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.

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[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. <u>SPS's economic analysis does not properly evaluate the risk that the amount of economically recoverable water may fall faster than SPS currently contemplates</u>

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.

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[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

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[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. <u>SPS's economic analysis does not properly reflect how the water shortage will impact peak capacity availability</u>

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 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. <u>SPS needs to include the costs and risks of all likely environmental regulations in its updated retirement analysis</u>

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	Description	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]

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[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.

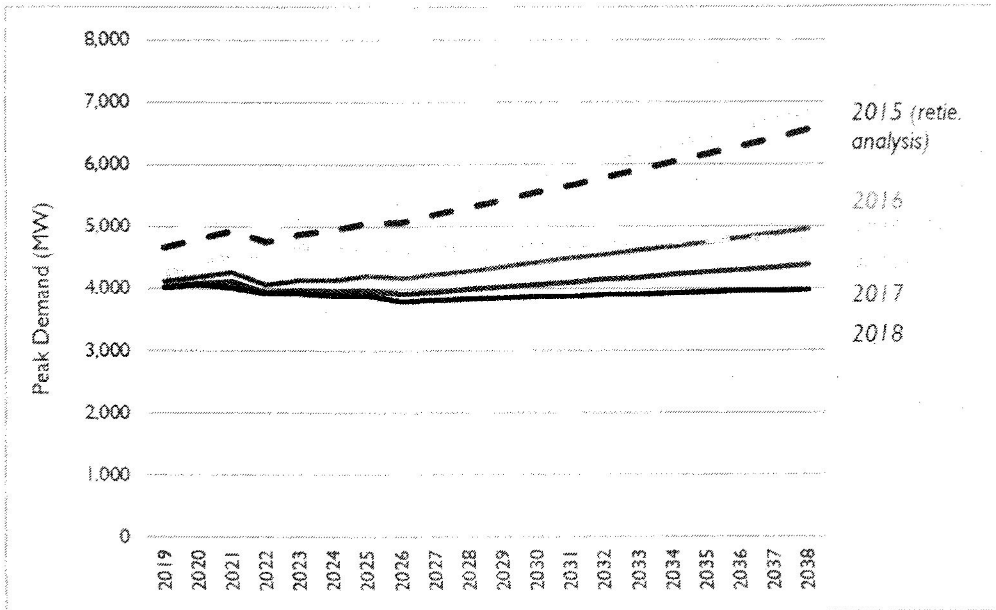
Table 12. Peak demand growth rates from SPS's load forecasts (2019–2038)

[illegible]	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.

Exhibit DG-3

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

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

Exhibit DG-3

BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

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,	)	NO 22 019
SOUTHWESTERN PUBLIC SERVICE COMPANY,	)	**Case No. 19-00170-UT**
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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Exhibit DG-3

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DATED this 22 day of November 2019.

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

Xcel Energy Exhibit DG-4

July 16, 2021

Ms. Melanie Sandoval, Records Bureau Chief
New Mexico Public Regulation Commission
P.O. Box 1269
Santa Fe, NM 87504-1269

Re: Case No. 21-00169-UT *In the Matter of Southwestern Public Service Company's 2021 Integrated Resource Plan*

Dear Ms. Sandoval:

Pursuant to Section 9(A) of NMAC 17.7.3, Southwestern Public Service Company ("SPS") hereby files with the New Mexico Public Regulation Commission ("Commission"), its 2021 New Mexico Integrated Resource Plan ("IRP") for the period 2022 through 2041.

A copy of this filing is being provided electronically to the Commission's Utility Division Staff, interveners in SPS's most recent general rate case, and participants in SPS's most recent renewable energy, energy efficiency, and IRP proceedings.

SPS is also providing a copy of the filing on the Xcel Energy IRP website, https://www.xcelenergy.com/company/rates_and_regulations/resource_plans.

If you have any questions, please contact me at (806) 378-2115 or Linda Hudgins, Case Specialist II at (806) 378-2709.

Yours very truly,

/s/ Mario Contreras
Mario Contreras,
Manager Rate Cases

Enclosures

Exhibit DG-4

2021
Integrated Resource Plan
Filed in Compliance with 17.7.3 NMAC

Southwestern Public Service Company

July 16, 2021

Xcel Energy[SM]
SOUTHWESTERN PUBLIC SERVICE

Safe Harbor Statement

This document contains forward-looking statements. Such statements are subject to a variety of risks, uncertainties, and other factors, most of which are beyond Southwestern Public Service Company's, a New Mexico corporation ("SPS"), control and many of which could have a significant impact on SPS's operations, results of operations, and financial condition, and could cause actual results to differ materially from those anticipated. For further discussion of these and other important factors, please refer to reports filed with the Securities and Exchange Commission. The reports are available online at www.xcelenergy.com.

The information in this document is based on the best available information at the time of preparation. SPS undertakes no obligation to update any forward-looking statement or statements to reflect events or circumstances that occur after the date on which such statement is made or to reflect the occurrence of unanticipated events, except to the extent the events or circumstances constitute material changes in the Integrated Resource Plan ("IRP") that are required to be reported to the New Mexico Public Regulation Commission ("Commission") pursuant to 17.7.3.10 NMAC.

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Glossary of Acronyms and Defined Terms

Acronym/Defined Term	Meaning
2021 IRP	Integrated Resource Plan, filed July 16, 2021
Action Plan	IRP Implementation During the First Four Years of the IRP
Action Plan Period	2021 IRP implementation from 2022-2025
ATB	Annual Technology Baseline
BESS	Battery Energy Storage System
CC	Combined Cycle
CO_2	carbon dioxide
Commission	New Mexico Public Regulation Commission
CTG	Combustion Turbine Generator
DSM	Demand-Side Management
EE	Energy Efficiency
ELCC	Effective Load Carrying Capability
EOY	End of Year
EUEA	Efficiency Use of Energy Act
FOM	Fixed Operations and Maintenance
GCP	Combined Real Gross County Product
GWh	gigawatt-hour
HRSG	Heat Recovery Steam Generator
ICO	Interruptible Credit Option
IRP	Integrated Resource Plan

Acronym/Defined Term	Meaning
IRP Rule	17.7.3 NMAC
ISO	independent system operator
ITC	Investment Tax Credit
kW	kilowatt
kWh	kilowatt-hour
L&R	Loads and Resources
LED	Light Emitting Diode
LM	Load Management
LOLE	Loss of Load Expectation
LRE	Load Responsible Entity
MMBtu	Million British Thermal Unit
MW	megawatt
MWh	megawatt-hour
NAAQS	National Ambient Air Quality Standards
NERC	North American Electric Reliability Corporation
NREL	National Renewable Energy Laboratory
NYMEX	New York Mercantile Exchange
OATT	Open Access Transmission Tariff
O&M	Operations and Maintenance
Planning Period	2022-2041 Planning Period

<u>**Acronym/Defined Term**</u>	<u>**Meaning**</u>
Planning Reserve	available capacity above the projected peak demand
PPA	Purchased Power Agreement
PRM	Planning Reserve Margin
PTC	Production Tax Credit
PV	photovoltaic
QF	Qualifying Facility
RFI	Request for Information
RPS	Renewable Portfolio Standard
RTO	Regional Transmission Organization
SPS	Southwestern Public Service Company, a New Mexico corporation
Staff	Utility Division Staff of the Commission
STG	Steam Turbine Generator
TCEQ	Texas Commission on Environmental Quality
Tolk Analysis	analysis evaluating the economically optimal retirement date of the Tolk Units
TOU	Time of Use
VOM	Variable Operations and Maintenance
Xcel Energy	Xcel Energy Inc.

Executive Summary

SPS presents its 2021 Integrated Resource Plan ("2021 IRP") identifying the most cost-effective portfolio of resources over the 20-year Planning Period (2022 – 2041). For more than a decade, SPS has strived to serve its customers with a cleaner mix of generating resources and with an energy grid that is more reliable and secure - all while keeping customer energy bills low. SPS continues to deliver on this goal, successfully adding an additional 1,230 megawatts ("MW") of low-cost wind generation since the filing of the 2018 IRP. In addition, SPS is well positioned to comply with New Mexico's Renewable Portfolio Standards ("RPS") and the State's carbon emission reduction goals. In SPS's most recent RPS filing (New Mexico Case No. 21-00172-UT), SPS proposed early compliance with the RPS's 2025 goal to supply no less than 40% of SPS's New Mexico retail energy sales by renewable energy, and last year, SPS's carbon emissions were reduced 55% when compared with 2005 levels.

The highlighted changes below demonstrate that SPS's 2021 IRP continues to support the company's commitment to provide clean, reliable and affordable energy.

Future Operation of SPS's Coal Generating Units

SPS's existing coal generating units have, or are planned to, undergo substantial operational changes since SPS's filed its last IRP in 2018. Beginning 2021, the Tolk Generating Units located in Texas are economically dispatched during the high load summer months, and to conserve limited groundwater are shut down in the eight off-peak months (unless called upon in urgent need conditions). SPS's Tolk Analysis, which was filed in advance of this IRP, continues to support seasonal operation of the Tolk Units until a 2032 retirement date. Additionally, per an agreed order with the Texas Commission on Environmental Quality ("TCEQ"), SPS's other coal-fired plant, the

Harrington Generating Station located in Texas, is planned to be converted to operate exclusively on natural gas by the end of 2024. Both the Tolk and Harrington Generating Stations are scheduled to retire within the 20-year IRP planning period.

Aging Gas Steam Resources

Several of SPS-owned gas steam generating units are at the end of their useful life. During the 4-year Action Plan[1], over 650 MW of gas steam generation is scheduled to retire and within the Planning Period, SPS's entire 1.6 GW portfolio of gas steam generating units are scheduled to retire.

Economic Renewable Energy Resources

SPS's most cost-effective portfolio of resources and alternative portfolios support a continued transition to a more renewable-heavy portfolio of generating resources, especially as SPS's existing coal and aging gas steam resources are scheduled to retire. Despite scheduled retirements, during the Action Period, SPS has sufficient resources to meet its reliability and regulatory requirements, therefore is well positioned to acquire new economic energy resources only when they are most likely to economically benefit SPS's customers.

Emerging Technologies

The continued transition to a more renewable heavy portfolio of resources will also necessitate a need for firm peaking and load-following resources to provide reliability and energy while intermittent resources, such as wind and solar, are not available. Currently, natural gas combustion turbine generators ("CTG") are the most economical technology to provide critical system reliability needs. However, to meet New Mexico's 2045 carbon-free goal, natural gas CTGs may be required to use carbon-free hydrogen as a fuel source, or CTGs may ultimately be replaced by emerging

[1] IRP Implementation During the First Four Years of the IRP

technologies, such as battery energy storage systems ("BESS"). By preserving the capacity and energy benefits of the Tolk and Harrington Generating Stations under current planning, SPS's most cost-effective portfolio of resources does not include any new carbon-emitting resources until 2031, therefore, providing SPS time to re-evaluate emerging technologies in future IRPs.

Section 1. INTRODUCTION

SPS, a wholly-owned subsidiary of Xcel Energy Inc. ("Xcel Energy"), presents its 2021 integrated resource plan ("2021 IRP") in accordance with the Efficient Use of Energy Act (NMSA 1978, § 62-17-1, *et seq.*, "EUEA") and 17.7.3 NMAC (the "IRP Rule"). SPS's 2021 IRP: (i) identifies the most reasonable, cost-effective resource portfolio to meet all applicable regulatory requirements and to supply the energy needs of New Mexico customers during the 2022-2041 Planning Period ("Planning Period"); and (ii) provides an Action Plan discussing 2021 IRP implementation from 2022-2025 ("Action Plan Period").

Per the uncontested comprehensive stipulation in SPS's New Mexico Base Rate Case No. 19-00170-UT, SPS's 2021 IRP includes an updated "Tolk Analysis" evaluating the economically optimal retirement date of the Tolk Units. The Tolk Analysis is included in its entirety in Appendix H and was filed with the Commission in advance of the IRP on June 30, 2021.

SPS's 2021 IRP was developed by considering studies, forecasts, regulatory predictions, and information exchanged through a series of technical conferences and a public advisory process, combined with historical data, existing and potential resource capabilities, and costs associated with alternative generation resource expansion plans. SPS's analysis considered applicable regulatory, and operational obligations and both short- and long-term least-cost impacts to customers, while balancing the ability to deliver the expected level of service to customers while meeting applicable regulatory and operational obligations. The goal of SPS's 2021 IRP was to develop a reliable, robust, cost-effective, and environmentally-focused generation expansion plan.

Many factors may impact this IRP and could potentially require updates to the Action Plan and will be the subject of future IRPs. These factors include: (i) changes to the operation of SPS's existing coal-fired generating units; (ii) changes to, or the extension of, renewable tax credits; (iii) uncertainty in the cost and schedule of interconnecting new generation within SPS's footprint; and (iv) potential technological and economic advances in emerging technologies. Each of these factors are discussed in more detail in Section 7.

Most importantly, the resource plan is presented based on the best information available at this time and with recognition that SPS will have to be flexible in resource plan execution over the Action Plan and Planning Period as new information becomes available and in response to the inherent uncertainty of long-term forecasting and resource planning. SPS will continue to actively monitor developments in these areas. However, as presented, SPS's 2021 IRP provides a well-rounded resource portfolio that addresses customer cost impacts, environmental impacts, critical reliability needs in localized areas of SPS, operational issues, and complies with applicable regulatory requirements.

The remainder of the IRP is organized as follows: (i) Section 2 provides a background; (ii) Section 3 discusses existing supply- and demand-side resources, and reserve margin/reliability requirements, (iii) Section 4 provides SPS's current load forecast; (iv) Section 5 presents SPS's Loads and Resources ("L&R") table for the Planning Period; (v) Section 6 identifies the resource options; (vi) Section 7 presents a determination of the most cost-effective resource portfolio and alternative portfolios; (vii) Section 8 discusses the public advisory process; and (viii) Section 9 presents SPS's Action Plan.

