SPP Southwest Power Pool

2021 OPERATING PLAN

By the SPP Finance Department

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SPP OVERVIEW

Southwest Power Pool's (SPP) mission is "Helping our members work together to keep the lights on... today and in the future." SPP provides services independently on a regional basis, focused on electric reliability, cost effectiveness and bringing value to SPP members and their customers. SPP is mandated by the Federal Energy Regulatory Commission (FERC) to ensure reliable supplies of power, adequate transmission infrastructure and a competitive wholesale electricity marketplace. SPP's primary services are:

- Facilitation
- Reliability coordination
- Tariff administration
- Transmission planning
- Market operations
- Compliance
- Training

FERC directly regulates SPP. FERC must approve all changes to SPP's Open Access Transmission Tariff (tariff) before implementation. The tariff defines SPP's process for non-discriminatory access to transmission. SPP is required to report any failure to comply with tariff provisions or FERC directives and may be subject to penalties and fines for noncompliance.

GOVERNING DOCUMENTS

TARIFF

The tariff defines the majority of the required workload for SPP's operations and engineering departments. The Market Operations Policy Committee (MOPC) has oversight over the majority of changes to the tariff. Significant duties defined by the tariff include, but are not limited, to:

- Administering the tariff, including scheduling
- Providing ancillary services
- Operating the market
- Operating the Balancing Authority (BA)
- Settling all transactions under the tariff

- Administering credit services for tariff customers
- Completing system impact studies
- Completing the annual SPP transmission expansion plan
- Studying generation interconnection requests
- Evaluating long-term transmission service requests
- Administering the competitive process for transmission expansion
- Administering the Southwestern Power Administration transmission system beyond their tariff
- Monitoring activities in SPP's energy markets and exercise plans to mitigate market power

MEMBERSHIP AGREEMENT

The membership agreement is an agreement between SPP and each of its members that obligates SPP to perform outlined services, including those in the tariff. Changes to the scope of responsibilities are primarily within the purview of the MOPC and Board of Directors and Members Committee. The agreement describes other significant duties, which include, but are not limited, to:

- Acting as the reliability coordinator for the bulk electric system (BES)
- Developing regional reliability plans and emergency procedures
- Reviewing and approving all planned BES maintenance
- Coordinating generation unit maintenance
- Administering an open access same-time information system

BYLAWS

The bylaws describe SPP's organizational operation, specifically outlining duties of the board and its advisory committees. Changes to the bylaws are under the oversight of the Corporate Governance Committee and board. SPP has a responsibility to facilitate meetings of every organizational group:

- Board of Directors and Members Committee (1)

- Regional State Committee (1)
- Board-level committees (6)
- Working groups (18)
- Task forces, subcommittees, strike teams (35+)

PROTOCOLS AND BUSINESS PRACTICES

SPP has well-documented business practices detailing the administrative practices SPP follows in administering the tariff, including coordinating the sale of transmission service. SPP also has well-documented market protocols detailing how market participants and SPP are to interact. These documents are developed, monitored and amended through SPP's stakeholder process.

ORGANIZATIONAL STRUCTURE

SPP operates via two distinct organizational structures. The governance structure (Appendix A), begins with the board and is composed of other board-level committees and working groups. This organizational structure is populated largely with representatives from SPP's member companies. These groups provide directives on the work SPP is expected to accomplish.

The internal staff structure (Appendix B) defines reporting relationships between employees. The staff structure begins with the SPP president and cascades into vice presidents, departmental directors/managers, etc. The staff structure is based on functional responsibilities. The governance structure provides directives to staff.

FUNDING

SPP funds its ongoing operating costs through charges to transmission customers under the tariff and customers of specific non-tariff services. SPP's operating costs include scheduled principal and interest payments on its outstanding debt but exclude depreciation and amortization expenses incurred. SPP is able to collect up to 100% of its operating costs from charges to transmission customers up to a cap of 43¢/megawatt-hour (MWh). SPP is charging customers 43.0¢/MWh for service in 2020.

SPP will move to an unbundled rate design effective Jan. 1, 2021, subject to the same overall cap described above. Generally, under the FERC filed and approved formula rate design, transmission customers will be charged for system dispatch and control costs, auction revenue rights and transmission congestion rights holders will be charged for costs to operate the congestion rights markets, generation, load, and financial-only participants will be charged the common costs to administer the energy markets, and generation and load will be charged the costs to operate the physical energy markets.

SPP's funds its capital expenditures with borrowings from periodic debt issuances and with 20% equity allocation included in the annual net revenue requirement. SPP's debt issuances are generally unsecured. They have a one-to-two year, interest-only payment period and then fully amortize by the maturity of the notes. SPP is required to obtain regulatory approvals before issuing new debt.

SPP carries an A rating from Fitch Ratings that was last affirmed in November 2019. SPP issued new notes in August 2018 to fund capital expenditures incurred through 2023.

SPP achieves short-term liquidity by managing its cash float. SPP has a committed $30 million revolving credit facility with a commercial bank to provide additional liquidity support.

2021 EXPECTED BUSINESS ENVIRONMENT

SPP's business environment is constantly changing. The organization utilizes an evolutionary, rather than revolutionary, approach to managing change. Some of the opportunities and challenges affecting SPP are related to continued electrification, changing generation mix, transmission planning and cost allocation, evolving energy markets, expansion to the west, regulatory issues and cybersecurity risks. The full impact of the COVID-19 pandemic on SPP and its members is unknown but considered in SPP's 2021 budget.

ELECTRIFICATION

While many projections show U.S. energy consumption will continue to decline, overall electricity use is expected to increase with technologies such as electric cars and heat pumps. SPP anticipates continued growth in its members' demand response and energy efficiency programs. Over time, these changes will likely cause lower summer peaks, higher winter peaks and a flattening of load shapes due to an annual normalization of electricity use. Consumers will have more choices about how they use energy and interact with the electric grid. While major changes may not materialize over the next year, SPP is incorporating more of these evolving assumptions in its engineering models.

