LEI Semi-Annual Regional Market Update and

10-year Energy Price Forecast

Southwest Power Pool

3st Quarter 2021

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Description of Report

London Economics International LLC (LEI) provides semi-annual regional market updates and 10-year energy price forecasts for major markets in North America and around the world. In addition to providing price projections, the reports highlight major developments in each of the regions as well as the underlying structural dynamics. LEI also provides more detailed regional market price forecasts tailored to a client's individual needs, including longer time horizons and forecasting of plant-specific revenues or the impact of structural or market design changes.

Executive Summary

The Southwest Power Pool ("SPP") operates an energy-only market covering part or all of 14 states from as far south as Texas, spanning northwards to North Dakota. In March 2014, SPP moved from a real-time energy market towards an 'integrated marketplace', which is a more comprehensive day-ahead and real-time energy market design. In October 2015, the Integrated System ("IS"), comprising the Western Area Power Administration – Upper Great Plains, Basin Electric Power Cooperative, & Heartland Consumers Power District, gained full membership to SPP, expanding the Regional Transmission Organisation ("RTO") footprint to the Northern Great Plains states of Wyoming, North and South Dakota and Montana. In June 2019, SPP released its proposal and design for a Western Energy Imbalance Service ("WEIS") market. This market would extend into the western interconnection and would be based on its previous experience of bilateral energy imbalance market. In December 2020, FERC approved SPP's WEIS tariff, and the market launched in February 2021 with eight participating utilities. [1]

SPP is over-supplied on a system-wide basis, but reserve margins are likely to decline gradually as demand growth outpaces supply additions. Eight SPP member states have Renewable Portfolio Standards ("RPS"), established from 1999/2000 in Texas to 2010 in Oklahoma, which require new renewable capacity installation in areas with renewable potential. In line with the priority projects from its 10-Year Integrated Transmission Plan ("ITP10"), SPP completed a number of major transmission expansion projects in 2016, including the Sibley-Mullin Creek-Nebraska City 345kV which was energized in December 2016, resolving major constraints in the Central zone. Following these completions, recent projects have comprised upgrades to existing lines in order to meet specific needs, e.g., congestion relief.

Key changes since Q1 2020 release

- Announced new entry and retirements have been updated to take into account plants recently commercialized and proposed to be retired
- Abandonment of the Holcomb Expansion, and additional renewable new entry, notably wind generation which continues to grow in SPP
- LEI introduces a national carbon price of $50/metric ton starting from 2028

Energy prices across SPP zones in 2022 are projected to be around $22.9/MWh, which is higher than 2020 prices which averaged $17.7/MWh. Wholesale energy prices are expected to move in line with the gas price trend and the known additions in the near term. A sharp price increase occurs in 2028 when the national carbon price kicks in. Thermal generation accounts for slightly less than 50% generation share in 2028 and the $50/metric ton carbon price translates into a $33/MWh price increase. Post 2028, the price increases moderately as the renewable capacity come online.

[1] This expansion effort is discussed in further detail in Section 1.2.

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1 Market overview and recent developments

1.1 Market overview

The Southwest Power Pool ("SPP") is a not-for-profit organization and Regional Transmission Organization ("RTO") mandated by the Federal Energy Regulatory Commission ("FERC") to manage reliability coordination, wholesale markets, and transmission services using its members' transmission systems. SPP established a real-time energy market in 2007 and moved to an integrated day-ahead and ancillary services energy market in March 2014, referred to as the Integrated Marketplace. In our modeling, the spot market price forecast assumes efficient, least-cost dispatch. Least-cost dispatch, already accommodated by the previous real-time market, is further enhanced through the day-ahead market design.

Key Facts about SPP
(2020 footprint)

- Based in Little Rock, Arkansas, SPP has approximately 600 employees
- Geographic area: 553,000 square miles
- 105 members in 14 states with 262 TWh of generation in 2020
- 1,162 generating plants and 70,025 miles of transmission lines

SPP has a number of roles that it carries out on behalf of its members, including Reserve Sharing Group, Reliability Coordinator ("RC") Area, Regional Transmission Organization/Tariff, and the Integrated Marketplace region.[2] SPP combined its 16 legacy Balancing Authorities ("BA") into one entity and now acts as the Consolidated Balancing Authority ("CBA") for the entire market footprint, which has been in effect from March 2014. As the CBA, SPP balances the region's supply and demand, and maintains both frequency and electricity flows between adjacent BAs. The CBA is also obligated to meet numerous North American Electric Reliability Corporation ("NERC") performance standards and criteria, as well as being the primary reporting authority to FERC for member utilities.

The CBA provides economic incentives and structure for the most efficient regional grid operation. The consolidated structure offers market participants more reserve resources from which to draw, allowing the region to meet NERC standards more efficiently. SPP's footprint includes 16 control areas responsible for matching electricity supply and demand within their individual regions. There is no rate pancaking on transactions between these control areas, as a result of SPP's coordinating role and RTO status.

The integrated marketplace merged all SPP legacy balancing authorities into a single, larger balancing authority touching all or portions of Arkansas, Kansas, Louisiana, Missouri, Nebraska, New Mexico, Oklahoma, and Texas. Following the addition of the Integrated System ("IS") in 2015, SPP's footprint expanded to include portions of Iowa, Minnesota, Montana, North Dakota, South Dakota, and Wyoming.

The 2019 coincident peak electric demand in SPP's footprint was 50,662 MW and installed generating capacity as of the end of 2020 was 94,648 MW, with a diverse generation mix largely

[2] Note that SPP's role as Regional Entity ("RE") came to an end at the end of 2018 after the Board voted to dissolve it.

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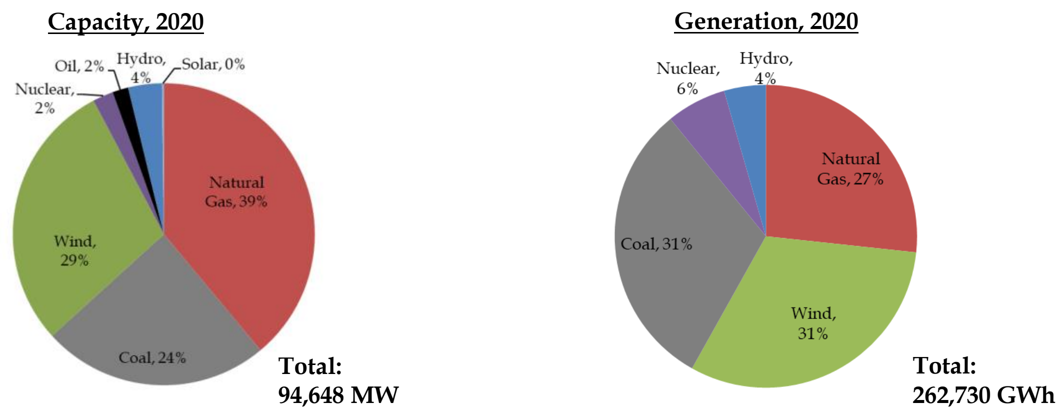
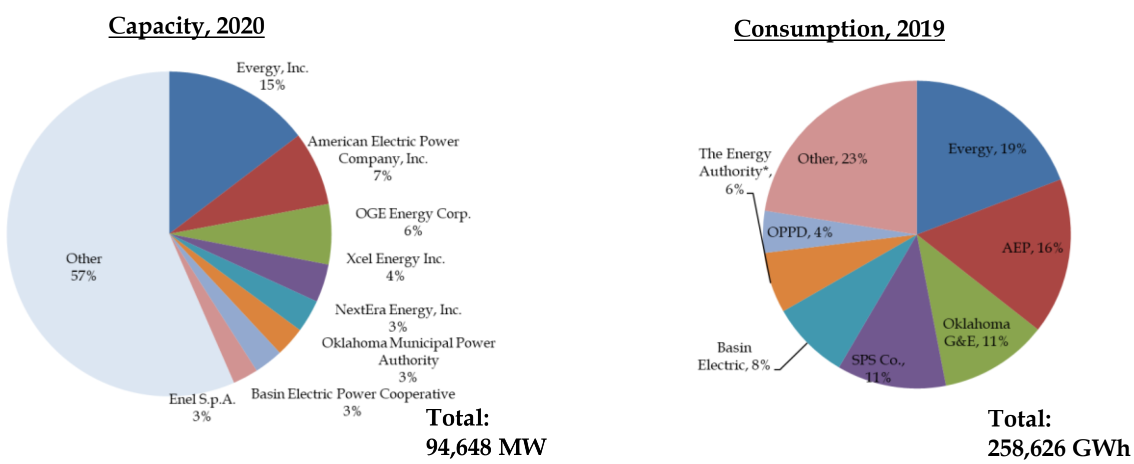
concentrated in natural gas, coal, and wind.[3] SPP has around 27 GW of wind in service, and significant wind resource exists in northern SPP, the Great Plains states of Kansas, and Oklahoma, as well as parts of the market's southwest, in the Texas Panhandle.

Figure 1. Installed capacity and generation by fuel type



Source: SPP State of the Market Report; commercial database provider.

Figure 2. Installed capacity and consumption by market player



Source: SPP State of the Market Report; commercial database provider.

As of the end of 2020, there was 82,366 MW of generation capacity in the interconnection study queue under review for addition to the grid. Solar accounts for the majority of proposed generation interconnection, at approximately 35,562 MW, while wind interconnection requests are a close second at 30,770 MW.[4]

[3] Commercial third-party database.

[4] Southwest Power Pool. SPP 101 – An Introduction to SPP. 2021.

Eight of the SPP states have established Renewable Portfolio Standards ("RPS"). In our modeling, state-level goals are allocated to each zone based on their load proportion. State-specific targets for renewable-generated power range from 15% by 2015 (for Oklahoma) to 20% by 2020 (for Kansas and New Mexico).

We assume that RPS-compliant renewable capacity that is built will recover its costs through all-in Power Purchase Agreements ("PPAs") with local utilities. In states without an RPS, some utilities have also established their own renewable goals, e.g., Nebraska Public Power District and Omaha Public Power District have a 10% renewable goal by 2020.