Section 2. BACKGROUND

The objective of the IRP is to identify the most cost-effective portfolio of resources to supply the energy needs of customers while giving preference to resources that minimize environmental impacts and whose costs and service quality are equivalent (17.7.3.6 NMAC).

Specifically, the IRP Rule requires that affected utilities provide the following details (17.7.3.9(B) NMAC):

(1) description of existing electric supply-side and demand-side resources;
(2) current load forecasts;
(3) load and resources tables;
(4) identification of resource options;
(5) description of the resource and fuel diversity;
(6) identification of critical facilities susceptible to supply-source or other failures;
(7) determination of the most cost-effective resource portfolio and alternative portfolios;
(8) description of the public advisory process;
(9) Action Plan; and
(10) other information that the utility finds may aid the Commission in reviewing the utility's planning process.

Please refer to Appendix N for a table indicating where each of the rule requirements is met in this filing.

In addition, the uncontested comprehensive stipulation in New Mexico Case No. 19-00170-UT required SPS's 2021 IRP to include a robust analysis of Tolk abandonment and economical potential means of replacement by June 2021 (the "Tolk Analysis"). The Tolk Analysis is included in its entirety in Appendix H and was filed with the Commission in advance of the IRP on June 30, 2021.

SPS filed its initial New Mexico IRP on July 16, 2009 (Case No. 09-00285-UT), its second IRP on July 16, 2012 (Case No. 12-00298-UT), its third IRP on July 16, 2015 (Case No. 15-00217-UT), and its fourth IRP on July 16, 2018 (Case No. 18-00215-UT); all of SPS's IRPs were accepted by the Commission. SPS's 2021 IRP includes all required components of the IRP Rule.

Section 3. EXISTING SUPPLY-SIDE & DEMAND-SIDE RESOURCES

3.01 - SPS-Owned Resources

SPS owns supply-side thermal generation resources, located in both New Mexico and Texas, which serve its entire system. SPS's supply-side thermal resources had a 2020 summer generation capacity of 4,335 MW and were comprised of a mix of coal-fired, gas steam, and simple-cycle CTG units. As shown in Table 3-1 (next page), the Tolk and Harrington coal-fired generating units provided nearly half of the 2020 summer peak capacity; gas steam units totaled approximately 1.6 GW; and simple-cycle CTG units totaled over 600 MW.

SPS also owns and operates two wind generating facilities. The 478 MW Hale Wind generating facility (Hale County, Texas) was placed in-service in June 2019, and the 522 MW Sagamore Wind generating facility (Roosevelt County, New Mexico) was placed in-service in December 2020.

The names, fuel types, locations, rated capacities (MW), expected retirement dates, capital costs (gross plant balance), fixed and variable operation and maintenance costs ("FOM" and "VOM"), fuel costs, heat rates (Btu/kWh), and annual capacity factors for calendar year 2020 are provided in Table 3-1 (next page).

Exhibit DG-4

Table 3-1: Location, Rated Capacity, Retirement Date, Cost Data, Heat Rate, and Capacity Factor for all Generating Units - Calendar Year 2020

Southwestern Public Service Company
Location, Rated Capacity, Retirement Date, Cost Data, Heat Rate, & Capacity Factor for all Owned Generating Units
Calendar Year 2020

Unit Name	Location	Rated Capacity (MW)	Expected Retirement Date	Capital $ (Gross plant)	O&M $	Fuel $	Net Unit Heat Rate (Btu/kWh)	Annual Capacity Factor
Steam Production - Gas/Oil								
Jones Unit 1	Lubbock Co., TX	243	2031	$ 54,714,121	9,504,622	$ 31,153,663	10,860	51%
Jones Unit 2	Lubbock Co., TX	243	2034	$ 48,095,614			10,889	44%
Plant X Unit 1	Lamb Co., TX	39	2022	$ 13,451,522	8,652,844	$ 14,622,353	13,577	18%
Plant X Unit 2	Lamb Co., TX	90	2022	$ 24,644,736			11,831	25%
Plant X Unit 3	Lamb Co., TX	0	2024	$ 18,947,804			0	0%
Plant X Unit 4	Lamb Co., TX	193	2027	$ 41,695,050			10,902	40%
Steam Production - Gas								
Cunningham Unit 1	Lea Co., NM	68	2022	$ 17,960,216	5,683,791	$ 11,537,882	11,640	43%
Cunningham Unit 2	Lea Co., NM	171	2025	$ 41,996,765			10,539	31%
Maddox Unit 1	Lea Co., NM	112	2028	$ 48,678,630	3,561,308	$ 7,318,514	11,201	51%
Nichols Unit 1	Potter Co., TX	108	2022	$ 26,144,622	9,888,210	$ 22,649,935	11,709	27%
Nichols Unit 2	Potter Co., TX	111	2023	$ 27,212,118			11,434	38%
Nichols Unit 3	Potter Co., TX	246	2030	$ 48,467,985			11,208	30%
Steam Production - Coal								
Harrington Unit 1	Potter Co., TX	340	2036	$ 168,499,280	23,260,669	$ 56,125,073	11,442	35%
Harrington Unit 2	Potter Co., TX	340	2038	$ 185,120,344			11,063	36%
Harrington Unit 3	Potter Co., TX	341	2040	$ 191,081,811			10,746	42%
Tolk Unit 1	Bailey Co., TX	531	2032	$ 326,426,504	17,733,283	$ 36,010,273	11,399	20%
Tolk Unit 2	Bailey Co., TX	538	2032	$ 361,728,360			11,094	20%
Turbine - Gas								
Cunningham Unit 3	Lea Co., NM	106	2040	$ 47,076,368	556,537	$ 10,299,704	11,816	34%
Cunningham Unit 4	Lea Co., NM	104	2040	$ 43,994,537			12,354	30%
Maddox Unit 2	Lea Co., NM	61	2025	$ 19,619,416	359,224	$ 3,773,271	13,647	34%
Jones Unit 3	Lubbock Co., TX	166	2056	$ 95,173,578	662,642	$ 11,117,912	10,606	22%
Jones Unit 4	Lubbock Co., TX	167	2058	$ 83,646,977			10,500	22%
Turbine - Fuel Oil								
Quay	Hutchinson Co, TX	17/23	2034	$ 26,418,131	191,823	$ 76,600	17,184	0.13%
Other Production - Wind								
Hale	Hale Co, TX	478	2044	$ 680,220,686	11,999,743	$ -	N/A	50%
Sagamore	Roosevelt Co, NM	522	2050	$ 800,917,397	201,016	$ -	N/A	N/A

Note (1) The O&M $ are reported by plant
Note (2) Fuel $ is measured at the plant level
Note (3) SPS plans on converting the Harrington Units to operate on natural gas end of year 2024

3.02 - SPS-Purchased Power

In addition to SPS's owned generation, SPS currently has long-term purchased power agreements ("PPA") totaling 2,444 MW of nameplate capacity and associated energy. SPS purchases the energy output from renewable intermittent generation consisting of 1,450 MW of wind and 192 MW_{AC} of solar. These resources serve SPS's entire system. Table 3-2 lists the nameplate capacity and expiration dates for each long-term PPA under which SPS currently purchases capacity and/or energy.

Table 3-2: PPA Capacity and Expiration Dates

Purchased Power Agreement	Nameplate Capacity (MW)	Commercial Operation Date	Expiration Date
Sid Richardson Carbon Ltd. Gas Facility	5	2001	2021[2]
Blackhawk Station Simple Cycle Combustion Turbines	223	1999	2024[3]
Lea Power Partners Combined Cycle	574	2008	2033
Subtotal	**802**		
Caprock Wind	80	2004	2024
San Juan (Padoma) Wind	120	2005	2025
Wildorado Wind	161	2007	2027
Spinning Spur Wind	161	2012	2027
Mammoth Wind	199	2014	2034
Palo Duro Wind	249	2014	2034
Roosevelt Wind	250	2015	2035
Lorenzo Wind (Bonita I)	80	2018	2048
Wildcat Wind (Bonita II)	150	2018	2048
Subtotal	**1,450**		
Sun Edison Solar	50	2011	2031
Chaves Solar	70	2016	2041
Roswell Solar	70	2016	2041
SoCore Clovis 1 LLC[4]	1.98	2021	2041
Subtotal	**192**		
Total Firm (PPAs)	**2,444**		

Figure 3F.1 below provides a regional map of the SPS generation fleet (owned and PPAs). A regional map of SPS's transmission system is also provided in Appendix O.

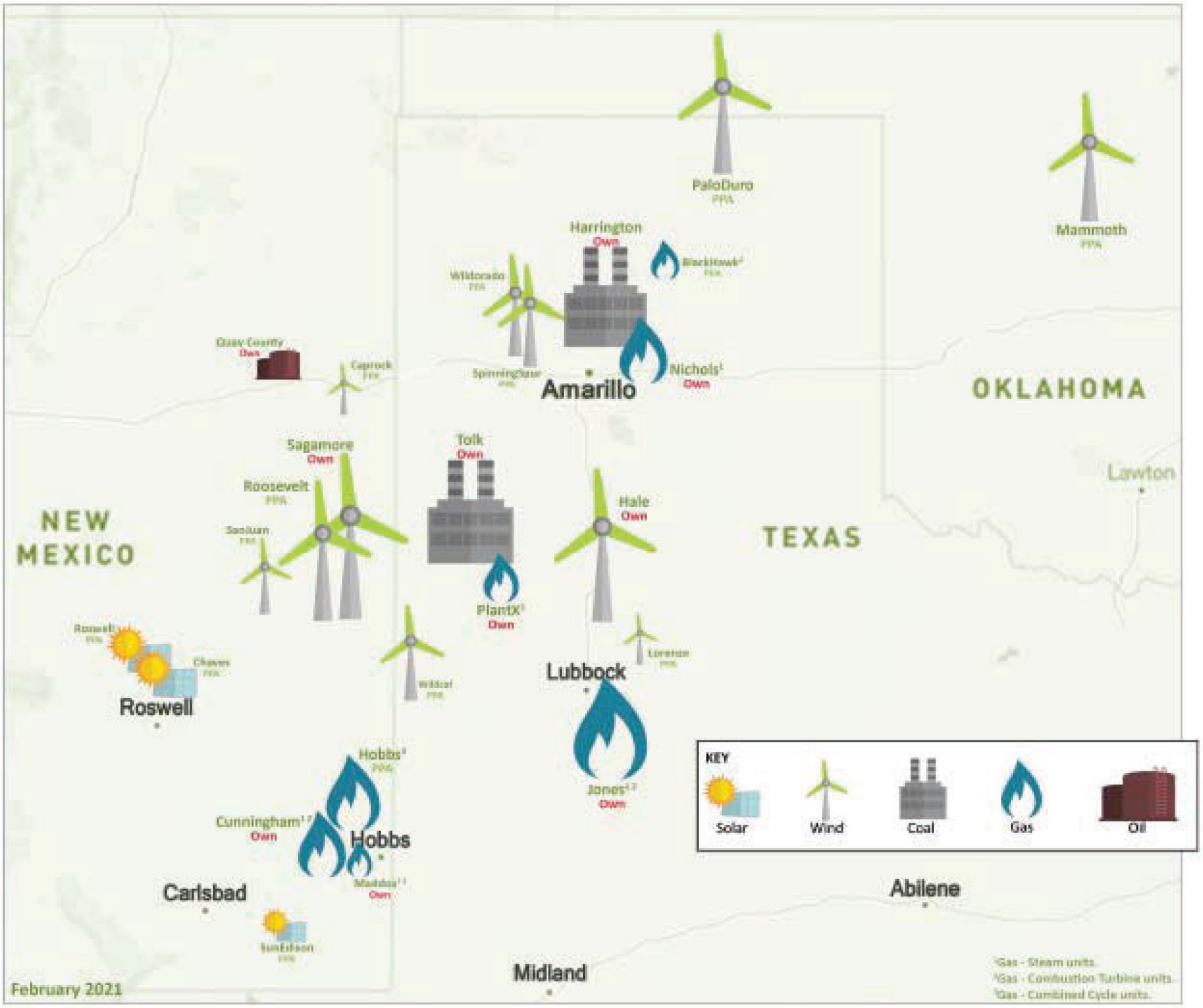
[2] The PPA between SPS and Tokai Carbon CB Ltd. (Sid Richardson) is scheduled to terminate August 1, 2021, which is prior to the end of the Southwest Power Pool Summer Season (June 1 – September 31).

[3] The PPA between SPS and Borger Energy Associates (Blackhawk Station) is scheduled to terminate on June 12, 2024, which is prior to the expected summer peak .

[4] The SoCore Facility is utilized for SPS's Voluntary Renewable Energy Program in New Mexico, referred to as Solar*Connect.

Exhibit DG-4

Figure 3F.1: SPS Existing Generation Fleet (Owned and PPAs)



3.03 – SPS Qualifying Facilities

In addition to SPS's owned and long-term PPAs, SPS also purchases energy from eight Qualifying Facilities ("QF"), with a total nameplate capacity of 111 MW, that are put to SPS under the Public Utility Regulatory Policy Act of 1978. Per SPS's New Mexico Rate No. 4 or the Texas Electric Tariff Sheet No. IV-117 (Rev. No. 4) a QF that chooses to sell energy to SPS under these Rates/Tariffs, must execute the standard Purchase Agreement. See Table 3-3 below for a list of SPS QF Wind facilities.

Table 3-3: QF Wind

QF Wind	Nameplate Capacity (MW)	Commercial Operation Date
Ralls Wind	10	07/20/2011
Cirrus Wind	61.2	12/12/2012
Pantex Wind	11.5	06/20/2014
Pleasant Hills Wind	19.8	06/04/2014
Aeolus Wind	3	04/05/2004
National Windmill	0.66	12/07/2005
West Texas A&M	3.51	11/11/2013
Mesalands Community College	1.5	07/08/2015

In addition, SPS historic cost (calendar year 2020) information regarding each of the long-term PPAs and QFs is provided in Appendix A.

3.04 - Existing & Approved Energy Storage Resources

Currently, SPS has no existing or approved energy storage resources.

