**BEFORE THE**
**NEW MEXICO PUBLIC REGULATION COMMISSION**

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| **IN THE MATTER OF SOUTHWESTERN PUBLIC SERVICE COMPANY'S APPLICATION FOR: (1) REVISION OF ITS RETAIL RATES UNDER ADVICE NOTICE NO. 282; (2) AUTHORIZATION AND APPROVAL TO SHORTEN THE SERVICE LIFE AND ABANDON ITS TOLK GENERATING STATION UNITS AND (3) OTHER RELATED RELIEF** | **CASE NO. 19-00170-UT** |

# PUBLIC (REDACTED) VERSION

## Direct Testimony of Devi Glick

## On Behalf of

## Sierra Club

## November 22, 2019

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## 1. INTRODUCTION AND PURPOSE OF TESTIMONY

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

A My name is Devi Glick. I am a Senior Associate at Synapse Energy Economics, Inc. My business address is 485 Massachusetts Avenue, Suite 2, Cambridge, Massachusetts 02139.

**Q Please describe Synapse Energy Economics.**

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

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

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

A At Synapse, I conduct economic analysis and write testimony and publications that focus on a variety of issues related to electric utilities. These issues include, non-exhaustively, power plant economics, utility resource planning practices, valuation of distributed energy resources, and utility handling of coal combustion residuals waste. I have submitted expert testimony on plant economics, utility resource needs, and solar valuation in the states of Connecticut, Virginia, North Carolina, South Carolina, and Florida. I authored a report on replacement analysis for the San Juan Generating Station in northwestern New Mexico. In the course of

my work, I develop in-house models and perform analysis using industry-standard models.

Prior to joining Synapse, I worked at Rocky Mountain Institute, focusing on a wide range of energy and electricity issues. I have a master's degree in public policy and a master's degree in environmental science from the University of Michigan, as well as a bachelor's degree in environmental studies from Middlebury College. I have more than seven years of professional experience as a consultant, researcher, and analyst. A copy of my current resume is attached as Exhibit DG-1.

**Q On whose behalf are you testifying in this case?**

A I am testifying on behalf of Sierra Club.

**Q Have you testified previously before the New Mexico Public Regulation Commission?**

A No, I have not.

**Q What is the purpose of your testimony in this proceeding?**

A My testimony evaluates Southwestern Service Company's ("SPS" or the "Company") Application as it relates to the Company's request for cost recovery in base rates for its operations and investment at its Tolk Generating Station ("Tolk") and its Harrington Generating Station ("Harrington"), both multi-unit coal-fired power plants.

First, in Section 3 below, I evaluate Tolk and Harrington's actual historical economic performance over the past few years. My analysis looks first at the

plants' overall economics relative to the market, and then more narrowly on an operational basis, by calculating each plant's annual costs and revenues from 2015 through 2018. In doing so, I evaluate the reasonableness of SPS's request to recover ongoing operations and maintenance ("O&M") and capital expenditures—including certain avoidable costs that stem from the Company's general practice of choosing to "self-commit" the units, *i.e.*, dispatching the units into the market regardless of whether it loses money by doing so.

Next, in Sections 4–6, I evaluate the likely future economic performance of the Tolk and Harrington plants. For the Tolk plant specifically, I focus on the reasonableness of SPS's request for approval to operate both of Tolk's two units seasonally, and in synchronous condenser mode, in an attempt to address the plant's serious water constraints.

Finally, in Section 7, I discuss the problems with SPS's prior Strategist unit retirement analysis. I also describe my recommendations that SPS should perform updated, more comprehensive (and hence more accurate) retirement analysis for both Tolk and Harrington.

**Q What documents do you rely upon for your analysis, findings, and observations?**

A My analysis relies primarily upon the workpapers, exhibits, and discovery responses of SPS witnesses associated with this proceeding. Additionally, I rely to a limited extent on certain external, publicly available documents such as the Southwest Power Pool's ("SPP") 2018 State of the Market Report and U.S. Energy Information Administration (EIA) data.

## 2. FINDINGS AND RECOMMENDATIONS

**Q Please summarize your findings.**

A My primary findings include the following:

1. Tolk has historically been operated and dispatched uneconomically. When it converts to seasonal operation, it will likely continue to operate uneconomically, at an unnecessary cost to ratepayers.

2. Harrington, too, has historically been operating uneconomically and will likely continue to do so.

3. SPS's general practice of deciding to "self-commit" these units in the SPP market—so that they are dispatched even when wholesale prices are lower than what's needed for the units to break even—has resulted in net uneconomic operations at both Tolk and Harrington at ratepayers' expense.

4. SPS cannot economically procure enough water to operate through the Tolk units' current respective retirement dates of 2042 and 2045.

5. Even if SPS can procure enough water to operate Tolk seasonally, or at a reduced capacity through 2031, the Company has not demonstrated that doing so would be the least-cost option to provide its customers with reliable service.

6. SPS's future operating plan and economic analysis for Tolk does not consider: (1) the risk that the water shortage faced by the plant is more extreme than currently projected, (2) the potential opportunity to sell the water for valuable alternative uses, (3) the impact of water limitations on peak availability, and (4) the possibility of retiring the generating assets at Tolk while operating the synchronous condenser year-round to get the necessary voltage support services.

7. SPS's 2014–2015 unit replacement analysis for Tolk and Harrington relies on outdated demand forecasts and resource cost assumptions. In addition, SPS's analysis fails to consider future capital expenditures that may be necessary to

address both current and reasonably possible future environmental regulations.

**Q Please summarize your recommendations.**

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

1. The Commission should disallow recovery of the increment of test year (April 1, 2018–March 31, 2019) O&M expenses at Tolk and Harrington incurred during the months of the year that the Company's self-dispatch practices for each plant resulted in net uneconomic operations. During those months, the Commission could disallow specifically the increment of cost incurred to operate and dispatch the units that is over and above the cost at which SPS could have procured energy from the SPP market to serve its customers. To the extent SPS has not provided data at a sufficiently granular level to enable calculation, the Commission should order SPS to provide it.
2. The Commission should investigate (as some other regulators have) whether costs (including fuel costs) have been improperly passed on to customers due to uneconomic self-commitment and dispatch of Tolk and Harrington.
3. The Commission should deny recovery of the costs of any significant future capital projects that may be intended to prolong the lives of Tolk and Harrington as generating assets, given the plants' uneconomic performance and the impending water shortages at Tolk.
4. The Commission should require SPS to perform a full retirement analysis for Tolk, assuming a retirement date earlier than 2025 as part of its next Integrated Resource Plan ("IRP"). This analysis should include sensitivities on the timing of water depletion and incorporate (1) the risk of significant future capital and O&M expenditures on environmental compliance, (2) potential revenue from sale of the

water, and (3) unit de-rating to reflect the risk to peak operations as the aquifer becomes depleted.

5. The Commission should require SPS to perform and submit an updated unit replacement study for Harrington as part of its next IRP. This analysis should include the risk of substantial future expenditures (capital as well as any increased O&M) stemming from environmental compliance, as well as the possibility of seasonal operations.

## 3. SPS HAS BEEN OPERATING ITS COAL PLANTS UNECONOMICALLY SINCE AT LEAST 2015

**Q Please summarize this section.**

A I start by providing a brief overview of the Tolk and Harrington plants. I then summarize SPS's rate requests regarding historical capital and O&M costs. In Section (i), I evaluate the economics of Tolk and Harrington, and I find that total costs exceeded the cost to procure energy from the market in each year from 2015 through 2018 for both plants. In Section (ii), I evaluate the annual operational performance of Tolk and Harrington from 2015 through 2018. I find that variable operational costs alone often exceeded the cost at which SPS could have procured energy from the SPP market, which could have provided retail customers with less costly (while adequate and reliable) service. In Section (iii), I review SPS's coal plant dispatch practices more broadly, discuss the implications for ratepayers, and recommend that the Commission disallow an increment of test year (April 1, 2018–March 31, 2019) O&M expenses at Tolk and Harrington on the basis of uneconomic operations stemming from self-commitment in the SPP market.

**Q Please provide a brief overview of the Tolk Generating Station.**

A Tolk consists of two 1980s-era coal-fired units located in Sudan, Texas. Unit 1 is rated at 540 MW and Unit 2 is rated at 542 MW. Although the units were originally estimated to operate for only 35 years—*i.e.*, until 2017 (Unit 1) and 2020 (Unit 2)—the Commission approved extensions of their retirement dates to 2042 and 2045, respectively.[1] Tolk relies exclusively on groundwater from the Ogallala Aquifer for generation cooling. However, as SPS's own testimony in this case emphasizes, the aquifer is currently in serious and irreversible decline.[2] At the current rate of consumption, SPS will not have sufficient water to operate the plant beyond the mid-2020s at the latest.[3]

**Q Please provide a brief overview of the Harrington Generating Station.**

A Harrington consists of three coal-fired units located northeast of Amarillo, Texas. The plant's units came online between 1976 and 1989. Units 1 and 2 are rated at 339 MW, and Unit 3 is rated at 340 MW. The units currently have Commission-approved retirement dates of 2036, 2038, and 2040, respectively.

**Q What are SPS's requests in this rate case for Tolk and Harrington?**

A SPS is requesting the following:

1. Inclusion in base rates of O&M costs for the test year period April 1, 2018–March 31, 2019 for the operation of Tolk and Harrington;

[1] Direct Testimony of M. Lytal on Behalf of SPS, at 51–52.

[2] *Id.* at 53.

[3] *Id.* at 56.

2. Inclusion in rate base of capital expenditures of $4.3 million for Tolk and $3.9 million for Harrington for the test year period of April 1, 2018–March 31, 2019,[4] as well as $1.87 million for Tolk and $3.0 million for Harrington for the period April 1, 2019–August 31, 2019[5] (associated depreciation expenses and a return on investment requested for inclusion as well);
3. A change to Tolk's retirement dates from 2042 for Unit 1 and 2045 for Unit 2, to 2032 for both units, along with a corresponding adjustment of depreciation rates; and
4. A switch to the seasonal operation of both units starting in 2020.[6]

### *i. Tolk and Harrington each lost money overall relative to the market from 2015 through 2018*

**Q What did you find regarding the overall economic performance of the Tolk units?**

A Using data provided by SPS, I calculated that the Tolk units incurred net losses relative to the SPP energy market in the years 2015 through 2018. This is based on a comparison of the annual costs of energy production and the annual market revenue for each of the two Tolk units. Table 1 shows that the Tolk units collectively lost at least $34 million relative to the market in each year from 2015 through 2018. This includes annual losses relative to the market as high as $33

[4] *Id*. at Exhibit ML-2, New Mexico Retail portion of Additions to Plant-in-service.

[5] *Id.*

[6] *E.g.*, Direct Testimony of W. Grant on Behalf of SPS at 8.

million for Tolk Unit 1 alone in 2015. Over the four-year timeframe, the Tolk units combined lost $158 million relative to the market.

**Table 1. Net annual revenues of Tolk 1 and 2, 2015-2018 (2018 $Million)**

| Unit | 2015 | 2016 | 2017 | 2018 | Total |
|---|---|---|---|---|---|
| **Tolk 1** | ($33) | ($20) | ($22) | ($12) | ($87) |
| **Tolk 2** | ($6) | ($14) | ($25) | ($26) | ($71) |
| **Total** | ($39) | ($34) | ($46) | ($38) | ($158) |

*Source: Workpaper of B. Weeks, SO - _SPS_SCENARIO2_REDUXOPS_2031.xlsx, Exhibit SPS-SC 1-9(k) and Response to SPS-SC 1-9(p), Exhibit SPS-SC 1-9(f) and Exhibit SPS-SC 1-9(i).*

**Q What did you find regarding the overall economic performance of the Harrington units?**

**A** Again, using data provided by SPS, I calculated that the Harrington units also incurred net losses relative to the market in the years 2015 through 2018. Table 2 shows that the three Harrington units lost at least $16 million relative to the market in each year from 2015 through 2018, with combined losses relative to the market as high as $75 million in 2016 alone. Total losses relative to the market over the four-year period were $230 million dollars combined for Harrington's three units.

**Table 2. Net annual revenues of Harrington 1-3, 2015-2018 ($Million)**

| Unit | 2015 | 2016 | 2017 | 2018 | Total |
|---|---|---|---|---|---|
| **Harrington 1** | ($20) | ($28) | ($25) | ($8) | ($80) |
| **Harrington 2** | ($24) | ($25) | ($24) | ($1) | ($74) |
| **Harrington 3** | ($26) | ($22) | ($20) | ($7) | ($75) |
| **Total** | ($70) | ($75) | ($68) | ($16) | ($230) |

*Source: Workpaper of B. Weeks, SO - _SPS_SCENARIO2_REDUXOPS_2031.xlsx, Exhibit SPS-SC 1-9(k) and Response to SPS-SC 1-9(p), Exhibit SPS-SC 1-9(f) and Exhibit SPS-SC 1-9(i).*

**Q Describe how you arrived at the values in Table 1 and Table 2.**

A The net revenue values in Table 1 and Table 2 are based on data provided by SPS. This includes data on Tolk and Harrington's respective energy revenues, ancillary services revenues, fixed O&M costs, variable costs, fuel costs, environmental capital costs, non-environmental capital costs, and property taxes. I calculated annual net revenues by subtracting fixed O&M costs, variable costs, fuel costs, environmental capital costs, non-environmental capital costs, and property taxes from energy revenues and ancillary services revenues.

