource Plan, Appendix K at 7, Case No. 21-00169-UT (July 16, 2021)
DG-5:	EPA IPM Model - Updates to Cost and Performance for APC Technologies, January 2017.
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DG-7:	Attachment LJW-2 to Direct Testimony of Laurie Wold on Behalf of SPS, Case No, 19-00170-UT
DG-8:	Harrington Station Fuel Repowering System Impact Study. Xcel Energy Services, Inc. Transmission Planning, South. July 10. 2019. 9 **(confidentiality designation waived, NM PRC 21-00200-UT)**

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implemented during the units' remaining lives, it should choose to retire between one and three Harrington units.

~~8. Synapse's modeling, which uses updated assumptions for renewable and battery storage costs as well as realistic ongoing sustaining capital expenditures at Harrington, finds that it likely costs less to retire Harrington Unit 1 and fill any outstanding capacity gaps with Solar PV and battery storage than to convert the unit to gas.~~

Q Please summarize your recommendations.

A Based on my findings, I offer the following recommendations:

1. The Commission should require the retirement of Unit 1 or affirm that it will not allow the Company to collect a rate of return on any plant balances that are not used and useful.
2. The Commission should find that SPS did not meet its obligation to demonstrate that converting Harrington Unit 1 to operate on gas is the least-cost option. This finding should be based SPS's use of unrealistic projections for ongoing capital costs, its failure to conduct a CO_2 price sensitivity, its flawed cost assumption for alterative resources, and its omission of any analysis on alternative financing mechanisms such as a regulatory asset or securitization, which can spread out the costs over the economic life of the asset.
3. The Commission should require SPS to issue a request for proposal ("RFP") and determine which resources are still available and their timeline for availability.

Table 4: Sustaining capital expenditure estimates vs actual spending for steam coal plants and steam gas plants

Item	Description	Annual capital expenditure spending ($2021 Million)
Coal Capex		
Harrington historical capital expenditures spending (coal)	Average of 2015–2020 actual spending	$18.59
U.S. EIA estimate of sustaining capital expenditures for steam coal plant	Sargent and Lundy report, plant 30–40 years old, no FGD	$24.12
Gas Capex		
Harrington projected capex spending (gas)	**Projection for 2024–2040, escalated at 2%/year**	**$3.75**
U.S EIA estimate of sustaining capital expenditures for steam gas plant	Sargent and Lundy report, plant >30 years old, >1000 MW	$12.47
SPS historical capital expenditures spending on steam gas plants	Rate case spending, April 1, 2018–March 31, 2019 for company's steam gas units	$8.58

Source: Calculations based on SPS Response to SC Request 3-3 (a); Ex. DG-7, Exhibit Attachment LJW-2 to Direct Testimony of Laurie Wold on Behalf of SPS, Case No, 19-00170-UT; Ex. DG-6, Sargent & Lundy Consulting, prepared for U.S. EIA. Generating Unit Annual Capital and Life Extension Costs Analysis, December 2019.

Q Do SPS's assumptions around sustaining capital expenditures have a large impact on its overall findings?

A Yes. As shown in Table 5, SPS estimated the NPV of sustaining capital expenditures for Harrington operating on gas at between ~~$16.1~~ **$15.9** million (with one unit converted) and ~~$33.9~~ **$33.5** million (with all units converted) over the remaining

life of the plant.[52] These values are substantially lower than the ~~$42.8~~ **$20.5** million (one unit converted) to ~~$58.0~~ **$43.2** million (three units converted) range we estimate based on SPS's historical spending on its gas steam plants.[53] The comparison is even more jarring using EIA's methodology, which shows values of ~~$79.9~~ **$79.0** million (one unit converted) to ~~$167.8~~ **$166.1** million (three units converted).[54] While it is reasonable that SPS would want to minimize investments at a plant with such a low projected capacity factor, there is a baseline level of investment and maintenance required to ensure the plant is actually reliable and functional when needed. In total, this means that SPS has very likely understated the ongoing costs required to maintain the Harrington plant by between ~~$42.8~~ **$20.5** million and ~~$133.9~~ **$132.6** million.