1.2 Recent developments

There have been a number of recent developments in the SPP market since the last report. Some key developments include SPP's successful launch of the Western Energy Imbalance Service ("WEIS") and commitment to study RTO expansion in the Western Interconnection. Other notable developments are its implementation of the recommendations from the Holistic Integrated Tariff Team ("HITT") report, the impact of the winter storm of 2021, which led to significant levels of load shedding in some portions of the SPP footprint in February 2021.

In addition, SPP continues to experience record levels of wind and renewables penetration, and in 2020 and 2021, numerous records were broken. In 2020, wind generation was the leading fuel source in SPP for the first time in its history, while in March 2021, wind generation comprised over 80% of generation for a notable interval, breaking previous penetration records. SPP has so far been able to reliably integrate these high wind penetration levels into its grid.

These key developments are discussed in further detail below.

1.2.1 Wind reaches new milestone in SPP

The year 2020 marked a significant milestone for SPP as wind generation comprised the highest share of total generation for the first time, as it accounted for 32% of total generation.[5] This is a five point increase from the previous year when wind comprised 27% of total generation, second to coal generation, which was first at just under 35%. In 2020, coal generation accounted for 31% of total generation, continuing a year-over-year decline for the past seven years. As recently as 2013, coal generation comprised 61% of total system generation.

The shift in the resource mix in SPP has been rapid and resulted in numerous retirements of coal-fired generators – in 2019 alone, six units of ~970 MW of coal capacity retired.[6] According to the Market Monitoring Unit ("MMU") at SPP, nearly 85% of coal capacity and 40% of gas capacity in SPP is older than 30 years, and by contrast, "*wind generation has accounted for 88 percent of the*

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[5] Southwest Power Pool. *SPP becomes first regional grid operator with wind as No. 1 annual fuel source, considers electric storage participation in markets, approves 2021 transmission plan.* January 26, 2021.

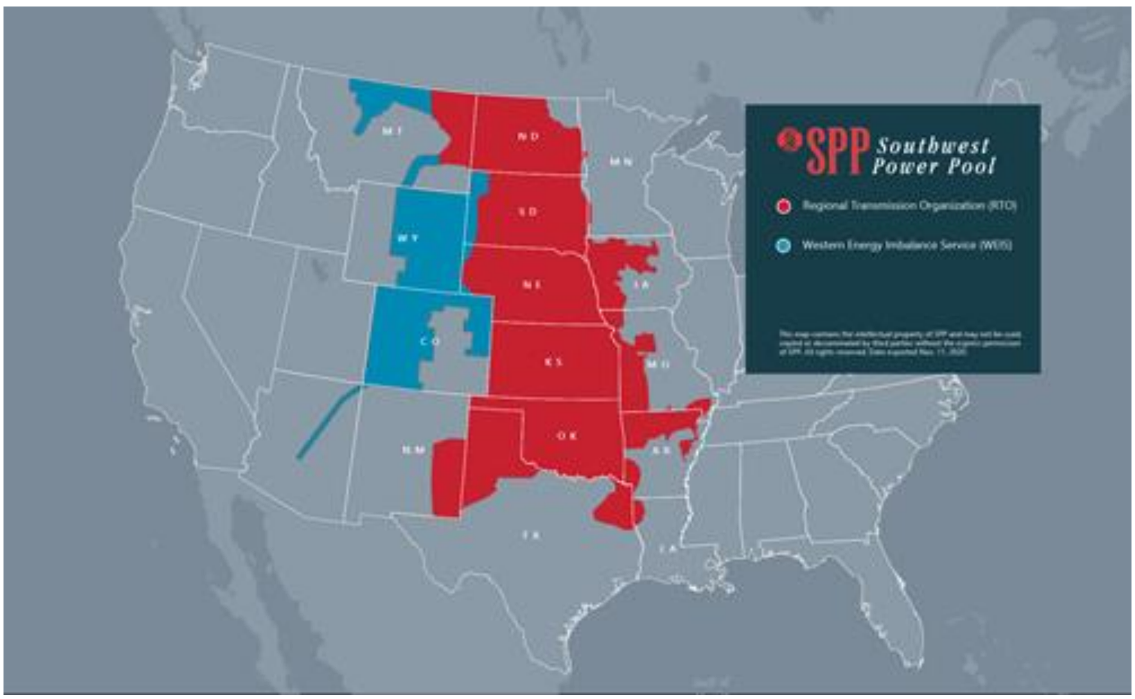
[6] Southwest Power Pool. *Annual State of the Market Report 2019.* May 11, 2020.

additions over the last three years and all of the additions in 2019."[7] This suggests that the transition of the fuel mix in SPP is expected to continue at least in the near term.

1.2.2 SPP receives approval for and launches the Western Energy Imbalance Service

In June 2019, SPP released its proposal and design for a Western Energy Imbalance Service ("WEIS") market.[8] This wholesale market would be based on its previous experience of bilateral energy imbalance market that it operated before the Integrated Marketplace between 2007 and 2014. SPP would serve as the market administrator and centrally dispatch energy from participating resources throughout the region every five minutes.[9] It would operate on a contract basis, meaning that entities need not be members of the RTO in order to participate. The potential combined footprint of SPP and WEIS is shown in Figure 3 below.

Figure 3. SPP WEIS and RTO footprints



Source*:* Southwest Power Pool website.

In December 2020, FERC approved SPP's WEIS tariff, which would allow for the launching of the market by February 2021. FERC approved the terms, rules and conditions for participants in the market, consistent with SPP's proposal, including the fact that SPP would administer the WEIS

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[7] Ibid. P.225.

[8] Southwest Power Pool. *A Proposal for the SPP Western Energy Imbalance Service Market.* June 17, 2019.

[9] Ibid.

tariff separate from the RTO's Open Access Transmission Tariff.[10] Eight utilities are currently participants, namely: Basin Electric Power Cooperative, Deseret Power Electric Cooperative, Municipal Energy Agency of Nebraska, Tri-State Generation and Transmission Association, Western Area Power Administration's Upper Great Plains West, Rocky Mountain Region and Colorado River Storage Projects, and the Wyoming Municipal Power Agency.

According to SPP's analysis of the first two months of the WEIS operation (that is, February and March 2021), the average hourly load for the first two months of the WEIS market was 2.5 GWh, with the average load for February being 2.6 GWh, and 2.3 GWh in March.[11] Coal-fired generation comprised the majority of generation in the WEIS at 65%, while hydro was 21% of generation. The extreme winter weather event in mid-February 2021 had a major impact on prices, with natural gas prices averaging $18/MMBtu at the Cheyenne hub and an average real-time price of over $92/MWh for the month.[12] In March, prices fell to $19.8/MWh, consistent with lower gas prices of $2.5/MMBtu as the impact of the severe winter conditions subsided. LEI describes this winter event in a subsequent section in this report.

For the purposes of this report, LEI has modeled the Integrated Marketplace i.e., the existing RTO footprint, and will monitor the development of the WEIS as utilities study potential RTO membership.

1.2.3 Severe winter weather event in February 2021

In the week of February 15th, 2021, extreme weather events related to an Arctic blast enveloped much of the Southwest US, impacting large swathes of the SPP footprint (see Figure 4). This caused record levels of residential heating demand for natural gas and freezing of natural gas supplies at wellheads that contributed to a shortage in supply. As a result, between 3 GW and 25 GW of generation was forced offline over the period, and SPP declared an Energy Emergency Alert 1 ("EEA1") before upgrading it to EEA3. At this point, SPP initiated load shedding on a rotating basis to mitigate a full blackout – at the highest point, the grid operator shed 2,718 MW of load at around 7AM on February 16th before restoring service several hours later.[13] SPP states that this is the first time in its history that it has had to call for regionwide curtailments.

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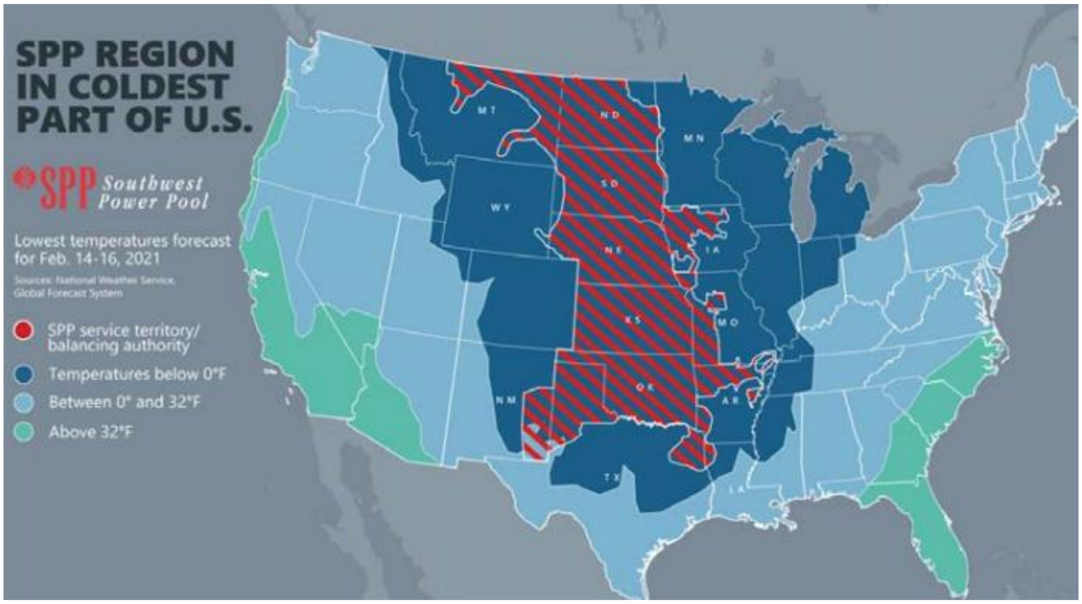
[10] Southwest Power Pool. *SPP receives approval of western market tariff.* December 23, 2020.