SPS provided some of the data at the unit level. This includes energy revenues, ancillary services revenues, and property taxes.[7] Fixed O&M costs, variable costs, fuel costs, environmental capital costs, and non-environmental capital costs were provided at the plant-level.[8] I converted plant-level fuel costs and variable costs using a simple ratio of each unit's annual generation relative to the plant's total

[7] Exhibit SPS-SC 1-9(k); SPS Response to SPS-SC 1-9(p) (*see* Exhibit DG-2).

[8] Exhibit SPS-SC 1-9(f); Exhibit SPS-SC 1-9(i) (*see* Exhibit DG-2).

annual generation in gigawatt-hours (GWh).[9] Similarly, I converted plant-level fixed O&M costs, environmental capital costs, and non-environmental capital costs using a ratio of each unit's share of the plant's total capacity in megawatts (MW).[10]

**Q Would the results change if you included a capacity value in the calculations?**

**A** We did not include a capacity value in the preceding analyses because SPP does not have a capacity market. If we were to try to include SPS's savings from not acquiring capacity from other sources, net losses would be slightly smaller. Nonetheless, both plants would still have net losses relative to the market in each historical year I evaluated.[11] I valued capacity at the price SPS earns for firm capacity sales (according to the Strategist model output)[12] and found that the value of the capacity from Tolk and Harrington (in $2018) would be $10.3 million and $9.8 million, respectively, annually in each year from 2015 through 2018. Thus, that capacity value is still significantly below the net losses that each plant incurred in each year from 2015 through 2018. When I add a capacity value into the equation, Tolk's total losses relative to the market over the four-year period are $117 million and Harrington's total losses are $191.

[9] I relied on annual generation data from the Strategist outputs included as workpapers with witness B. Weeks' Direct Testimony on Behalf of SPS. Specifically, I relied on data from "SO - _SPS_SCENARIO2_REDUXOPS_2031.xlsx".

[10] Source of unit-level capacity data:
https://www.xcelenergy.com/energy_portfolio/electricity/power_plants/harrington;
https://www.xcelenergy.com/energy_portfolio/electricity/power_plants/tolk.

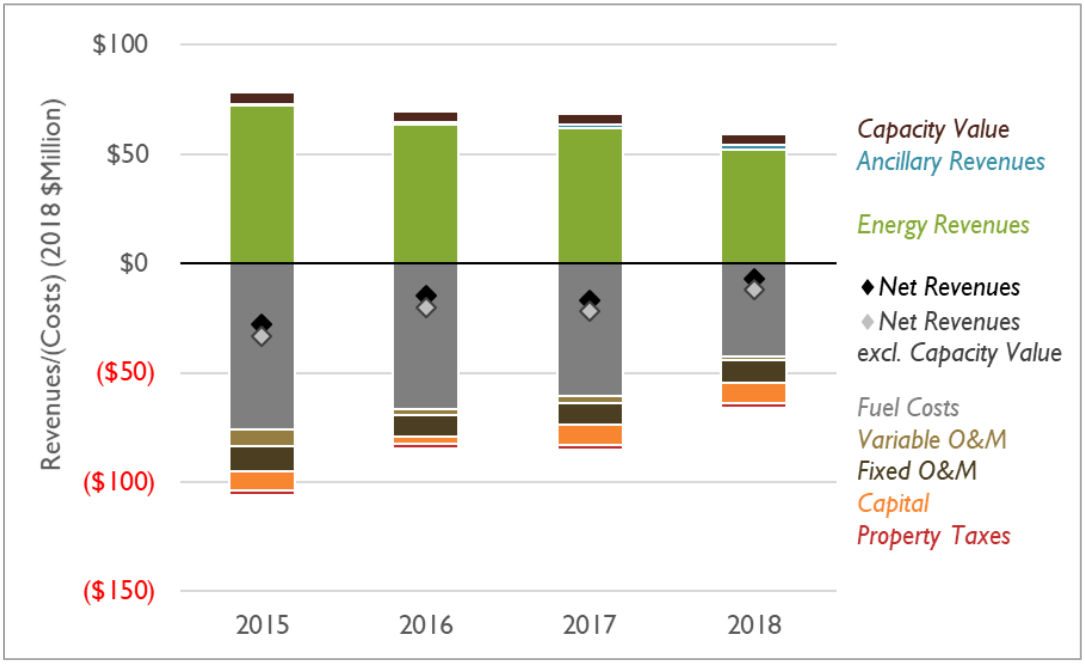
[11] On a unit level, all units with the exception of Harrington 2 in 2018, would have net losses.

[12] Workpaper of B. Weeks, SO - _SPS_SCENARIO2_REDUXOPS_2031.xlsx.

**Q Is it possible to present the results from Tables 1 and 2 above to show each cost and revenue component of your analysis including the capacity value?**

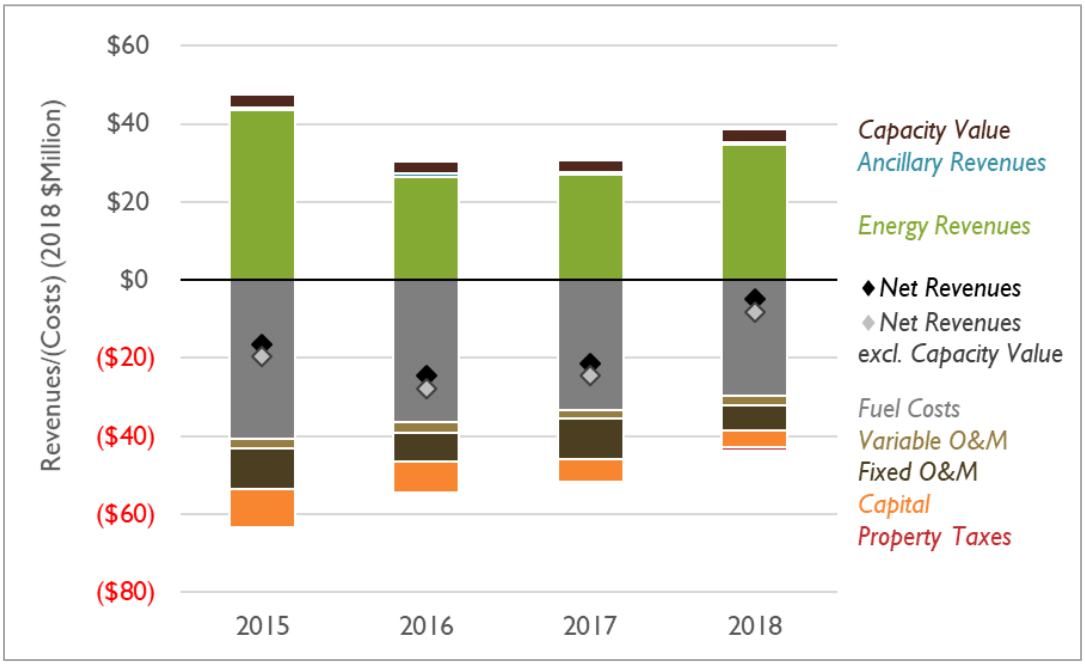
**A** Yes. Figure 1 and Figure 2 present the results of the historical analysis for Tolk 1 and Harrington 1 with each cost and revenue component shown separately, including the capacity value discussed above. The results for Tolk 2, Harrington 2, and Harrington 3 show a similar pattern. Because they are so similar, I do not produce them here due to space considerations. Figure 1 and Figure 2 illustrate that, in many years, the units' annual fuel costs alone approach or exceed the units' annual revenues.

**Figure 1. Annual net revenues of Tolk 1, 2015-2018**




*Source: Workpaper of B. Weeks, SO - _SPS_SCENARIO2_REDUXOPS_2031.xlsx, Exhibit SPS-SC 1-9(k) and Response to SPS-SC 1-9(p), Exhibit SPS-SC 1-9(f) and Exhibit SPS-SC 1-9(I) (see Exhibit DG-2).*

**Figure 2. Annual net revenues of Harrington 1, 2015-2018**




*Source: Workpaper of B. Weeks, SO - _SPS_SCENARIO2_REDUXOPS_2031.xlsx, Exhibit SPS-SC 1-9(k) and Response to SPS-SC 1-9(p), Exhibit SPS-SC 1-9(f) and Exhibit SPS-SC 1-9(i) (see Exhibit DG-2).*

**Q Would SPS be justified in keeping a unit online that was operating at an average annual loss relative to the market over multiple years?**

A No. As I will discuss in the next section, SPS could be justified in operating Tolk or Harrington at a loss relative to the market on an hourly, daily, or potentially monthly basis in order to meet peak demand, or conceivably for reliability reasons. However, it is not reasonable to operate a plant for years at a time if the operator cannot earn enough revenue from the market to cover the costs to operate and maintain the plant. To justify operation, generation resources should, on average, be able to earn enough per kilowatt-hour from the market to cover the variable operations costs, plus a small amount each towards the fixed and capital costs needed to maintain the plant. Otherwise, the Company could more economically procure energy for its customers from the market.

**Q Do your findings regarding the recent net losses incurred by SPS's coal units indicate that the Company should retire all five of those units immediately?**

A No. There are likely sound logistical and reliability-related reasons to not retire SPS's entire coal fleet at once. In addition, retiring one or more coal units may improve the economics of the remaining coal units. Also, past losses relative to the market are not a guarantee of future losses relative to alternative resource options. Given the recent net losses of SPS's coal units relative to the market, however, the Company should conduct rigorous economic assessments of near-term retirement dates for each of those units.

### *ii. Tolk and Harrington often did not earn enough revenue even to cover variable operational costs from 2015 through 2018*

**Q Please explain the purposes of this section, including the difference between its analysis and the analysis above in Section (i).**

A In Section (i), I reviewed the total cost to operate and maintain Tolk and Harrington relative to procuring energy from the market. That analysis evaluated the combination of variable operational costs, fixed costs, and capital costs, and then compares the total cost to keep the plant online to the cost of procuring energy from the market. That type of analysis is relevant for determining whether a plant should be kept online or retired and replaced with an alternative.

In this section, by contrast, I review the variable operations costs (including fuel) and evaluate whether the plant is covering even the incremental cost to operate the unit each hour. This type of analysis is relevant for evaluating a plant's dispatch practices, and it sets up evaluation of the reasonableness of SPS choosing

to self-commit the units into the wholesale energy market. I discuss this further in Section (iii), below.

**Q Please summarize your findings regarding the operational economic performance of the Tolk units in the years from 2015 through 2018.**

A Using data provided by SPS, I calculated that each of the Tolk coal units incurred net operational losses relative to the market in multiple years from 2015 through 2018 (Table 3). Net operational losses result when the sum of the hourly fuel and variable O&M costs over a given year are greater than the sum of the hourly nodal locational marginal prices ("LMPs") during all hours the unit is generating energy. Combined, these two units experienced annual net operational losses over half of the time, with the highest annual net operational loss of $10 million occurring in 2015 at Tolk 1.

**Table 3. Annual net operational revenues of Tolk 1 and 2, 2015-2018 (2018 $Million)**

| Unit | 2015 | 2016 | 2017 | 2018 | Total |
|---|---|---|---|---|---|
| **Tolk 1** | ($10) | ($4) | ($0) | $10 | ($6) |
| **Tolk 2** | $17 | $2 | ($3) | ($4) | $12 |
| **Total** | $6 | ($3) | ($3) | $6 | $6 |

*Source: Workpaper of B. Weeks, SO - _SPS_SCENARIO2_REDUXOPS_2031.xlsx, Exhibit SPS-SC 1-9(k) and Response to SPS-SC 1-9(p), Exhibit SPS-SC 1-9(f) and Exhibit SPS-SC 1-9(i) (see Exhibit DG-2).*

**Q Please summarize your findings regarding the operational economic performance of the Harrington units in the years from 2015 through 2018.**

A Using the same data provided by SPS discussed above, I calculated that each of the Harrington coal units incurred annual net operational losses in multiple years from 2015 through 2018. Table 4 shows that each of the Harrington units incurred aggregate operational losses of more than $7 million from 2015 through 2018.

Together, the units incurred net operational losses of $35 million from 2015 through 2018. This means that customers would have saved money over this time period if SPP had purchased energy from the market rather than operating its coal units.

**Table 4. Annual net operational revenues of Harrington 1, 2, and 3, 2015-2018 (2018 $Million)**

| Unit | 2015 | 2016 | 2017 | 2018 | Total |
|---|---|---|---|---|---|
| **Harrington 1** | $1 | ($12) | ($8) | $3 | ($15) |
| **Harrington 2** | ($4) | ($9) | ($7) | $11 | ($9) |
| **Harrington 3** | ($5) | ($6) | ($3) | $4 | ($10) |
| **Total** | ($7) | ($27) | ($18) | $18 | ($35) |

*Source: Workpaper of B. Weeks, SO - _SPS_SCENARIO2_REDUXOPS_2031.xlsx, Exhibit SPS-SC 1-9(k) and Response to SPS-SC 1-9(p), Exhibit SPS-SC 1-9(f) and Exhibit SPS-SC 1-9(i) (see Exhibit DG-2).*

**Q Describe how you arrived at the values in Table 3 and Table 4.**

**A** I arrived at the net operational revenue values in Table 3 and Table 4 by subtracting each of the Tolk and Harrington units' 2015–2018 variable O&M costs and fuel costs from its energy revenues and ancillary services revenues. Each of these costs and revenues were directly provided by SPS, as described in Section 3i.