Table 5: Total capex spending at Harrington using original and updated assumptions

Total capex spending (NPV $2021 Million)	**Convert 3 units to gas**	**Convert 2 units to gas**	**Convert 1 unit to gas**
Total			
SPS projection for sustaining capex on gas in Harrington 2019 Analysis	~~$33.9~~ **$33.5**	~~$25.7~~ **$25.5**	~~$16.1~~ **$15.9**
U.S. EIA estimate of sustaining capex for steam gas plant	~~$167.8~~ **$166.1**	~~$127.6~~ **$126.3**	~~$79.9~~ **$79.0**
SPS historical capex spending on steam gas plants	~~$91.8~~ **$76.7**	~~$77.5~~ **$58.3**	~~$58.9~~ **$36.5**
Delta between SPS projection and updated sustaining capex assumptions			
U.S. EIA estimate of sustaining capex for steam gas plant	~~$133.9~~ **$132.6**	~~$101.8~~ **$100.8**	~~$63.7~~ **$63.1**
SPS historical capex spending on steam gas plants	~~$58.0~~ **$43.2**	~~$51.7~~ **$32.8**	~~$42.8~~ **$20.5**

Source: Calculations based on SPS Response to SC Request 3-3 (a); Ex. DG-7, Exhibit Attachment LJW-2 to Direct Testimony of Laurie Wold on Behalf of SPS, Case No, 19-00170-UT; Ex. DG-6, Sargent &

[52] Ex. DG-2, SPS Response to SC Request 2-3(a).

[53] Calculated based on Ex. DG-7, Attachment LJW-2 to Direct Testimony of Laurie Wold on Behalf of SPS, Case No, 19-00170-UT.

[54] Ex. DG-6, Sargent & Lundy Consulting, prepared for U.S. EIA. Generating Unit Annual Capital and Life Extension Costs Analysis, December 2019. Available at https://www.eia.gov/analysis/studies/powerplants/generationcost/pdf/full_report.pdf.

6. SYNAPSE'S MODELING FINDS THAT IT IS THE LOWEST-COST SCENARIO, AND A NO-REGRETS DECISION, TO RETIRE UNIT 1 AT HARRINGTON AND CONVERT ONLY TWO UNITS

Q Explain the alternative modeling that Synapse conducted.

A We began with SPS's Encompass files used by the Company to conduct its Harrington 2021 Analysis.[64,65] We reviewed the inputs and methodology as discussed in the prior section. We developed updates and corrections to address the items outline above.

We used SPS's scenario from the Harrington 2020 Analysis as the basis for our modeling and we used SPS's results as reference costs. Note that we originally evaluated all of SPS's conversion scenarios. But because SPS made it clear in its rebuttal testimony in NM Docket 21-00200-UT that retirement of two or three units are not viable options, given the timeline required to secure replacement resources, we will focus on the results regarding the conversion of two units and the retirement of Unit 1.

1. Scenario 2: Convert Harrington Units 1, 2, and 3 to operate on gas[66]
2. Scenario 6: Retire Unit 1 and convert Units 2 and 3 to operate on gas.

For each model run, we used the following assumptions as shown in Table 7:

[64] SPS Response to SC 1-3(i)(HS)(USB) *Encompass Optimized Databased 10.18.21* files.

[65] The modeling files provided by SPS did not contain the databases for Scenario 2. We therefore relied on the EnCompass files that were provided as part of the Tolk Analysis during the IRP Docket, Case No. 21-00169-UT as the basis of our evaluation of Scenario 2.

[66] *Id.*

Table 7: Scenarios modeled

Base Scenario	Tolk Retirement	Harrington Retirement / Conversion	Tx Cost[67]
Scenario 2	2032	All units converted at end of 2024	$400/kW
Scenario 5	2032	Units 2 and 3 units converted at and of 2024; Unit 1 retired	$400/kW

Q Explain each of the changes you made to the model.

A We first updated several assumptions in SPS's base runs.

First, for all generic solar, wind, and battery storage resource additions we relied on the National Renewable Energy Laboratory's ("NREL") Annual Technology Baseline ("ATB") capital cost assumption for generic solar PV and wind resources. SPS assumed that the federal ITC expires in 2025, while NREL assumed that it is extended beyond 2025 for solar PV.[68]

Second, we updated the FOM assumptions for the Harrington units between 2022–2024 using the correction we discussed above. 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.

Third, we did not allow the model to build any new gas projects prior to 2030 in any scenarios. Although we did allow new gas after 2030, we assume that any new gas projects that the model selects after 2030 are simply place-holders for firm and dispatchable capacity resources that SPS may need in the future.

[67] SPS modeled transmission costs of $200/kW, $400/kW, and $600/kW. We used SPS's central value of $400/kW in all scenarios.

[68] National Renewable Energy Laboratory, Annual Technology Baseline.

Fourth, we modeled sustaining capital expenditures for Harrington on the basis of SPS's historical spending. As discussed above in Table 4 and Table 5, the historical Harrington sustaining capital values we use in our modeling are higher than those used in the SPS scenarios but remain below EIA's projections.

Finally, we capped annual storage additions at 300 MW over the modeling horizon. This annual limit was used to ensure that the model would not overbuild battery storage in any single year. There was no cumulative constraint, however, on any resource type over the period of analysis.

Q Explain which sensitivities you tested.

A We tested a number of sensitivities based on likely future outcomes that SPS should consider in deciding whether to retire or convert Harrington to operate on gas.