[11] Southwest Power Pool Market Monitoring Unit. *Western Energy Imbalance Service (WEIS) State of the Market. February – March 2021.* May 13, 2021.

[12] Ibid. Page 15.

[13] Southwest Power Pool. *Quarterly State of the Market. Winter 2021.* April 2021. P.67.

Figure 4. SPP report of cold weather event in February 2021



Source*:* Southwest Power Pool. *Quarterly State of the Market. Winter 2021.* April 2021.

During this extreme weather event, prices reached and exceeded SPP's price cap of $2,000/MWh over several intervals – it is notable that offers at and above the cap must be verified by the MMU.[14] In addition, the volume of net imports increased sharply to meet demand. For example, the MMU estimates that in a typical hour, net imports into SPP are +/- 200 MW per hour. However, during the winter event, imports from PJM reached nearly 3,600 MW per hour due to high prices in SPP relative to PJM.[15]

In July 2021, SPP published the findings of its winter storm review, observing that unavailability of generation, driven mostly by lack of fuel, was the largest contributing factor to the severity of the winter weather event's impacts. Specifically, the RTO noted that the largest single cause of its forced generation outages was attributed to fuel-supply issues, causing nearly 47% of the outages and affecting over 13 GW of gas generation.[16] In addition, these supply constraints were exacerbated by record demand as well as a rapid reduction of energy imports.[17]

Going forward, the report states that it is imperative that it assesses its ability to operate the system with more intermittent and fewer base-load resources, as well as ensuring there is better

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[14] In addition, scarcity prices can add over $1,700/MWh to the price cap, which occurs when regulation and operating reserves are short. This was the case during the winter event. (Source: SPP MMU. Quarterly State of the Market. Winter 2021. April 2021.)

[15] Ibid. 69.

[16] Southwest Power Pool. *A Comprehensive Review of SPP's Response to the February 2021 Winter Storm*. July 19, 2021.

[17] Ibid.

coordination between gas and electric industries. Among the recommendations, SPP notes it will perform initial and ongoing assessments of minimum reliability attributes needed from SPP's resource mix.[18]

1.2.4 Reporting on SPP's resource adequacy requirement

In August 2018, FERC approved SPP's revised submission for a Resource Adequacy Requirement ("RAR") which requires "*a Load Responsible Entity ("LRE") to maintain capacity required to meet its load and planning reserve obligations*." This RAR, referred to as Attachment AA of the SPP tariff, is applicable for the June 1 to September 30 period of each year for all LRE in the utility's footprint. For each LRE, failing to maintain an appropriate minimum level of capacity would entail a "deficiency payment" equal to the amount of megawatts that it is deficient times a calculated cost-of-new entry ("CONE") – initially $85.61/kW-year – times a "CONE factor." The CONE factor varies by how much the overall SPP planning reserves exceed the target reserve margin.

In June 2020, SPP released its second ever resource adequacy report, covering the 2020 summer season, concluding that "all LREs have complied with the Resource Adequacy Requirement for the 2020 Summer Season."[19] Specifically, the planning criteria defined for the requirement mandates that all LREs maintain a Planning Reserve Margin of 12%, or 9.98% if the LRE has at least 75% hydro-based generation. For the 2020 summer season, SPP assessed the RAR for 58 LREs, and all satisfied the criteria, with a BA-wide PRM of 20.7%, down from 24.4%.[20] Going forward, SPP anticipates a decline to a planning area reserve of 12.5% by 2025, driven by retirements and replacement by fewer additions, including wind generation.

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[18] Ibid.

[19] Southwest Power Pool. 2020 Resource Adequacy Report. June 15, 2020.

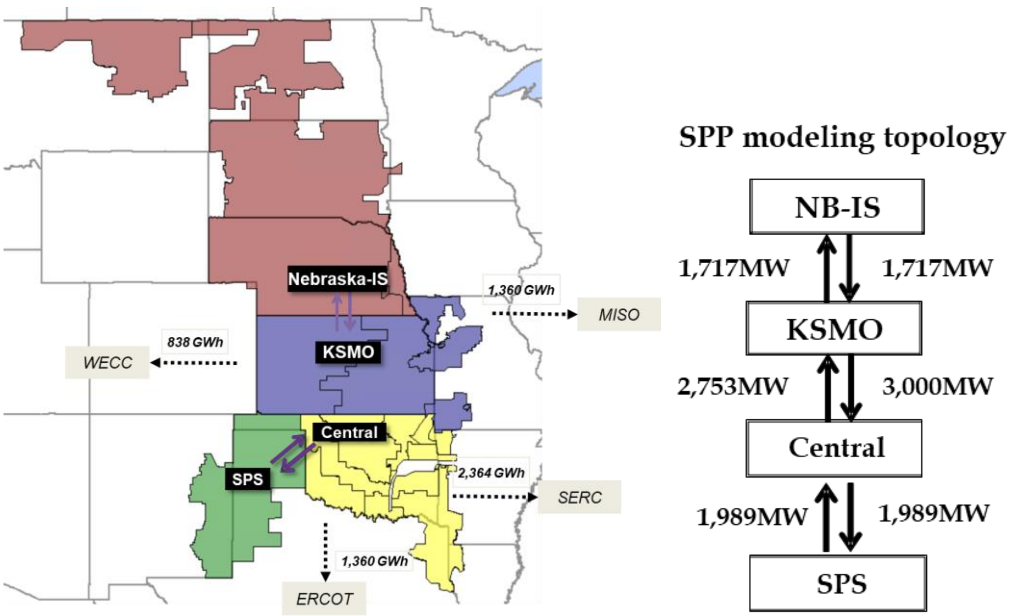
[20] Ibid.

2 Modeling assumptions

2.1 Market topology

Using recognized transmission constraints, we have modeled a total of four zones in SPP: Nebraska-Integrated System ("Nebraska-IS"), Kansas-Missouri ("KSMO"), Central,[21] and SPS.[22] The transmission interface limits within the four zones and the SPP footprint are presented in Figure 5.

Figure 5. SPP footprint and regional transmission interface limits



Source: Commercial database provider; *EPA data; LEI analysis.*

2.2 Fuel price projections

Fuel prices were developed based on updated market trends. Short-term needs are driven by forward market expectations, while longer-term trends are based on more general commodity price paths. In this section, LEI discusses its approach to its fuel price projections for natural gas, oil, and coal, as used in the model.

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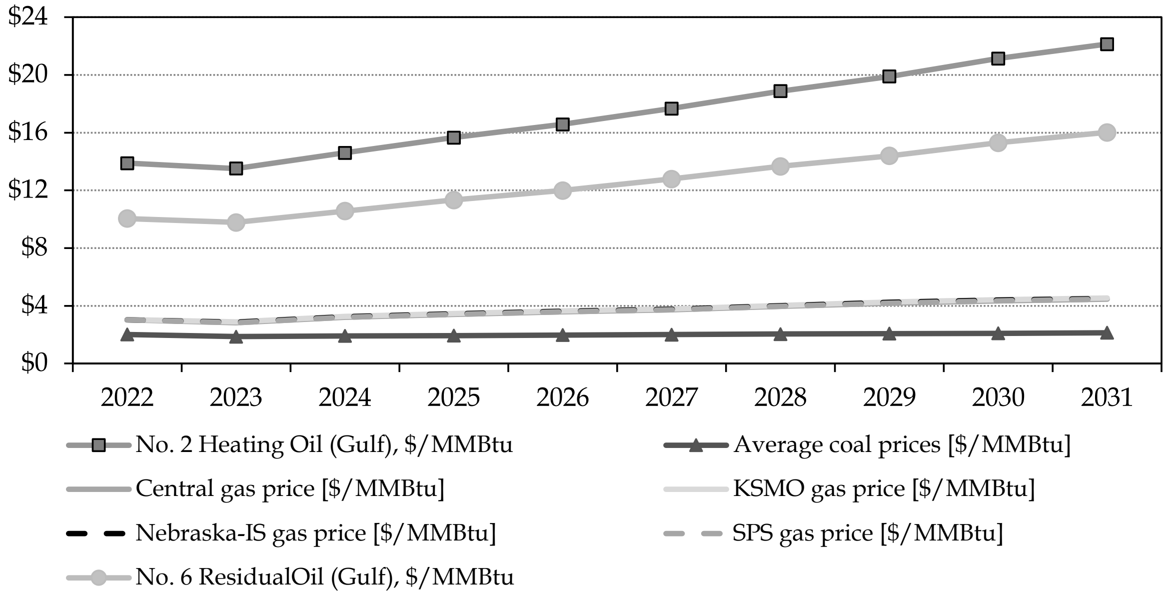
[21] Includes the entirety of Oklahoma and parts of Arkansas, and Texas.

[22] Includes parts of New Mexico, Texas and Oklahoma.

Figure 6. Fossil fuel price projections (nominal $/MMBtu)



[$/MMBtu]	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
No. 2 Heating Oil (Gulf), $/MMBtu	$13.9	$13.5	$14.6	$15.7	$16.6	$17.7	$18.9	$19.9	$21.1	$22.1
No. 6 ResidualOil (Gulf), $/MMBtu	$10.0	$9.8	$10.6	$11.3	$12.0	$12.8	$13.7	$14.4	$15.3	$16.0
SPS gas price [$/MMBtu]	3.0	2.8	3.2	3.4	3.6	3.7	4.0	4.2	4.4	4.5
Central gas price [$/MMBtu]	3.0	2.8	3.2	3.4	3.6	3.7	4.0	4.2	4.4	4.5
KSMO gas price [$/MMBtu]	3.1	2.9	3.3	3.5	3.6	3.8	4.0	4.3	4.4	4.5
Nebraska-IS gas price [$/MMBtu]	3.0	2.9	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.5
Average coal prices [$/MMBtu]	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.1	2.1	2.1

Source: OTCGH, EIA AEO 2021.