3.05 - Additional SPS Owned Generation Approved but not In-Service

Currently, SPS has no new generating resources under construction or scheduled for the Planning Period.

3.06 - Wheeling Agreements

SPS does not purchase any capacity or energy under wheeling agreements with other utilities.

3.07 - Demand-Side Resources

The IRP Rule specifically requests that the utilities detail their existing demand-side management ("DSM") resources in their IRP filing and defines those resources as "energy efficiency and load management." Energy efficiency ("EE") is defined in the IRP Rule as "measures, including energy conservation measures, or programs that target consumer behavior, equipment or devices to result in a decrease in consumption of electricity without reducing the amount or quality of energy services."[5] Load management ("LM") is defined as "measures or programs that target equipment or devices to decrease peak electricity demand or shift demand from peak to off-peak periods."[6] SPS offers DSM resources in both New Mexico and Texas in accordance with state-specific rules and laws.[7]

New Mexico DSM

SPS must annually report its achieved levels for the previous calendar year and receive approval of its forward looking plans every three years to continue towards its statutory goals. SPS's 2019 EE Triennial Plan approving Plan Years 2020-2022 was approved in Case No. 19-00140-UT on February 19, 2020.[8] SPS will continue its approved Triennial Plan through Plan Year 2021. In

[5] Rule 17.7.3.7.D NMAC.

[6] Rule `7.7.3.7.I NMAC.

[7] DSM costs are directly assigned by jurisdiction.

[8] *In the Matter of Southwestern Public Service Company's Triennial Energy Efficiency Plan Application Requesting Approval of: (1) SPS's 2020-2022 Energy Efficiency Plan and Associated Programs; (2) A Financial Incentive for Plan Year 2020; (3) Recovery of the Costs Associated with a potential Energy Efficiency Study over a Two-Year Time Period; and (4) Continuation of SPS's Energy Efficiency Tariff Rider to Recover Its Annual Program Costs and Incentives,* Case No. 19-00140-UT, Final Order Approving Certification of Stipulation (Feb 19, 2020).

accordance with the Final Order in Case No. 19-00140-UT, SPS refiled its Plan Year 2022 portfolio and proposed goals on July 15, 2021. Previous plans were approved for calendar years 2011 – 2019 in Case Nos. 11-00400-UT, 13-00286-UT, 15-00119-UT, 16-00110-UT, 17-00159-UT, 18-00139-UT, and 19-00140-UT, respectively. Table 3-4 below describes SPS's EE achievements under the EUEA.

Table 3-4: New Mexico EE Achievements for Plan Years 2013-2020

Year	Customer kW[9] Saved	Customer kWh Saved
2013	8,056	37.674.221
2014	8,873	30,492,802
2015	10,716	35,225,196
2016	8,486	34,384,659
2017	8,476	33,191,039
2018	7,539	42,841,455
2019	9,415	39,420,766
2020	7,404	46,980,168

At the time of this IRP filing, SPS is offering the following approved DSM programs to its New Mexico customers (designated by "EE" for energy efficiency and "LM" for load management).

<u>Residential Segment</u>:

- Residential Energy Feedback (EE) – This program is designed to quantify the effects of informational feedback on energy consumption in approximately 15,000 residential households, consistent with the Commission's Final Order in Case No. 09-00352-UT.[10] This program provides educational materials and communication strategies to create a change in energy usage behavior. The purpose of the program is to measure when, how, and why customers change their behavior when provided with feedback on their energy using habits.

- Residential Cooling (EE) – This program offers rebates for the purchase of high efficiency evaporative cooling, air conditioning, and heat pump units. Rebates for evaporative coolers are paid for purchase of new units with an efficiency greater than 85%, installed in new or existing construction, regardless of whether or not the customer is replacing an existing unit.

[9] kilowatt

[10] Case No. 09-00352-UT, *In the Matter of Southwestern Public Service Company's Application for Approval of its 2010/2011 Energy Efficiency and Load Management Plan and Associated Programs, Requested Variances, and Cost Recovery Tariff Rider,* Final Order Adopting Certification of Stipulation (Mar. 15, 2011).

Air conditioning and heat pump rebates are paid to registered contractors who perform a quality installation in new and existing homes.

- Home Energy Services (EE) – Under this program, SPS provides incentives for the installation of a wide range of energy savings measures that reduce customer energy costs. The incentives are paid to energy efficiency service providers on the basis of deemed (*i.e.*, pre-determined) energy savings. The program, which also includes a Low-Income offering, includes attic insulation, air infiltration reduction, refrigerators (for low-income participants) and duct leakage repairs. The program is delivered via third-party providers interacting directly with customers to perform the home improvements. Additionally, Income-qualified customers, will receive an offer through mail informing them of their eligibility to receive a free Energy Savings Kit. A customer is qualified by being identified as receiving energy assistance through federal Low-Income Home Energy Assistance Program. If the customer chooses to receive a kit, they will send their response to the third-party implementer. Customers will receive a kit within six to eight weeks.

- Home Lighting (EE) – This program provides incentives for customers to purchase energy efficient LEDs[11] through participating retailers. Participating retailers may include home improvement, mass merchandisers, and hardware store locations. Customers will be able to recycle used compact fluorescent lights at select retail partner locations.

- Heat Pump Water Heaters (EE) – This program provides rebates for the purchase of high-efficiency electric heat pump water heaters. Customers can purchase these units through local home improvement stores or heating, ventilating, and air conditioning contractors.

- School Education Kits (EE) – The School Education Kits Program provides free kits to fifth grade classrooms in SPS's New Mexico service area. These kits include energy efficiency educational materials and products, including four LEDs, one low-flow showerhead, a kitchen and bathroom aerator, and an LED nightlight, which are distributed along with curriculum. This program provides value beyond the direct installation of measures included in the kits by creating awareness of energy efficiency with students, teachers, and parents.

- Smart Thermostats (EE) – In SPS's 2019 Triennial, the Saver's Stat program was transitioned into an exclusively energy efficiency program utilizing the new ENERGY STAR connected Thermostat specification in Plan Year 2020. Eligible customers will be able to receive the $50 rebate for an ENERGY STAR connected thermostat through the Xcel Energy storefront, paper applications and online applications that are available to both end use customers and trade allies.

[11] Light Emitting Diode

Business Segment:

- Business Comprehensive Program, which is made up of the following components:
  - Cooling Efficiency (EE) – provides rebates for purchasing air conditioning equipment that exceeds standard efficiency equipment. This product also includes rebates for specific commercial refrigeration equipment;
  - Custom Efficiency (EE) – offers rebates to reduce incremental project costs for customers who install energy efficient measures. Since energy applications and building systems can vary greatly by customer type, this program provides rebates for business projects or process changes that are not covered by SPS's prescriptive programs;
  - Large Customer Self-Direct (EE) – provides the opportunity for qualifying large customers to either self-direct their own EE projects or opt-out of the EE tariff rider if they can prove they have completed all cost-effective conservation. Self-direct participants of this program are also eligible for the other Business Segment programs;
  - Lighting Efficiency (EE) – offers rebates for customers to install more efficient lighting, or de-lamp, as needed;
  - Motor & Drive Efficiency (EE) – offers rebates to customers who install motors exceeding the National Electrical Manufacturers Association Premium Efficiency® motors standards and variable frequency drives in existing and new construction facilities; and
  - Building Tune-up (EE) – is a study/implementation option designed to assist smaller business customers to improve the efficiency of existing building operations by identifying existing functional systems that can be "tuned up" to run as efficiently as possible through low- or no-cost improvements.

EE Goals from 2009-2020

Under the 2008 amendment of the EUEA, SPS was required to acquire cost-effective and achievable DSM to achieve no less than an 8% reduction in 2005 sales by 2020. SPS's 2005 New Mexico retail sales were 3,750,469 megawatt-hour ("MWh") therefore SPS needed to achieve savings of 300,037,520 kilowatt-hour ("kWh") or greater by 2020. SPS met this obligation in Plan Year 2018 by achieving savings of 302,366 kWh (8.06%).

Table 3-5 below shows SPS's savings achievements during the 2008 EUEA requirement, using the Portfolio Effective Useful Lifetime method (energy savings provided in gigawatt-hours ("GWh")).[12]

Table 3-5: New Mexico Actual Savings Provided by the 2008-2020 EE Programs

Year	Annual Net Customer Achievement (GWh) [13]	Cumulative Net Customer Achievement (GWh)	Cumulative % of 2005 Retail Sales
2008	3.355	3.355	0.09%
2009	14.136	17.491	0.47%
2010	23.231	40.722	1.09%
2011	35.642	76.363	2.04%
2012	31.534	107.897	2.88%
2013	34.452	142.349	3.80%
2014	30.493	172.841	4.61%
2015	32.805	202.962	5.41%
2016	31.966	234.257	6.25%
2017	29.429	263.686	7.03%
2018	38.680	302.366	8.06%
2019	36.081	320.169	8.54%
2020	46.980	348.061	9.28%

EE Goals through 2041

Under the 2019 amendment of the EUEA, SPS is required to achieve no less than savings of 5% of 2020 total retail kWh sales to as a result of EE and LM programs implemented in years 2021 through 2025. The following goals were developed in accordance with the 2008 EUEA, which SPS was following at the time of SPS's most recent Triennial Plan Filing. Note that the EUEA neither

[12] This calculation method is consistent with the methodology proposed by the Commission's Utility Division Staff in Case No. 09-00352-UT (*see Staff Compliance Affidavit Regarding Decretal Paragraph "L" of the Certification of Stipulation Adopted by the Commission in its March 11, 2010 Final Order in this Proceeding,* Oct. 19, 2010).

[13] Annual Net Customer Achievement (GWh) does not include the Energy Feedback Program's yearly savings achievement as the product only has a 1-year life.

requires nor establishes annual goals. Thus, the goals in Table 3-6 below are preliminary and subject to change in SPS's upcoming re-filing of PY 2022, Triennial Filing covering PY 2023-2025, and future Triennial Filings covering years 2025-2041.

Table 3-6: Filed and Forecasted New Mexico DSM Goals at the Customer Level for the Planning Period

Year	Demand Savings (MW)	Energy Savings (GWh)
2021	5.42	40.134
2022	8.81	56.492
2023-2041	8.81	56.492

In SPS's recent EE Potential Plan filing, filed one day before this IRP filing, SPS proposed a revised EUEA goal for 2025 based on an adjustment to SPS's 2020 total kWh retail sales used to determine the goal. The adjustment excludes kWh sales to certain customers for which there is no corresponding recovery of costs to fund EE programs due to the application of the EUEA's $75,000 per customer EE program cost-recovery cap. Based on the adjusted 2020 kWh retail sales, SPS proposed a revised EUEA energy savings goal for 2025 of 269,769 MWh to be achieved over the period of 2021 through 2025. SPS's proposed revised goal has not yet been approved by the Commission.

Texas DSM Requirements

SPS offers DSM programs in its Texas service territory pursuant to the Public Utility Regulatory Act and 16 Tex. Admin. Code § 25.181. These programs include standard offer and market-transformation programs for commercial and industrial, LM, residential, and low-income customers limited to customers receiving service at 69 kilovolts or less and all government customers. Table 3-7 below shows SPS's historic demand savings (in MW) and energy savings (in GWh) in its Texas service territory.

Table 3-7: SPS's EE and LM Achievements - 2011 to 2020 in Texas

Year	Customer Demand Savings (MW)	Customer Energy Savings (GWh)
2011	3.88	13.821
2012	5.30	9.077
2013	5.10	7.950
2014	5.02	11.900
2015	8.17	14.537
2016	8.19	14.451
2017	7.80	16.871
2018	9.57	18.908
2019	9.57	23.328
2020	11.672	25.663

In addition, SPS offers residential Saver's Switch and Interruptible Credit Option ("ICO") LM programs (the savings are not included in the table above).

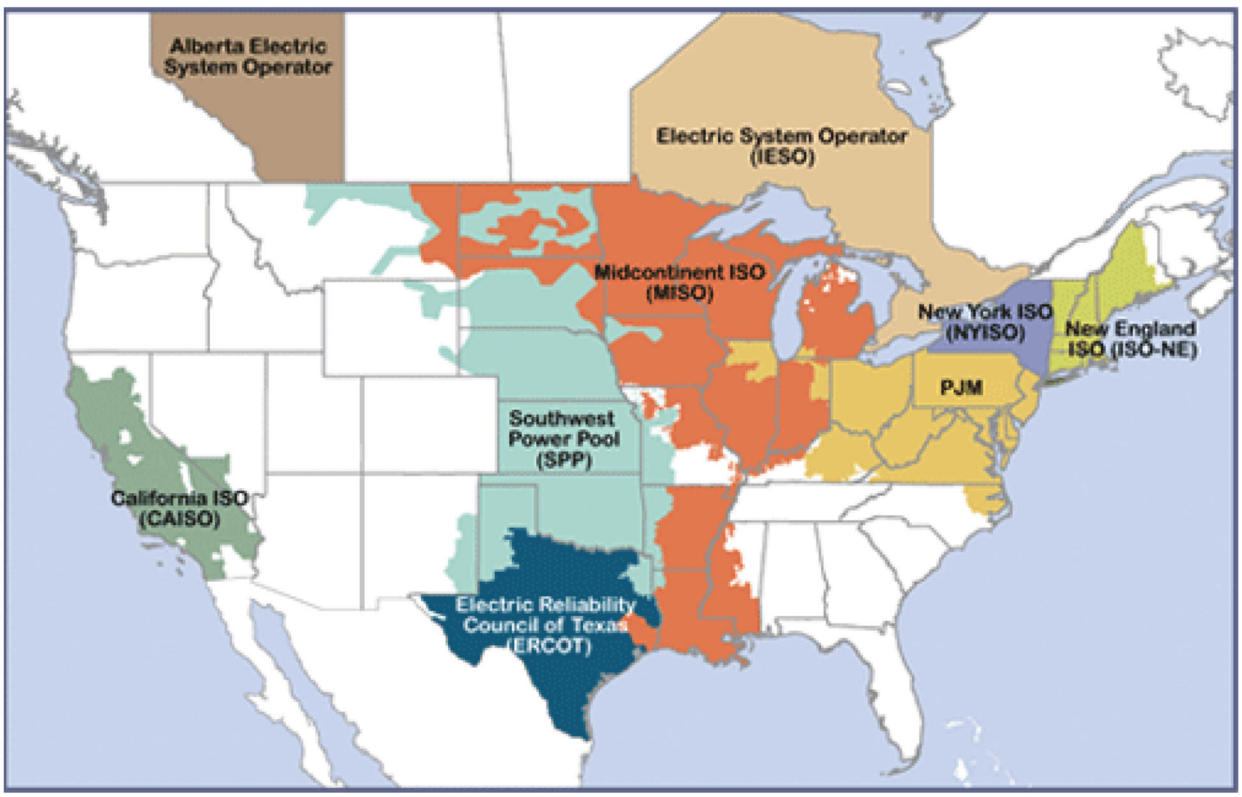
3.08 - Reserve Margin and Reserve Reliability Requirements

Southwest Power Pool Integrated Market

SPS is a member of the Southwest Power Pool. Southwest Power Pool is one of nine independent system operators ("ISO") and Regional Transmission Organizations ("RTO") in North America. Southwest Power Pool's Integrated Marketplace is the mechanism through which it facilitates the sale and purchase of electricity to ensure cost-effective electric reliability throughout a 14-state region in the Eastern Interconnect. As a Balancing Authority, Southwest Power Pool balances electric supply and demand, ensuring there is adequate generation to meet the demand.