1. **CO_2 price:** To assess the impact that future carbon regulations would have on the cost to continue to operate Harrington, we tested a carbon price sensitivity. We used the middle carbon price that SPS relied on for its most recent New Mexico IRP, which was $20/metric ton using a base year of 2011 and escalated at 2.5 percent per year.[69]
2. **Financial Load:** Like SPS, we tested our sensitivities using both the higher Planning Load and the lower Financial Load.
3. **Depreciation schedule:** Given the uncertainty around SPS's recovery of the remaining plant balance at Harrington, we tested several alternative assumptions for recovery of the undepreciated plant balance at Harrington.

[69] Ex. DG-4, SPS 2021 IRP, page 85.

a. Depreciate remaining balance over each unit's remaining life instead of three years for any unit that retired early *without* a return on investment post-retirement.

b. Disallow the entire undepreciated plant balance after a unit retired.

c. Disallow half the undepreciated plant balance after a unit retires and disallow a rate of return on the remaining balance.

4. **Gas sustaining capital expenditure costs:** SPS's assumptions around the sustaining capex costs required after the units are converted to gas operation are extremely low and unsupported. Therefore, we tested a sensitivity using SPS historical data based on its existing steam gas plants for sustaining capex costs. We did not model the risk of compliance costs from future environmental regulations. Technologies to limit nitrogen oxide emissions could cost between $24.9 million and $368 million for SNCR and SCR technologies respectively.[70] The inclusion of these costs, and the associated annual O&M, would make gas conversion more expensive in our modeling compared to a partial retirement or full retirement scenario.

Q What did you find when you made the changes and tested the sensitivities outlined above?

A Like SPS, I find that retiring Unit 1 results in a lower NPVRR than converting all three Harrington units to operate on gas, as shown in Table 8 below. Specifically,

[70] This range was calculated using the updated methodology developed by Sargent and Lundy in May 2018 for the EPA IPM Model v6. The Emission Control Technology Attachment 5-3 SCR Cost Development Methodology and Attachment 5-4 SNCR Cost Development Methodology are attached in Ex. DG-5.

our results show that SPS would save roughly $62 million if it chose to retire Unit 1 instead of converting all three units to gas.

Table 8: NPVRR results from Synapse modeling runs

	2022–2024		2022–2041	
Cost ($Million)	**Delta**	**NPV**	**Delta**	**NPV**
SPS Modeling Results				
Convert all Harrington (IRP Scenario 2)	$0	**$2,450**	$0	**$11,949**
Retain 2 Gas Harrington / Retire 1	$39	**$2,490**	($5)	**$11,944**
Planning Load				
Convert all Harrington	$0	**$2,428**	$0	**$11,534**
Retain 2 Gas Harrington / Retire 1	$40	**$2,468**	($62)	**$11,472**
Financial Load				
Convert all Harrington	$0	**$2,272**	$0	**$10,027**
Retain 2 Gas Harrington / Retire 1	$40	**$2,313**	($62)	**$9,965**
CO_2 Price				
Convert all Harrington	$0	**$2,855**	$0	**$12,491**
Retain 2 Gas Harrington / Retire 1	$41	**$2,896**	($65)	**$12,426**

Source: Synapse results from modeling completed based on SPS Response to SC 1-3(i)(HS)(USB), Encompass Optimize Databased 10.18.21.

While SPS would incur slightly higher capital costs and purchased power costs, it would also see savings from fuel, non-fuel VOM, and FOM costs, as shown in Table 9 below. Results are similar with both the planning load and the financial load.

Table 9: NPVRR breakdown for Synapse Unit 1 retire scenario

Cost Category Description	2022–2041 Delta from Convert All Baseline ($Million)
Capital Costs	$2.1
Fuel Costs	($11.3)
Commitment Costs	($0.7)
Non-Fuel VOM	($10.8)
FOM	($45.2)
Purchase Costs	$11.2
Contract Costs	($7.2)
Total	**($61.9)**

Source: Synapse results from modeling completed based on SPS Response to SC 1-3(i)(HS)(USB), Encompass Optimize Databased 10.18.21

As shown in Table 10, I also find that retiring Unit 1 is a no-regrets decision that results in nearly identical or lower NPVRR than converting all three units under every scenario and sensitivity I tested. Additionally, I find that SPS's modeling substantially understated the likely savings from retiring Unit 1 units relative to converting it. Despite recommending conversion of all three units to gas, SPS's own results did show that over the planning period (2022–2041), there would be NPVRR savings of $5 million from retiring Unit 1 relative to converting all three units. Our results show that the likely savings are larger, ranging between $62 and $65 million.