While load in the SPP region has been flat overall for the last several years, there are pockets of load growth. Commercial and industrial customers seeking low-cost, renewable service options are increasingly attracted to the SPP region. Companies such as Google, T-Mobile USA and Facebook have contracted with renewable generators to power their data centers or meet carbon-emission-reduction goals.

CHANGING GENERATION MIX

The generation fleet at SPP's disposal — more than 750 generators participating in its markets across a 14-state region — has changed dramatically over the last 10 years. SPP's current generation fuel mix is primarily coal, wind and gas. On average, these fuel types made up 35%, 27% and 26% of energy production generation. Coal has been on a continual decline in production and capacity since 2014. SPP members are planning no new coal generation, and older plants are being retired or projected to be retired.

The SPP region has seen a massive increase in renewable energy. In 2008, wind energy made up just 3% and solar a fraction of a percent of SPP's annual energy production. In 2019, wind comprised 27.4% and solar 0.2%. At a given moment, SPP has reliably met as much as 73% of its

load with wind. SPP's primary operational challenge is maintaining grid reliability as it becomes increasingly dependent on energy delivered from intermittent resources. The generator interconnection (GI) queue represents new generators "waiting in line" to be analyzed and connected to the transmission system. There are 54,000 MW of wind in the planning queue. SPP needs to develop economic and cost recovery strategies to use excess wind and identify upgrades across independent system operator/regional transmission organization (ISO/RTO) boundaries to move wind energy into other markets.

There is only a small amount of solar energy installed in SPP in 2020, but solar and battery storage are growing. There are 32,982 MW of solar and 7,069 MW of storage in SPP's generation interconnection queue. SPP expects these emerging technologies to continue to evolve and become more prevalent, presenting as utility-scale resources or transmission assets when connected to the transmission system and as reduced load when connected to the distribution system.

SPP has identified physical needs of the bulk power system that conventional generation inherently provide or has been designed to provide to maintain the reliability of the bulk electric system. New resources, such as wind, solar, and battery rely on inverter-based provision of AC power and thus do not inherently or physically provide those responses and physical need of the power system, including stored potential energy to respond.

TRANSMISSION PLANNING AND COST ALLOCATION

SPP works with its members annually to determine what new transmission is needed in the region. These projects benefit the region by connecting new generators and demand sources to the transmission system, ensuring utilities can deliver low-cost electricity to consumers, and solving power grid issues that, if not addressed, could impact the reliable delivery of electricity or cause power outages.

The determination of who should pay for transmission upgrades is a highly debated public policy issue. SPP works continuously to better align its transmission planning processes, Integrated Marketplace and transmission cost allocation methodologies. It is important to address the cost responsibility of loads and generators as well as cost allocation among loads.

SPP predicts additional challenges based on a changing generation mix. One challenge is determining how to both use storage for transmission reliability and provide economic benefits through the markets. As load also starts to respond to either reliability needs or economic benefits through the markets, planning will increase in complexity because load will no longer just be a forecast demand.

EVOLVING ENERGY MARKETS

Natural gas prices have been low, and wind has zero fuel cost and enjoys significant federal tax incentives. This is enabling an economic dispatch of SPP's changing generating fleet, reducing wholesale energy prices and shifting the region away from traditional generation. This economic dispatch is feasible due to both SPP's robust transmission system investment and Integrated Marketplace. The Integrated Marketplace has provided more than $3.5 billion in savings to participants since it launched in 2014.

In 2019, SPP's spot wholesale energy prices remained the lowest of any organized market. SPP's primary financial challenge is to ensure that, despite declining wholesale energy prices, resources that provide reliability are appropriately compensated and incentivized to offer and deliver these services to the grid. SPP continuously works with stakeholders to enhance the Integrated Marketplace's ability to cost-effectively utilize its diverse generation mix, manage grid congestion and reliably respond to changes in load and generation.

WESTERN ENERGY SERVICES

SPP began operating in the Western Interconnection as a North American Electric Reliability Corporation (NERC)-certified reliability coordinator in December 2019. SPP works with customers to keep the lights on and mitigate operational contingencies that threaten reliability. In February 2021, SPP plans to launch a Western Energy Imbalance Service (WEIS) market and administer it on a contract basis. The market will centrally dispatch energy from participating resources every five minutes, enhancing reliability and affordability for western consumers. These partnerships with new customers will benefit SPP's existing customers through economies of scale and cost savings.

FEDERAL AND STATE ENERGY POLICIES

SPP regularly monitors and analyzes proposed federal and state legislative actions and determines the potential impact on SPP and its members and stakeholders. At the federal level, SPP has observed broad energy policy trends toward increased renewables, storage development, cybersecurity, grid security and modernization, and specific reforms for FERC. Historically, comprehensive federal energy legislation has been slow to become law. The pace at which regulatory rulemakings have been issued appears to have slowed, with finalized actions often facing lengthy court challenges.

At the state level, legislative changes happen more quickly. Hundreds of energy-related bills become law each year across the country. These state-level changes both reflect and drive energy development and investment trends. SPP has seen state energy policy trends similar to federal trends, as well as continued interest in renewable portfolio standards, retail choice, RTO participation and right of first refusal laws.

Federal and state energy policy trends toward increased renewables, storage development, cybersecurity, and grid security and modernization are likely to continue in the coming years. As states continue to increase their renewable energy goals and reduce their greenhouse gas emissions, interest in advanced transmission systems, RTOs and retail choice could continue to grow. Consumers, utilities and large private corporations are also likely to advance policy through independent actions.

REGULATORY

Directives from FERC impact SPP's business and operations.

FERC's Order 841 directed RTOs and ISOs to revise the rules of their organized markets to allow energy storage resources to participate. SPP worked with stakeholders to refine market participation practices to accommodate storage. In late 2019, FERC found that SPP's initial filings generally satisfied the directive but required SPP to submit another filing to incorporate minimum runtime rules and practices for all resource types. In February 2020, FERC granted an SPP request to delay implementation of storage market participation due to delays in the development of a new market and transmission settlement system and software changes associated with Order 841 reforms. FERC set Aug. 5, 2021 as the new effective date for SPP's tariff changes related to Order 841.