### *iii. SPS's decision to self-commit its units to dispatch in the market has resulted in the uneconomic operation of Tolk and Harrington, at avoidable expense to ratepayers*

**Q Please provide a summary of this section.**

**A** In this section, I discuss some of the decisions and dynamics underlying the annual net operational losses identified in Section 3ii. Specifically, I show how

SPS's operational decision-making is biased in favor of running its coal plants to generate energy rather than serving its load with energy available at lower cost in the market. Running SPS coal plants to serve load has resulted in higher costs to ratepayers.

**Q How does SPS typically operate the Tolk and Harrington units?**

A SPS operates its coal units in the SPP energy market with the units' commitment statuses set to "Self-Commit" most often, and "Economic" or "Outage" each less often. When a unit is set to "Self-Commit" status, a utility decides in advance that it will operate the unit at its minimum operational level or higher regardless of market prices. Conversely, when a unit is set to "Economic" status, the utility is indicating that it will only operate the plant if it is selected based on the day-ahead market results. This means that the utility bids in the price to operate the unit, based on its variable and fuel costs in each hour, and the unit is selected if the bid price is lower than the bid price of the marginal unit (the last unit needed to meet demand in that hour).

Table 5 shows that each of Tolk's two units was set to Self-Commit for at least [redacted] of the hours in each year from 2016 through 2018, and in some years considerably more. For Harrington, Table 6 shows that, on average from 2016 through 2018, each of the three units was set to Self-Commit for [redacted] of the hours (in the case of Harrington 2, substantially more).

**Table 5. Tolk commitment practices, 2016-2018 CONFIDENTIAL**

*Source: Exhibit SPS-SC 2-6(b)(CONF)(CD) (see Exhibit DG-2).*

**Table 6. Harrington commitment practices, 2016-2018 CONFIDENTIAL**

*Source: Exhibit SPS-SC 2-6(b)(CONF)(CD) (see Exhibit DG-2).*

**Q Describe how you arrived at the values in Table 5 and Table 6.**

A I relied on unit-level hourly commitment status data provided by SPS to arrive at the values shown in Table 5 and Table 6. For each unit, I calculated the total number of hours of data provided for each year, and the number of hours each unit's commitment status was set to Economic, Outage, Reliability, and Self-Commit. Finally, I divided the hours for each commitment status by total hours of data to arrive at the percentage of hours that each unit was set to a given commitment status.

**Q How does SPS describe its unit-commitment practices?**

A SPS asserts that "under most market operating conditions, SPS offers the Tolk and Harrington units into the SPP Integrated Market ("IM") in "market status" which allows the SPP IM to economically commit and dispatch the units according to market needs." SPS further indicates that it will "'self-schedule' Tolk and Harrington units under certain conditions…"[13] As a matter of fact, however, most of the time SPS does *not* offer the Tolk or Harrington units in 'Market' (by which the Company presumably means to suggest 'Economic' status) as illustrated above. The Company offers no clear explanation for the discrepancy between how it describes its dispatch practices and how it actually dispatches its plants.

[13] SPS Response to SC 2-8 (*see* Exhibit DG-2). "SPS will 'self-schedule' Tolk and Harrington units under certain conditions such as required environmental emissions testing, unit performance testing, coal bunker management for safety purpose, and to ensure adequate reserve margins for system reliability under high demand and adverse weather conditions that jeopardize the renewable energy production; such as extreme hot or cold weather, icing, wind over speed, cold and hot temperatures cut outs of the wind turbines and potential impacts to natural gas supplies for the SPS generating fleet."

**Q Do you have concerns with SPS's commitment practices?**

A Yes. SPS's claim that it offers Tolk and Harrington in Market status under most operating conditions is not supported by the Company's own dispatch record, in which the Company has clearly designated the units with a Self-Commit status [redacted] (see Table 5 and Table 6).[14] In the past, when natural gas prices were higher and renewable prices were still coming down, the coal plants may have actually been earning enough revenue to cover their operational costs during a majority of hours. (Note this does not mean that the units were covering their fixed and capital costs, and were therefore overall economic to operate.) In this context, applying a Self-Commit status would not have had as large an impact on market conditions as it would today. However, the modern market environment is driven by persistently low gas prices and greater levels of zero-marginal-cost renewables such as wind and solar. In this context, the coal units are actually uneconomic to operate during a large portion of the year, and SPS's continued bias in favor of committing and dispatching them is costing ratepayers millions of dollars a year.

**Q Have other entities raised concerns about self-commitment in the SPP region?**

A Yes. The SPP Market Monitor raised this concern in its 2018 *State of the Market* report, in which it states: "Self-commitment of generation continues to be a concern because it does not allow the market software to determine the most economic market solution. Furthermore, it can contribute to market uplifts and

[14] Exhibit SPS-SC 2-6(b)(CONF)(CD) (*see* Exhibit DG-2).

low prices."[15] The SPP Market Monitor's report further states that it continues to "view reducing self-commitment of generation as a high priority for SPP and its stakeholders as this will enhance market efficiency and improve price signals."[16]

Moreover, public utilities commissions in both Minnesota and Missouri have opened formal dockets to investigate utility self-dispatch practices.[17] Additionally, the Sierra Club recently published a report outlining the problems that self-commitment and uneconomic dispatch pose in wholesale energy markets (known as "ISOs" or "RTOs").[18]

**Q Have you conducted any additional analyses that explore the frequency with which SPS operates its units at a loss, beyond the economic analysis presented above in Section 3(ii)?**

A Yes. I used data provided by SPS to determine the number and percentage of hours in which each unit operated when the hourly unit-level LMP was less than the unit's variable O&M costs and fuel costs.[19] This analysis is similar to what I

[15] Exhibit DG-3, Southwest Power Pool - Market Monitoring Unit, *State of the Market 2018* at 5 (May 15, 2019), *available at*: https://www.spp.org/documents/59861/2018%20annual%20state%20of%20the%20market%20report.pdf.

[16] *Id.*

[17] *See* Missouri Public Service Commission, Docket No. EW-2019-0370; Minnesota Public Utilities Commission, Dockets Nos. E999/AA-17-492 and E999/AA-18-373.

[18] Exhibit DG-4, Fisher, Jeremy, *et al.*, *Playing With Other People's Money: How Non-Economic Coal Operations Distort Energy Markets*, Sierra Club (October, 2019), a*vailable at:* https://www.sierraclub.org/sites/www.sierraclub.org/files/Other%20Peoples%20Money%20Non-Economic%20Dispatch%20Paper%20Oct%202019.pdf.

[19] I relied on: hourly unit-level generation data provided in Exhibit SPS-SC 1-10(a)(CD); hourly unit-level day-ahead LMP data provided in Exhibit SPS-SC 2-6(i)(CD); unit-level variable O&M costs data provided in Exhibit SPS-SC 2-6(g)(CONF)(CD), provided at irregular intervals but with at least one unit-level datum per year; and monthly plant-level fuel costs data provided in Exhibit SPS-SC 1-10(b) (*see* Exhibit DG-2).

presented in Section 3(ii), except here I focus on the frequency of hourly results rather than net annual results. Specifically, I calculated the percentage of annual operational hours in which each unit's fuel costs alone are greater than the unit's LMP. Then I added in each unit's variable O&M costs and calculated the percentage of hours where the combined variable and fuel costs exceed the unit's LMP.

**Q What did you find about the frequency with which SPS operates the Tolk and Harrington units at a loss?**

**A** I found that in 2016 and 2017, for more than [redacted] of the operational hours at Harrington and Tolk, the units' estimated[20] fuel costs were greater than the units' LMP (Figure 3). When I added in the estimated variable O&M costs to the fuel costs, that percentage increased to [redacted] of the time (Figure 4). Plant performance for both Tolk and Harrington appears to improve in 2018, but this is due in large part to the LMP spike in 2018. There is no reason to believe that LMPs will remain at this level; in fact, the average day-ahead energy prices were 10 percent lower this summer (2019) than they were in the summer of 2018.[21] It is important to note that for Tolk, this slight improvement in 2018 was also concurrent with SPS introducing an Opportunity Cost Calculator (OCC) at Tolk to alter the offer price to reduce dispatch and conserve water.[22] It is concerning that the combination of the OCC and the high LMPs only slightly

[20] Estimated because fuel costs data was provided on a monthly basis only.

[21] Exhibit DG-5, Southwest Power Pool - Market Monitoring Unit, *State of the Market Report, Summer 2019* at 2 (Oct. 25, 2019), *available at*: https://www.spp.org/documents/60882/spp_mmu_qsom_summer_2019.pdf.

[22] OCC was introduced in April 2018. SPS Response to SC 2-5 (*see* Exhibit DG-2).

improved unit performance. This indicates that even when the plant switches to seasonal operations, its fuel and variable costs could still likely exceed its LMPs.

**Figure 3. Percent of operational hours where estimated fuel costs were greater than LMP, 2016-2018 CONFIDENTIAL**

*Source: Exhibit SPS-SC 1-10(a)(CD); Exhibit SPS-SC 2-6(i)(CD); Exhibit SPS-SC 2-6(g)(CONF)(CD); Exhibit SPS-SC 1-10(b) (see Exhibit DG-2).*

**Figure 4. Percent of operational hours where estimated fuel costs plus variable O&M costs were greater than LMP CONFIDENTIAL**

*Source: Exhibit SPS-SC 1-10(a)(CD); Exhibit SPS-SC 2-6(i)(CD); Exhibit SPS-SC 2-6(g)(CONF)(CD); Exhibit SPS-SC 1-10(b) (see Exhibit DG-2).*

**Q Is there a monthly or seasonal trend in uneconomic dispatch by SPS?**

A Yes, as shown in Table 7 and Table 8, all units operated uneconomically during a larger portion of the off-peak season hours—namely, October through May—compared to the on-peak season hours—June through September. Below, Table 7 shows the estimated percentage of peak and off-peak season hours when just the units' fuel costs were larger than the units' LMP. Table 8 shows the percentage of peak and off-peak season hours when the units' total variable operational costs, which includes fuel and variable O&M costs, were larger than the units' LMP.

**Table 7. Operating hours with fuel costs > LMP (%) by peak season and off-peak season CONFIDENTIAL**

*Source: Exhibit SPS-SC 1-10(a)(CD); Exhibit SPS-SC 2-6(i)(CD); Exhibit SPS-SC 2-6(g)(CONF)(CD); Exhibit SPS-SC 1-10(b) (see Exhibit DG-2).*

**Note: Peak season is defined as June–September; Off-peak is defined as October–May.**

**Table 8. Operating hours with total operational costs > LMP (%) by peak season and off-peak season CONFIDENTIAL**

*Source: Exhibit SPS-SC 1-10(a)(CD); Exhibit SPS-SC 2-6(i)(CD); Exhibit SPS-SC 2-6(g)(CONF)(CD); Exhibit SPS-SC 1-10(b) (see Exhibit DG-2).*

**Q Do you know how the magnitude of total operational losses or revenues break down by peak and off-peak season?**

A No. We know total annual net operational losses (or revenues), which I presented in Section 3(ii). However, we do not know how those losses break down by season because SPS has not provided data on hourly costs (which Sierra Club

requested).[23] Without these more granular, hourly data, we are unable to calculate operational losses by season. To be clear, the data in Table 7 and Table 8 tell us about the estimated *frequency* of uneconomic operation, but not the *magnitude*. This means we do not know if, on the whole, the Tolk and Harrington units are actually covering operational costs during the peak season (but not off-peak season), or if they are uneconomic during both seasons. The Commission should require SPS to produce this information to evaluate the reasonableness of the seasonal operation plan for Tolk, and to help determine whether seasonal operation at Harrington would benefit ratepayers relative to continued full-year operations.

**Q What are the implications of this section's findings of uneconomic plant operations and unit commitment decision-making by SPS?**

A These results indicate that, in many hours over the past three years (the historical years for which SPS provided data), SPS is often committing and dispatching its units in ways that result in net operational losses. This means the plants are not even covering their operational costs, let alone earning enough to cover the fixed and capital costs required to make the plant economic and reasonable to keep online. Moreover, these losses could have been avoided or mitigated by choosing not to offer the units into the SPP market in self-commit status—at the least during the off-peak season. The years with net operational losses represent extreme cases of uneconomic operations (relative to years when the plants covers operational costs, but do not fully cover fixed and capital costs). These findings

[23] Fuel costs were provided as monthly averages, and variable O&M costs were provided for only a few hours per unit for the years 2016 through 2018. Exhibit SPS-SC 2-6(g)(CONF)(CD); Exhibit SPS-SC 1-10(b) (*see* Exhibit DG-2).

indicate that SPS is imprudently making its unit commitment and operations decisions. In doing so, the Company is incurring net operational losses that it passes on to its retail ratepayers.