Table 10: NPVRR of retire one unit scenario Unit 1 retirement scenario

Description	2022–2041 Delta from Convert All Baseline ($Million)
SPS Scenario 5	
SPS Base (Planning Load)	($5)
Financial Load	($29)
Synapse Scenario 5	
Synapse Base with baseline changes discussed above	($62)
Financial Load	($62)
CO_2 Price	($65)
Undepreciated balance disallowed post-retirement	($109)
Undepreciated balance allowed but no return allowed	($77)
Financial Load, undepreciated balance disallowed post-retirement	($110)

Source: SPS results from Tables BRE-2 and BRE-3. Synapse results from modeling completed based on SPS Response to SC 1-3(i)(HS)(USB), Encompass Optimize Databased 10.18.21.

Q What resources are required to replace the units when they retire?

A The retirement of one unit does not necessitate a significant change in resource mix over what the model already selects in the "Convert All" scenario. My modeling results show an addition of 40 MW of incremental battery storage in 2027, and another 70 MW in 2028 for a total of 110 MW of battery storage. This minimal difference over the next decade, and in fact over the entire planning period, between the scenarios with and without Unit 1 shows exactly how little remaining value and use Unit 1 has for SPS and its ratepayers. This finding is supported by the Company's own modeling results which, as discussed above, shows that Unit 1 is never used even after it is converted to gas operation.

Q What did you find in terms of CO_2 prices, pollutants, and emissions?

A Synapse modeled a CO_2 price sensitivity set to $20/metric tonnes in Base Year 2011, escalating at 2.5 percent per year. The CO_2 price scenarios were identical to

the Synapse base EnCompass runs, with the exception of the CO_2 price. In these scenarios, we found that converting two Harrington units and retiring Unit 1would all be cheaper for SPS customers between 2022 and 2041 if a CO_2 price is implemented. As shown in Table 11, savings were $65 million with Unit 1 retired.

Table 11: CO_2 price sensitivity results

Scenario	NPVRR ($Million) 2022-2041	Delta ($Million) Compared to Convert All Scenario
Convert All Harrington Units	$12,491	$0
Convert Two Harrington Units	$12,426	($65)

Source: Synapse results from modeling completed based on SPS Response to SC 1-3(i)(HS)(USB), Encompass Optimize Databased 10.18.21.

Given these results, our recommendation is that SPS model a CO_2 price sensitivity so that the utility's modeling can capture the risk that the conversion of all Harrington units to gas would pose to SPS customers should federal carbon legislation be enacted.

Q What did you find under alternative financing options and plant balance assumptions?

A I found that when all or part of the undepreciated balance is disallowed after retirement, or if the rate of return is disallowed post retirement, the savings from retiring Unit 1 relative to conversion increase substantially, as shown in Table 12. It intuitively makes sense that if the balance is disallowed, savings will increase. But these results show the cost that SPS assumes its ratepayers will be required to pay for the remaining plant balance at Harrington. Specifically, if Unit 1 is retired and the remaining balance for the unit is disallowed post-retirement, SPS ratepayers will save $109 million relative to the cost of converting the unit to operate on gas and paying off the balance prior to retirement. Even if only 50 percent of the balance is disallowed, savings will be around $73 million. And if

the full balance is allowed post-retirement but a rate of return is not permitted, we estimate savings of around $77 million.

Table 12: NPVRR of Synapse runs under alternative financing and plant balance recovery assumptions

	2022–2024		2022–2040	
Cost ($Million)	**Delta**	**NPV**	**Delta**	**NPV**
100% Undepreciated balance disallowed post-retirement				
Convert all Harrington	$0	$2,428	$0	**$11,534**
Retain 2 Gas Harrington / Retire 1	($7)	$2,421	($109)	**$11,424**
50% Undepreciated balance disallowed post-retirement				
Convert all Harrington	$0	$2,428	$0	**$11,534**
Retain 2 Gas Harrington / Retire 1	($7)	$2,421	($73)	**$11,461**
Undepreciated balance allowed, no return post-retirement				
Convert all Harrington	$0	$2,428	$0	**$11,534**
Retain 2 Gas Harrington / Retire 1	($7)	$2,421	($77)	**$11,457**
Financial Load / 100% undepreciated balance disallowed post-retirement				
Convert all Harrington	$0	$2,272	$0	**$10,027**
Retain 2 Gas Harrington / Retire 1	$11	$2,283	($110)	**$9,917**

Source: Synapse results from modeling completed based on SPS Response to SC 1-3(i)(HS)(USB), Encompass Optimize Databased 10.18.21

Q What do you conclude about the reasonableness and cost of SPS's proposal to convert all three Harrington units to operate on gas?

A I find that SPS has not demonstrated that converting Harrington Unit 1 to operate on gas is in the best interest of its ratepayers. As discussed above, SPS's modeling is flawed and based on inaccurate assumptions and its results do not show a meaningful cost difference between many scenarios. Our modeling results, produced based on SPS's modeling files with our own modifications, show that retiring one unit and only converting two units will result in substantially lower costs for ratepayers than converting all three units to operate on gas.