In February 2020, FERC denied SPP's request for a rehearing regarding Attachment Z2 of the SPP tariff, which defines how transmission customers are compensated for upgrades other entities subsequently use. FERC affirmed that refunds are the appropriate remedy, and any interest owed on the refunds should be collected from entities that received settlement payments from SPP. In April, SPP's board approved a modification to its tariff that eliminates Attachment Z2 revenue credits prospectively for certain network upgrades. SPP filed the revision with FERC the following day, asking for an effective date of July 1, 2020.

In 2019, FERC directed SPP to eliminate its exit fee for non-transmission owning (NTO) members, and rejected SPP's proposal to instate a lower, standard exit fee for all members. However, the Commission specified that SPP could submit a new proposal with "adequate explanation" for why NTOs should pay an exit fee, and ensure NTOs pay a smaller exit fee than transmission owners. In March 2020, FERC clarified that NTO members of SPP are still subject to a $50,000 membership deposit, rejecting a complaint that the deposit constitutes a barrier to membership. In April 2020. SPP filed board-approved revisions to its bylaws and membership agreement for FERC's review. The revisions define and differentiate exit fees for transmission owning and NTO members.

CYBERSECURITY RISKS

The threat of cyberattacks continues to be a major risk to SPP and the electric utility industry. SPP must remain involved in developing NERC standards that are flexible enough to meet

security challenges while allowing the provision of reliable and affordable electricity. Evolving threats and emerging technologies surface more quickly than NERC has been able to revise implement related standards.

SPP remains committed to addressing the changing cybersecurity landscape. SPP will identify actions to address known and emerging issues, as well as post-event actions to mitigate the financial consequences of a cyber event.

CORPORATE AND DEPARTMENTAL 2021 OBJECTIVES

SPP's officers met in June 2020 to discuss corporate and departmental objectives for 2021. That discussion informed the 2021 operating plan and 2021-2023 budget.

CORPORATE OBJECTIVES

1. **Holistic Integrated Tariff Team (HITT) recommendations implementation:** The SPP board of directors approved a comprehensive slate of 21 recommendations from the HITT at its July 2019 meeting. The approved implementation plan includes completion of tariff changes or study work for the following in 2021:

    a. January 2021:

        i. Study offer requirements for variable resources

        ii. Study mitigation of unduly low offers

    b. April 2021: Implement ERS/ORS compensation model

    The majority of the HITT recommendations are scheduled for completion of tariff changes or study work prior to 2021 but will either be awaiting FERC approval or in process of operational implementation. Recommendation R5 (Study additional operational tools) is ongoing, and recommendation T4 (Study three-phase GI process effectiveness) is dependent on implementation of the process.

2. **Reduce GI study backlog:** SPP entered 2020 with generation interconnection studies pending since 2015. Additional full-time personnel were approved in 3Q'19 to reduce the backlog to an acceptable level. SPP has now completed all 2015 studies and expects to complete all 2016 studies by the end of 2020. In 2021, SPP plans to complete all 2017-2019 studies.

3. ***Z2:*** *Legacy Z2 resettlement:* Legacy Z2 resettlement is on appeal to the D.C. Circuit Court of Appeals. SPP's objective is to participate in the legal process and drive towards a resolution that complies with court and FERC orders.

4. **New strategic planning process**: SPP launched a comprehensive strategic planning effort in 2020 to help determine strategic initiatives critical to SPP's members and stakeholders. This work will culminate with presentation of a new strategic plan to the board of directors in April 2021.

5. ***Relationship-building*:** Barbara Sugg and Lanny Nickell are leading efforts to further build relationships across SPP. Throughout 2021 they will lead outreach efforts to representatives of each SPP member and engage with neighboring systems, regulators, legislators, policymakers, non-governmental organizations and other groups critical to SPP's ongoing success.

6. **Improve operating efficiency:** SPP's cost of operations is the lowest of all U.S. ISO/RTOs. SPP will continue to search for and drive improvement in its cost of operations. The Customer Savings Innovation (CSI) program piloted in June 2020 is expected to uncover ideas for continuous improvement. SPP remains committed to implementing ideas that achieve savings without sacrificing quality or service levels. SPP intends to utilize virtual meeting technology to lower future meeting and travel costs.

7. **Design comprehensive transmission planning process:** Continuous improvement of the SPP transmission planning and services processes remains a subject of focus for 2021. SPP will develop a framework to combine planning and services processes where appropriate to develop a more comprehensive process that adds value for SPP's members and customers. Transmission planning and services processes should be enhanced to emphasize improving utilization of the existing transmission network and adding data analysis and risk management approaches to the assessment of transmission needs.

8. **Value and Affordability Task Force (VATF) Recommendations:** In 2019, the board created the VATF to seek opportunities to increase SPP's value and improve affordability while maintaining and protecting its mission. The VATF made 13 recommendations in the broad areas of 1) value of SPP and transmission, 2) stakeholder groups and services, and 3) internal processes. Two recommendations were targeted to be implemented in 2021:

    a. A study to determine the value of transmission expansion in SPP. The VATF recommended that SPP staff work with the Strategic Planning Committee to develop a study scope by the end of 2020 and perform the study in 2021.

    b. MOPC re-organization. The VATF recommended the MOPC continue to improve its organizational groups, minimizing meeting costs where possible and identifying other efficiency and effectiveness improvements, with a goal of implementation by April 2021.

9. **Western Energy Imbalance Services (WEIS):** SPP contracted to implement and administer an energy imbalance market for contract participants operating in the western interconnection. Development has been underway throughout 2020 and implementation is scheduled for February 1, 2021. The WEIS will initially include eight utilities, six of which are affiliated with existing SPP members. This development closely follows the implementation of western reliability coordination services.

10. **Mature and expand contract services:** The provision of contract services reduces the net revenue requirement (NRR) collected from tariff customers. SPP is currently administering several contracts and plans to implement its WEIS contract in February 2021. SPP will expand its business development efforts in 2021 to offer additional services that reduce its NRR. The SPP board of directors will closely oversee and monitor efforts to achieve this objective.