**Q What are your recommendations to the Commission with regard to SPS's request for O&M for Tolk and Harrington?**

A I recommend that the Commission disallow recovery of a portion of the requested test year O&M costs from April 1, 2018–March 31, 2019 for Tolk and Harrington on the basis that the plants have been, on average, failing to cover even their operational expenses. Specifically, the Commission should disallow recovery of O&M associated with the units' uneconomic self-commitment dispatch practices. To calculate the exact amount to disallow, I recommend that the Commission require SPS to first calculate total operational revenues or losses on a monthly basis. For the months with net uneconomic operations, the Commission should disallow the increment of cost incurred to operate and dispatch the unit that is over and above the cost at which SPS could have purchased energy from the market.[24]

I further recommend that the Commission investigate whether costs have been improperly passed on to customers due to uneconomic self-commitment and dispatch of Tolk and Harrington through a docket dedicated to the issue. At a minimum, the Commission should make clear that it will continue to evaluate the issue in future proceedings, including in SPS's fuel and purchased power cost adjustment clause ("FPPCAC"), rate, and planning dockets.

[24] Alternatively, the Commission would disallow just the portion of O&M incurred to operate the units during the hours they are operating uneconomically in self-commit mode.

## 4. TOLK AND HARRINGTON ARE LIKELY TO CONTINUE TO BE UNECONOMIC INTO THE FUTURE, AT UNNECESSARY COST TO RATEPAYERS

**Q Please provide a summary of this section.**

A In this section I evaluate the likely future economic performance of both Tolk and Harrington using the forward-going cost projections and power prices provided by SPS.[25] First, I calculate projected future net revenues or losses for each unit and find that continued operation of both Tolk and Harrington is likely to result in substantial losses to ratepayers from 2020-2032. Then, to back up these findings, I compare just the Company's projected costs to the revenues that would be required to avoid operating at an economic loss, *i.e.*, "break-even revenues." I compare the results to the historical revenues, and I find that both Tolk and Harrington would need to earn significantly more revenue than each unit has historically to avoid continuing operating at a loss.

[25] After the close of business on November 21, 2019, the evening before the filing deadline for this testimony, SPS provided a supplemental discovery response to SC 3-1, in which the Company admitted that it erroneously designated May as a "summer peak" month in its Tolk Strategist analysis. Given the late disclosure and the fact that SPS has not provided the updated Strategist output results for our review, or an update to the monthly data requested in SC 3-1, I was unable to incorporate the new information into this testimony.

I will note, however, that SPS's error appears to have biased the Company's analysis in favor of continuing to operate Tolk, for at least two reasons. First, since the plant will be operating only four months, rather than five, that means SPS will receive approximately 20% less annual revenue (even though variable O&M and fuel costs drop by the same percent, SPS relies on projected power market prices that are higher than projected fuel and variable costs) . Second, since the additional year of operation will be when the water shortage is most extreme, the extended operation may require additional wells and associated costs. In light of SPS's corrected discovery response, I reserve the right to supplement or amend my testimony and conclusions, as may be appropriate.

**Q Using the data provided by SPS, what can you say about the likely future economic performance of both plants?**

A I find that both Tolk and Harrington are very likely to lose ratepayers a substantial amount of money between 2020 and 2032. Specifically, I find that Tolk could lose anywhere between $8 million and $234 million and Harrington could lose between $49 and $510 million between 2020 and 2032, depending on how often each plant is dispatching during on-peak and off-peak times.[26] Based on the likely scenario that each plant dispatches two-thirds of its monthly generation during on-peak hours, and one-third during off-peak hours (Table 9), I find that Tolk is likely to lose $88 million and Harrington is likely to lose $202 million between 2020 and 2032.

[26] The upper and lower bounds associated with dispatching 100% of generation during on-peak hours or 100% during off-peak hours are not feasible because start-up and shut-down costs would prevent the units from operating in this manner. In reality, a portion of each unit's generation will be dispatched during on-peak hours, and a portion off-peak.

**Table 9. Projected net revenues (losses) assuming 2/3 of generation is dispatched during on-peak hours and 1/3 during off-peak hours**

| | 2020 | 2021-2025 | 2026-2031 | Total |
|---|---|---|---|---|
| Tolk 1 | ($7) | ($26) | $14 | ($19) |
| Tolk 2 | ($13) | ($45) | ($11) | ($69) |
| Harrington 1 | ($7) | ($45) | ($23) | ($75) |
| Harrington 2 | ($11) | ($37) | ($16) | ($64) |
| Harrington 3 | ($6) | ($39) | ($19) | ($64) |

*Source: SPS response to SC 1-23; SPS response to SC 3-1; Workpaper of B. Weeks, "SO -_SPS_SCENARIO2_REDUXOPS_2031.xlsx"; SPS response to SC 1-26 (see Exhibit DG-2).*

**Q Describe how you calculated the values in Table 9.**

A I calculated the forward-going costs the Tolk and Harrington units are projected to incur based on adding together the fuel costs, variable O&M costs, fixed O&M costs, and ongoing capital costs—including the costs to drill additional wells at Tolk (allocated evenly between Units 1 and 2)—provided by Company witness B.F. Weeks in the Strategist output files.[27] I then calculated energy revenue using monthly generation data from the Tolk Strategist model[28] and the monthly on and off-peak power prices provided by SPS for SPP South.[29] I assumed that two-thirds of monthly generation was dispatched during on-peak hours, and one-third was dispatched during off-peak hours.

[27] Workpaper of B. Weeks, "SO -_SPS_SCENARIO2_REDUXOPS_2031.xlsx."

[28] SPS Response to SC 3-1 (*see* Exhibit DG-2).

[29] SPS Response to SC 1-26 (*see* Exhibit DG-2). SPS provided projected power prices for several locations; however, given the location of Tolk and Harrington in SPP south, I selected the prices for this location.

**Q SPS's data seems to indicate that Tolk will become more economic after 2025. Do you think this is accurate and does this support continued operation of the plant?**

A No. First, the plant is projected to lose significant money relative to the market between now and 2025. Those losses far outweigh the projected net revenues. Second, projected revenues are based on power market price projects that are increasingly uncertain as you get further out. Finally, the Company appears to be understating the costs to maintain access to sufficient water at Tolk based on the Company's recent historical spending on water supply and water availability projects at Tolk. While it is reasonable for SPS to project lower O&M costs when the plant switches to seasonal operation, and to avoid spending on large capital projects as the plant nears retirement, [30] SPS's projection of future capital investments needs to reflect the full likely costs to maintain access to sufficient water. Between 2014 and 2017, SPS spent $11.2 million on water supply and water availability-related capital investments, and the Company has spent an additional $4.9 million since the beginning of 2019. [31] Going forward, SPS projects spending an average of only $1 million annually on water projects at Tolk.[32]

[30] With a switch to seasonal operation, SPS will have to recover the fixed and capital costs over a smaller portion of hours. However, SPS asserts that with a switch to seasonal operation, O&M will be lower and "the interval between [capital] projects can be extended." Further, SPS states that "all capital projects in the later years will be evaluated for the need during managed decline phase of the units." SPS Response to SC 1-23 (*see* Exhibit DG-2).

[31] SPS Response to SC 1-24 (*see* Exhibit DG-2).

[32] Workpaper of B. Weeks, "SO -_SPS_SCENARIO2_REDUXOPS_2031.xlsx".

**Q Given the uncertainty about future conditions, have you performed any other analysis to support your findings above?**

A Yes. I have also performed break-even analysis to focus on just SPS's projected costs, and the revenue required to cover those costs. The analysis I presented above, comparing projected future costs and revenues for each unit, relies on uncertain power price projections years into the future. This analysis also required me to make a key assumption about when each unit was dispatching. The analysis answers the question, "Based on the power prices and costs provide by the Company, and your assumptions around unit dispatch, what is the likely economic performance of each unit." The break-even analysis, on the other hand, is based almost entirely on the Company's information and involves minimal additional operational assumptions. It answers the question, "What assumptions about future power prices are needed for the analysis to show positive net revenues, given the Company's assumptions around future costs, in order for the plants to earn net revenues."

**Q What is a break-even analysis?**

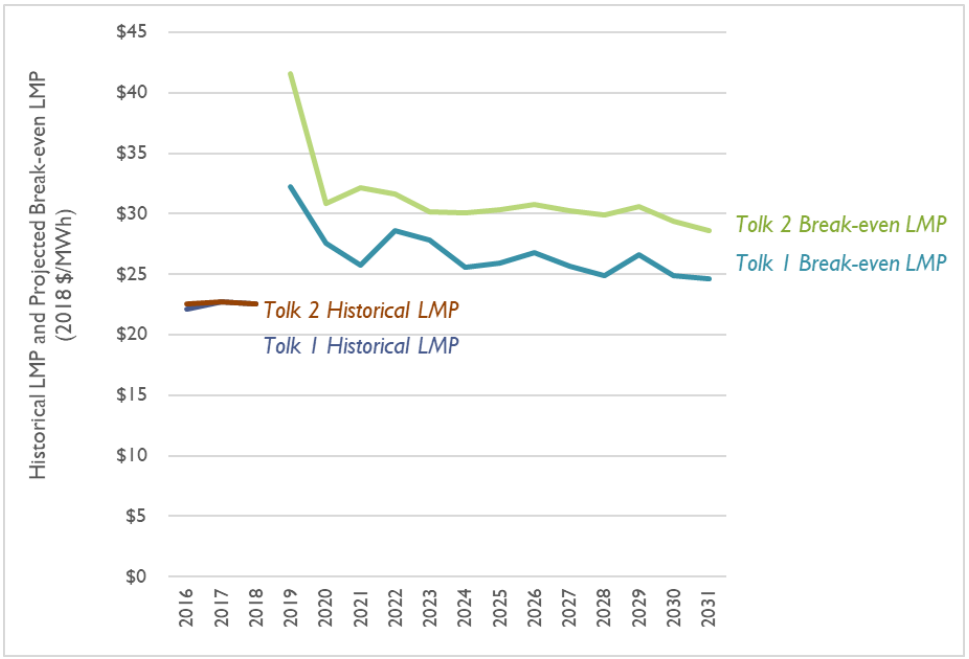
A A break-even analysis in this context calculates the LMP or the revenue that is required for the plant's revenues to exactly equal its operational costs (fuel and variable O&M). The break-even LMPs can be thought of as the minimum average LMP a unit must receive for generation in order to not lose money during a given year. If the actual, average LMPs during a year are less than the break-even LMP, the unit would operate at 1-256a loss. Break-even total revenue can be thought of as the minimum total revenue that a plant must earn in a year, based on the calculated LMPs and the likely projected future generation levels.

**Q Please summarize your findings regarding the future economic performance of the Tolk units.**

A Using future cost and generation projections provided by SPS,[33] and historical LMPs from SPP,[34] I find that the Tolk units will need to receive an average LMP that significantly exceeds average peak-season LMPs from the recent past (2015–2018) to avoid operating at an economic loss (Figure 5). I present the forward-going costs as the hourly LMP that the Tolk units would need to earn. I compared these projected LMPs to historical annual average hourly LMP for each unit from the months of June through September based on hourly unit-level LMPs from the SPP from 2015 through 2018. SPS has presented no evidence or projections that indicate that the Company believes future LMPs will increase to the level required to make sustained operation of Tolk economic.

[33] Workpaper of B. Weeks, "SO -_SPS_SCENARIO2_REDUXOPS_2031.xlsx."
[34] *Available at*: https://marketplace.spp.org/pages/rtbm-lmp-by-location.

**Figure 5. Tolk Units 1 & 2 historical and future break-even LMPs, 2015–2032**




*Source: Source: Workpaper of B. Weeks, "SO -_SPS_SCENARIO2_REDUXOPS_2031.xlsx."*

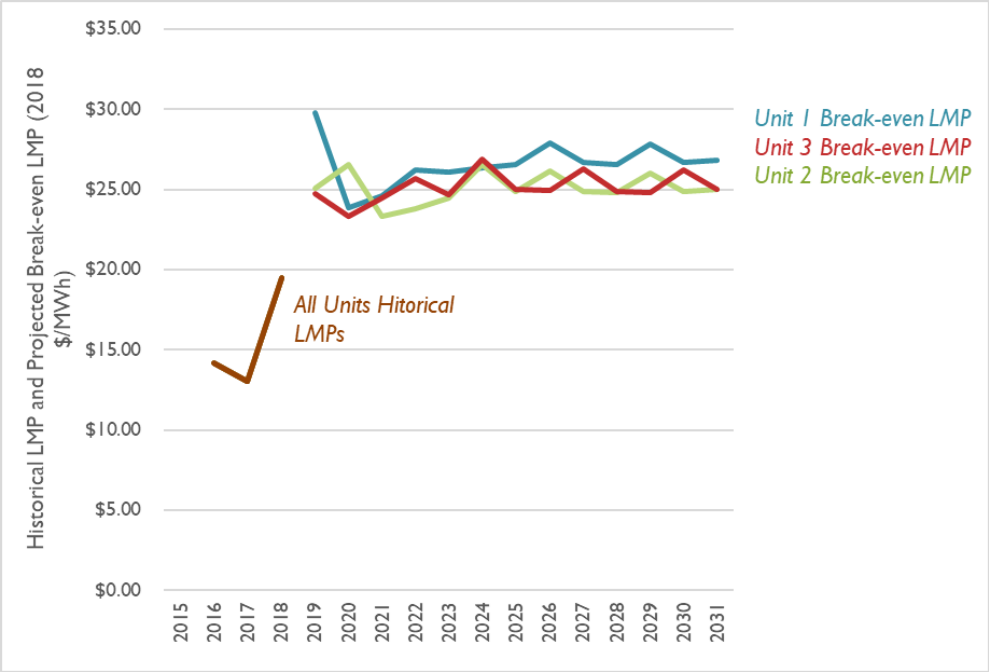
**Note: Historical LMPs represent the average of the hourly LMPs for only the four on-peak months that SPS plans to operate Tolk beginning 2020 (June through September).**

**Q Please summarize your findings regarding the future economic performance of the Harrington units.**

A Using the same data provided by SPS, I calculated the forward-going costs that the Harrington units are projected to incur through 2032, and therefore the revenues and LMPs that the Harrington units would need to receive to operate economically. Figure 6 shows that for the Harrington units to avoid operating at a loss they would need to receive annual average LMPs in most years that exceed the annual historical average LMPs they received from 2015 through 2018. Despite the 2018 spike in SPP energy prices, there is no evidence to support an assumption that future revenues and LMPs will continue to increase to a level required to sustain economic operations. Using past LMPs as a proxy for future

LMPs, all three Harrington units would be operating at an economic loss in the majority of years through 2032.