2.2.1 Natural gas

Natural gas price assumptions are based on OTC Global Holdings ("OTCGH") Henry Hub projections in the near term, relying on forwards markets for projected locational gas prices. Long-term natural gas projections are based on the 2021 EIA Annual Energy Outlook ("AEO"). For the first two years of the forecast period (2022 and 2023), LEI has used the three-month average forwards between October and December 2020 reported by OTCGH. Beyond 2023, LEI has conducted a fundamentals analysis, using a reference point plus a transportation adder and local distribution charges. LEI employed its proprietary Levelized Cost of Pipeline ("LCOP") model to forecast the gas price spread between Henry Hub and modeled gas pricing points.

LEI employs its proprietary Levelized Cost of Pipeline ("LCOP") natural gas basis differential model to forecast longer term trends in the transportation adder component of natural gas prices. The LCOP model evaluates 30 gas pricing hubs in North America by tracking forward basis differentials and the levelized cost of building new pipeline(s) between each hub. The cost of pipeline capacity in the model relies on data collected from FERC on actual and proposed pipeline projects. In the long run, price spreads between two gas pricing hubs are assumed not to exceed the levelized cost of building a new pipeline between the two hubs. This levelized cost therefore effectively sets a long-term price cap on the transportation cost adder or basis differential between two pricing hubs.

For the markets we cover in this report, the primary gas pricing points are listed below:

- Waha (Central & SPS);
- El Paso San Juan (KSMO); and
- Cheyenne (Nebraska-IS).

LEI also accounted for strong seasonal variations exhibited in gas prices at all pricing points. We have used the five-year average (2016-2020) seasonality index in our modeling. Over the modeling horizon, natural gas prices in SPP start at an average[23] of $3.0/MMBtu in 2022 and increase by a CAGR of 4.4% to reach $4.5/MMBtu in 2031. Figure 6 shows the forecast delivered costs of natural gas.

2.2.2 Oil

The distillate oil price is based on heating oil forwards in the short term, and the growth rate from the EIA crude oil forecast is applied for the long term. The residual oil price was developed based on a multi-year average of the ratio of residual and distillate oil prices. The oil price is forecasted to increase at an average of 7.0% annually with the distillate increase from $13.9/MMBtu in 2022 to $22.1/MMBtu in 2031 and the residual increase from $10.0/MMBtu in 2022 to $16.0/MMBtu in 2031, as shown in Figure 6.

2.2.3 Coal

Despite its recent decline in market share, coal remains one of the major fuel types in SPP, historically comprising about a third of total generation. Given the diversity in coal sourcing, quality, and price, we developed plant-specific coal price outlooks. We began with an estimate of recent actual delivered costs, taking into account the type of coal used at each plant (since each coal plant has different sulphur content levels and different contracts for price and transportation), and escalated that estimate with the longer-term trends for the commodity (the coal price forecast) and inflation rate from EIA's Annual Energy Outlook 2021. The coal price indices — Interior regions — were used for the coal plants in SPP. The average coal price is expected to increase from $2.0/MMBtu in 2022 to $2.1/MMBtu in 2031, growing at a CAGR of 0.7%, as shown in Figure 6.

2.3 Carbon costs

LEI assumes that there will be a national carbon program starting in 2028. This is based on LEI's expectation of the timeline required to pass federal regulation, complete state implementation plans, and close out any judicial appeals. LEI assumes that the national carbon price will start at

[23] Average of the three gas pricing hubs.

$50/metric ton in 2028 and increase by 2% per year.[24] This assumed carbon price is consistent with the current federal rule for carbon capture storage ("CCS") tax credits and is lower than many estimates of the social cost of carbon.[25]

Assumptions on carbon emissions price forecasts and the timing of the implementation of a carbon regulation, as well as the compliance mechanism of such program discussed in this report, should be considered illustrative. No assumption provided by LEI on a potential carbon regulatory framework (regional) should be taken as a promise or guarantee of any such occurrence in the future. Moreover, in this report LEI does not make any recommendations as to the timing and/or mechanism of the program or the expected carbon emissions prices.

Figure 7. Emissions cost projections (nominal $/ton)

[$/ton]	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Carbon Prices	-	-	-	-	-	-	$50.0	$51.0	$52.0	$53.1

2.4 Hydrology

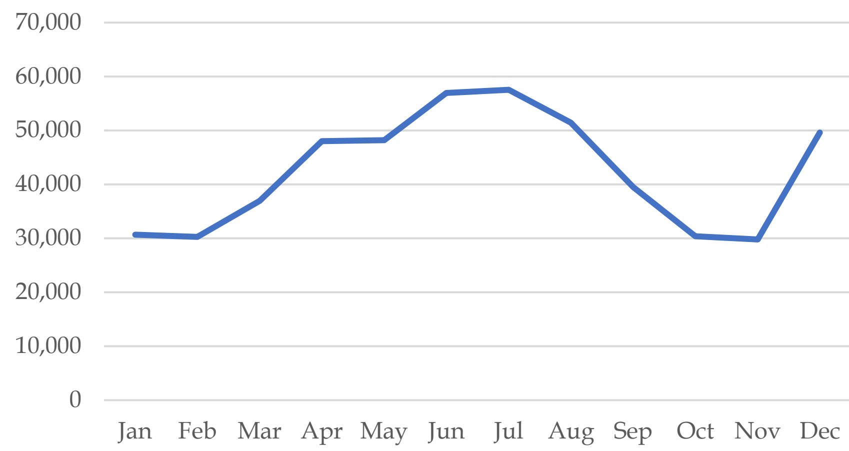
Hydro generating capacity will have somewhat more significance following the addition of the Integrated System, and the subsequent addition of nearly 3,000 MW of hydro capacity. Thereafter, total hydro capacity will represent approximately 5,000 MW, which translates to close to 6% of total generating capacity, clustered in two zones i.e., Central zone and Nebraska-IS. In order to determine the target amount of energy production of the hydroelectric plants, we relied on 10-year historical monthly production data for individual plants to create typical monthly energy budgets for each plant in our database. Run-of-river hydroelectric plants produce more energy during high water availability months and less during the dry summer months, but specific generation levels in any given month may nevertheless vary from plant to plant.

The following figure shows the modeled monthly energy budgets for all existing hydro in the system, developed based on historical hydrology.

[24] LEI's assumed carbon price is reasonable given the proposed carbon prices in other markets. For instance, in Canada, the government announced that the carbon tax will increase from its current CAD$30/ton of greenhouse gas to CAD$170/ton in 2030. This amount is based on the estimated social cost of carbon of $50/tCO2 (in 2019 dollars). If this is implemented into law, the carbon tax will increase by CAD$15/ton per year starting in 2023 until the tax hits CAD$170/ton in 2030. The federal carbon tax is set under the Greenhouse Gas Pollution Pricing Act and applies to a province or territory that does not have its own carbon pricing scheme that meet federal benchmarks.

[25] Under the carbon capture tax credits regulation (under 45Q of the Internal Revenue Code), owners of carbon capture projects can claim tax credits of up to $50 per ton for capturing carbon oxide and permanently burying it, using it as a tertiary injectant in enhanced oil or natural gas recovery project, or using it in another commercial process that would result in the permanent disposal of the carbon oxide.

Figure 8. Average monthly hydroelectric energy budget (GWh/month)



Source: Commercial third-party database.

2.5 Generic new entry

In the longer term, we assume that generators make "just-in-time" capacity investment decisions that are timed to load growth, as we are targeting an effective reserve margin on top of peak load. Renewable new entry is synchronized to meet the renewable portfolio standards set by state regulators. Load serving entities in SPP are required to have a planning reserve margin of 12%,[26] and we assume this as a benchmark check on a SPP-wide basis. In several SPP states, a hybrid industry structure dominates the market, and utilities are still rate-regulated for generation. Most new entry is likely to be utility-built under a cost-of-service regime for reliability targets, as described in their Integrated Resource Plans ("IRP").

In our modeling, we also consider retirements. Plants are assumed to choose to exit the market if their energy market revenues cannot cover the minimum going forward fixed costs three years in a row, consistent with economically rational business behavior.

We expect substantial coal retirement when the carbon price is introduced in 2028. On the other hand, we also expect some efficient coal units will be converted to gas and continue operating for another decade or two in order to maintain the system reliability. Other aging thermal plants (oil and natural gas) are generally retired after 60 years as well – this age-based retirement serves as a proxy rule for aging technology over the longer-term horizon, over and above the announced retirements by utility resource plans. We assume nuclear units will have their licenses renewed by the Nuclear Regulatory Commission ("NRC") and stay online over the modeling horizon.

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[26] SPP defines 'capacity margin' as follows: {(total capacity-peak demand)/total capacity} (Source: *Southwest Power Pool Criteria*: April 25, 2011).

Figure 9. Cost of generic new entry assumptions for SPP, 2025 and 2030

2025	CCGT	SCGT	Onshore wind	Solar	Storage	Solar PV w/ storage
Capital cost [$/kW]	1,103	724	1,401	1,126	1,434	1,434
Leverage	60%	30%	70%	70%	60%	60%
Debt interest rate	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%
Tax rate	26.0%	26.0%	26.0%	26.0%	26.0%	26.0%
Pre-tax required equity return	12.5%	12.5%	10.0%	10.0%	10.0%	10.0%
Post-tax required equity return	9.3%	9.3%	7.4%	7.4%	7.4%	7.4%
Debt financing term (years)	20	10	20	20	20	20
Equity contribution capital recovery term (years)	20	20	20	20	20	20
Lead time (months)	36	24	36	18	18	18
Heat rate, Btu/kWh	6,367	9,806	-	-	-	-
Nominal variable O&M, $/MWh	$2.8	$4.9	$0.0	$0.0	$0.0	$0.0
CO2 content (lb/MMBtu)	117	117	-	-	-	-
Carbon cost ($/short ton)	-	-	-	-	-	-
CO2 adder ($/MWh)	-	-	-	-	-	-
Nominal fixed O&M, $/kW/year	$14.7	$7.3	$26.6	$14.0	$19.9	$28.5
Capacity factor	60.0%	25.0%	40.0%	18.0%		18.0%
Fuel price ($/MMBtu)	$2.7	$2.7	$0.0	$0.0	$0.0	$0.0
All-in fixed cost [$/kW-yr]	$131.3	$109.1	$157.2	$115.4	$155.3	$164.0
Levelized non-fuel cost of new entry [$/MWh]	$27.8	$54.7	$44.9	$73.2		$104.0
Levelized cost of new entry [$/MWh]	$45.2	$81.6	$44.9	$73.2		$104.0