DEPARTMENTAL OBJECTIVES

OPERATIONS

Summary of key initiatives:

- Refine existing reliability tools and processes for improved efficiency without the need for additional investment. These include TSAT, VSAT, PMU, GAP and RTOP.
- Expand and improve market functionality with products for ramp capability, uncertainty and fast start resources.

ENHANCED RELIABILITY CAPABILITIES

SPP must maintain reliability excellence in the context of the bulk electric system's changing landscape. The industry continues to integrate more inverter-based technologies, mostly renewable energy generation. In the previous eight years, the amount of SPP load served by coal decreased from 63% to 35%, while the amount served by wind increased from 6% to 27%. The generation interconnection queue includes approximately 45 GW wind, 31 GW solar, 6.7 GW battery storage, and 390 MW traditional fuels.

Large transfers of variable energy continue to increase across the SPP footprint. Wind farms are often located in remote areas with little to no load density. Some traditional fossil generation that directly supports load centers is being retired. Fuel-mix dispatch changes and new generation technologies are creating new operational challenges, such as voltage and transient instability. Other areas that require closer real-time and sometimes multi-day-ahead monitoring are inter-area oscillations, inertia, primary frequency response and uncertainties in load and wind forecasting. The increased complexity of the bulk electric system’s behavior will require SPP to further enhance processes, technologies and software to meet these challenges and present results comprehensively to system operators. To this end, operational efforts focus on these initiatives:

INTEGRATING NEW PROCESSES

SPP will continue to enhance several new processes throughout 2020.

The generation assessment process (GAP) was implemented in August 2019 and has been endorsed by the operating reliability working group. The GAP assesses submitted generation outages for capacity adequacy to ensure the SPP BA will have sufficient generation capacity for all possible scenarios of high load, low wind and high forced outage levels. For conflicts, generation operators are coordinating with SPP to re-schedule planned outages when there is maintenance margin available. The Generation Outage Task Force was formed to investigate if

further policy changes are needed in this area. SPP staff intends to continue to evolve and learn from this process as it adjusts to balance necessary outages and grid reliability.

The Uncertainty Response Team (URT) formed in July 2018 to mitigate increased exposure to error in wind and load forecast models. Weather models that forecast wind speed are highly dependent on accurate low pressure system forecasting. In general, wind-forecast error rates have improved over time, but the SPP footprint has experienced several stalled low pressure systems and complex interactions in the upper atmosphere that resulted in a sudden drop of wind generation not forecasted by weather models. It is the responsibility of the URT to review results of weather forecast models and determine if there is sufficient conventional capacity to respond to deviations in load and wind forecast over varying time horizons. Responsibilities generally include looking several days in the future and recommending actions for system operators such as extending existing commitments or committing new generation. SPP staff will continue to evolve and improve processes that can help determine uncertainty levels that require consideration in real-time operations.

MISO and SPP's transmission system seam stretches from Canada into Texas. Each BA's intra-market dispatch use the other's transmission system as a parallel path. Flows between MISO North and MISO South have a particularly high impact on the SPP transmission system, and MISO and SPP developed a regional transfer operations procedure (RTOP) to mitigate the impacts and specify early communication and actions. During their inquiry into the January 2018 cold weather event, FERC and NERC recognized several needs. They include ongoing monitoring of the impact of the regional transfer flows, performance of periodic impact studies, early communication between MISO and SPP RC, conducting capacity and energy emergency drills, and changes to the RTOP to address how to return regional transfer flows to their limits. SPP and MISO are working to improve processes and procedures and to provide increased visibility of the impact of regional transfer flows to system operators.

INTEGRATING NEW TOOLS

The voltage security assessment tool (VSAT) is part of the dynamic security assessment (DSA) suite of tools that has been in production since May 2018. VSAT provides shift engineers, operators and other support staff an analysis, complimentary to real-time contingency analysis, that considers real-time conditions and calculates the additional margin that could flow across an interface that is limited due to voltage constraints. The tool assists staff in protecting grid reliability for large system transfers in real time. VSAT results have been incorporated into custom displays that operators use to monitor the transmission system. SPP will continue to evaluate the effectiveness of the VSAT. Based on future transmission system conditions, new VSAT scenarios will be added as necessary.

The transient security assessment tool (TSAT) has been in production since August 2019 in a pilot phase. Validation of results is ongoing to ensure accurate and concise results that can be trusted for real-time decision making. TSAT provides operators time-domain analysis to determine the impacts of a fault on the transmission grid. The tool assists staff in protecting grid reliability from transient instability. SPP will continue to evaluate the accuracy and effectiveness

of the TSAT. Based on future transmission system conditions, new TSAT scenarios will be added as necessary.

In 2017, SPP deployed a suite of tools to receive, store, and analyze members' phasor measurement unit (PMU) data. The primary goal of SPP's PMU software is to detect and identify forced and inter-area oscillations. When the initial project concluded in 2017, most of the PMU data originated from a single member, but two additional members have begun voluntarily sending PMU data to SPP. Other members continue work on their own PMU deployments with plans to send data to SPP. As of November 2019, all new generators greater than 50 MW must include a PMU device and stream the data to the transmission operator and SPP. SPP is also working with other RCs and RTOs in the eastern interconnection to exchange data. This growth in available PMU data is allowing us to better study oscillations in the eastern interconnection. SPP is also working with a PMU software vendor to add source location to existing oscillation detection capabilities. This may enable SPP to determine if the source of an inter-area oscillation is in our footprint and take steps to mitigate it.

In 2016, SPP launched a multiyear project to upgrade its dispatcher training simulator (DTS). SPP is working with an external software developer to create a full training and testing simulated environment that performs more closely to real-time production systems. The first two phases are complete. The DTS upgrade will continue through 2020 to integrate dedicated market system and situational awareness displays. The DTS will provide realistic simulation training using market systems critical to SPP operators' readiness and increased reliability. This will improve operator training and greatly enhance support of reliability coordination, balancing authority and market operations.