Southwest Power Pool is responsible for generation unit commitment and dispatch across the Southwest Power Pool footprint. Additionally, Southwest Power Pool administers the day-ahead and real-time balancing market, including incorporation of a price-based operating reserve market (i.e., regulation up/down and spin/supplemental reserves). Instead of each load serving entity (e.g., SPS) committing and dispatching its own generation resources to meet its own load requirements, reliability unit commitment and economic dispatch are performed by the Southwest Power Pool. Current expectations and future requirements regarding market operations, locational generation dispatch, congestion, and losses will impact future transmission and generation planning/siting activities.

Figure 3F.2: ISO / RTO Map



Planning and Operating Reserves

Each system must preserve an adequate supply of firm electric generation that will meet the maximum demand of its customers (i.e., the "peak" demand) and provide for unforeseen events (e.g., transmission line outages, generating unit outages, and potential increased in actual load, etc.). To accomplish these objectives, electric utilities acquire (through direct ownership or PPAs) and operate more generation capacity than is needed to meet peak demand. The available capacity above the projected peak demand is typically referred to as the "reserve margin" (i.e., "Planning Reserves"). Generally, there are two basic types of reserves: (i) Planning Reserves, which are the amount of installed capacity required above annual firm peak demand, and (ii) Operating Reserves, which are the amount of generation capacity required in real-time, either with units carrying regulation and/or spinning reserves; or units offline but in warm standby and capable of providing additional electric supply in order to meet real-time changes in load/demand and any unforeseen contingencies (e.g., transmission outage, generator forced outage, gas supply disruptions, etc.).

Southwest Power Pool Capacity Reserve Requirements

The Planning Reserve Margin ("PRM") for capacity is set in Section 4 of the Southwest Power Pool Planning Criteria.[14] Southwest Power Pool currently requires each Load Responsible Entity ("LRE") to have a reserve margin of at least 12% of its peak demand forecast (the planning reserve requirement is a minimum requirement, not a maximum or a target). Determination of the PRM is described in Attachment AA[15] of the Southwest Power Pool Open Access Transmission Tariff ("OATT") and is supported by a probabilistic Loss of Load Expectation ("LOLE") Study, which analyzes the ability of the Transmission Provider to reliably serve the Southwest Power Pool

[14] https://spp.org/Documents/58638/spp%20planning%20criteria%20v2.4.pdf
[15] https://spp.org/Documents/58597/Attachment%20AA%20Tariff.pdf

Balancing Authority Area's forecasted peak demand. The LOLE Study is performed biennially, and Southwest Power Pool studies the PRM such that the LOLE for the applicable planning year does not exceed one day in ten years, or 0.1 day per year.

3.09 - Existing Transmission Capabilities

SPS, as a member of Southwest Power Pool, participates in several technical groups and committees. SPS is also a member of the North American Transmission Forum, a group that promotes sharing of technical solutions among members.

An analysis of the SPS transmission system is contained in the Southwest Power Pool 2020 Integrated Transmission Planning Assessment Report, which is provided as Appendix B. This report discusses the performance of the SPS network and recommends new projects to improve the network performance.

A list of current transmission projects SPS is constructing based on notifications to construct is provided as Appendix C. This list also includes service for one generator interconnection project.

Transmission Import Rights

Southwest Power Pool has a total of 1,885 MW of transmission flow capability minus the single largest contingency and other factors (i.e., imports from Palo Duro and Mammoth Wind) to deliver resources to the SPS zone from the rest of the Southwest Power Pool transmission system. SPS's reservation of this capability on a firm basis is more fully described below.

249 MW Palo Duro Wind

SPS has firm transmission service for this wind farm beginning January 1, 2018 and continuing for the term of the PPA through December 31, 2034.

199 MW Mammoth Plains Wind

SPS has firm transmission service for this wind farm beginning November 16, 2018 and continuing for the term of the PPA through December 31, 2034.

96 MW Import from Elk City 2 Wind

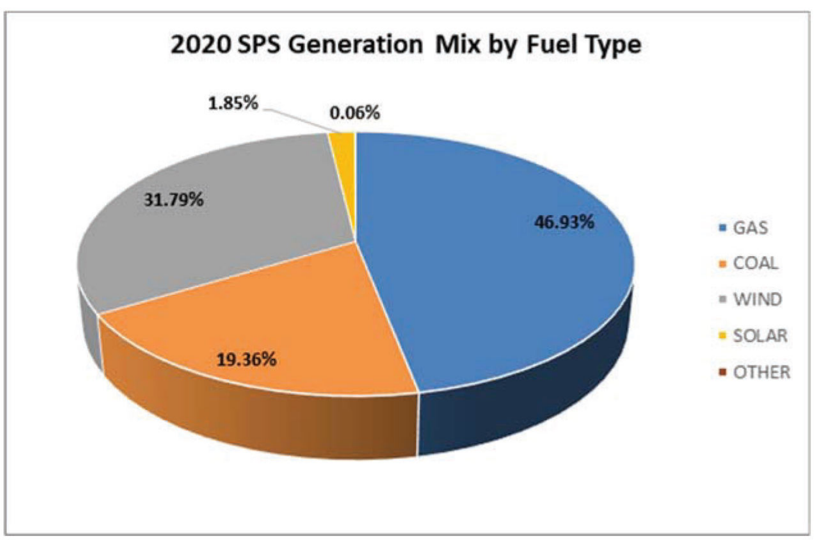
As agent for the City of Lubbock, Texas, SPS holds the firm network transmission rights to import up to 96 MW from the Elk City 2 Wind Farm, located in Oklahoma. This resource represents part of the replacement power required to serve the City of Lubbock upon termination of its full requirements contracts with SPS. The term of this service began June 1, 2019 and continues for 13 years. Any capacity associated with this reservation is held by the City of Lubbock.

3.10 - Environmental Impacts of Existing Supply-Side Resources

Percentage of MWh Generated

The percentages of MWh generated by each fuel type used by SPS for Calendar Year 2020 are provided in Figure 3F.3 below.

Figure 3F.3: Percentage of MWh Generated in 2020 by Fuel Type



SPS Emissions Information

The emission rates for SPS-owned generation resources are shown in Table 3-8 below. All emission rates are expressed in pounds per kWh.

Water Consumption Rates

Average water consumption rates, by plant, and expressed in gallons per kWh (H_2O Consumption) are also shown in Table 3-8 below.

Table 3-8: Emission and Water Consumption Rates

2020 SPS Emission Rates of Criteria Pollutants plus Mercury and Carbon Dioxide Expressed in Pounds per Kilowatt-Hour (lb/KWh) and Water Consumption Expressed in Gallons per KWh

Plant	Unit	SO2	NOx	PM	CO2	Hg	CO	Pb	VOC	H2O Consumption (Plant Average)
Cunningham	1	7.212E-06	1.879E-03	8.625E-05	1.3736E+00	3.115E-09	8.092E-06	5.841E-09	6.242E-05	0.433
Cunningham	2	6.356E-06	1.729E-03	7.935E-05	1.2582E+00	2.621E-09	1.059E-04	5.242E-09	5.743E-05	
Cunningham	3	6.438E-06	6.591E-04	5.348E-05	1.2980E+00	2.894E-09	5.460E-05	0.000E+00	2.293E-05	
Cunningham	4	6.987E-06	6.553E-04	5.577E-05	1.3906E+00	3.011E-09	9.360E-05	0.000E+00	2.457E-05	
Harrington	1	4.912E-03	1.699E-03	5.283E-04	2.1800E+00	1.081E-08	1.126E-03	6.160E-08	3.913E-05	0.698
Harrington	2	4.768E-03	1.412E-03	1.244E-04	2.1354E+00	8.097E-09	1.156E-03	2.089E-08	3.770E-05	
Harrington	3	4.984E-03	1.489E-03	1.453E-04	2.2797E+00	7.923E-09	1.124E-03	2.181E-08	3.663E-05	
Jones	1	6.408E-06	1.490E-03	8.071E-05	1.2696E+00	2.782E-09	2.549E-04	5.286E-09	5.841E-05	0.326
Jones	2	6.538E-06	1.138E-03	8.219E-05	1.2932E+00	2.869E-09	2.595E-04	5.314E-09	5.947E-05	
Jones	3	6.263E-06	3.059E-04	2.714E-05	1.2409E+00	2.681E-09	1.012E-04	0.000E+00	2.089E-06	
Jones	4	6.203E-06	3.052E-04	3.721E-05	1.2285E+00	2.656E-09	1.143E-04	0.000E+00	3.101E-06	
Maddox	1	6.538E-06	1.975E-03	8.118E-05	1.2928E+00	2.799E-09	7.613E-06	4.398E-09	5.875E-05	0.656
Maddox	2	1.052E-05	3.767E-03	9.007E-05	1.5964E+00	3.620E-09	2.047E-05	6.723E-09	2.866E-05	
Maddox	3	1.791E-05	7.648E-03	1.567E-04	2.7871E+00	0.000E+00	5.448E-04	0.000E+00	5.075E-05	
Nichols	1	6.783E-06	1.109E-03	8.171E-05	1.3047E+00	2.833E-09	2.580E-04	5.261E-09	5.913E-05	0.701
Nichols	2	1.123E-05	1.360E-03	8.595E-05	1.3718E+00	2.708E-09	2.714E-04	5.417E-09	6.220E-05	
Nichols	3	1.146E-05	1.887E-03	8.538E-05	1.3632E+00	2.989E-09	2.696E-04	5.663E-09	6.179E-05	
Plant X	1	8.394E-06	7.923E-03	1.039E-04	1.6505E+00	3.412E-09	1.148E-03	6.824E-09	7.520E-05	0.738
Plant X	2	7.058E-06	8.819E-04	8.747E-05	1.3941E+00	3.087E-09	2.761E-04	5.659E-09	6.326E-05	
Plant X	3	0.000E+00	0.000E+00	0.000E+00	0.0000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
Plant X	4	6.597E-06	1.638E-03	8.225E-05	1.3095E+00	2.851E-09	2.597E-04	5.402E-09	5.951E-05	
Quay County	1	3.202E-05	1.608E-02	2.516E-04	2.7712E+00	0.000E+00	2.382E-04	4.058E-07	8.389E-04	0.000
Tolk	1	4.884E-03	1.737E-03	7.675E-05	2.2389E+00	8.898E-09	2.514E-03	1.297E-08	3.933E-05	0.650
Tolk	2	5.158E-03	2.165E-03	1.203E-04	2.5482E+00	8.112E-09	2.440E-03	1.882E-08	3.833E-05	

3.11 - Identification of Critical Facilities Susceptible to Supply-Source or Other Failures and Summary of Back-up Fuel Capabilities and Options

SPS takes system reliability very seriously and devotes significant resources to protecting the electric grid from multiple types of risks. The SPS transmission system is planned and designed for single contingency or N-1 standards, and therefore has the ability to sustain overall grid reliability in the face of various types of generator and transmission contingencies. In addition, SPS is compliant with the applicable NERC[16] reliability standards which require that assets critical to operation of the bulk electric system be identified and special protections for those facilities implemented. For safety and reliability, any lists or descriptions of these critical assets are considered highly confidential and not available to the public domain. Furthermore, SPS's owned generation units have redundant fuel supplies, mitigating the risk of supply-source failures. Additionally, purchases from the Southwest Power Pool market would typically address any deficiencies in SPS resources.

[16] North American Electric Reliability Corporation

Section 4. CURRENT LOAD FORECAST

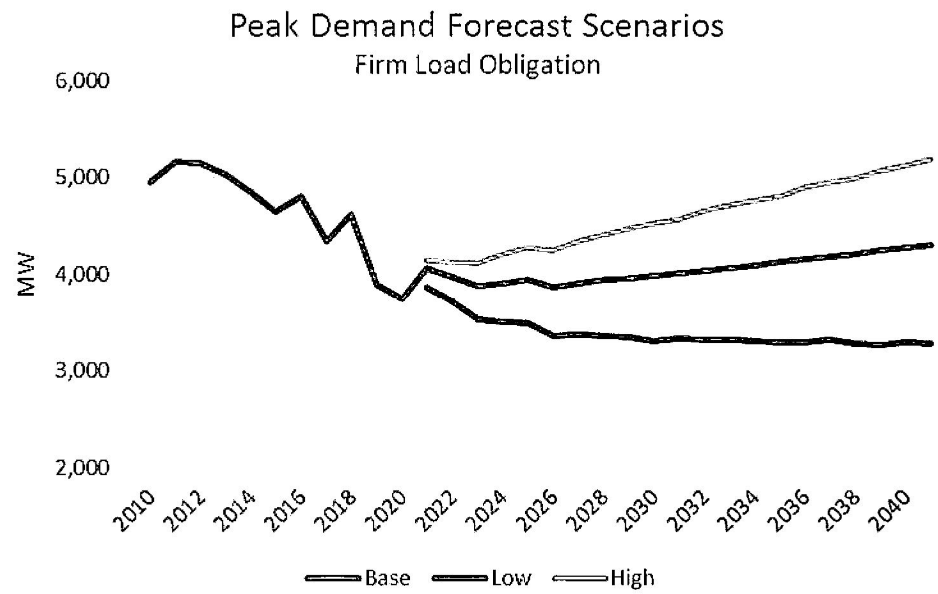
4.01 - Forecast Overview

Projections of future energy sales and coincident peak demand are fundamental inputs into SPS's resource need assessment. As required by the IRP Rule, SPS has prepared base, high, and low case scenario forecasts (17.7.3.9(D)(2) NMAC).