2030	CCGT	SCGT	Onshore wind	Solar	Storage	Solar PV w/ storage
Capital cost [$/kW]	1,188	776	1,379	950	1,228	1,228
Leverage	60%	30%	70%	70%	60%	60%
Debt interest rate	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%
Tax rate	26.0%	26.0%	26.0%	26.0%	26.0%	26.0%
Pre-tax required equity return	12.5%	12.5%	10.0%	10.0%	10.0%	10.0%
Post-tax required equity return	9.3%	9.3%	7.4%	7.4%	7.4%	7.4%
Debt financing term (years)	20	10	20	20	20	20
Equity contribution capital recovery term (years)	20	20	20	20	20	20
Lead time (months)	36	24	36	18	18	18
Heat rate, Btu/kWh	6,335	9,757	-	-	-	-
Nominal variable O&M, $/MWh	$3.1	$5.4	$0.0	$0.0	$0.0	$0.0
CO2 content (lb/MMBtu)	117	117	-	-	-	-
Carbon cost ($/short ton)	52.0	52.0	52.0	52.0	52.0	52.0
CO2 adder ($/MWh)	19.3	29.7	-	-	-	-
Nominal fixed O&M, $/kW/year	$15.8	$7.8	$26.2	$11.8	$17.8	$24.4
Capacity factor	60.0%	25.0%	40.0%	18.0%		18.0%
Fuel price ($/MMBtu)	$3.7	$3.7	$0.0	$0.0	$0.0	$0.0
All-in fixed cost [$/kW-yr]	$141.4	$117.0	$154.6	$97.4	$133.8	$140.4
Levelized non-fuel cost of new entry [$/MWh]	$30.0	$58.8	$44.1	$61.7		$89.0
Levelized cost of new entry [$/MWh]	$72.6	$124.5	$44.1	$61.7		$89.0

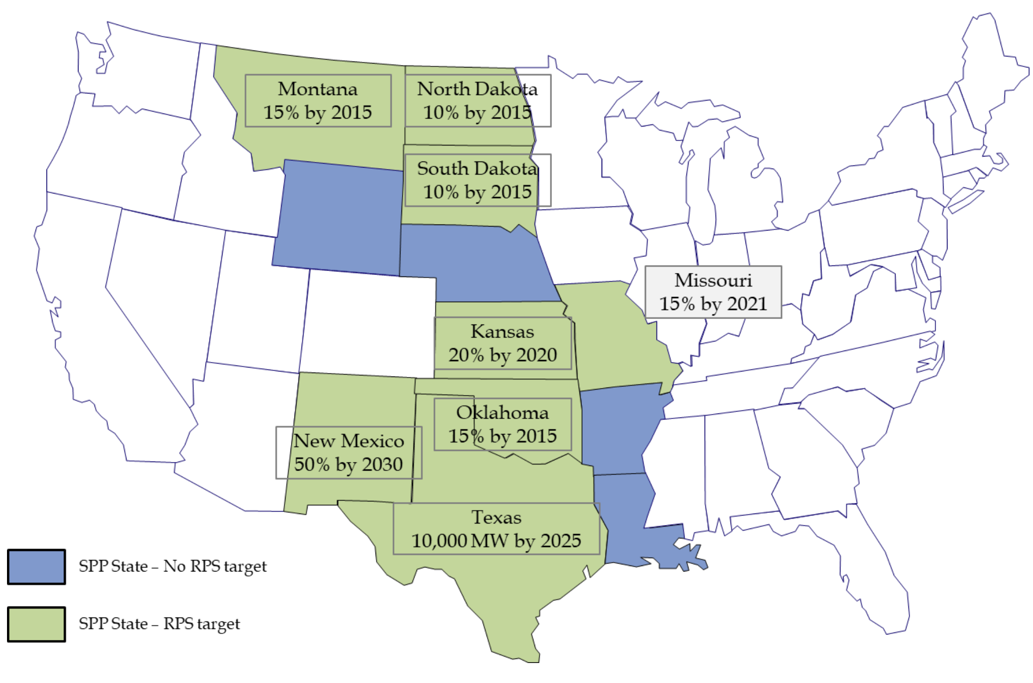
Note: All-in fixed cost includes interest and principal debt payments and fixed O&M. *Source: EIA AEO 2021; LEI.*

Figure 9 presents New Entry Trigger Price ("NETP") assumptions for a new generation resource. The NETP sets a long-run, effective cap on energy prices, such that energy prices may exceed NETP only for so long as it takes for price signals to be recognized and trigger the construction cycle of a new unit. As seen below the least cost new technologies, when looking at the levelized cost of new entry measured in $/MWh, in 2025 in SPP are CCGTs and wind. However, there are few CCGTs in the SPP generator interconnection queue. Given that a fair amount of renewable capacity is expected to come online in the coming years with the introduction of a national carbon tax, the market needs flexible capacity to accommodate the large amount of intermittent resources in the generation fuel mix. We thus believe peaker is more likely to be a new entry candidate than CCGTs. However, in the late 2020s, the capital cost for storage declines significantly and solar with storage co-located technology becomes a preferred entry choice given it operates seamlessly with a market with growing solar capacity. As a result, solar and wind are the major generic new entry, combined with some storage in late 2020s. This is consistent with the planned new entry observed in the SPP generator interconnection queue, which is dominated by wind and solar, with some storage plants.

2.6 RPS requirements

Eight out of fourteen states in SPP have established Renewable Portfolio Standard ("RPS") requirements, which are presented in Figure 10. Details of each state's RPS target is detailed in the subsequent table. We note that several of these requirements have either been met or surpassed – for instance in Kansas, Montana, and Texas – and have not been superseded by increased targets. For several of these states, a combination of favorable resources and federal policy means that renewables development, mostly wind development, has not been driven by state mandates. This means they do not factor into future supply additions in our assumptions.

Figure 10. RPS requirements in SPP



Source: DSIRE website database; State websites.

Figure 11 shows the timing and eligible resources for renewable portfolio standards in the states corresponding to the SPP market.

Figure 11. RPS requirements in the SPP market

State	State	State RPS targets	Eligible resources
Arkansas	**AR**	No RPS target	A renewable technology rebate fund set up; PV: $1.50/kWh for systems 25 kW or under, $0.75/kWh for systems over 25 kW; Wind: $1.25/kWh for systems 20 kW or under, $0.625/kWh for systems over 20 kW; Solar Water Heating: $30/sq. ft. for systems 320 sq. ft. or less, $15/sq. ft. for systems over 320 sq. ft
Kansas	**KS**	20% of peak demand capacity for each calendar year beginning in 2020	Solar Space Heat, Solar Thermal Electric, Solar Thermal Process Heat, Photovoltaics (PV), Landfill Gas, Wind, Biomass, Hydroelectric, Small Hydroelectric and Fuel Cells using Renewable Fuels
Louisiana	**LA**	No RPS target	N/A
Missouri	**MO**	2% by 2011; 5% by 2014; 10% by 2018; 15% by 2021 (retail sales)	(Goal of 1% Solar) Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Municipal Solid Waste, Anaerobic Digestion, Small Hydroelectric and Fuel Cells
Montana	**MT**	15% by 2015 and for each year thereafter	Geothermal Electric, Solar Thermal Electric, Solar Photovoltaics, Wind (All), Biomass, Hydroelectric, Landfill Gas, Wind (Small), Hydroelectric (Small), Anaerobic Digestion, Fuel Cells using Renewable Fuels
Nebraska	**NE**	No RPS target	Renewable energy tax credits exist: Credits are available for a 10-year period: $0.00075/kWh for electricity generated through 9/30/2007; $0.001/kWh from 10/1/2007 - 12/31/2009; $0.00075/kWh from 1/1/2010 - 12/31/2012; $0.0005/kWh on or after 1/1/2013
New Mexico	**NM**	Investor-owned utilities: 50% by 2030; 100% carbon-free by 2045	For IOUs only in 2020: Solar: 20% of RPS requirement (4% of sales); Wind: 30% of RPS requirement (6% of sales); Other renewables: 5% of RPS requirement (1% of sales); Distributed Renewables: 3% of RPS requirement (0.6% of sales)
North Dakota	**ND**	Goal: 10% by 2015	Eligible resources include electricity produced by solar, wind, biomass, hydropower, geothermal, hydrogen derived from another eligible resource, and recycled energy systems that generate electricity from currently unused waste heat resulting from combustion or other processes and that do not use an additional combustion process
Oklahoma	**OK**	15% of the total installed generation capacity in Oklahoma to be derived from renewable sources by 2015	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, Anaerobic Digestion, Small Hydroelectric, Fuel Cells using Renewable Fuels, Other Distributed Generation Technologies
Texas	**TX**	5,880 MW by 2015, plus 500 MW non-wind; 10,000 MW by 2025	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Tidal Energy and Wave Energy
South Dakota	**SD**	Goal: 10% by 2015	Qualifying electricity includes that produced from wind, solar, hydroelectric, biomass* and geothermal resources, and electricity generated from currently unused waste heat from combustion
Wyoming	**WY**	No RPS target	N/A

Source: US Department of Energy. *Database of State Incentives for Renewables and Efficiency*. Accessed June 2021.

State RPS goals are allocated to each zone based on their load proportion, and utility level renewable goals are also considered as they may be more aggressive than state goals. Renewable capacity needed to meet the RPS is added in zones with renewable potential consistent with RPS requirements. It is assumed that new RPS-compliant renewable capacity will recover its costs through either energy revenues as well as implicit green attributes via Power Purchase Agreements ("PPAs") with local utilities.

2.7 Import and export flows

SPP is interconnected with the following three regions: (i) Western Electricity Coordinated Council ("WECC"); (ii) Electric Reliability Council of Texas ("ERCOT"); (iii) MISO; and (iv) Southeastern Electric Reliability Corporation ("SERC").