**Figure 6. Harrington Units 1–3 historical and future break-even LMPs, 2015–2032**




*Source: Workpaper of B. Weeks, "SO - _SPS_SCENARIO2_REDUXOPS_2031.xlsx."*

**Q Describe how you arrived at the values in Figure 5 and Figure 6.**

**A** I calculated the forward-going costs the Tolk and Harrington units are projected to incur using the same data and methodology outlined in the first part of this section.[35] I used the projected annual costs for each unit net of the capacity value to estimate the level of annual revenues SPS would have to receive from the ancillary and energy markets in order to break even. That is, if the annual revenues for a unit were exactly equal to the annual costs, the unit would achieve

[35] Workpaper of B. Weeks, "SO -_SPS_SCENARIO2_REDUXOPS_2031.xlsx."

break-even economic status. However, if the annual revenues are less than the annual costs, the unit would be operating at a loss.

Because SPS plans to reduce operations at Tolk and operate the plant only from June through September (peak season) between 2020 and 2032,[36] it is not useful to directly compare forward-going break-even revenues with historical revenues.[37] Instead, I divided the calculated annual break-even revenues by projected generation by unit—provided in SPS's Strategist output files[38]—to arrive at break-even LMPs. For consistency of analysis, I present the results from Harrington as a break-even LMP as well based on year-round operation.

**Q Is there other analysis that supports your overall economic assessment of SPS's Tolk and Harrington Stations' forward-going economics?**

A Yes. Analysis from SPP's Market Monitoring Unit (MMU) supports this assessment. SPP's 2018 *State of the Market* report describes coal plant economics within the SPP region and indicates that "…MMU analysis shows that market revenues do not support going forward costs for coal resources."[39]

[36] Direct Testimony of B. Weeks at 22.

[37] Due to the reduced operations in the forward-going analysis, forward-going production costs will be lower than historical production costs, and consequently the break-even revenues will be less than historical revenues.

[38] Workpaper of B. Weeks, "SO -_SPS_SCENARIO2_REDUXOPS_2031.xlsx."

[39] Exhibit DG-3, Southwest Power Pool - Market Monitoring Unit, *State of the Market 2018* at 2 (May 15, 2019), *available at*: https://www.spp.org/documents/59861/2018%20annual%20state%20of%20the%20market%20report.pdf.

**Q What are the implications of these uneconomic results for ratepayers?**

A Based on SPS's own input assumptions, we find during two separate types of analysis, that Tolk and Harrington are very likely to continue operating at a loss going forward. This means that ratepayers will continue to pay for SPS to uneconomically operate the Company's coal fleet.

**Q What are your recommendations to the Commission with regard to any request for recovery of future capital investments at Tolk and Harrington?**

A Given that Tolk and Harrington will likely remain uneconomic, I recommend that the Commission preemptively deny recovery of the costs of any substantial future capital projects that may be intended to prolong the lives of Tolk and Harrington as generating assets. It is unreasonable for ratepayers to spend any more money to keep economically non-competitive plants online, particularly in light of the impending water shortages at Tolk.

## 5. TOLK CANNOT ECONOMICALLY PROCURE WATER TO OPERATE THROUGH ITS UNITS' CURRENT RESPECTIVE RETIREMENT DATES OF 2042 AND 2045

**Q Please summarize this section.**

A In this section I review SPS's request to adjust the depreciation dates of the two Tolk units based on a retirement date of 2032, accelerated from the current dates of 2042 for Unit 1 and 2045 for Unit 2. Specifically, I examine the Company's groundwater modeling and economic analysis and find that the modeling and analysis supports the Company's assertion that it cannot economically procure groundwater to maintain operations at Tolk through 2042 and 2045.

**Q What is SPS's request regarding future operations of Tolk in this rate case?**

A SPS requests the following relief:

- A change to the Tolk Station retirement dates from 2042 for Unit 1 and 2045 for Unit 2 to 2032 for both units, and a switch to seasonal operation starting in 2021.[40]
- A change in the depreciation lives of the Tolk Units to 2032 for generating purposes.[41]
- A depreciable life for the assets associated with Tolk's operation in synchronous condenser mode ending in 2055.[42]

**Q Has SPS previously requested a change in the remaining useful life for Tolk?**

A Yes, in SPS's last rate case, the Company requested to shorten the retirement dates for Tolk for depreciation purposes. However, SPS did not officially request a 2032 retirement date until this case.[43]

**Q Why is SPS requesting a change in the remaining useful life date for Tolk?**

A SPS is requesting a change to the retirement date, and plans to switch to seasonal operations at Tolk, due to the "continuing and irreversible decline of the Ogallala Aquifer."[44] SPS asserts that if Tolk continues to operate at current levels, economic depletion of the aquifer will occur between 2024 and 2026. Once

[40] Direct Testimony of W. Grant on Behalf of SPS at 8.
[41] Direct Testimony of M. Lytal on Behalf of SPS at 5-6.
[42] *Id*.
[43] Direct Testimony of W. Grant at 79.
[44] Direct Testimony of M. Lytal at 4.

economic depletion occurs, the cost to secure water through continued drilling of new wells or alternative procurement measures will make it uneconomic to ratepayers for SPS to continue operating the plant.[45]

**Q What alternative solutions has SPS explored to procure the water needed to keep Tolk operating through its original retirement dates of 2042 and 2045?**

A SPS explored alternative solutions in the prior rate case; specifically a water pipeline project with the City of Lubbock and the construction of hybrid cooling towers.[46] However, the City of Lubbock notified SPS that it is not able to provide Tolk the required quantity of water, and the construction of two hybrid cooling towers would be cost prohibitive at around $236 million.[47] Based on this and other assessments, SPS has asserted that "there is no feasible operational scenario that would allow SPS to economically maintain the Tolk generating units until the end of their currently approved service lives in 2042 and 2045."[48]

**Q Has SPS already been facing water supply challenges at Tolk?**

A Yes. As the Ogallala Aquifer is depleted and the level of saturated thickness drops,[49] SPS has had to drill an increasing number of wells to supply the water needed for peak operations. Tolk's well count has increased 207 percent since 1992, yet total wellfield production has declined by 25 percent during the same

[45] *Id.* at 38.

[46] Direct Testimony of W. Grant at 82.

[47] Company Witness Grant stated "SPS has determined that the installation of hybrid cooling towers at Tolk to be economically imprudent given the age of Tolk, the uncertainty and cost of the technology, and the potential for increased environmental costs that may occur at some point in the future." *Id.* at 83.

[48] Direct Testimony of M. Lytal at 81.

[49] The saturated thickness of the aquifer is defined as the distance from the water table to the base of the aquifer.

timeframe.[50] SPS hired an external firm, WSP USA, to perform its groundwater modeling. WSP's 2018 groundwater modeling concluded that SPS would have trouble extracting enough water from the wellfield to meet peak demand in the summer starting in 2019.[51]

**Q Has Tolk undertaken any projects recently related to water supply access?**

A Yes. Tolk added eight new wells between 2018 and 2019 to offset predicted production deficits from the current wells.[52] SPS acknowledged that the Company will need to continue regularly drilling new wells to sustain operation through 2031.[53]

**Q Has SPS presented sufficient evidence to support its assertion that Tolk cannot feasibly maintain operations at current levels through the units currently approved service lives of 2042 and 2045?**

A Yes. Based on groundwater data collected for the Company between 2007 and 2018,[54] and the Company's evaluation of alternatives, SPS has presented ample evidence to demonstrate that the costs of obtaining the water required to sustain operation through 2042 and 2045 far exceeds economic levels. In light of the rapidly deteriorating water supply, it is clear that the Tolk units should be retired

[50] At the time Tolk was built, the wellfield average flow was approximately 700 gallons per minute (gpm) per well; now the flow rate is approximately 200 gpm and projected to drop to between 50-80 gpm as the aquifer is further depleted. Direct Testimony of M. Lytal at 65.

[51] *Id. at* 64.

[52] *Id.* at 64.

[53] *Id.* at 76-77.

[54] Sources included 3-D modeling and other public data from the High Plains Water District ("HPWD"), modeling and data from the United States Geological Survey, semi-annual wellfield productivity test, and groundwater modeling from the firm WSP.

by 2032 *at the latest*. Indeed, our analysis of the Company's own data makes clear that customers would save money by retiring the plant even sooner. Based on this, I recommend that the Commission approve a retirement (and depreciation) date for Tolk no later than 2032, or ideally earlier.

## 6. SPS HAS NOT DEMONSTRATED THAT SEASONAL OPERATION OF TOLK THROUGH 2031 IS THE LOWEST-COST OPTION FOR SERVING CUSTOMERS' NEEDS

**Q Please summarize this section.**

A In this section I first explain SPS's proposal to conserve water by operating Tolk seasonally as a generator from 2020 through 2031, and by operating the unit as a synchronous condenser in the off-peak season. I summarize the groundwater modeling and Strategist analysis upon which SPS relied and outline my concerns with the groundwater modeling and economic analysis. Then, in Section (i), I review how the risk of water shortage is incorporated into SPS's water model. In Section (ii), I discuss an alternative use for the water currently used at Tolk. In Section (iii), I outline how water shortages can impact modeling of peak capacity. In Section (iv), I review the Company's Tolk Strategist analysis. Finally, in Section (v), I outline how to incorporate each of the water-related risks and opportunities into the Company's economic analysis.

**Q Please explain SPS's proposed seasonal operation plan at Tolk between now and the proposed retirement date of 2032?**

A To conserve the economically recoverable water to which Tolk has access, and to extend the life of the plant to maintain the capacity value of the plant, SPS is

proposing to reduce operations seasonally.[55] Between 2019 and 2020, SPS proposes to operate Tolk as a coal-fired generator at full "economic dispatch" between June through September, and to operate the unit only at minimum load in the remaining off-peak months.[56] Then, starting in 2021, SPS proposes to continue full "economic dispatch" operations during the peak months (June–September) and operation in synchronous condensing mode during the off-peak months (October–May).[57]

**Q Why does SPS propose to operate Tolk in synchronous condenser mode when it is not operating as a generator?**

A Tolk currently provides voltage stabilization to the transmission system when it generates electricity.[58] SPS claims that the regional transmission system will face voltage constraints when Tolk is not generating electricity. Installation of a synchronous condenser and operation in synchronous condenser mode will allow the plant to provide the voltage stabilization SPS asserts is needed without operating the plant in generation mode and consuming fuel.

**Q What analysis did SPS rely on to develop its strategy to operate Tolk seasonally?**

A As noted, SPS relied on 2018 groundwater modeling from the firm WSP to evaluate whether the groundwater supply could roughly meet the required demand

[55] Direct Testimony of M. Lytal at 50, 72.
[56] Direct Testimony of B. Weeks at 22. SPS indicates that because of the time required to install the synchronous condenser, it is not feasible to take Tolk offline during the off-peak months beginning in 2019.
[57] *Id* at 17.
[58] Direct Testimony of M. Lytal at 72.

for continued operation under both current operations (typical demand) and seasonal operations (optimized demand).[59] Based on the results of this modeling, SPS then developed a spreadsheet-model ("SPS's water model") to more closely evaluate Tolk's long-term water supply under five operating scenarios[60] and identify a water depletion window in which the Company could no longer economically meet its generation cooling needs.[61] SPS then input the parameters from the water model into the Strategist model ("Tolk Strategist analysis") to calculate present value revenue requirement of each scenario.

**Q Do you have any concerns with the way SPS incorporated its water depletion assumptions into the economic analysis?**

A Yes. SPS asserts that seasonal operation of the plant offers the lowest-cost option for ratepayers. However, SPS's Tolk Strategist analysis contains several flaws and shortcomings—specifically that it: (1) does not properly account for the risk that the amount of economically recoverable water may fall faster than currently contemplated; (2) does not consider the revenue that could be gained by selling the remaining water in place of using it to support plant operations; (3) does not directly consider the impact that accelerated water shortages could have on the plants' peak availability; and (4) is limited to five scenarios that each assume continued operation and do not contemplate retirement earlier than 2025 alongside replacement with alternatives.