SPS projects its base or median electric firm obligation load (firm retail and firm wholesale requirements customers) to increase at a compounded annual growth rate of 0.4% or an average of 12 MW per year through the Planning Period (2022-2041). Growth in retail demand is expected to more than offset the impact of losing wholesale customers through the forecast period. SPS's base or median energy sales are forecasted to increase at a compounded annual growth rate of 0.6% or an average growth rate of 154 GWh during the same period. The load growth over the Planning Period contrasts to the historical annual average load decline of -2.7% over the last 10 years (ending 2020). The historical annual average energy decline over the ten years ending 2020 is -1.9%. Load and energy decreases were driven primarily by the decline of wholesale load due to expiration of the New Mexico Cooperatives' wholesale contracts and contractual changes within existing wholesale contracts. In addition, the decline in oil prices that started in the third quarter of 2015 paused the oil and gas expansion in southeastern New Mexico and the SPS region has seen a decline in potash mining in the last decade. Finally, 2020 sales and demands were negatively impacted by the business shutdowns and economic slowdown as a result of the COVID-19 pandemic.

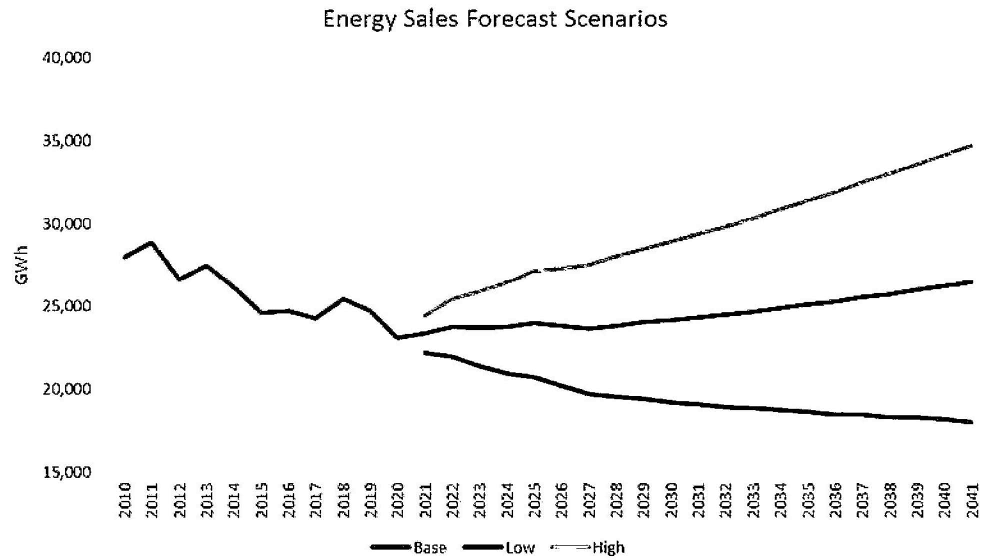
The SPS low forecast scenario of coincident peak demand decreases at a compounded annual growth rate of -0.6% through the Planning Period, and the high forecast scenario of coincident peak demand increases at a compounded annual growth rate of 1.2% per year. Figure 4F.1 below contains a graphical representation of the low and high forecast scenarios of coincident peak demand.

Figure 4F.1: Coincident Peak Demand Forecasts



SPS's annual energy sales low forecast scenario decreases at a compounded annual growth rate of -1.0% through 2041, and the annual energy sales high forecast scenario increases at a compounded annual growth rate of 1.6% per year. Figure 4F.2 below contains a graphical representation of the low and high scenario forecasts of annual energy sales.

Figure 4F.2: Energy Sales Forecasts



Figures 4F.1 and 4F.2 (above) show the base, high, and low forecasts for firm coincident peak demand and annual energy sales graphically. Appendix D (Tables D-10 and D-11) provides the data supporting the charts. Appendix D (Table D-11) also shows the SPS forecast for its total annual energy sales with eleven years of history starting in 2010, and it shows annual growth and compounded growth to/from 2020. The bold line across the table delineates historical from projected information.

The base peak demand forecast assumes economic growth based on projections from IHS Markit[17] and normal summer peak weather conditions. SPS estimates a 70% probability that the actual peak demands and energy sales will fall between the high and the low forecast scenarios.

4.02 - Peak Demand Discussion

Firm peak demand in the SPS service territory has declined over the last 10 years (through 2020). SPS's firm peak demand decreased by -1,203 MW or -24.3%, from 2010 to 2020. Load

[17] As discussed below, IHS Markit is a trusted data source for forecasting professionals that SPS uses for economic and demographic data and forecasts.

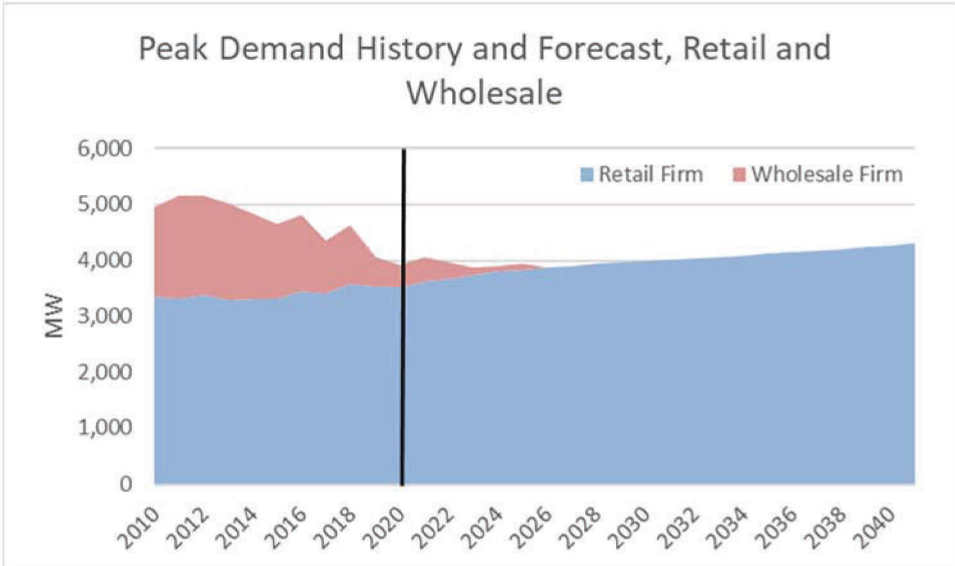
growth was dampened as a result of decreased demand from wholesale customers due to changes in contracted load. In the 10-year period ending 2020, the population in the SPS service territory grew by an annual average rate of 0.1% per year. Combined Real Gross County Product ("GCP") for the counties in the SPS service territory averaged gains of 2.0% from 2010 through 2020. During this same period, SPS gained about 17,900 residential customers, for total growth of 6.0%.

The peak demand forecast compounded annual growth rate for the Planning Period through 2041 is 0.4%. This is stronger growth than seen over the past ten years, which averaged annual declines of 2.7%. Retail peak demand for the Planning Period increases at a compounded annual growth rate of 0.8%, compared to the ten-year period ending 2020 compounded annual growth rate of 0.4%. Retail peak demand growth is driven by population and economic growth in the service territory, continued expansion of the oil and gas industry in southeastern New Mexico, and adoption of electric vehicles. Wholesale peak demand for the Planning Period gradually decreases as contracts expire and is zero starting in 2026. SPS assumes that expiring wholesale contracts will not be renewed after their known expiration dates.

SPS service territory GCP is expected to average 2.3% through 2041. Population growth is similar to the recent past, with annual gains averaging 0.3% through the Planning Period. SPS projects residential customer growth will average annual increases of 0.5% per year through 2041.

Table D-4 in Appendix D (Electric Energy and Demand Forecast) shows the SPS coincident peak demand by retail and wholesale customer categories. Figure 4F.3 shows the SPS coincident peak demand by retail and wholesale customers graphically.

Figure 4F.3: Peak Demand History and Forecast, Retail and Wholesale

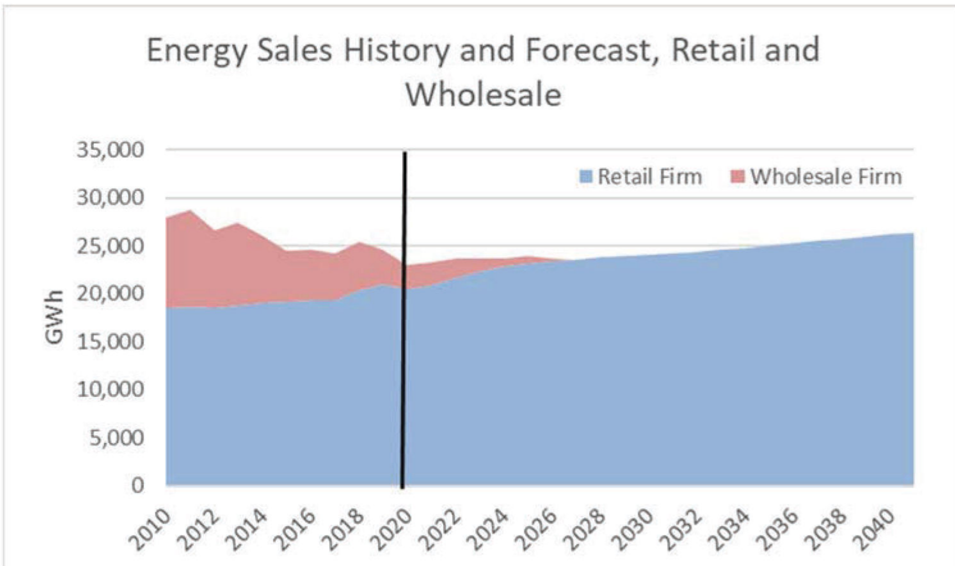


4.03 - Annual Energy Discussion

SPS is anticipating energy sales in the base case forecast to average 0.6% growth annually over the Planning Period. The declines in wholesale energy sales corresponding to the termination or reduction of sales to specific wholesale customers will offset growth in the retail sector.

During the past ten years SPS has experienced declines in energy sales, much of that also impacted by the declining wholesale sales. Energy sales decreased by 4,853 GWh, or -17.3%, from 2010 to 2020. The energy sales forecast's compounded annual growth rate for the Planning Period through 2041 is 0.6%. The growth in retail energy sales is expected to more than offset the declines in wholesale. Retail energy sales for the Planning Period increase at a compounded annual growth rate of 1.0%, similar to the 10-year period ending 2020 compounded annual growth rate of 1.0%. Retail energy sales will benefit from strong growth in the New Mexico commercial and industrial sector, which is heavily dependent on the oil and natural gas industries, and the adoption of electric vehicles. Base case wholesale energy sales are forecasted to decline steadily before reaching zero in 2027. Figure 4F.4 shows SPS's energy sales by retail and wholesale customer class graphically.

Figure 4F.4: Energy Sales History and Forecast, Retail and Wholesale



4.04 - Electric Vehicles

SPS has developed a projection of electric vehicle adoption in its service territory. SPS expects to have 307,700 electric vehicles in its service territory by 2041. These vehicles are expected to contribute 1,972 GWh to annual energy sales and 241 MW to coincident summer peak demand.

4.05 - High and Low Case Forecasts

Development and use of different energy sales and demand forecasts for planning future resources is an important aspect of the planning process. Alternative high and low forecast scenarios to the base case were developed for the 2021 IRP. The high and low forecast scenarios are based on a Monte Carlo simulation for energy sales and peak demand forecasts with probabilistic inputs for the economic, energy, and weather drivers of the forecast models and for model error. The high forecast scenario is the forecast level from the Monte Carlo simulation that represents a plus one standard deviation confidence band from the base case forecast. The low forecast scenario is the forecast level from the Monte Carlo simulation that represents a minus one standard deviation confidence band from the base case forecast. There is a 70% probability that actual energy sales and coincident peak demand will fall within the high and low forecast scenarios.

Appendix D (Table D-10 and Table D-11) provides a summary of the base, high, and low peak demand and energy sales forecasts.

Typical Historic Day Load Patterns

Please refer to Appendix E for the typical day load patterns on a system-wide basis for each customer class provided for: peak day, average day, and representative off-peak days for each calendar month.

4.06 - Forecasting Methodologies

The following discussion describes the methods used to forecast energy sales and coincident peak demand for each of its various customer classes in SPS.

SPS forecasts retail energy sales and customers by class for each jurisdiction. Retail coincident peak demand is forecasted in aggregate at the total SPS level. The wholesale energy sales and coincident peak demand forecasts are developed at the individual customer level of detail. SPS models its forecasts at a monthly frequency and uses monthly historical data to develop the customers, energy sales, and coincident peak demand forecasts. Annual energy sales are an aggregation of the monthly energy sales estimates. Energy sales are forecasted at the delivery point and peak demand is forecasted at the generating source. The annual coincident peak demand occurs in July throughout the Planning Period 2022-2041.

IHS Markit, a trusted data source for forecasting professionals, provides economic and demographic data and forecasts. SPS assumes normal weather for the forecast period. Normal weather is based on a 30-year rolling average of historical weather data for the energy sales and retail coincident peak forecasts.