Figure 12. Targeted annual imports / (exports)

	WECC Net import/(export)	ERCOT Net import/(export)	MISO Net import/(export)	SERC Net import/(export)	Total Net import/(export)
GWh	4,337	(1,620)	(7,500)	2,660	(2,122)

Source: FERC Form 714.

For interchange between SPP and the surrounding markets, LEI developed an hourly interchange profile based on the historical hourly interchange data. In summary, our modeling assumes SPP exports just over 2,122 GWh annually to ERCOT, MISO, SERC and WECC on a combined basis.[27]

2.8 Demand and supply

Demand growth across SPP is projected to increase steadily, at an average of 0.7% annually region-wide. Peak demand and energy up until 2029 are forecasted by the SPP balancing authority according to its FERC Form 714 filings.[28] Going forward, we assume the load growth in 2029 will continue over the modeling horizon.

We have developed hourly load profiles based on actual 2019[29] hourly demand from balancing authorities' FERC Form 714 filings, with adjustment for load from non-filing entities as well as to reflect the SPP Balancing Authority filing.

[27] For the purpose of this modeling exercise, we assume the historical import/export trend continues and there are no major shifts over time.

[28] Following the launch of the Integrated Marketplace, SPP has taken over Balancing Authority duties for the utilities in its footprint, referring to them as 'legacy' balancing authority regions. For the purpose of this model, LEI has pro-rated the total SPP Balancing Authority forecast for its 4 modeling zones based on historical actual demand.

[29] Latest available FERC Form 714 data filing made by SPP is for Year End 2019, last updated June 24, 2020. (Source: FERC website. *Form No. 714 - Annual Electric Balancing Authority Area and Planning Area Report*).

Figure 13. Forecast peak demand and annual energy by zone

SPP-Nebraska-Integrated System	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Peak demand (MW)	11,620	11,776	11,873	11,958	12,045	12,101	12,168	12,239	12,311	12,383
Growth in Peak (MW)		0.6%	0.5%	0.5%	0.4%	0.5%	0.5%	0.5%	0.5%	0.5%
Energy (GWh)	60,060	61,191	61,951	62,466	63,032	63,391	63,852	64,258	64,667	65,079
Growth in Energy		1.2%	0.9%	0.5%	0.5%	0.6%	0.8%	0.6%	0.7%	0.7%

SPP-KSMO	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Peak demand (MW)	16,600	16,823	16,961	17,084	17,207	17,287	17,383	17,484	17,587	17,689
Growth in Peak (MW)		0.6%	0.5%	0.5%	0.4%	0.5%	0.5%	0.5%	0.5%	0.5%
Energy (GWh)	85,800	87,415	88,502	89,237	90,046	90,559	91,217	91,798	92,382	92,970
Growth in Energy		1.2%	0.9%	0.5%	0.5%	0.6%	0.8%	0.6%	0.7%	0.7%

SPP Central	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Peak demand (MW)	20,474	20,748	20,919	21,070	21,222	21,321	21,439	21,564	21,690	21,817
Growth in Peak (MW)		0.6%	0.5%	0.5%	0.4%	0.5%	0.5%	0.5%	0.5%	0.5%
Energy (GWh)	105,820	107,812	109,153	110,059	111,056	111,689	112,501	113,217	113,938	114,663
Growth in Energy		1.2%	0.9%	0.5%	0.5%	0.6%	0.8%	0.6%	0.7%	0.7%

SPP-SPS	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Peak demand (MW)	6,640	6,729	6,785	6,833	6,883	6,915	6,953	6,994	7,035	7,076
Growth in Peak (MW)		0.6%	0.5%	0.5%	0.4%	0.5%	0.5%	0.5%	0.5%	0.5%
Energy (GWh)	34,320	34,966	35,401	35,695	36,018	36,223	36,487	36,719	36,953	37,188
Growth in Energy		1.2%	0.9%	0.5%	0.5%	0.6%	0.8%	0.6%	0.7%	0.7%

SPP	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Peak demand (MW)	55,334	56,076	56,538	56,945	57,356	57,623	57,942	58,281	58,622	58,965
Growth in Peak (MW)		1.3%	0.8%	0.7%	0.7%	0.5%	0.6%	0.6%	0.6%	0.6%
Energy (GWh)	286,001	291,384	295,007	297,456	300,152	301,862	304,056	305,992	307,940	309,901
Growth in Energy		1.9%	1.2%	0.8%	0.9%	0.6%	0.7%	0.6%	0.6%	0.6%

Source: FERC Form 714, LEI Analysis.

For new capacity coming online, new entry is dominated by wind and solar plants in both the short term and long-term. Over the 10-year modeling horizon, approximately 27,000 MW (nameplate capacity) is added to meet reserve margins[30] and RPS requirements. New entry is also aligned with utility integrated resource plans, with 6,500 MW of known projects between 2022 and 2025 and 20,500 MW of generic capacity between 2026 and 2031. The generic new entry is introduced based on the technology cost considerations and the generator interconnection queue from SPP which shows the utilities and the developers' preference of timing and the type of renewable resources.[31] LEI's model also ensures the generation from renewable resources is sufficient to meet the state RPS goals shown in Figure 11.[32]

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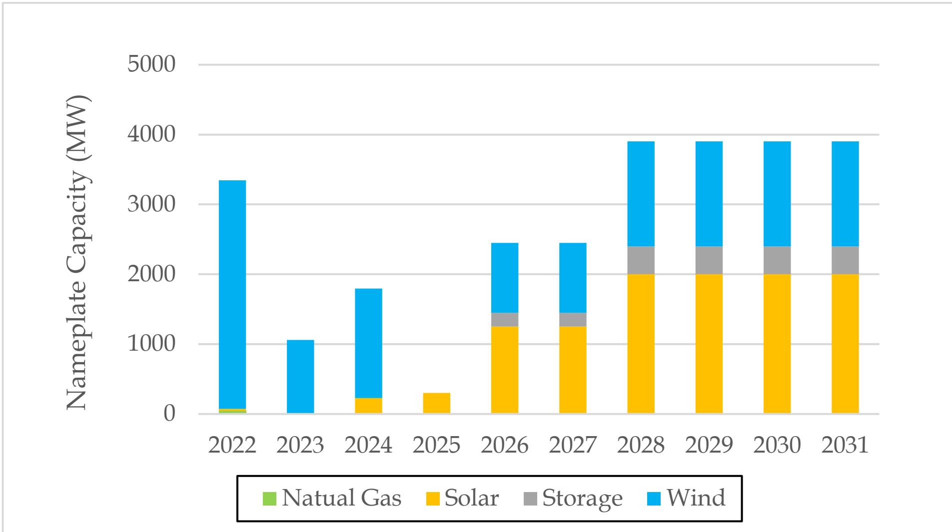
[30] As previously discussed, SPP lowered its planning reserve margin to 12%, previously at 13.6%.

[31] LEI also references "2022 20-YEAR ASSESSMENT SCOPE" published by SPP, February 2, 2021. <https://www.spp.org/documents/63932/2022%2020%20year%20assessment%20scope%20v1.0%20mopc%20approved.pdf>

[32] New Mexico, partially in SPP, is the only state in SPP that has carbon reduction requirement. Specifically, in 2019, the State of New Mexico established a target via Executive Order to reduce greenhouse gas emissions by 45% below 2005 levels by 2030. With the national carbon tax introduced in 2028 in the modeling, retiring coal is replaced by solar and wind, and New Mexico is able to meet the carbon reduction goal implicitly.

Figure 14. New entry in the modeling horizon (2022-2031)



Retirements are modeled during the forecast horizon based on the following:

- **announced retirements** of approximately 3,500 MW, largely coal retirements, based on utility resource plans over the modeling horizon;

- **economic and age-based retirements:** beyond 2024, and in addition to retirements detailed in utility resource plans, LEI has applied an age-based retirement rule checked against the profitability of the existing thermal units. With this rule, LEI has considered historical retirements in SPP for thermal plants by technology and augmented with nationwide data where there may not be enough data in SPP. Taking into account this age-based rule and profitability, LEI has retired an additional 9,000 MW of thermal generation (mostly coal units); and

- lastly, with the national carbon tax of $50/metric ton introducing in 2028, most coal units cannot earn sufficient revenue from the energy market. The old, less efficient coal units will be retired; however, the **newer, more efficient coal units will opt to converting to gas**. As a result, there is approximately 8,000 MW of coal converting to gas between 2028 and 2031.

Figure 15 presents the region-wide demand-supply balance over the modeling horizon. The capacity margin shows a declining trend over time and reaches approximately 12% by the end of the modeling horizon. Note that LEI started retiring coal units in 2028, in line with the timing of the carbon tax. If utilities were to choose to retire coal units before 2028, the reserve margin will fall at a faster rate and reach close to 12% at an earlier year.