EXPAND AND IMPROVE MARKET FUNCTIONALITY

UNCERTAINY

As SPP's generation fleet includes increasingly more renewable resources, the majority of many days' planned operating capacity comes from a forecastable resource. Due to changes in temperature, humidity, cloud cover and human behavior, these resource forecasts are not always accurate. This can lead SPP to rely on capacity that cannot actually supply energy when needed to meet demand.

SPP is developing an *uncertainty product* that accounts for uncertainty in energy production from available capacity to ensure there is enough available during these events. A time horizon for this product has not been determined. Other markets have addressed this issue with products in the 30-minute time horizon. SPP's analyses indicate promise for one or more products in time ranges of up to four hours. SPP working groups are analyzing the results of SPP's uncertainty study and developing this product to ensure it meets the needs of SPP and the membership.

RAMPING CAPABILITY

SPP is creating a *ramping capability product* to ensure there is enough ramping capability to address potential wind forecast errors and concerns that SPP's real-time prices are overly volatile due to scarcity pricing. Resources' ramping capability is an essential component of efficiently and economically meeting the energy needs of SPP's market participants. A resource's asset age and technology impacts its ability to ramp.

SPP's market does not directly value the ability to perform ramping functions. This could result in new technology ignoring ramp as a valued product and older assets not optimizing their offers or maintenance to produce enough ramping capability to meet the region's needs. With the continuing development of forecastable resources, the ability to procure and value excess ramping capability to handle potential errors in renewable forecasts will help ensure a stable, reliable and economic grid. SPP filed Revision Request 361 (Ramping Capability) with FERC on April 21, 2020 and is awaiting the response to begin implementation planning.

FAST-START RESOURCES

A third area of focus to improve and expand market functionality is on *fast-start resources*, which are essential to the reliable provision of energy. These resources typically have short startup times, low minimum run-time requirements and faster-than-average ramp rates, characteristics that provide needed flexibility for managing SPP's operational challenges.

Although the need for fast-start resources could decrease with the implementation of ramping capability market products, SPP anticipates continuing to encounter unforeseen circumstances requiring a fast-start market product or service. While SPP currently has a participation model for fast-start resources, many market participants believe the model's compensation principles are lacking and do not adequately incent participation of fast-start resources. FERC and some stakeholders are concerned about the inclusion of start-up and no-load costs into the locational marginal price (LMP) calculation.

SPP and its stakeholders have initiated fast-start market product enhancements in the form of *RR375 (FERC Order on Fast-Start Pricing*) and *RR402 (HITT R3: Fast-Start Resources, Enhanced Intra-Day Reliability Unit Commitment)*. SPP has filed RR375 at FERC and is awaiting response. The Market Working Group has approved *RR402,* and SPP will implement these changes after gaining approval from FERC.

INFORMATION TECHNOLOGY

IT's foremost responsibility is maintaining the currency and availability of existing systems to fulfill SPP's core mission of keeping the lights on. To satisfy this obligation, a large percentage of IT's daily work is associated with efforts that support reliability.

IT plays a key role in the successful implementation of approved corporate capital projects included elsewhere in this document. An estimated 55,150 hours of IT resources are required to implement projects proposed in the 2021 capital projects budget. Additionally, IT provides support and refreshes for all capital assets throughout their useful life.

Beyond these critical responsibilities, IT is focusing on the following areas.

CRITICAL INFRASTRUCTURE PROTECTION STANDARDS (CIP) AND SECURITY

SPP is enhancing security efforts in accordance with a cyber strategic plan that is monitored by the oversight committee. This work includes:

- Modifying software development processes to include secure coding practices by design and default. These modifications will enable SPP to address security vulnerabilities upstream during development.
- Automating the monitoring and provision of logical access to information systems, including implementing an identity and access management system. Role-based access control limits user access to only the data necessary for their job. Creating patterns of risk mitigation through architecture or roles enables rapid risk reduction through common approved structures. Roles are one example of how security architecture can reduce burden while increasing security and lowering risk.
- Applying a corporate risk management process.
- Updating business continuity plans.
- Strengthening the information management program by establishing a data governance program. One of the first priorities will be to agree on enhanced classifications and labels of sensitive data, a precursor to implementing data-loss prevention and tracing the flow of sensitive information through SPP's infrastructure.

SPP is also reducing manual work associated with assessing and administering security patches issued by third-party software providers, most of which are driven by CIP requirements. IT resources are devoted to the daily care and upkeep of hardware and software. We manage a continuous stream of patches and updates across all installed hardware and software. SPP processes security patches for over 5,300 unique pieces of software installed on critical cyber assets, resulting in tens of thousands of patch assessments that must be conducted by staff and approximately 1,100 security patches deployed annually across 1,400 assets. In addition, SPP

processes and deploys security patches across its lower environment stack and non-CIP classified assets. IT is developing automated solutions and working with an outside vendor to conduct security and non-security patch assessments. Automating this solution reduces the opportunity for human error and related compliance and security risks.

Finally, in accordance with NERC standard CIP-013-1 (Supply Chain Risk Management), SPP is automating and refining supply chain processes to streamline intra- and interdepartmental efforts.

INCREASE OPERATIONAL EFFICIENCY

IT receives continuously more requests and resulting work that reinforces the need for ongoing process improvement and automation to gain efficiencies.

Efforts to identify and prioritize process optimization opportunities are ongoing. IT continues to focus on highly manual, repeatable administrative activities that carry a high risk of manual errors.

Another goal for minimizing risk is to identify and prioritize opportunities for automation, maintain a clearinghouse for automation activities, determine the cost/benefit of automation proposals, and develop a cohesive automation implementation plan. The automation framework has been established, and multiple automation initiatives are in flight and in the queue. Relevant efforts include automating and managing passwords to reduce overhead and ensure compliance and automating application deployments, server builds and decommissions, and the CIP supply chain process.