[59] Direct Testimony of M. Lytal at 72.
[60] Direct testimony of M. Lytal at 72; SPS Response to SC 1-25(CD) attachment Tolk_x water supply model_scenario_2 (*see* Exhibit DG-2); Direct Testimony of M. Lytal at Attachment ML-6(CD).
[61] Direct Testimony of M. Lytal at 73.

### *i. SPS's economic analysis does not properly evaluate the risk that the amount of economically recoverable water may fall faster than SPS currently contemplates*

**Q Please summarize this section.**

**A** First, I discuss my concerns with the way SPS incorporated, and relied upon, the WSP groundwater modeling into the Company's economic modeling and its plan to operate Tolk seasonally given the level of uncertainty in the WSP groundwater modeling. Second, I outline the implications of SPS's failure to incorporate the risks that agricultural and municipal pumping will deplete the aquifer faster than anticipated into its SPS's spreadsheet water model. Finally, I conclude that SPS has not presented adequate evidence to demonstrate that the aquifer can economically supply the water needed to support operations through 2031.

**Q Do you have concerns with the Company's use of the WSP groundwater modeling to develop its plan to operate Tolk seasonally?**

**A** Yes, SPS asserts that the WSP groundwater modeling "confirms that reduced operations can extend the useful lives of the Tolk units until 2030–2032 relative to typical operations."[62] However, the results presented by WSP actually do not fully support this statement. While the report finds that the difference between the available water supply and demand was likely to be significantly lower under an optimized demand scenario (relative to a tradition demand scenario), the report clearly states:

[62] Direct Testimony of M. Lytal at 75; Exhibit DG-6, *2018 Groundwater Modeling Results,* Xcel Energy (Nov. 2018).

SPS will likely have challenges meeting the average annual groundwater demands throughout both scenarios, with these challenges accelerating in the year 2024. Meeting peak demands in the summer will also likely be a challenge for the wellfields starting in 2019.[63]

Moreover, WSP acknowledges that its model may have underestimated depletion rates, most notably because of the uncertainty about groundwater pumping rates from irrigators located close to the SPS Water Rights Area ("XWRA") boundary.[64]

**Q What are the implications of WSP's findings that meeting peak water demands will be challenging starting in 2019, and accelerating starting in 2024?**

A WSP's findings indicate that it will be difficult for SPS to ensure access to sufficient water at peak times through 2032, even assuming a baseline-level of additional wells. This means that water could be depleted more quickly than modeled in SPS's water model, and the Company would therefore need to spend more money than currently included in the Tolk Strategist analysis to maintain access to sufficient water. Any wells required beyond that baseline will make Tolk more uneconomic. Therefore SPS's Strategist economic analysis should have included robust evaluation of sensitives for deviations from (1) the water depletion windows calculated in SPS's water model, and thus (2) an increase in the number of wells required to supply peak water demands.

[63] Direct Testimony of M. Lytal, at Attachment 2018_Xcel_Groundwater_Model_Update_final_reduced, page 3; Exhibit DG-6, *2018 Groundwater Modeling Results*, Xcel Energy (Nov. 2018).
[64] *Id.*

Instead, SPS's economic analysis relies on a best-case scenario input assumption around water availability, without also including any evaluation of the costs and impact on ratepayers if the water actually costs more to procure going forward. Just as prudent utilities evaluate a range of fuel and capital cost assumptions, energy prices, and load forecasts, SPS should have evaluated a high-band water depletion scenario that reflects the very real risk that SPS's baseline assumption is overly optimistic.

**Q Please explain why pumping by irrigators located close to the SPS Water Rights Area ("XWRA") is relevant to SPS's analysis.**

A The amount of water available to Tolk is critically influenced not just by how much water the Company uses at the plant, but also by how much water agricultural and municipal entities in the area are using.[65] SPS witness Lytal acknowledged this in stating that "one of the most significant variables in the WSP model relates to the amount of agricultural water used in the model domain outside of the SPS wellfield, which drives overall water usage in the area."[66] This means that SPS has no control over a main factor driving depletion of its water supply.[67]

**Q How large of an impact could changes in agricultural and municipal pumping have on the aquifer depletion rates?**

A SPS does not quantify how large of an impact changes in area water pumping could have on depletion rates; therefore, we have no information on how the

[65] Direct Testimony of M. Lytal at 66-67.
[66] *Id.*
[67] *Id.* at 76.

magnitude of uncertainty from external pumping compares to the magnitude of impacts from changing plant operations.[68] Without this information, the Commission cannot know on whether internal operational efforts by SPS to manage aquifer depletion rates could be easily negated and overwhelmed by changes in external pumping practices.

**Q How does SPS's water model take into account the uncertainty of pumping by agricultural and municipal parties in the area?**

**A** SPS's water model uses a small range (three years) of potential depletion dates to capture some uncertainty.[69] However, the model does not directly quantify or evaluate uncertainty from agricultural and municipal pumping. SPS's water modeling focuses only on how changes in operation of its own plants impact the water depletion timeline.[70]

**Q Do you have any other concerns with SPS's modeling of future water availability?**

**A** Yes. None of the groundwater modeling on which SPS relies considers the risk of future regional droughts leading to less economically recoverable water.[71] Drought can directly impact the water available to Tolk. For example, by decreasing the surface water available to municipal and agricultural parties in the

[68] SPS Response to SC 1-19 (*see* Exhibit DG-2). SPS states that it has not performed any analysis to evaluate or quantify the risk of less than projected economically recovery water resources preventing seasonal operation of the Tolk plant through 2032.
[69] *Id.*
[70] SPS Response to SC 1-25(CD) attachment Tolk_x water supply model_scenario_2 (*see* Exhibit DG-2).
[71] SPS Response to SC 1-18 (*see* Exhibit DG-2).

area, drought can cause an increase in the rate at which they draw from the aquifer beyond the levels anticipated.

**Q Has SPS adequately demonstrated that optimized seasonal operations will ensure there is sufficient water to sustain operations through 2031?**

**A** No. While SPS has definitely demonstrated that there is not sufficient water to sustain operations through the currently approved 2042 and 2045 retirement dates, the Company's analysis does not demonstrate that there will be sufficient water to sustain operations through 2031. As discussed above, SPS will face increasing challenges meeting groundwater need as soon as 2019 and accelerating beyond 2024.[72] Despite this, SPS is still proposing to run Tolk in seasonal operations mode for an additional 13 years beyond the 2019 date of increasing challenges, and eight years beyond the 2024 date of the onset of accelerating problems.

**Q If the evidence does not definitively support the feasibility or economic soundness of operation through 2031, why is SPS proposing this date?**

**A** It is unclear why SPS is requesting approval for a 2032 retirement date for ratemaking reasons while simultaneously admitting its analysis shows that an earlier retirement date is likely.[73] Specifically, Witness Weeks includes the following in testimony:

[72] Direct Testimony of M. Lytal at Attachment 2018_Xcel_Groundwater_Model_Update_final_reduced, page 3.
[73] Direct Testimony of B. Weeks at 22-23.

Q: "If SPS's analysis shows that the retirement date for Tolk could be earlier than 2032, why does SPS propose a 2032 retirement date for ratemaking purposes?"

A: SPS is proposing this date to be conservative for ratemaking purpose. SPS first requested a 2032 retirement date in Case No. 17-00255-UT but the request was denied…[74]"

The lack of clarity provided by the Company here on why the 2032 date was selected indicates that it is was likely arbitrarily selected rather than supported by analysis or actual evidence.

### *ii. SPS's economic analysis does not consider alternative uses for the water other than plant operations at Tolk*

**Q Has SPS considered selling its water rights instead of using the water to operate Tolk?**

A No. SPS claims it has not explored any opportunities to sell the water the Company would otherwise use to operate Tolk.[75]

**Q Is there evidence that there would be demand for Tolk's water supply or Xcel's water rights?**

A Yes. SPS discussed the possibility of buying water from the City of Lubbock. This plan was not pursued because the City realized it did not have sufficient

[74] Direct Testimony of B. Weeks at 22-23.
[75] SPS Response to SC 1-20 (*see* Exhibit DG-2).

water to supply Tolk.[76] SPS has also discussed the declining levels of water available for area agricultural and municipal parties. All of these parties facing water shortages themselves present potential buyers for the water that SPS is currently using to run Tolk.

**Q What is the implication of omitting this potential revenue stream from economic or retirement analysis of Tolk?**

A The value of selling the water or water rights represents a real value stream that SPS could realize under alternative resource scenarios. Omitting potential revenue streams from the sale of Tolk's water results in an undervaluing of alternative resource options relative to continued operations of Tolk.

### *iii. SPS's economic analysis does not properly reflect how the water shortage will impact peak capacity availability*

**Q How does uncertainty about future water availability discussed above impact the economics of operations at Tolk?**

A SPS cited the value of Tolk's capacity as a reason to maintain the unit as a seasonal resource.[77] However, WSP's findings clearly indicate that SPS will have trouble maintaining access to water sufficient to support peak summer operations beyond 2019.[78] Based on this uncertainty, SPS cannot rely on Tolk's full capacity as a firm resource during summer peaks. Therefore, modeling Tolk at its full

[76] Direct Testimony of W. Grant at 82.
[77] Direct Testimony of M. Lytal at 72.
[78] Direct Testimony of M. Lytal at Attachment 2018_Xcel_Groundwater_Model_Update_final_reduced, page 3.

capacity results in an overstatement of the summer capacity value that Tolk actually provides to the system and overstates the value of keeping Tolk operating as a generator.

### *iv. SPS's economic analysis is limited in scope and fails to consider retirement in advance of 2025*

**Q Please summarize this section.**

A In this section I review the limitations of the Strategist modeling that SPS performed using the water depletion findings from the Company's water model. I discuss how SPS constrained its analysis to only five scenarios and did not consider retirement in advance of 2025 in any of its scenarios. Then, I discuss why the Tolk Strategist analysis does not actually provide adequate information on whether continued operation of Tolk in seasonal mode through 2031 is the least-cost option for ratepayers.

**Q Please describe SPS's Strategist analysis and how it connects with the WSP groundwater modeling, and SPS's water model.**

A SPS used the Company's water model to develop an estimate of when aquifer depletion would occur based on five different scenarios of plant operation. SPS then modeled these five scenarios (Table 10) of plant operation in the Strategist model,[79] along with the costs required for each, to determine the total cost of each

[79] "Strategist is a resource planning model specifically designed to determine the least-cost resource mix for a utility system from a prescribed set of resource technologies under given sets of constraints and assumptions." Direct Testimony of B. Weeks at 7.

scenario.[80] SPS presented the net present value of revenue requirements ("NPVRR") of each scenario, and the cost difference for each scenario relative to the baseline of sustaining current operations through 2025.

**Table 10. Strategist scenarios modeled by SPS**

| Scenario | Description |
|---|---|
| **Scenario 1** | Full economic dispatch until the water runs out |
| **Scenarios 2-4** | Variations of economic dispatch in peak season and operation of one or both units in either Synchronous Condenser mode or at minimum load in off-peak seasons |
| **Scenario 5** | Full economic dispatch of one unit with retirement of the other unit and installation of synchronous condenser |

*Source: Direct Testimony of B. Weeks at 17-18.*

**Q Do the scenarios modeled capture an adequate range of operational scenarios?**

A No. All of SPS's scenarios assume that both units stay online as generators through at least 2025. This means there is no analysis of partial or full retirement of the generation assets in advance of 2025 and replacement with alternatives. In other words, SPS's strategist analysis does not answer the question, "What is the least-cost option for ratepayers going forward to provide the energy, capacity and voltage support services that the system needs, and would otherwise get from Tolk?" Instead, SPS's strategist analysis answers the question, "Assuming the Tolk units stay online as generators through at least 2025, which combination of seasonal operation, generator retirement, and operation in synchronous condenser mode, from among the five options we have outlined, is the lowest cost?" This is

[80] SPS modeled the following costs for each scenario: (1) ongoing capital expenditures; (2) ongoing capital expenditures associated with additional water wells; (3) the cost associated with synchronous condensers; (4) fixed O&M; (5) and costs associated with TUCO fuel handing. Direct Testimony of M. Lytal at 76-77.

not a replacement or a retirement analysis; rather, this is a comparison of the costs of five specific scenarios that all assume full operation through 2025.

**Q Is it reasonable for SPS to narrow down a unit replacement or economic analysis to that set of potential scenarios?**

A While it can be reasonable for a utility to conduct economic analysis based on comparing only specific scenarios, those scenarios need to be inclusive of the full range of reasonable results, spanning near-term retirement, through long-term continued operation. In this case, the given scenarios were all biased towards continue operations of Tolk, and therefore the scenarios did not encompass a full range of outcomes. Therefore, the results are unsuitable for determining whether seasonal operation through 2031 is the least-cost plan for ratepayers.