4.07 - Energy Sales Forecasts

SPS's retail customer counts, retail energy sales, and full requirement wholesale energy sales forecasts are developed using econometric models and trend models. An econometric model is a widely accepted modeling approach involving linear regression analysis. Linear regression analysis is a statistical technique that attempts to understand the movement of the dependent variable, for example, energy sales, as a function of movements in a set of independent variables, such as economic and demographic concepts, customers, price, trend, and weather, through the quantification of a single equation. Other variables used in the econometric models may include autoregressive correction terms and binary variables. Binary variables are used in models to account for non-weather-related seasonal factors and unusual billing activity. The autoregressive correction term is used to aid in eliminating bias found in time-series models. After developing and testing the econometric models to identify the relationship between the dependent and independent variables, forecasts of the independent variables are used to predict future energy sales and customer counts.

SPS's econometric models are evaluated through examining the model statistics output and tests results. Each variable coefficient in the models is checked for the correct theoretical signs and statistical significance. The coefficient of determination (R-squared) test statistic is a measure to verify the quality of the model's fit to the historical data. The models are also tested for correlation of errors from one period to the next. The absence of correlation between the residual errors is an important indicator that the model is performing adequately. Graphical inspection of a model's error term helps identify if a model suffers from auto-correlation (i.e., error terms are not random and are correlated between periods) or heteroscedasticity (i.e., inconstant variance of errors over the sample period). A model with auto-correlation may indicate model misspecification.

The output from the econometric models for the retail energy sales is adjusted to reflect the expected incremental impact of DSM programs. The model output is also adjusted for electric vehicle impacts. SPS developed a base, low, and high scenario of estimated sales due to electric vehicles. The forecast assumes the base sales scenario. The model output may also be adjusted with information from SPS's Managed Account Sales group regarding SPS's largest commercial and industrial customers. The Managed Account Sales group provides information about known events that can impact energy sales that would not be captured in the historical data. Such events might include a scheduled increase or decrease in load for a specific customer due to a plant expansion, or a reduction in load stemming from a plant shutdown. The final adjusted output from the econometric models becomes part of the base case energy sales forecast.

Energy sales forecasts for SPS's partial requirement wholesale customers are developed based on historical consumption patterns or econometric models as described above, subject to contractual agreement with the customer.

4.08 - Peak Demand Forecasts

SPS develops an econometric model, as described above, to forecast the monthly retail coincident peak demand. Total retail coincident peak demand is forecasted in aggregate at the source for the total SPS company level. The exogenous variables in the retail coincident peak demand model include weather, binary and trend variables, and retail energy sales. Retail energy sales are not adjusted for DSM savings, electric vehicle increases, or load increases or decreases as identified by the Managed Account Sales group prior to being used in the model. Instead, such adjustments are made to the output from the retail peak demand model.

The full requirements wholesale coincident peak demand is developed on an individual customer basis. SPS uses a load factor methodology to calculate the coincident peak demand associated with the energy sales for each full requirement wholesale customer. For each customer, SPS calculates a monthly load factor based on historical energy sales and coincident peak demand data as recorded at the delivery point. Monthly load factors are calculated as:

Load Factor = Energy Sales/(Peak Demand * Hours Per Month)

The monthly load factors are then applied to each full requirement wholesale customer's respective energy sales forecast to derive the monthly peak demand forecasts.

Peak Demand = Energy Sales/(Load Factor * Hours Per Month)

The peak demand forecasts are then adjusted for line losses to derive the peak demand forecast at the source.

The partial requirement wholesale customer coincident peak demand forecasts are determined by individual customer contractual agreement.

4.09 - Modeling for Uncertainty

SPS has developed high and low forecast scenarios to the base case forecast. These alternative forecasts are derived from Monte Carlo simulations of energy sales and coincident peak demand.

Monte Carlo simulation is a modeling technique that ascribes probabilistic characteristics to selected inputs and the output of a model. The Monte Carlo simulations are based on econometric models used to forecast energy sales and coincident peak demand. In particular, energy sales and coincident peak demand are modeled at the combined retail and full requirement wholesale sales level of aggregation.

In these models, probability distributions are defined for exogenous variables with inherent uncertainty associated with their forecast values. Probability distributions are a realistic way of describing uncertainty in variables. An example of a variable with inherent uncertainty is the maximum peak day temperature in the coincident peak demand model. While SPS assumes the value will be 99.6 degrees Fahrenheit for each July during the forecast period, it is unlikely that each year the actual peak day maximum temperature will be 99.6 degrees Fahrenheit. The probability distributions contain the possible values for variables with inherent uncertainty over the forecast period, based on characteristics of the data set for each variable. The weather, economic and energy variables, and the model error are assumed to have inherent uncertainty in the models used to develop the high and low energy sales and coincident peak demand forecast scenarios.

For each simulation run of these forecasting models, the values for the exogenous variables with inherent uncertainty are randomly selected from respective probability distribution. By using probability distributions, variables can have different probabilities of different outcomes occurring. Monte Carlo simulation calculates the model results over and over, each time using a different set of random values from the probability functions. The output from the Monte Carlo simulation models is then calibrated so that the 50% probability forecast is equal to the respective energy sales and coincident peak demand base case forecast.

4.10 - Weather Adjustments

SPS incorporates several different weather variables in its forecasting models. For the energy sales models, SPS may include monthly heating degree days, cooling degree days, and precipitation.

The heating degree days and the cooling degree days are calculated on a base of 65 degrees Fahrenheit for each day and then totaled by month.

Heating Degree Days = Max (65 - Average Daily Temperature, 0)

Cooling Degree Days = Max (Average Daily Temperature - 65, 0)

The coincident peak demand models include a maximum peak day temperature variable and a rolling two-week summation of the days prior to the monthly peak day with a maximum daily temperature of 95 degrees Fahrenheit or greater variable.

Weather during the forecast period is assumed to be normal. Normal weather is defined as a rolling 30-year average for heating degree days, cooling degree days, precipitation, maximum temperature, minimum temperature, average temperature, and days with maximum temperature 95 degrees Fahrenheit or greater. The energy sales and coincident peak demand forecasts do not have any other weather normalization adjustments.

For historical periods, SPS weather normalizes historical energy sales and coincident peak demand data for variance analysis purposes. This weather normalization process involves subtracting weather-impacted energy sales or peak demand from actual sales or peak demand. Weather-impacted sales or peak demand is calculated by multiplying the forecast model weather variable coefficients by the variance of actual weather from normal weather.

Weather-Impacted Energy Sales =

Weather Coefficient * (Actual Weather-Normal Weather)

Weather Impacted Peak Demand =

Weather Coefficient * (Actual Weather-Normal Weather)

4.11 - Demand-Side Management

SPS promotes DSM programs that help its customers reduce energy sales and peak demand through energy efficiency and education. Xcel Energy's DSM Regulatory Strategy and Planning group develops the projections of future and embedded DSM program savings.

SPS adjusts its retail energy sales and coincident peak demand forecasts with projected incremental DSM program savings. The incremental DSM program savings are calculated by subtracting embedded DSM savings from future DSM savings.

Incremental DSM Savings = Future DSM Savings – Embedded DSM Savings

SPS does not directly adjust its forecast models or model output for naturally occurring DSM savings that could be attributed to actions other than those of SPS. However, theoretically, the historical energy sales and coincident peak demand data used in SPS's forecast modeling process does have embedded in it any naturally occurring DSM savings. Therefore, the forecast models and model output do account indirectly, through the historical data, for naturally occurring DSM savings. Naturally occurring DSM energy and peak demand savings do not impact SPS's sponsored DSM resources.

4.12 - Demand Response, Energy Efficiency, and Behind-the-Meter Generation

The historical energy sales data used in SPS's forecast modeling process is net of behind-the-meter generation and demand response energy sales. Therefore, the forecast models and model output indirectly account, through the historical data, for behind-the-meter and demand response energy sales. The historical peak demand data used in the forecasting process has not been adjusted to account for behind-the-meter generation and demand response.

4.13 - Forecast Accuracy

SPS reviews its demand and energy forecasts for accuracy annually. Appendix D (Table D-12 through Table D-17) provides a comparison of the actual energy sales and firm load obligation demand forecasts to the forecasted sales and firm load obligation demands, as required by the IRP Rule. Firm load obligation equals actual load less available interruptible load. See Figures 4F.5 and 4F.6 (next page).

Figure 4F.5: Forecast Comparison with Actual Energy Sales

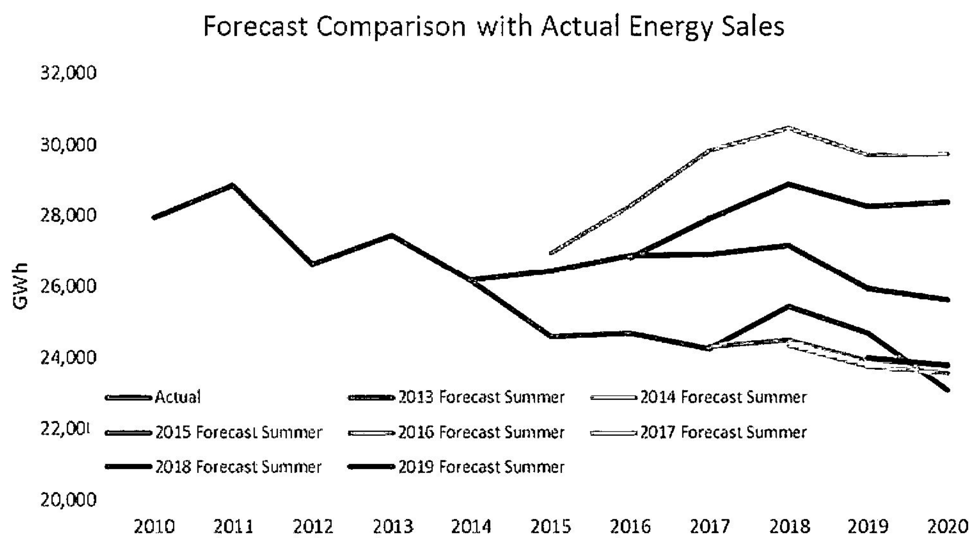
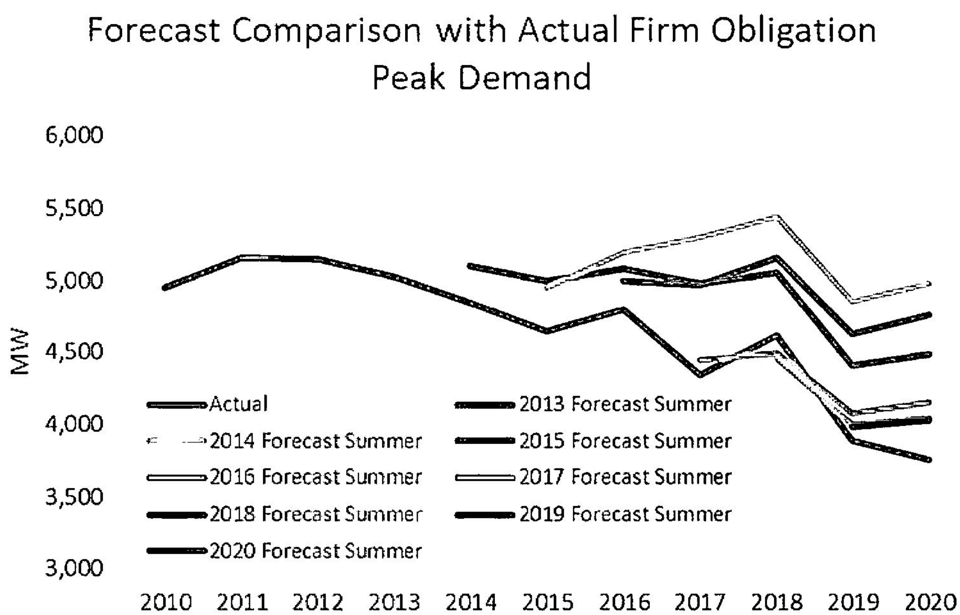


Figure 4F.6: Forecast Comparison with Actual Firm Load Obligation Peak



4.14 - Econometric Model Parameters

Please refer to Appendix F, which provides the parameters associated with SPS's econometric forecasting model.

Section 5. L&R TABLE

The IRP Rule requires that utilities provide an L&R table of existing loads and resources at the time of its IRP filing, specifically including: (1) utility-owned generation; (2) energy storage resources; (3) existing and future contracted-for purchased power including, where applicable, QF purchases, (4) purchases through net metering programs, as appropriate, (5) demand-side resources, as appropriate, and (6) any other resources relied upon by the utility.

Resource planners use a range of approaches to help identify the amounts, timing, and types of generation resources that should be added to meet increasing customer demand for electric power. One basic and straightforward tool is the L&R table. The function of an L&R table is to provide a comparison between the amount of electric generating supply and the peak load of a system. In years when load plus the planning reserve margin exceeds generation supply, additional generation is needed. Table 5-1 provides a summarized L&R table for the SPS electric system assuming the base load forecast described in Section 4.

Table 5-1: Summarized L&R Table

		2022 (MW)	2023 (MW)	2024 (MW)	2025 (MW)
(a)	Owned Generation Capacity	4,333	4,270	4,159	4,159
(b)	Purchased Power Capacity	1,208	1,254	1,030	1,020
(c)	Total Generation Capacity	5,541	5,524	5,189	5,179
(d)	Firm Load Obligation	3,969	3,874	3,899	3,937
(e)	Capacity Margin (12%)	476	465	468	472
(f)	Total Firm Load + Reserves	4,445	4,339	4,367	4,409
(g)	Resources Position Long / (Short)	1096	1184	823	770

The Summarized L&R table above provides foresight into the amounts and timing of future generation resource needs. As shown in the summarized L&R table, SPS has sufficient supply-side resources to meet its planning reserve margin requirements during the Action Plan and, therefore, does not require any new generating resources. However, as described in Section 7, SPS may consider procuring additional resources if they are expected to provide other benefits, such as economical energy savings.