SPP has an extensive software portfolio including tools that provide similar functionality in source-code versioning, issue tracking, application build processes and information sharing. IT is standardizing platforms that will reduce SPP's software stack and costs associated with licensing, support and maintenance. The procurement process is being examined to clarify and consolidate the paths by which hardware and software are acquired, ensuring adequate architectural and security oversight, and auditable compliance with CIP-010-1 and CIP-013.

Finally, IT is working with stakeholders across the business to create and implement collaborative solutions with individual departments.

EVALUATE AND LEVERAGE EMERGING TECHNOLOGIES

IT continues to evaluate and implement technologies that increase and optimize SPP's functionality. The technology landscape continually changes, so it is prudent for IT to stay aware of evolving technologies with an eye toward integrating systems that support SPP's strategic initiative of enhancing member value and affordability.

For the vast majority of business applications, IT utilizes on-site infrastructure to run application systems and store critical business data. While there are advantages to this approach, there are

less-critical systems and data for which off-site cloud implementation may be appropriate. IT is evaluating on-site cloud solutions to enable more flexibility and efficiency while reducing equipment purchases. IT is developing cloud strategies, cloud usage and services policies, and associated processes and procedures. Cloud solutions increase efficiency by delegating responsibility for certain parts of the infrastructure to a third party that has economies of scale to manage it more efficiently. By separating infrastructure layers, we can eliminate dedicated, uniquely configured infrastructure to support each application in favor of a common infrastructure service. This is easier to support and more efficient to leverage, even if we choose an on-premise solution.

The amount of data required to support end-users continues to increase significantly, requiring additional investment in storage technology. Data must be appropriately available to end-users, perform satisfactorily and be backed up to secondary and/or offsite locations as required. In some cases, SPP applications must have data in multiple environments (test, development, member testing, quality assurance, and production) that may necessitate short-term and/or permanent retention periods, all of which require administrative oversight. A data governance program has begun that will define updated data classifications and label policies for SPP's major information systems.

MAINTAIN AND REPLACE ASSETS

Every system and tool SPP uses to perform its tariff, markets and reliability functions relies on technology. Physical technology assets (servers, hosts, storage devices and networking equipment) comprise approximately $40 million of capital inventory. Importantly, these physical assets must be replaced periodically due to exposure to increased failure rates, discontinued or unaffordable vendor support, operating system incompatibility and the need for improved application performance and connectivity requirements.

An asset inventory management program is being implemented to accurately inventory SPP's hardware and software and integrate across IT to ensure license compliance, support status, cyber compliance, and reduce overlapped vendor solutions. Savings will come through reduced exposure to contractual non-compliance fines, reduced risk of purchasing multiple overlapping technologies, reduced risk of infrastructure getting to end of support, and expense reduction of automating what is today a manual, incomplete, and error-prone task.

FINANCE

CREDIT POLICY

SPP's Integrated Marketplace creates both opportunity and risk for market participants. Risk is manifested in the potential for credit default and subsequent socialization of that loss among all participants. SPP's credit group and its stakeholders have undertaken a robust review of TCR-related credit risk and have proposed three initial enhancements to strengthen the credit policy and associated processes.

While the group proceeds with approval and implementation of these enhancements in 2020, they are forming additional recommendations to address other areas of risk within the policy. This second phase of recommendations will focus on forward-looking risk metrics and potential enhancements to auction processes, both of which could improve visibility into portfolio risk valuation.

The groups' goals are to achieve consensus on second-phase enhancements by early 2021, then seek stakeholder and FERC approval. Implementation of the recommendations would occur in late 2021 for production in early 2022.

ENGINEERING

GENERATION INTERCONNECTION PROCESS

In 2020, SPP will implement its new FERC-approved, three-phase GI study process in DISIS 2017-001 and DISIS 2017-002. SPP staff and consultants will concentrate on clearing the backlog of almost 200 requests from 2017 (more than 36 GW).

The requirements of FERC Order 845 are resulting in requests for surplus interconnection service requests which will complicate GI processes and require new approaches to address customer needs. The self-build option resulting from Order 845 is expected to result in conflict between transmission owners and customers that will likely impact the generator interconnection agreement negotiation process and thus require more GI staff facilitation.

The new generation interconnection user group is being established to both educate stakeholders and identify process improvements to help clear the GI queue backlog. Hybrid requests are becoming more prevalent that will require procedures and policies to address the hybrid facilities' unique characteristics.

The approval of Wolf Creek – Blackberry in the latest ITP, eliminating the need for the Wolf Creek – Emporia solution identified in GI studies, will likely result in significant push by transmission owners to force interconnection customers to share costs of approved network upgrades. HITT recommendations should address this need for cost allocation changes.

RESOURCE ADEQUACY PROCESS

In 2018, FERC approved new tariff provisions that SPP will implement in 2020. Foremost among these are a new enforcement process and enhanced data collection and monitoring provisions to ensure load responsible entities plan sufficient resource capacity.

The Supply Adequacy Working Group recognizes a gap in SPP policies related to capacity accreditation for storage as a capacity resource. Staff is working to finalize a scope of work to evaluate capacity accreditation improvements for storage using the Effective Load Carrying Capability (ELCC) methodology. These efforts, with HITT initiatives and Engineering's PRPC ESR project, are expected to close technical and policy gaps related to storage capacity accreditation while rolling into the existing attachment AA high level requirements

PROCESS INTEGRITY

COMPLIANCE TOOLS AND AUDITS

Compliance and reliability standards staff will work to formalize a controls program that will:

- Capture the slate of existing controls in governance risk and compliance (GRC) tool for NERC compliance.
- Collaborate with the internal audit department to document controls foundation (control objectives, design, and effectiveness testing).
- Strive to expand GRC usage to other departments and controls uses (e.g., EMBC, risk management, internal audit).
- Develop and capture high-risk controls in GRC tool for NERC compliance.

The enhancements to the controls program will help SPP compliance staff in its oversight role and should assist in managing SPP's compliance with NERC reliability standards. In addition to responding to and mitigating potential non-compliance issues, compliance staff will continue strengthening its relationship with NERC, the Midwest Reliability Organization (MRO) and the Western Electricity Coordinating Council (WECC).