**Q What are the implications for ratepayers of SPS relying on outdated retirement analysis and incomplete Strategist modeling of seasonal operations?**

A Ratepayers are being asked to pay for a resource plan that SPS has not demonstrated is the lowest-cost option to provide the energy, capacity, and voltage support services. Instead, SPS has calculated the net present value of revenue requirements for a few specific scenarios based on a set of incomplete model inputs. This means that SPS is saddling ratepayers with the cost of operating Tolk without adequately evaluating whether retiring the plant prior to 2025, and replacing it with lower cost resources, would be less costly to ratepayers.

### *v. SPS should incorporate the risks and opportunities relating to water and water shortage, among other modifications, into an updated retirement analysis*

**Q Please summarize how SPS should incorporate all of the factors outlined above into an updated economic analysis of Tolk.**

**A** SPS should evaluate, and incorporate into an updated unit replacement and retirement modeling of Tolk, the following items (in addition to other modifications described in other sections of my testimony, including additional environmental risks and costs): (1) the value of selling the water (or even water rights) that Tolk would otherwise rely on for cooling; (2) capacity de-ratings for Tolk based on the real and likely risk that water availability may not be able to support future peak operations; and (3) operation of Tolk in synchronous condenser mode year-round starting when the conversion is complete.

**Q How should SPS be incorporating the opportunity cost to sell water?**

**A** SPS should add the revenue that the Company would earn from selling Tolk's water, or alternatively the value to the Company of using the water at Plant X as a value stream in its economic modeling. SPS actually does currently include an opportunity-cost adder to alter Tolk's offer price to reduce plant dispatch and reduce water consumption when making dispatch decisions.[81] However, this has not been incorporated into its planning analysis.

[81] SPS Response to SC 2-5b (*see* Exhibit DG-2).

**Q How should the uncertainty around future water availability to support peak operations be integrated into SPS's modeling?**

A Tolk's firm capacity should be de-rated over the years to reflect the constraints water availability will place on Tolk's ability to meet peak summer demand. In the Strategist model, SPS models Tolk at full capacity (540 MW for Unit 1 and 543 MW for Unit 2) through 2031.[82] This allows SPS to credit the full capacity of Tolk towards meeting its reserve margin, and therefore avoiding new capacity. In reality, Tolk's capacity should be de-rated after 2019 to reflect the risk that the Company will not be able to economically procure sufficient water to support peak operations.

**Q What alternatives should SPS be considering for supplying the year-round voltage support services currently provided by Tolk?**

A SPS currently plans to get voltage support services from Tolk both when the plant is operating in generation mode and as a synchronous condenser. However, SPS does not need to operate the plant as a generator between June and September (peak season), as currently planned, to obtain voltage support. Instead, as an alternative, SPS should evaluate retiring the generation portions of Tolk as soon as it installs the synchronous condenser, and operating the plant year-round in only synchronous condenser mode. Converting the coal plant exclusively to a synchronous condenser would allow SPS to meet its voltage support needs, while extending the depreciation schedule for the Tolk assets required for synchronous condenser operation.

[82] SPS Response to SC 2-2 (*see* Exhibit DG-2).

## 7. SPS SHOULD PERFORM UPDATED RETIREMENT ANALYSIS FOR TOLK AND HARRINGTON THAT COMPREHENSIVELY EVALUATES ALTERNATIVES AS WELL AS ENVIRONMENTAL REGULATIONS, WITH ACCURATE UPDATED ASSUMPTIONS

**Q Please summarize this section.**

A In this section I first review the prior retirement analysis conducted for Tolk and Harrington and find that the most recent analysis from 2014–2015 needs to be updated based on changes in the prices of gas and renewables, which have dramatically shifted the electricity market. I will note that SPS was or should have been aware of these changes ahead of the filing of this rate case. Second, I summarize environmental regulations that could impact plant operations in the future, yet that SPS failed to include in its modeling. I then discuss the likely impact that each would have on plant economics. Finally, I outline my recommendations for an updated retirement analysis for both Tolk and Harrington that fully considers alternative resources and properly evaluates what the system actually needs.

### *i. SPS's most recent retirement analysis reflects outdated assumptions and market trends*

**Q When did SPS last conduct retirement analysis for its coal units?**

A SPS's last retirement analysis of Tolk and Harrington was completed in the 2014–2015 timeframe (this analysis was conducted using the Strategist model).[83] SPS actually concluded from this analysis that shutting down Tolk would not be

[83] SPS Response to SC 1-6 (*see* Exhibit DG-2).

expensive due to the presence of the production tax credits and investment tax credits for renewables, and due to lower gas and oil prices. Additionally, the analysis concluded that SPS should acquire additional wind resources and seek additional solar resources in late 2016.[84] It is unclear why the Company did not act on this finding. For this current rate case, SPS conducted Strategist analysis as well. However as discussed above, the analysis was constrained to five operational scenarios for the Tolk Plant and did not consider retirement for Tolk prior to 2025.

**Q Why should SPS do a full updated unit replacement analysis for Tolk and Harrington?**

A There have been large shifts in electricity markets since 2014–2015. These changes include the persistence of low natural gas prices, declining costs of renewables and storage, and minimal growth in electricity demand. The status of environmental regulations that could require large capital expenditures to comply has also changed. Additionally, the new operational constraints at Tolk significantly change the economics of operating the plant. Finally, neither Tolk nor Harrington is locked into a long-term coal contract that would pose a challenge to early retirement; [85] therefore there are no significant cost barriers to retirement.

[84] SPS Response to SC 1-6(a), Exhibit SPS-SC 1-6(a) at 33 (*see* Exhibit DG-2).
[85] Direct Testimony of H.C.Romer on Behalf of SPS at 20.

**Q What impacts have electricity market trends had on the operations of coal-fired plants nationwide?**

A In recent years, the trends around lower-cost gas and renewables, combined with the higher cost of environmental compliance for higher-polluting coal units, have driven the retirement of many coal units. The EIA recently reported that more than 65,000 MW of U.S. coal capacity retired between 2007 and 2018.[86] Furthermore, 2018 saw nearly 13,000 MW of U.S. coal capacity retired.[87] As an alternative to shutting down, some coal-fired plants, such as the Dolet Hill plant in Louisiana, have switched to seasonal operation, shutting down in off-peak seasons when demand is low and turning back on for just the peak seasons.[88] This decreases the environmental impact of running the plants while allowing the utility to retain the peak capacity.

[86] Exhibit DG-7, EIA, "U.S. coal consumption in 2018 expected to be the lowest in 39 years." (Dec. 28, 2018), *available at*: https://www.eia.gov/todayinenergy/detail.php?id=37817.

[87] Exhibit DG-8, EIA, "More than 60% of electric generating capacity installed in 2018 was fueled by natural gas." (Mar. 11, 2019), *available at*: https://www.eia.gov/todayinenergy/detail.php?id=38632; Exhibit DG-9, Nelson, William and Sophia Lu, Half of U.S. Coal Fleet on Shaky Economic Footing. Bloomberg New Energy Finance (Mar. 26, 2018).

[88] Exhibit DG-10, Gheorghiu, Iulia. Cleco, "SWPECO shift coal plant use, target 2.8 GW renewables in latest resource plans." Utility Dive (Sept. 6, 2019), *available at*: https://www.utilitydive.com/news/cleco-swepco-shift-coal-plant-use-target-28-gw-renewables-in-latest-reso/562213/.

### *ii. SPS needs to include the costs and risks of all likely environmental regulations in its updated retirement analysis*

**Q How should SPS include the future costs and risks of environmental regulations?**

A SPS should be modeling the projected impact of future environmental regulations that are likely to impact either plant. Specifically, SPS should include sensitivities in an updated unit replacement and retirement analysis on the risks of incurring new expenses for environmental compliance. The cost to comply with several of the regulations is considerable, meaning the economics would likely not support installation of the environmental controls and continued operation of the units. As such, SPS should evaluate resource portfolio options that can economically replace each plant over the range of possible years, reflected the uncertainty in the timing of when the regulations discussed below could be implemented.

Table 11 lists proposed environmental rules and their likely associated cost that SPS should add, at a minimum, to its existing modeling.

**Table 11. Proposed and final environmental rules that could impact Tolk and Harrington**

| Rule | Details | Cost |
|---|---|---|
| **Regional Haze** | Tolk identified as a "reasonable progress" source contributing to regional haze, and required to install dry scrubbers by Feb 2021; Xcel challenged that rule, and the Fifth Circuit remanded to EPA for review in 2017; there has been no action since, but the plant would be subject to review in 2021 plan. | Tolk: $400–$600 million,[89] plus $24 million annual O&M |
| **Best Available Retrofit Technology (BART)** | Harrington identified as "best available control technology" source; no final action taken yet. | Harrington: $400–500 million, plus $21 million annual O&M |
| **Affordable Clean Energy Rule** | Emissions guidelines, finalized July 2019. | TBD |

*Source: SPS response to SC 1-8 (see Exhibit DG-2).*

**Q Do any SPS company witnesses acknowledge the potential impact of future environmental compliance costs on plant economics?**

A Yes, on Tolk specifically. SPS witness Hudson acknowledged the potential impact on Tolk from environmental compliance costs, stating: "It should be noted that future environmental regulations may even further reduce the life span of the plant (Tolk)."[90] Company witness Grant also acknowledged that future environmental regulation could reduce the life span of Tolk as a generating resource, stating in a footnote (in reference to the request for a 2032 retirement date): "It should be noted that future environmental regulations may even further reduce the life span of the plant…"[91] Additionally, the risk of future additional

[89] Includes additional costs for water acquisition that would need to be made to operate the dry scrubbers appropriately. SPS Response to SC 1-8 (*see* Exhibit DG-2).

[90] Direct Testimony of D. Hudson on Behalf of SPS at 34.

[91] Direct Testimony of W. Grant at 79.

environmental regulations was also cited as one of the reasons SPS decided not to pursue the hybrid cooling towers at Tolk.[92]

**Q Why has SPS not included the cost of those proposed or other likely future environmental regulations in its most recent Tolk Strategist modeling?**

**A** Despite several SPS Company witnesses openly acknowledging the likelihood of future additional environmental compliance costs, the Company defends its position not to include these potential costs by stating that "SPS does not evaluate the effect of 'possible environmental regulations' (i.e. neither the subject or a proposed or final rulemaking) because they are speculative and may never be adopted, or they may be adopted in some different form than the proposal."[93]

**Q What regulations should SPS include in its retirement analysis for Tolk?**

**A** At Tolk, SPS should be modeling the cost to ratepayers of keeping Tolk if EPA moves forward on the "reasonable progress" requirements of the Regional Haze Rule, which could require the installation of ion dry scrubbers at a cost of $400–$600 million with annual O&M of $24 million.[94] It is worth noting that, regardless of the status of EPA's current regional haze rulemaking, Tolk would be subject to review and further control analyses in 2021, during the second planning period under the Regional Haze Rule.[95]

[92] *Id.* at 83.
[93] SPS Response to SC 1-8 (*see* Exhibit DG-2).
[94] *Id.*
[95] *See* 40 C.F.R. §§ 51.308(d), (f).

**Q What regulations should SPS include in its retirement analysis for Harrington?**

A At Harrington, SPS should be modeling the costs of installing additional sulfur dioxide ($SO_2$) controls, which SPS indicated may be required to comply with the National Ambient Air Quality Standards ("NAAQS"). [96] EPA's ruling on a final designation is expected by December of 2020 (once monitoring is finalized).[97] In 2017, EPA also proposed to require the installation of scrubbers at two of the Harrington units under the "best available retrofit technology" provisions of the regional haze rule.[98] Harrington's environmental compliance risk under the regional haze rule is still unresolved. As with Tolk, Harrington would also be subject to review and further control analyses in 2021, during the second planning period under the Regional Haze Rule.[99] The Company admitted that it has not evaluated the impacts that these potential investments will have on the economic operation of the Harrington units.[100]

**Q How does SPS's omission of potential environmental regulations impact the Strategist modeling results?**

A Omission of these costs understate the ongoing costs to operate the coal plant, and therefore makes the coal plants appear more economic than they are likely to be in reality. This also prevents SPS from adequately evaluating and planning for alternatives to provide the energy, capacity, and other services that the Company

[96] SPS Response to SC 1-8 (*see* Exhibit DG-2).
[97] *Id.*
[98] 82 Fed. Reg. 912, 949 (Jan. 4, 2017).
[99] *See* 40 C.F.R. §§ 51.308(d), (f).
[100] SPS Response to SC 1-8 (*see* Exhibit DG-2).

would need to replace either unit. If the EPA moves on the Regional Haze Rule or NAAQS $SO_2$ compliance, and Tolk or Harrington are required to install new environmental controls, the costs of compliance could easily exceed the economic value to ratepayers of continuing to operate the plants. These risks are real and should be factored into the utility's forward-looking decision-making.

### *iii. SPS should perform this updated retirement analysis as part of its next IRP*

**Q How should SPS be evaluating the energy, capacity, and other services that it actually needs in a retirement analysis?**

A In its future retirement analysis, SPS should focus on evaluating what the system actually needs in terms of energy, capacity, and other grid services, once one or both of the plants (or certain of their units) are retired. This is different than how utilities, including SPS, have traditionally approached retirement and replacement analysis by focusing on a replacement resource, or combination of resources, that provides the services that the retiring resource provides. This is critically inefficient because it presumes that the retiring unit was supplying exactly what the system needed, and this is almost never true. While the system needs may be aligned with or similar to the characteristics of the retiring unit, this approach biases resource planning in favor of resources that look like the resource that was retired, and that means fossil generators instead of alternative portfolios that include renewables, battery storage, and demand-side management.