Table 5-2: Summary of SPS Base Case L&R

SPS Loads & Resource Balance Summer 2022 - 2031 - Base Case Forecast
Based on March 2021 Load Forecast

SPS Load and Resources	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
EXISTING RESOURCES										
Owned - Thermal Resources	4,333	4,070	3,959	3,959	3,714	3,714	3,523	3,411	3,411	3,165
Owned - Renewable Resources	0	200	200	200	200	200	200	200	200	200
Purchased Power - Thermal Resources	797	797	574	574	574	574	574	574	574	574
Purchased Power - Renewable Resources	410	456	456	446	438	418	375	375	375	375
TOTAL ACCREDITED CAPACITY (MW)	**5,541**	**5,524**	**5,189**	**5,179**	**4,926**	**4,906**	**4,672**	**4,560**	**4,560**	**4,314**
LOAD										
Retail	3,696	3,778	3,827	3,865	3,895	3,933	3,962	3,988	4,009	4,034
Firm Wholesale	0	0	0	0	0	0	0	0	0	0
Firm PR Load	301	125	100	100	0	0	0	0	0	0
DSM / Interruptibles	(29)	(28)	(28)	(28)	(28)	(28)	(28)	(28)	(27)	(27)
FIRM LOAD OBLIGATION	**3,969**	**3,874**	**3,899**	**3,937**	**3,867**	**3,905**	**3,934**	**3,961**	**3,982**	**4,007**
RESERVES										
Planning Reserve Margin @ 12%	476	465	468	472	464	469	472	475	478	481
TOTAL PLANNING RESERVE MARGIN	476	465	468	472	464	469	472	475	478	481
CAPACITY REQUIREMENT	4,445	4,339	4,366	4,409	4,331	4,374	4,407	4,436	4,460	4,488
RESOURCE POSITION (MW): LONG/(SHORT)	**1,096**	**1,184**	**823**	**770**	**595**	**532**	**266**	**124**	**101**	**(174)**

SPS Loads & Resource Balance Summer 2032 - 2041 - Base Case Forecast
Based on March 2021 Load Forecast

SPS Load and Resources	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
EXISTING RESOURCES										
Owned - Thermal Resources	2,922	1,853	1,853	1,593	1,593	1,253	1,253	898	898	336
Owned - Renewable Resources	200	200	200	200	200	200	200	200	200	200
Purchased Power - Thermal Resources	574	574	0	0	0	0	0	0	0	0
Purchased Power - Renewable Resources	343	343	343	129	88	88	88	88	88	88
TOTAL ACCREDITED CAPACITY (MW)	**4,039**	**2,970**	**2,396**	**1,922**	**1,881**	**1,541**	**1,541**	**1,186**	**1,186**	**624**
LOAD										
Retail	4,060	4,088	4,111	4,149	4,181	4,211	4,235	4,269	4,305	4,331
Firm Wholesale	0	0	0	0	0	0	0	0	0	0
Firm PR Load	0	0	0	0	0	0	0	0	0	0
DSM / Interruptibles	(27)	(27)	(26)	(27)	(28)	(28)	(28)	(29)	(29)	(29)
FIRM LOAD OBLIGATION	**4,033**	**4,061**	**4,085**	**4,122**	**4,153**	**4,183**	**4,207**	**4,241**	**4,275**	**4,302**
RESERVES										
Planning Reserve Margin @ 12%	484	487	490	495	498	502	505	509	513	516
TOTAL PLANNING RESERVE MARGIN	484	487	490	495	498	502	505	509	513	516
CAPACITY REQUIREMENT	4,517	4,549	4,575	4,616	4,651	4,685	4,712	4,749	4,788	4,819
RESOURCE POSITION (MW): LONG/(SHORT)	**(478)**	**(1,578)**	**(2,179)**	**(2,694)**	**(2,770)**	**(3,144)**	**(3,171)**	**(3,563)**	**(3,602)**	**(4,194)**

Table 5-3: Summary of SPS High Load Case L&R

SPS Loads & Resource Balance Summer 2022 - 2031 - High Load Case Forecast
Based on March 2021 Load Forecast

SPS Load and Resources	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
EXISTING RESOURCES										
Owned - Thermal Resources	4,333	4,070	3,959	3,959	3,714	3,714	3,523	3,411	3,411	3,165
Owned - Renewable Resources	0	200	200	200	200	200	200	200	200	200
Purchased Power - Thermal Resources	797	797	574	574	574	574	574	574	574	574
Purchased Power - Renewable Resources	410	456	456	446	438	418	375	375	375	375
TOTAL ACCREDITED CAPACITY (MW)	**5,541**	**5,524**	**5,189**	**5,179**	**4,926**	**4,906**	**4,672**	**4,560**	**4,560**	**4,314**
LOAD										
Retail	3,860	4,018	4,135	4,197	4,268	4,361	4,431	4,492	4,549	4,593
Firm Wholesale	0	0	0	0	0	0	0	0	0	0
Firm PR Load	301	125	100	100	0	0	0	0	0	0
DSM / Interruptibles	(29)	(28)	(28)	(28)	(28)	(28)	(28)	(28)	(27)	(27)
FIRM LOAD OBLIGATION	**4,133**	**4,115**	**4,207**	**4,269**	**4,240**	**4,333**	**4,403**	**4,464**	**4,522**	**4,565**
RESERVES										
Planning Reserve Margin @ 12%	496	494	505	512	509	520	528	536	543	548
TOTAL PLANNING RESERVE MARGIN	496	494	505	512	509	520	528	536	543	548
CAPACITY REQUIREMENT	4,629	4,608	4,712	4,781	4,748	4,853	4,932	5,000	5,064	5,113
RESOURCE POSITION (MW): LONG/(SHORT)	**912**	**915**	**477**	**398**	**178**	**53**	**(259)**	**(440)**	**(504)**	**(799)**

SPS Loads & Resource Balance Summer 2032 - 2041 - High Load Case Forecast
Based on March 2021 Load Forecast

SPS Load and Resources	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
EXISTING RESOURCES										
Owned - Thermal Resources	2,922	1,853	1,853	1,593	1,593	1,253	1,253	898	898	336
Owned - Renewable Resources	200	200	200	200	200	200	200	200	200	200
Purchased Power - Thermal Resources	574	574	0	0	0	0	0	0	0	0
Purchased Power - Renewable Resources	343	343	343	129	88	88	88	88	88	88
TOTAL ACCREDITED CAPACITY (MW)	**4,039**	**2,970**	**2,396**	**1,922**	**1,881**	**1,541**	**1,541**	**1,186**	**1,186**	**624**
LOAD										
Retail	4,679	4,732	4,793	4,826	4,918	4,980	5,015	5,095	5,154	5,211
Firm Wholesale	0	0	0	0	0	0	0	0	0	0
Firm PR Load	0	0	0	0	0	0	0	0	0	0
DSM / Interruptibles	(27)	(27)	(26)	(27)	(28)	(28)	(28)	(29)	(29)	(29)
FIRM LOAD OBLIGATION	**4,652**	**4,706**	**4,767**	**4,799**	**4,890**	**4,952**	**4,987**	**5,066**	**5,125**	**5,182**
RESERVES										
Planning Reserve Margin @ 12%	558	565	572	576	587	594	598	608	615	622
TOTAL PLANNING RESERVE MARGIN	558	565	572	576	587	594	598	608	615	622
CAPACITY REQUIREMENT	5,210	5,270	5,339	5,375	5,477	5,547	5,585	5,674	5,740	5,804
RESOURCE POSITION (MW): LONG/(SHORT)	**(1,171)**	**(2,300)**	**(2,942)**	**(3,453)**	**(3,595)**	**(4,005)**	**(4,044)**	**(4,488)**	**(4,553)**	**(5,180)**

Exhibit DG-4

Table 5-4: Summary of SPS Low Load Case L&R

SPS Loads & Resource Balance Summer 2022 - 2031 - Low Load Case Forecast
Based on March 2021 Load Forecast

SPS Load and Resources	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
EXISTING RESOURCES										
Owned - Thermal Resources	4,333	4,070	3,959	3,959	3,714	3,714	3,523	3,411	3,411	3,165
Owned - Renewable Resources	0	200	200	200	200	200	200	200	200	200
Purchased Power - Thermal Resources	797	797	574	574	574	574	574	574	574	574
Purchased Power - Renewable Resources	410	456	456	446	438	418	375	375	375	375
TOTAL ACCREDITED CAPACITY (MW)	**5,541**	**5,524**	**5,189**	**5,179**	**4,926**	**4,906**	**4,672**	**4,560**	**4,560**	**4,314**
LOAD										
Retail	3,437	3,431	3,436	3,413	3,391	3,404	3,391	3,371	3,335	3,359
Firm Wholesale	0	0	0	0	0	0	0	0	0	0
Firm PR Load	301	125	100	100	0	0	0	0	0	0
DSM / Interruptibles	(29)	(28)	(28)	(28)	(28)	(28)	(28)	(28)	(27)	(27)
FIRM LOAD OBLIGATION	**3,709**	**3,528**	**3,507**	**3,484**	**3,363**	**3,376**	**3,363**	**3,343**	**3,308**	**3,332**
RESERVES										
Planning Reserve Margin @ 12%	445	423	421	418	404	405	404	401	397	400
TOTAL PLANNING RESERVE MARGIN	445	423	421	418	404	405	404	401	397	400
CAPACITY REQUIREMENT	4,154	3,951	3,928	3,902	3,767	3,781	3,767	3,745	3,705	3,732
RESOURCE POSITION (MW): LONG/(SHORT)	**1,386**	**1,572**	**1,261**	**1,277**	**1,159**	**1,125**	**906**	**816**	**855**	**582**

SPS Loads & Resource Balance Summer 2032 - 2041 - Low Load Case Forecast
Based on March 2021 Load Forecast

SPS Load and Resources	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
EXISTING RESOURCES										
Owned - Thermal Resources	2,922	1,853	1,853	1,593	1,593	1,253	1,253	898	898	336
Owned - Renewable Resources	200	200	200	200	200	200	200	200	200	200
Purchased Power - Thermal Resources	574	574	0	0	0	0	0	0	0	0
Purchased Power - Renewable Resources	343	343	343	129	88	88	88	88	88	88
TOTAL ACCREDITED CAPACITY (MW)	**4,039**	**2,970**	**2,396**	**1,922**	**1,881**	**1,541**	**1,541**	**1,186**	**1,186**	**624**
LOAD										
Retail	3,339	3,349	3,333	3,322	3,326	3,352	3,306	3,299	3,314	3,311
Firm Wholesale	0	0	0	0	0	0	0	0	0	0
Firm PR Load	0	0	0	0	0	0	0	0	0	0
DSM / Interruptibles	(27)	(27)	(26)	(27)	(28)	(28)	(28)	(29)	(29)	(29)
FIRM LOAD OBLIGATION	**3,312**	**3,322**	**3,307**	**3,295**	**3,298**	**3,324**	**3,278**	**3,270**	**3,285**	**3,283**
RESERVES										
Planning Reserve Margin @ 12%	397	399	397	395	396	399	393	392	394	394
TOTAL PLANNING RESERVE MARGIN	397	399	397	395	396	399	393	392	394	394
CAPACITY REQUIREMENT	3,710	3,721	3,704	3,690	3,694	3,722	3,672	3,663	3,680	3,677
RESOURCE POSITION (MW): LONG/(SHORT)	**330**	**(751)**	**(1,307)**	**(1,767)**	**(1,812)**	**(2,181)**	**(2,130)**	**(2,476)**	**(2,493)**	**(3,052)**

Section 6. IDENTIFICATION OF RESOURCE OPTIONS

The basic types of resources that are available for matching electricity supply and demand are discussed below. These resources play different roles in meeting an electric utility's demand and energy requirements. Supply-side resources provide generation capacity to serve load, whereas demand-side resources act to reduce the level of customer demand for electric power so fewer supply side-resources are required. Supply-side resources generally fall into three categories: traditional (or thermal), renewable, and energy storage. Traditional supply-side resources are typically fossil fuel-based generation resources with physical fuel supplies that can be dispatched as the demand (or need) for power changes (increases or decreases) throughout the day. Renewable resources, on the other hand, are intermittent supply-side "as available" generation resources, effectively the energy produced is a function of the timing and force created by the wind blowing or the solar radiation intensity and conversion of photons of light to electrical voltage (e.g., photovoltaic "PV"). Renewable resources are typically must-take resources, which at times can create operational issues related to their integration into the electrical power grid. Energy storage is typically achieved through BESS, which are electrochemical devices that store energy for use when needed. Battery chemistries vary in technical characteristics; however, lithium-ion chemistries are currently the most widely utilized in the U.S. The most common thermal, renewable, and BESS technologies are described in more detail below

Examples of Thermal Supply-Side Resources

- CTG (Combustion Turbine Generator) – Combustion Turbine Generators are typically referred to as simple-cycles because they operate on a single thermodynamic cycle known as the Brayton Cycle. CTGs can operate on several fuel sources but are typically fired with natural gas which turns a turbine coupled with an electric generator to generate electricity. Recent CTG technological advancements have enabled operation, for both new and retrofitted CTGs, to utilize carbon-free hydrogen as an alternative fuel source. CTGs are available in a wide range of sizes (4 MW to over 400 MW) and are typically inexpensive to build but are relatively inefficient sources of generation. As such, they are often considered "peaking" units, which are utilized during times of high electric demand. CTGs also provide extremely fast start capabilities and ramp rates, providing the capability to follow demand and intermittent renewable generation, such as wind and solar.