CUSTOMER TRAINING

Due to the spread of COVID-19, customer training took steps to safeguard the health and safety of SPP stakeholders while continuing to provide credential maintenance hours for NERC-certified system operators. With the health and safety of stakeholders still in mind, the 2021 customer training calendar will prioritize virtual training for the first half of 2021 and plan instructor-led training events in the last half of the year.

PERFORMANCE EXCELLENCE (PEX) RE-TOOLED

Beginning in 2020, SPP assessed prior years' PEX efforts. We recognized and acknowledged success towards the program's goals:

- Bridge staff ideas and leadership prioritization
- Provide a mechanism to:
    - Engage SPP Staff and leadership to improve processes.
    - Report to stakeholders the efforts and benefits of these improvements.

SPP also reaffirmed our commitment to the success of PEX by taking the following actions in 2020 and 2021:

- Shift from centralized facilitation to department ownership of PEX.
- Hold officers and directors responsible for their respective organization's improvements.
- Capitalize on the framework of successful PEX teams to enable continued success.

The PEX leadership team will identify opportunities for improvement of PEX efforts based on stakeholder feedback received from the annual stakeholder satisfaction survey.

2021 PROJECTS

SPP directors on the Project Review and Prioritization Committee (PRPC) reviewed enterprise project requests and approved those that align with SPP's foundational strategies and are justified by a business case. For the 2021-2023 budget planning cycle, the PRPC recommended a portfolio of 14 projects to the SPP executive team for their approval.

This 2021 recommendation is notable for at least two reasons: 1) it is the first time the PRPC submitted projects as a portfolio of projects in various stages of implementation and corresponding with the project pipeline and portfolio management principles adopted by the PRPC; and, 2) there were no new projects presented as part of the recommendation. The 14 projects are identified below with the following five projects highlighted because of significant schedule or budget revisions.

PROJECTS REVIEWED PREVIOUSLY, BUT NOT BUDGETED

- The fast-start resource compliance project was noted in last year's recommendation, and was prioritized in the portfolio, but the project has been on hold. This recommendation highlights the project because the PRPC prepares to stage the project in the current year.

- The freeze-date replacement project will update the data used in market interchanges. It was approved last year. The implementation has been postponed.

- The interface pricing and pseudo-tie modeling project was also in last year's recommendation and prioritized in the portfolio. The project has been on hold pending FERC directive and is being resubmitted as a 2022 project.

PROJECTS REVIEWED PREVIOUSLY WITH UPDATED BUSINESS CASE JUSTIFICATION

- The energy management system (EMS), centralized modeling tool (CMT) and markets upgrade projects will upgrade legacy EMS, CMT and markets software. This project was submitted in 2019 with an executive summary and is now represented with a full business case.

PROJECT WITH SIGNIFICANT INCREASE IN BUDGET

- The ramp product project was previously approved in 2019 with a total budget of $200,000. After consultation with the vendor, a statement of work was recently received for this effort for a total cost of $645,000. A revised three-year budget is presented in the documentation for this project.

Together, this portfolio of projects will address stakeholder requests and regulatory directives.

PRIORITY	PROJECT	TOTAL COST ($M)	STAFF HOURS
1	FERC Order 841	$0.4	22,118
2	HITT Program	$0.0	Not Estimated
3	Ramp Product	$0.7	7,850
4	Fast-start Resource Compliance	$0.2	4,421
5	WEIS Market Program	$6.2	75,295
6	Energy Storage Resource (Engineering)	$0.1	5,140
7	IAM Deployment	$0.5	3,910
8	Z2 FERC Remand Order (On Hold)	$0.0	Not Estimated
9	EMS, CMT & Markets Upgrade*	$3.5	8,880
10	Freeze Date Replacement	$0.4	6,019
11	Interface Pricing and Pseudo Tie Modeling (On Hold)	$0.2	3,827
12	TAGIT/SCERT Rewrite	$0.3	4,360
13	Uncertainty Product	$0.0	8,050
N/A	Market & Reliability Training Simulator (Formerly DTS Phase 2B)**	$2.5	6,160

TOTAL COSTS OF PROJECTS FOR 2020 THROUGH 2023

TOTAL PROJECT COSTS (2020 – 2023) ($M)					
	2020	**2021**	**2022**	**2023**	**TOTALS**
Project Capital	$5.4	$3.8	$1.3	$0	$10.5
IT Capital	$1.1	$0.1	$0	$0	$1.2
Dept. Operating	$2.2	$0.2	$0	$0	$2.4
IT Operating	$0.5	$0.2	$0.1	$0.1	$0.9
Total Cost	**$9.2**	**$4.3**	**$1.4**	**$0.1**	**$15.0**