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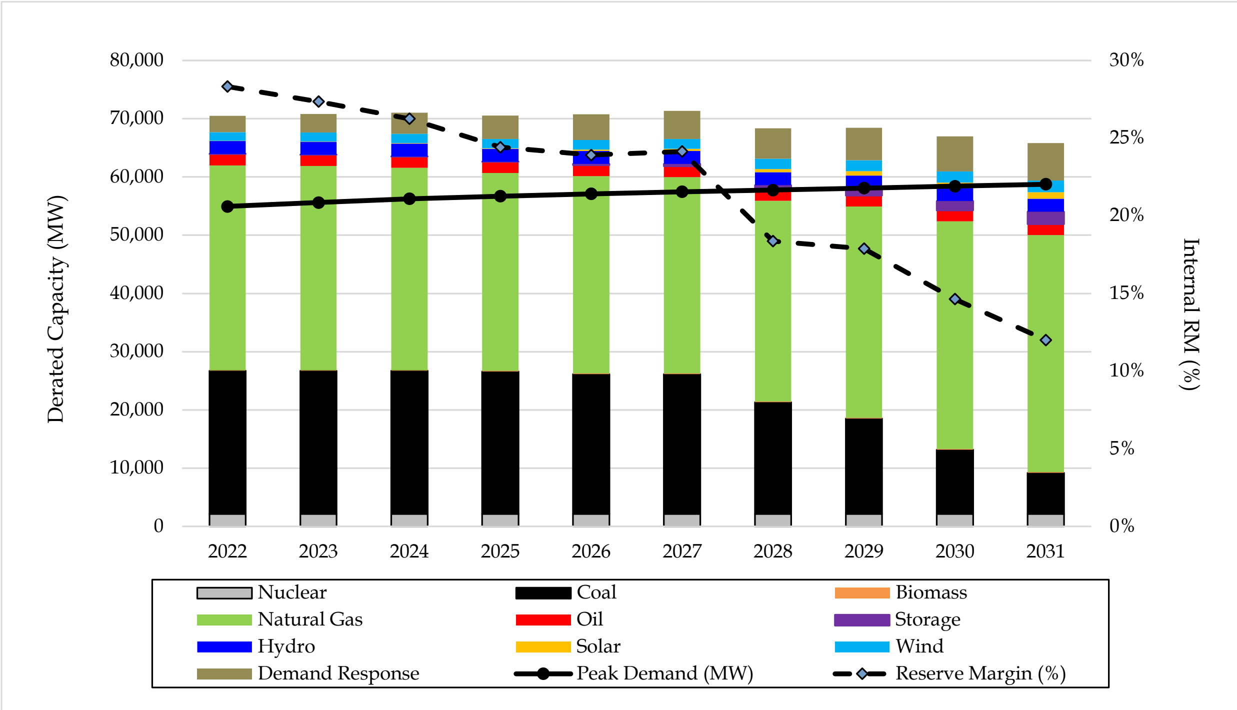
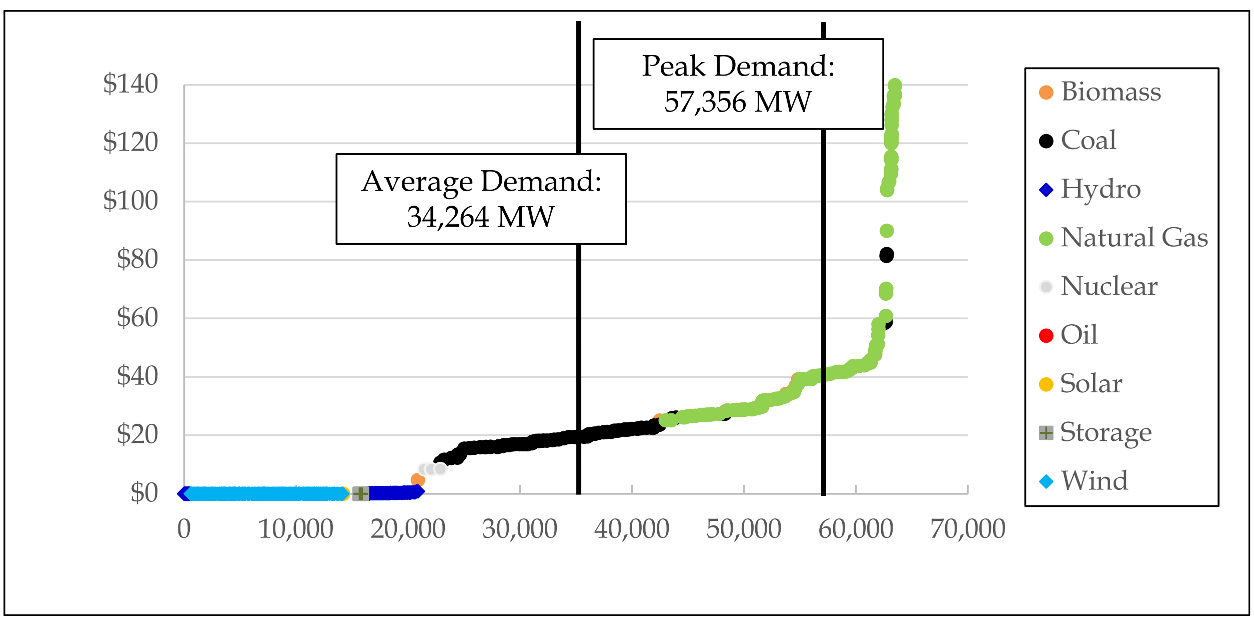
Figure 15. SPP demand-supply balance



Notes: Wind, solar, and hydro-electric resources are de-rated to 5%, 10%, and 40% respectively.

Figure 16 presents the supply curve for SPP in 2026, arranged in order of merit dispatch. It shows that coal and natural gas are the marginal units for the average and peak demand, respectively.

Figure 16. Supply curve for SPP (2026)

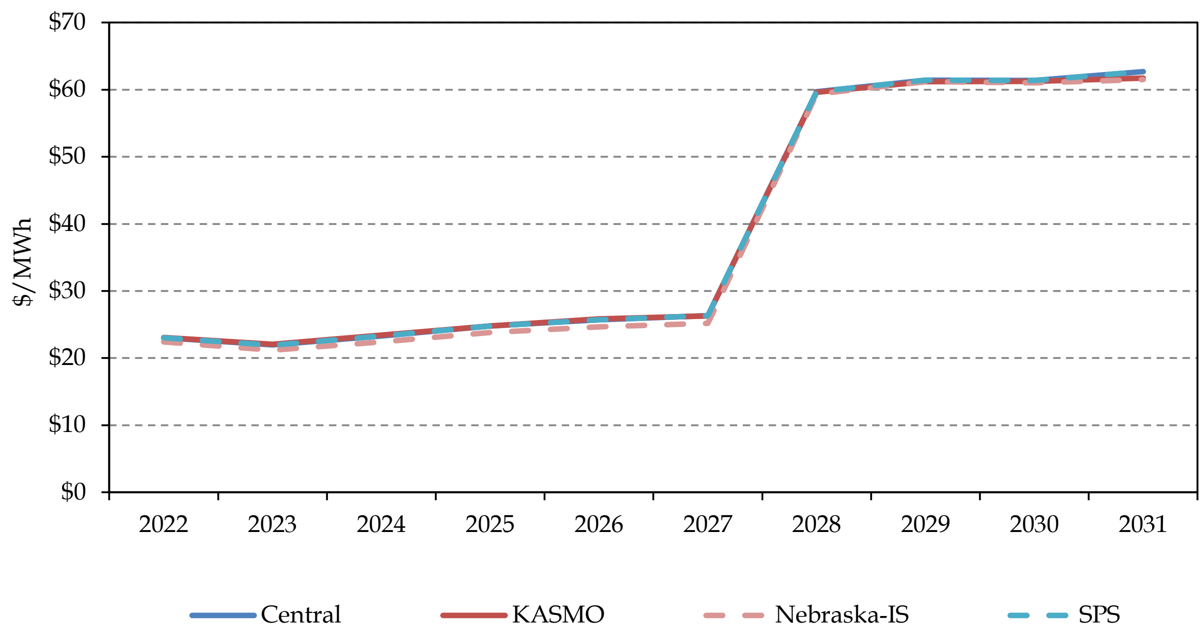


3 10-year price forecast

3.1 Energy market prices

Figure 17 presents the forecast energy market prices over the modeled horizon, 2022 to 2031.

Figure 17. Forecast energy market prices, 2022-2031 (nominal $/MWh)



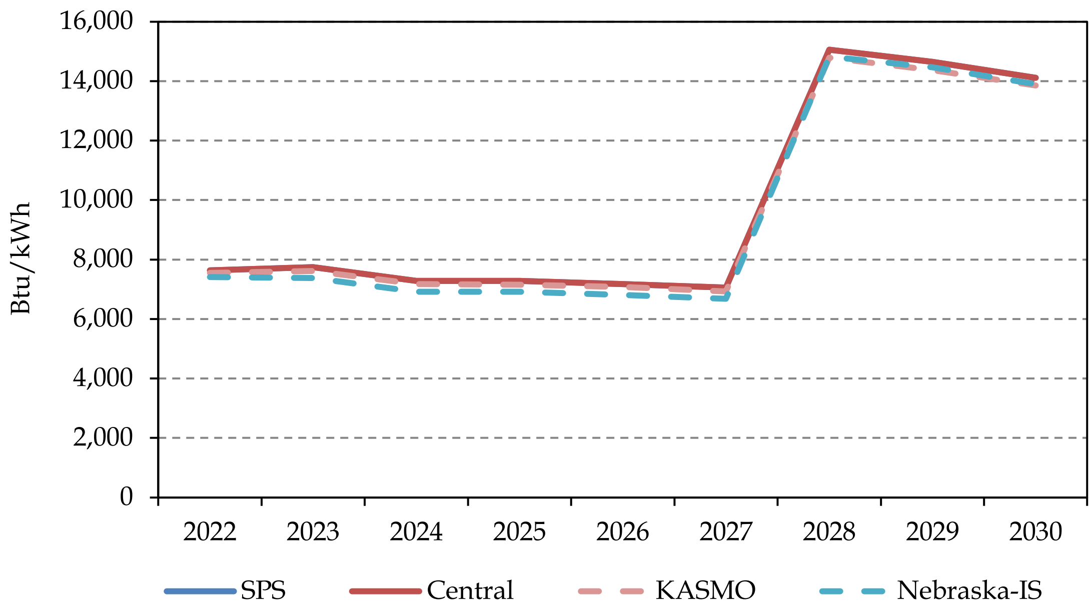
[$/MWh]	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	CAGR
Average											
SPS	$ 23.0	$ 21.9	$ 23.3	$ 24.8	$ 25.7	$ 26.3	$ 59.7	$ 61.4	$ 61.4	$ 62.7	11.8%
Central	$ 23.0	$ 22.0	$ 23.3	$ 24.8	$ 25.7	$ 26.3	$ 59.7	$ 61.4	$ 61.4	$ 62.7	11.8%
KASMO	$ 23.1	$ 22.0	$ 23.4	$ 24.8	$ 25.8	$ 26.3	$ 59.6	$ 61.2	$ 61.2	$ 61.7	11.6%
Nebraska-IS	$ 22.4	$ 21.2	$ 22.4	$ 23.8	$ 24.7	$ 25.2	$ 59.4	$ 61.2	$ 61.0	$ 61.5	11.9%
On peak											
SPS	$ 28.3	$ 27.3	$ 29.1	$ 31.2	$ 31.6	$ 32.4	$ 66.6	$ 67.6	$ 68.1	$ 69.3	10.5%
Central	$ 28.3	$ 27.3	$ 29.1	$ 31.2	$ 31.6	$ 32.4	$ 66.6	$ 67.6	$ 68.0	$ 69.3	10.5%
KASMO	$ 28.4	$ 27.5	$ 29.4	$ 31.3	$ 31.8	$ 32.3	$ 66.4	$ 67.1	$ 67.6	$ 67.6	10.1%
Nebraska	$ 27.4	$ 26.2	$ 28.0	$ 29.9	$ 30.3	$ 30.8	$ 66.1	$ 67.1	$ 67.3	$ 67.3	10.5%
Off-peak											
SPS	$ 18.2	$ 17.0	$ 18.0	$ 18.9	$ 20.4	$ 20.8	$ 53.4	$ 55.8	$ 55.3	$ 56.7	13.4%
Central	$ 18.2	$ 17.1	$ 18.0	$ 18.9	$ 20.4	$ 20.8	$ 53.4	$ 55.8	$ 55.3	$ 56.7	13.4%
KASMO	$ 18.2	$ 17.1	$ 18.0	$ 18.9	$ 20.3	$ 20.8	$ 53.4	$ 55.8	$ 55.4	$ 56.3	13.4%
Nebraska	$ 17.8	$ 16.6	$ 17.3	$ 18.3	$ 19.6	$ 20.1	$ 53.3	$ 55.9	$ 55.3	$ 56.3	13.6%