**Q What do we know about SPS's current capacity need?**

A SPS's demand forecasts dropped each year between 2014 and 2018, before increasing again in 2019 (Figure 7 and Table 12). This means that when SPS completed its retirement analysis back in 2015, the Company assumed a

significantly higher level of demand than we know has actually materialized. In a high demand future, Tolk and Harrington would be assigned a high capacity value, and therefore the model would be less likely to retire the resources. With the Company's most recent Tolk Strategist analysis, it relied on its 2019 demand forecast, which projected a much higher level of demand than just a year prior in the 2018 IRP. This projected upturn in demand is driven by the Eddy County and Lea County Permian Basin oil and natural gas customer segments,[101] an industry where short-term growth often does not translate into sustained long-term demand. Once again, to fill perceived need of this new industry, the Strategist model would be likely to keep Tolk online as a generator, based on the avoided cost of building new capacity.

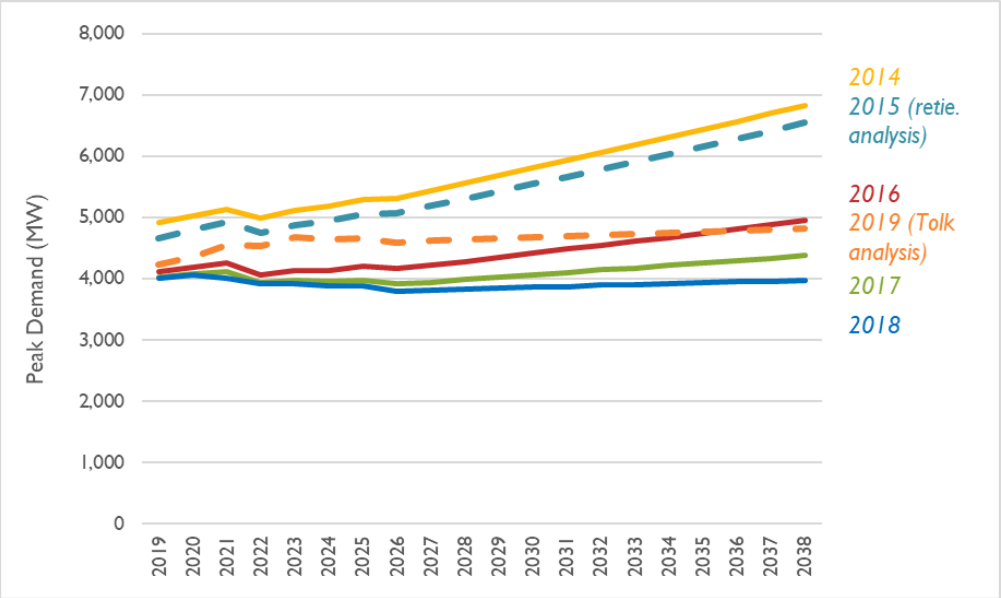
**Table 12. Peak demand growth rates from SPS's load forecasts (2019–2038)**

| Forecast | Compound Average Growth Rate (CAGR) |
|---|---|
| 2019 Tolk Strategist analysis | 0.76% |
| 2018 IRP | 0.0% |
| 2014/2015 Strategist retirement analysis | 1.75% |

*Source: SPS Response to SC 1-12; Workpaper SO - _SPS_SCENARIO2_REDUXOPS_2031.xlsx"; SPS Response to SC 1-6, Attachment SO – 05_RET EOY 21 23 (see Exhibit DG-2).*

[101] Direct Testimony of D. Hudson at 19.

**Figure 7. SPS's peak demand forecasts (2019–2038)**




*Source: SPS Response to SC 1-12; Workpaper SO - _SPS_SCENARIO2_REDUXOPS_2031.xlsx"; SPS Response to SC 1-6, Attachment SO – 05_RET EOY 21 23 (see Exhibit DG-2).*

**Q What do we know about what SPS likely needs for energy, capacity, and voltage support services if Tolk retires?**

A If Tolk retires and SPS has a capacity shortfall, the need should roughly align with the summer peak capacity that Tolk was going to provide operating in seasonal mode. This makes solar particularly well suited as a replacement option due to the alignment between the timing of system peak and solar generation in the region during summer months. If Tolk's retirement creates an energy need that cannot be met by solar, existing resources on the grid that could likely ramp up to provide the energy. SPS should not need any additional voltage support services when Tolk retires the plant's generation assets, assuming the proposed synchronous condenser is installed.

**Q What alternatives should SPS be considering in its retirement analysis for Harrington?**

A SPS should evaluate alternative resource options, including wind, solar, and battery storage, in addition to market purchases to replace Harrington. Additionally, the Company should be considering alternative operational options, such as seasonal operation for some or all the units. Seasonal operations would allow the Company to retain the capacity from the units but decrease the plants operational costs by generating electricity only during summer peak months when LMPs are highest. This would also decrease the environmental impact of the units by decreasing the amount of coal burned, which could have implications for compliance with the environmental regulations discussed above. This approach to switch to seasonal operation has been adopted by several plants, including Dolet Hills.[102]

**Q What do we know about the cost competitiveness of the renewables mentioned above in the region?**

A Other utilities in the region are actively procuring renewables. Public Service Company of New Mexico ("PNM") recently issued an all-source request for proposals ("RFP") in which the Company will seek to assess and integrate all bids, including packaged renewable energy, storage, demand-side resources, and distributed energy solutions.

[102] Exhibit DG-11, Daniel, Joseph. "Seasonal Shutdowns: How Coal Plants that Operate Less Can Save Customers Money." Union of Concerned Scientists (Dec. 20, 2018), *available at*: https://blog.ucsusa.org/joseph-daniel/seasonal-shutdowns-how-coal-plants-that-operate-less-can-save-customers-money.

Similarly, SPS's sister company, Xcel Energy Colorado, recently conducted an all-source RFP and received over 400 bids, most of which were for renewable resources, with the median bid for stand-alone wind energy resources at $18.10/MWh. Adding battery storage to wind energy resulted in median bids of $21/MWh. Moreover, Xcel Energy Colorado received 152 bids for solar projects comprising more than 13 GW of capacity, with the median bid at $29.50/MWh. Coupling solar with battery storage resulted in bids for $36/MWh. SPS should conduct a similar RFP process, and incorporate those cost assumptions into a revised retirement and replacement analysis.[103]

**Q Please summarize your recommendations to the Commission with regards to updated retirement analysis for both Tolk and Harrington.**

A The Commission should require that SPS conduct an updated and more comprehensive retirement analysis for both Tolk and Harrington as part of the next IRP. This analysis should include updated peak demand and load forecasts, alternative resource costs based on an RFP process similar to the ones outlined above, and alternative operational options, specifically seasonal operation for Harrington. Further, it should incorporate sensitivities around the cost of all likely future additional environmental regulations, as discussed above. Additionally, the retirement analysis for Tolk should include scenarios that incorporate capacity de-rating based on future water availability constraints, and the potential revenue from selling the water to other parties.

[103] Xcel Energy, *2016 Electric Resource Plan, 2017 All Source Solicitation 30-Day Report (Public Version)*, California Public Utility Commission, Proceeding No. 16A-0396E (Dec. 28, 2017).

**Q Does this conclude your testimony?**

**A** Yes.

**BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION**

| | | |
|---|---|---|
| **IN THE MATTER OF SOUTHWESTERN PUBLIC SERVICE COMPANY'S APPLICATION FOR: (1) REVISION OF ITS RETAIL ELECTRIC RATES UNDER ADVICE NOTICE NO. 282; (2) AUTHORIZATION AND APPROVAL TO SHORTEN THE SERVICE LIFE AND ABANDON ITS TOLK GENERATING STATION UNITS; AND (3) OTHER RELATED RELIEF** | ) | **Case No. 19-00170-UT** |

**AFFIDAVIT**

STATE OF Massachusetts )
) ss.
COUNTY OF Middlesex )

Devi Glick, first being sworn on her oath, states:

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

Devi Glick

SUBSCRIBED TO AND SWORN TO before me this ___ day of November, 2019, by Devi Glick.

JENNIFER MARUSIAK
Notary Public
COMMONWEALTH OF MASSACHUSETTS
My Commission Expires
April 29, 2022

Notary Public

My commission expires: 4/29/2022

## BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

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|---|---|---|
| **IN THE MATTER OF SOUTHWESTERN PUBLIC SERVICE COMPANY'S APPLICATION FOR: (1) REVISION OF ITS RETAIL RATES UNDER ADVICE NOTICE NO. 282; (2) AUTHORIZATION AND APPROVAL TO SHORTEN THE SERVICE LIFE OF AND ABANDON ITS TOLK GENERATING STATION UNITS; AND (3) OTHER RELATED RELIEF,** | ) | **Case No. 19-00170-UT** |
| **SOUTHWESTERN PUBLIC SERVICE COMPANY,** | ) | |
| **APPLICANT.** | ) | |

## CERTIFICATE OF SERVICE

**I HEREBY CERTIFY** that this day, a true and correct copy of the Direct Testimony of Devi Glick on Behalf of Sierra Club was sent to the following:

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|---|---|
| jfornaciari@hinklelawfirm.com | jth@keleher-law.com |
| Dhardy@hinklelawfirm.com | Cindy.Baeza@xcelenergy.com |
| william.a.grant@xcelenergy.com | steven.cordova@nmgco.com |
| Phillip.Oldham@tklaw.com | melchiore.Savarese@state.nm.us |
| katherine.coleman@tklaw.com | sgersen@earthjustice.org |
| Will.W.DuBois@xcelenergy.com | Anthony.Sisneros@state.nm.us |
| Evan.D.Evans@xcelenergy.com | fschmidt@hollandhart.com |
| jyee@cabq.gov | greg@emgnow.com |
| Zoe.E.Lees@xcelenergy.com | greg.tutak@hollyfrontier.com |
| Michael.A.D'Antonio@xcelenergy.com | matthew.marchant@hollyfrontier.com |
| Mario.A.Contreras@xcelenergy.com | mbking@hollandhart.com |
| tdomme@nmgco.com | nsstoffel@hollandhart.com |
| ctcolumbia@aol.com | rsougstad@hollandhart.com |
| mgorman@consultbai.com | tk.eservice@tklaw.com |
| jcaldwell@leacounty.net | tnelson@hollandhart.com |
| jdrake@modrall.com | aalderson@consultbai.com |
| scott.kirk.2@us.af.mil | cwalters@consultbai.com |
| JCP@jpollockinc.com | dmb@modrall.com |
| melissa_trevino@oxy.com | perry.robinson@urenco.com |
| darueschhoff@hollandhart.com | swilhelms@consultbai.com |
| lawoffice@jasonmarks.com | bjh@keleher-law.com |
| ashelhamer@courtneylawfirm.com | nvstrauser@tecoenergy.com |
| Linda.L.Hudgins@xcelenergy.com | rebecca.carter@nmgco.com |
| Jeffrey.L.Comer@xcelenergy.com | Kellie.Barahona@tklaw.com |
| smares@hinklelawfirm.com | KAT@jpollockinc.com |
| rhmoss@winstead.com | sancheza@rcec.coop |

| | |
|---|---|
| ann.coffin@crtxlaw.com | Jack.Sidler@state.nm.us |
| dgegax@nmsu.edu | jtauber@earthjustice.org |
| EHeltman@nmag.gov | nthorpe@earthjustice.org |
| sricdon@earthlink.net | ruben.lopez@endlessenergy.solar |
| Ramona.blaber@sierraclub.org | ckhoury@nmag.gov |
| ebony.payton.ctr@us.af.mil | rlundin@nmag.gov |
| tgurule@cabq.gov | gelliot@nmag.gov |
| cpinson@cvecoop.org | noble.ccae@gmail.com |
| csnajjar@virtuelaw.com | ajt@gknet.com |
| ryan.moore.5@us.af.mil | khart@redskylawnm.com |
| ACLee@hollandhart.com | stevensmichel@comcast.net |
| cadkins@hollandhart.com | Bradford.Borman@state.nm.us |
| dmfalliaux@hollandhart.com | John.Reynolds@state.nm.us |
| chall@earthjustice.org | dnajjar@virtuelaw.com |
| chris.dizon@endlessenergy.solar | wtempleman@cmtisantafe.com |
| matthew.miller@sierraclub.org | mmoffett@cmtisantafe.com |
| joshua.smith@sierraclub.org | Elisha.Leyba-Tercero@state.nm.us |
| Scott.Kirk.2@us.af.mil | jbroggi@hollandhart.com |
| Thomas.Jernigan.3@us.af.mil | bhart@hollandhart.com |
| Robert.Friedman.5@us.af.mil | glgarganoamari@hollandhart.com |
| Ebony.Payton.ctr@us.af.mil | |
| Arnold.Braxton@us.af.mil | |

**DATED** this 22 day of November 2019.

Jason Marks
Jason Marks Law LLC
1011 Third St NW
Albuquerque, NM 87102