- CC (Combined Cycle) – Combined Cycle ("CC") facilities utilize single or multiple CTGs in conjunction with Heat Recovery Steam Generators ("HRSG") and a Steam Turbine Generator ("STG") to generate electricity. These facilities are known as CCs because they combine the Brayton Cycle, mentioned above in the CTG section, with the Rankine Cycle, the HRSG, and STG's thermodynamic cycle. The waste heat from the CTG's exhaust gas is ducted through a HRSG which generates steam to turn a steam turbine coupled with an electric generator which produces additional electric power along with the CTGs. CCs can operate in multiple configurations, i.e., 1-on-1, 2-on-1, or 3-on-1, with the first number being the number of CTGs and HRSGs and the second number being the steam turbine, which is appropriately sized to efficiently utilize the total CTG waste heat. For example, a 2-on-1 CC consists of two CTGs and HRSGs and one STG. CCs can also operate on various fuel sources, including hydrogen, since the base motive drivers are the CTGs mention in the CTG section above. CC units come in a variety of sizes near 100 MW to over 1,600 MW depending on the specific configuration of the facility. CC units have higher installed costs than CTG units, but better efficiency and operating costs, thus CCs offer more expensive capacity but lower cost energy when compared to simple cycle CTGs.

Examples of Renewable Supply-Side Resources

- Solar – Solar generation resources convert the sun's energy (photons of light) into electricity. Solar generation has several forms, such as PV, concentrating PV, or concentrating solar power. Solar generation is intermittent, like other renewable energy resources. In SPS's service territory, solar generation capacity factors typically range from 30% - 35%. Solar generation is only available during the daytime and its output is coincident with the time of the day (i.e., as the sun rises and falls, so does the solar generation output). Maximum solar output occurs prior to the time when electric demand reaches its highest level. Therefore, less than the full nameplate generating capability of solar generation is counted toward meeting electric system peak demands.
- Wind – Wind generation typically consists of large, three-bladed turbines mounted atop towers over 250 feet tall arranged over several thousand acres of land. Wind generation consist of a multiple Wind Turbine Generators with aggregated capacities up to hundreds of MW. Because the wind drives the turbines, the generation from a wind turbine is considered intermittent and can be difficult to predict. Wind generation units in New Mexico and Texas typically have an annual capacity factor in the 45-55% range, depending on the specific location within these regions. As maximum wind generation output is variable and often noncoincidental to peak system loads, wind generation has a low capacity value when compared to other generating resource (including solar generation).

Examples of Energy Storage Supply-Side Resources

- Energy Storage – Lithium ion battery storage has become increasingly popular due to declining costs. These battery storage devices typically range in size from 10 to over 250 MW and vary in duration from 2 – 8 hours. For short duration requirements, battery storage can bring about frequency control and stability, and, for longer duration requirements, they can bring about energy management or reserves.

DSM Resources

- DSM resources act to reduce the demand for electric power and include a variety of measures such as EE, energy conservation, LM, and demand response. There are two basic types of demand-side resources: peak shavers and energy savers. Peak shavers are used to reduce a customer's demand and energy requirements during periods of high demand. Examples of peak shaver DSM options include ICO and the Saver's Switch programs. Energy savers are used to reduce energy over all periods of the year. An example of an energy saver would be replacement of incandescent light bulbs with more energy efficient LED bulbs to reduce energy consumption throughout the year.

Transmission Upgrades

- Investments in transmission can be used as an alternative for investments in new generating facilities or demand-side resources, where transmission upgrades are used to access existing generation within other transmission-constrained areas.

Supply-Side Resource Comparison

Each of the different supply-side generation technologies described above have distinctly different technical characteristics as well as capital and operating cost characteristics. These characteristics dictate how various technologies are dispatched or used to serve load requirements of the system. A high-level comparison of the supply-side generating resources is shown below in Table 6.1.

Table 6-1: Supply-Side Generating Resources Comparison

Costs	Gas CT	Gas CC	Wind	Solar	BESS
Installed Cost	Low	Mid	High	Mid/High	High
Operating Costs	High	Mid	Low	Low	Low
Expected Capacity Factor %	0-25%	25-80%	45-55%	30%	N/A
CO_2[18] per MWh	Medium	Low	None	None	N/A

6.01 - Resource Options Considered

SPS's 2021 IRP considers each of the five resource options described above; i.e., CTG, CC, Solar, Wind, and BESS. Depending on the year the resource option was available for selection in the EnCompass production cost model, SPS used one of two different approaches when determining the cost and technical characteristics of new generating resources. First, as shown in Table 6-2, for the thermal resources available for selection in 2026 and beyond, SPS used general generic characteristics such as asset life, capital costs, fixed and variable operating and maintenance costs, fuel type (when applicable), heat rates (when applicable), and CO_2 emissions. These general generic characteristics are carried through each year of the planning period and costs are escalated where stated. Annual

[18] Carbon Dioxide

capacity factors are not an input for thermal generic resources, rather they are calculated by the EnCompass production cost model. The EnCompass output files will be provided under Protective Order. Availability factor can vary year-on-year and are also available in the EnCompass output files. Second, for resources available for selection between the years 2023 and 2025, inclusive, SPS used information contained in proposals received from the Tolk Analysis Request for Information ("RFI").

6.02 - Generic Resources

Generic characteristics are developed "in-house" utilizing SPS's experience with these technologies and leveraging market relationships to validate any characteristic assumptions. When determining the future cost of renewable resources, SPS also leveraged data from National Renewable Energy Laboratory's ("NREL") 2020 Annual Technology Baseline ("ATB"). These resource characteristics were then included in the EnCompass production cost model to represent how these various technologies would integrate with the existing SPS electric system to serve future customer load projections. The cost of SPS's generic thermal resources, which are summarized below in Table 6-2, were estimated in current dollars and then escalated at 2% per year thereafter. SPS used NREL ATB cost data as a baseline for estimating annual costs for wind, solar and BESS resources. Annual cost estimates for wind, solar and BESS incorporated applicable renewable tax credits for the year the project was expected to be in-serviced and, where applicable, continued declining costs in real dollars. The annual cost estimates for wind, solar, and a 4-hour BESS resource are shown below in Table 6-3. Additional cost and performance information related to the generic thermal resource types is presented in Appendix G.

Table 6-2: Thermal Generic Resource Summary Cost and Performance - 2021[19]

Technology	Asset Life (yrs)	Capacity (MW)	Capacity Cost $/kw	Fixed O&M[20] $000/yr	On-Going Capital $000/yr	VOM $/MWh	Heat Rate MMBTu/MWh	CO_2 Emissions Lbs/MMBTu
2x1 CC	40	771	$773	$5,400	$5,150	$1.22	6,608	117
CTG	40	201	$495	$1,120	$1,313	$0.00	10,009	117

Table 6-3: Generic Renewable and BESS Resource Cost by Year

Levelized Costs by In-Service Year (LCOE)						
EOY[21]	**Wind ($/MWh)**		**Solar ($/MWh)**		**Battery ($/kW-mo)**	
2026	$	39.20	$	30.68	$	12.80
2027	$	38.96	$	29.14	$	12.57
2028	$	38.70	$	27.56	$	12.33
2029	$	38.41	$	25.94	$	12.09
2030	$	38.78	$	26.08	$	12.17
2031	$	39.16	$	26.21	$	12.26
2032	$	39.53	$	26.35	$	12.34
2033	$	39.91	$	26.48	$	12.42
2034	$	40.28	$	26.61	$	12.50
2035	$	40.65	$	26.74	$	12.58
2036	$	41.03	$	26.87	$	12.58
2037	$	41.40	$	27.00	$	12.57
2038	$	41.76	$	27.12	$	12.55
2039	$	42.13	$	27.24	$	12.51
2040	$	42.49	$	27.36	$	12.47
2041	$	42.86	$	27.47	$	12.41

6.03 - Proposals Received from the Tolk Analysis RFI

As part of the Tolk Analysis, SPS was required to issue an RFI. The proposals received from the RFI generally included indicative commercial operation dates through the end of year 2025.

[19] Table 6-2 reflects 2021 costs escalating at 2% per year.
[20] Operations and Maintenance
[21] End of Year

Therefore, rather than use generic characteristics through 2025, SPS utilized the proposals received from the RFI for resources that were available for selection in the EnCompass production cost model between 2023 – 2025. For the purposes of determining the most cost-effective portfolio of resources, SPS utilized the commercial operational dates provided from perspective bidders. However, as described in more detail in Section 7.07, it is doubtful that many of the proposals can still meet the commercial operation dates they submitted in the RFI.

As a result of the RFI, SPS received information from 18 different bidders, with most bidders submitting multiple proposals and/or pricing structures. The majority of proposals submitted were for new wind generation, solar generation, or solar generation plus battery energy storage.

Wind Generation

SPS received wind proposals ranging from a little over 100 MW up to 1,000 MW. The median pricing of wind proposals received from the RFI was $23.05/MWh, assuming 60% production tax credits ("PTC") eligibility. However, as discussed in detail in the Tolk Analysis, most proposals did not include the full cost of the necessary transmission network upgrades required to interconnect the new generation.

Solar Generation

SPS received solar proposals ranging from less than 50 MW to just over 1,000 MW. The median pricing of solar proposals received from the RFI was $27.52/MWh. SPS received solar proposals that included 30%, 26%, and 10% investment tax credits ("ITC"). Again, most proposals did not include the full cost of the necessary transmission network upgrades to interconnect the new generation.

Battery Energy Storage Systems

SPS did not receive any standalone BESS resources. Instead, SPS received several proposals for solar generation coupled with BESS as this allowed the BESS to qualify for the same ITC as the solar generation. To qualify for the solar ITC, SPS assumed the BESS must be charged by the coupled solar generation for the first 5 years of operation. The incremental cost of a 4-hour BESS was approximately $6/kW-month to $8/kW-month inclusive of qualifying ITCs.

6.04 - Other Supply-side Resource Technologies

SPS received other supply-side resource technology proposals from the RFI. These technologies included gravitational energy storage, compressed air storage, and a 1-on-1 CC with hydrogen production and storage. Gravitational and compressed air storage provide the potential for longer duration energy storage than current lithium-ion BESS. In the absence of carbon-free fuels, longer duration energy storage is critical to achieving New Mexico’s carbon free energy aspirations. However, neither gravitational or compressed air storage is currently well-established, and the proposals received are in the early developmental stage; as such, it is highly doubtful that either proposal could achieve commercial operation within the Action Plan and therefore were not considered for SPS’s most cost-effective portfolio of resources. Currently, the cost of hydrogen production and storage is cost prohibitive when compared to other energy resources, such as wind, solar or even traditional gas-fired CCs. However, as demonstrated in Section 7, as SPS transitions to a more renewable-heavy portfolio of generating resources, SPS will need firm and dispatchable resources. Hydrogen-capable resources are one possibility to fulfill this critical need in the future.

Accredited Capacity - Planning Reserve Margin

Each of the supply-side resource technologies described above has the ability to contribute capacity to SPS's planning reserve margin requirements. Thermal resources, such as CTGs and CCs, can be dispatched when needed and provide 100% of their rated capacity towards SPS's planning reserve margin. Intermittent resources, such as wind generation and solar generation contribute less than their full nameplate generating capacity toward meeting SPS's planning reserve margin requirement due to their variability. The current accredited capacity SPS assumed for each resource type is shown below in Table 6-6. The Southwest Power Pool determines the methodology that is used to determine the amount of renewable capacity that can be applied to SPS's planning reserve requirement. Beginning summer of 2023, Southwest Power Pool will replace the current renewable accreditation methodology with the Effective Load Carrying Capability ("ELCC") methodology. The Southwest Power Pool will also apply the ELCC methodology to energy storage resources in the future. The ELCC methodology will result in decreasing accreditation of renewable resources and energy storage resources as the penetration of those resources increase across the Southwest Power Pool Balancing Authority Area. As SPS is unable to determine the future penetration of renewable resources and energy resources across the Southwest Power Pool Balancing Authority Area, when determining the most cost-effective portfolio of resources, SPS did not incorporate diminishing accredited capacity for generic solar, wind, and BESS resources.

Table 6-4: Accredited Capacity for New Resources

Summer Accredited Capacity for Generic Resources	
Generic Solar	58.00%
Generic Wind	19.90%
Generic CTG	100.00%
Generic CC	100.00%
Generic BESS	100.00%

Lead Time for New Resources

Development and subsequent construction of new generation facilities can take several years to complete, depending on the public and regulatory environment for which the resource is planned. SPS's recent experience has shown the regulatory approval process for new resources can exceed 12 months – excluding a competitive procurement process that can add a further six to nine months. Development of resources can take anywhere from 1 year to multiple years depending on the resource, such as renewable energy, where thousands of acres of land are required to be secured for development. Finally, engineering, procurement, construction, startup, and commissioning of new facilities can take anywhere from two to three years. Although most of the processes are scheduled to occur strategically in parallel, that is, concurrently, especially development and other "at-risk" engineering and planning, the best case execution of these tasks from start to finish would result in a resource coming online within approximately two to four years from start to finish. These public and regulatory details must be strategically accounted for when planning and executing the installation of new resources, including the lead times for critical equipment manufacturing and delivery to sites. Other factors such as current lead times for interconnection agreements detailed in Section 7.07 also add an additional level of schedule uncertainty and risk that must be considered in the overall schedule.

6.05 - Existing Rates and Tariffs

SPS's current mix of seasonal rate design, service curtailment programs, and EE programs provide a fair balance between the interest in meeting, delaying, or avoiding the need for new capacity, balanced with cost containment and minimizing adverse rate impacts resulting from significant changes in rate structures.[22]

General Service Rates

All general service rates have some form of seasonality in the kWh consumption charge or the kW demand charge. Summer rates are higher than winter (non-summer) rates, which requires the customer to pay more for electricity used in higher demand, peak periods in the summer compared to the same levels of usage in winter billing months. A higher bill can serve to discourage excessive usage in summer months and, where possible for the customer, serve as an incentive to shift usage to lower demand winter billing periods; thus, mitigating the need for new resources over time.

TOU Rates

Time of Use ("TOU") rates are available as an option for all general service customers, except Large General Service – Transmission. TOU rates provide a lower rate compared to general service rates for off-peak demand or energy consumption, with a higher charge based upon avoided capacity cost during peak hours. Peak hours are 12 noon through 6 p.m., Mondays through Fridays, during the summer billing months of June through September. Lower rates during off-peak hours, and all

[22] SPS's current rates were set in Case No. 19-00170-UT. The rates are subject to revision in Case No. 20-00238-UT.