Energy prices are expected to move consistent with the gas price trend in nominal terms. The slightly decrease in 2023 is due to the gas price decline, along with the known additions. The sharp increase in the energy price from 2027 to 2028 is attributed to the national carbon program.

LEI assumed a national carbon price of $50/metric ton starting in 2028 and increasing by 2% per year. The implementation of carbon prices would increase the energy prices as the plants that operate on fossil fuels and emit carbon need to include the carbon emissions allowance price in their variable cost of energy production. The energy prices are also projected to increase because of the retirement of carbon-emitting plants that could not recover their going forward fixed costs. On the other hand, the increased energy price is also dampened slightly by the addition of renewable new entry. We expect renewable entry (solar and wind) will come into the market in the anticipation of carbon price as the higher market price will result in higher profit for non-carbon-emitting plants. With the $50/metric ton carbon price, we see an increase of energy price of $33/MWh. Post 2028, the price increases moderately through 2031.

3.2 Implied market heat rate

Figure 18. Forecast heat rates, 2022-2031 (Btu/kWh)



[Btu/kWh]	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Average										
SPS	7,633	7,740	7,278	7,279	7,174	7,060	15,054	14,650	14,111	14,047
Central	7,633	7,746	7,279	7,279	7,175	7,060	15,054	14,647	14,110	14,041
KASMO	7,555	7,618	7,179	7,153	7,076	6,930	14,785	14,369	13,855	13,616
Nebraska-IS	7,415	7,379	6,919	6,916	6,808	6,681	14,820	14,460	13,895	13,655

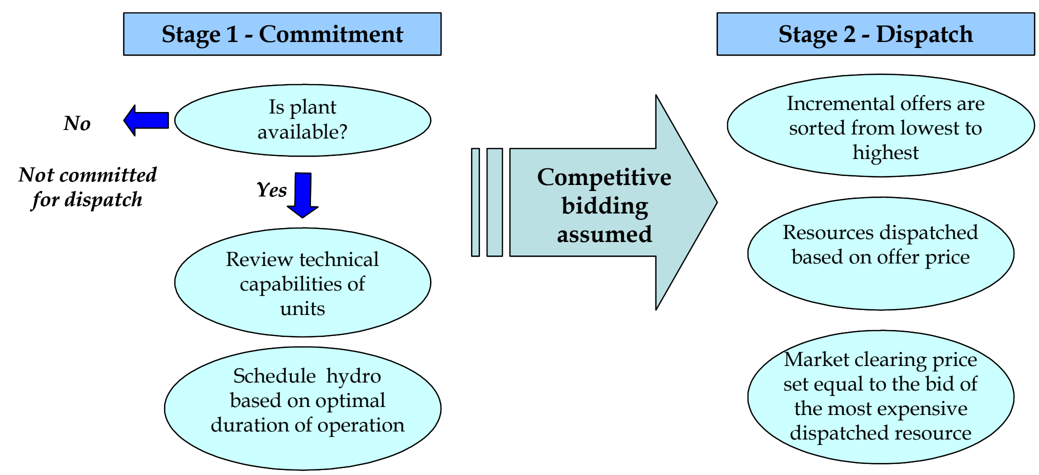
Heat rates in the short run are lower than the recent historical market heat rates given the very low gas price in 2020. The heat rates increase in 2028 reflect the inclusion of carbon prices. Post 2028, the market heat rate declines due to the addition of zero marginal cost renewable new entry.

4 Appendix A: Overview of forecasting methodology

For the wholesale energy prices outlook, we employed our proprietary simulation model, POOLMod, as the foundation for our electricity price forecast. POOLMod simulates the dispatch of generating resources in the market subject to least cost dispatch principles to meet projected hourly load and technical assumptions on generation operating capacity and availability of transmission.

POOLMod consists of a number of key algorithms, such as maintenance scheduling, assignment of stochastic forced outages, hydro shadow pricing, commitment, and dispatch. The first stage of analysis requires the development of an availability schedule for system resources. First, POOLMod determines a 'near optimal' maintenance schedule on an annual basis, accounting for the need to preserve regional reserve margins across the year and a reasonable baseload, mid-merit, and peaking capacity mix. Then, POOLMod allocates forced (unplanned) outages randomly across the year based on the forced outage rate specified for each resource.

Figure 19. POOLMod's two-stage process



POOLMod next commits and dispatches plants on a daily basis. Commitment is based on the schedule of available plants net of maintenance and takes into consideration the technical requirements of the units (such as start/stop capabilities, start costs (if any), and minimum on and off times). During the commitment procedure, hydro resources are scheduled according to the optimal duration of operation in the scheduled day. They are then given a shadow price just below the commitment price of the resource that would otherwise operate at that same schedule (i.e., the resource they are displacing).

In addition, POOLMod is a transportation-based model, giving it the ability to take into account thermal limits on the transmission network.

5 Appendix B: Introduction to LEI and its work in SPP

LEI is a global economic, financial, and strategic advisory professional services firm specializing in energy, water, and infrastructure. The firm combines detailed understanding of specific network and commodity industries, such as electricity generation and distribution, with sophisticated analysis and a suite of proprietary quantitative models to produce reliable and comprehensible results.

The firm also has in-depth expertise in many economic and financial issues related to the electricity sector, such as asset valuation, procurement, regulatory economics, and market design and analysis. LEI has done extensive work with electricity markets in North America, Europe, Asia, and the Middle East, and has a comprehensive understanding of the issues faced by the utilities and regulators alike.

The following attributes make LEI unique:

- internally-developed proprietary models for electricity price forecasting incorporating game theory, real options valuation, Monte Carlo simulation, and sophisticated statistical techniques;

- balance of private sector and governmental clients enables LEI to effectively advise both regarding the impact of regulatory initiatives on private investment and the extent of possible regulatory responses to individual firm actions; and

- worldwide experience backed by multilingual and multicultural staff.

LEI also has extensive experience with the SPP electricity market, including the following recent assignments:

- ***retail rate study for Kansas:*** LEI was selected by the Kansas Legislative Coordinating Council ("LCC") to perform a study of the retail rates of Kansas electric public utilities. The study, which involved two main sections, aimed to inform electric sector policies and result in competitive electric rates and reliable electric service in Kansas. Section 1 of the study evaluated the effectiveness of current Kansas ratemaking practices and their ability to attract required capital investments and balance utility profits with public interest objectives and reliable service. Section 2 focused on exploring options available to the State Corporation Commission and the Kansas Legislature to affect Kansas retail electricity prices to become regionally competitive while providing the best practicable combination of price, quality and service.

- ***whitepaper on restructuring generation and transmission co-operative:*** London Economics International LLC ("LEI") was retained by Poudre Valley Rural Electric Association, Inc. ("PVREA") to provide a white paper discussing a potential framework for restructuring the Tri-State G&T organization in order to benefit existing membership. The paper included a description and commentary on the possibility of a major transformation of the Tri-State G&T that includes functional unbundling of the generation and transmission businesses, a sale of the transmission assets, and a transformation of the generation business to align it more closely with competitive wholesale markets, for the benefit of members.

- LEI was retained by a large European utility to assess the revenue potential for wind assets across the US. This project analyzed the revenue potential for wind facilities in CAISO, SPP, and PJM, developing price forecasts through 2045 and assessed market rules to identify any potential penalties that may apply to intermittent generation and deviations from generation profiles. LEI provided an SPP outlook with high and low case sensitivities.

- LEI was retained by a US developer to value a three-way HVDC connection between the Eastern, Western, and ERCOT interconnections. LEI utilized its proprietary production cost simulation model, POOLMod, to project energy prices in the markets surrounding the proposed project, including SPP, WECC and ERCOT. LEI was responsible for developing revenue forecasts for the project over a 20-year period as the project is subject to market-based rates. LEI continues to advise on other financing, regulatory, and development issues related to the project.

- LEI was engaged to provide evaluation services pertaining to the announced decision by Entergy to join MISO on the behalf of a public utility company. LEI used a multi-disciplinary approach to perform a quantitative and qualitative analysis of specific costs/benefits attributable to Entergy and its customers following membership in either MISO or SPP, including but not limited to net trade benefits, transmission cost allocation, governance issues, and continued participation in the Entergy Service Agreement following RTO membership.