STAKEHOLDER INITATIVES

STRATEGIC MARKET ROADMAP

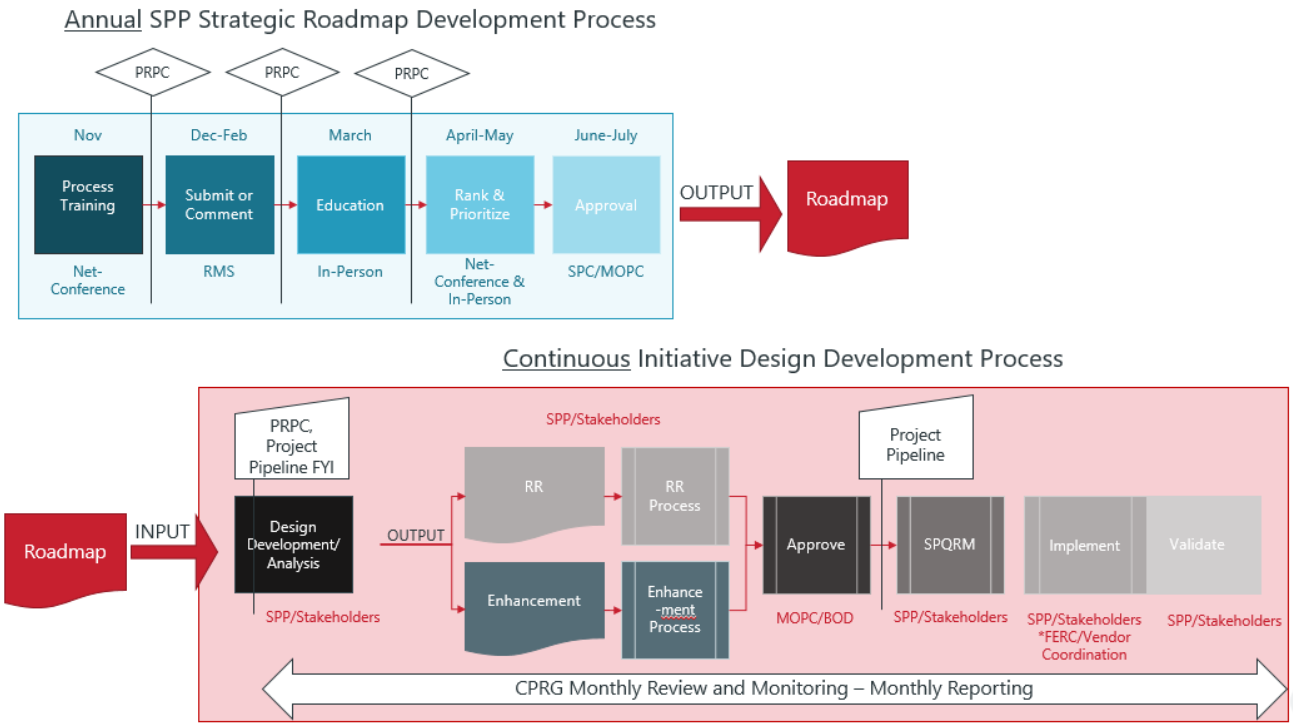
In 2019, the SPP market design department completed the development of the strategic market roadmap process with the goal of reaching approval in June 2020. The process enhances current efforts in this area by adding a formalized structure and creating consistency in the prioritizing of market-related initiatives and efforts.

The SPP director team approved the process in early June noting the following benefits to all stakeholders:

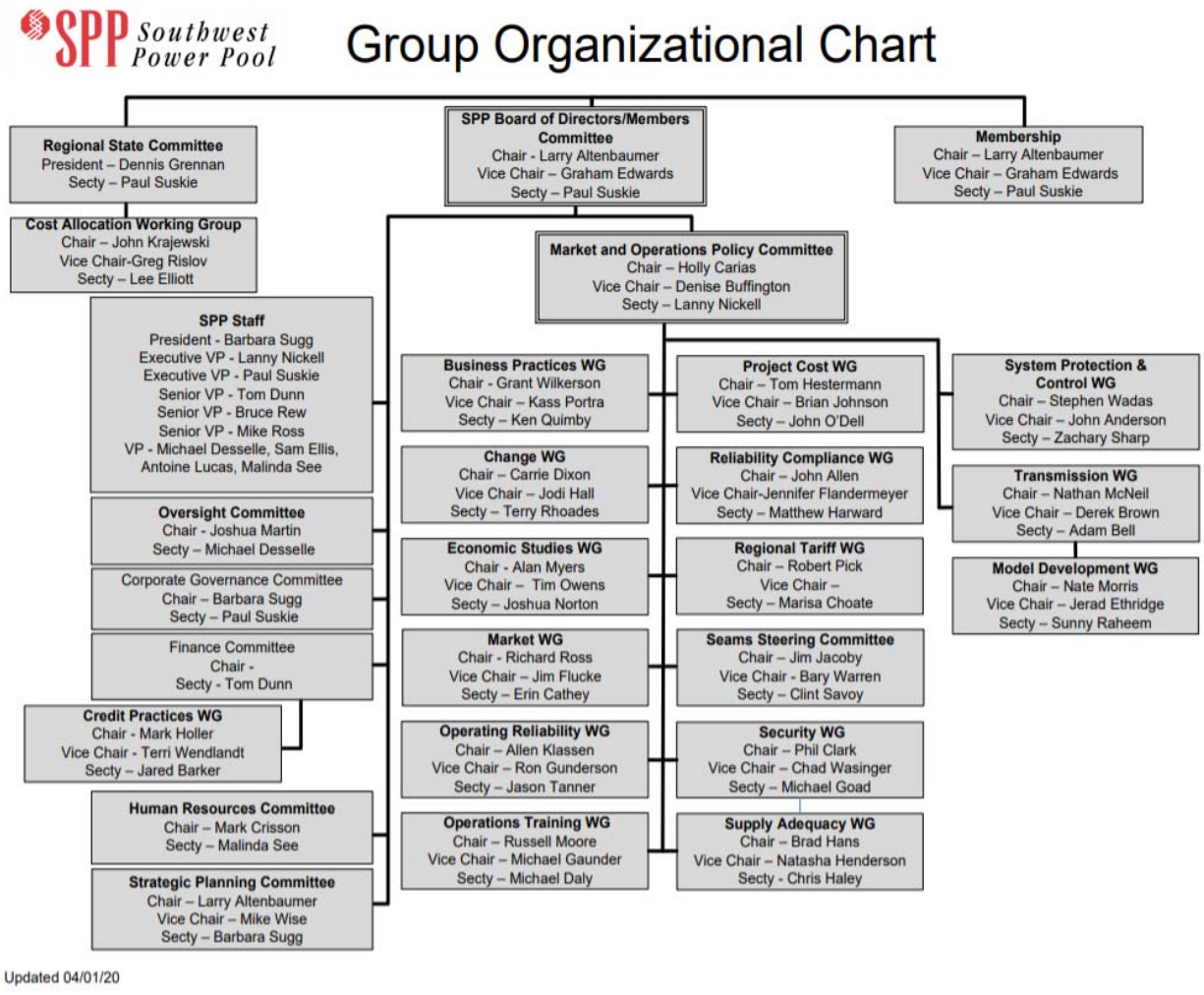
- Increase transparency and collaboration.
- Balance of diverse interests.
- Ensure alignment with SPP's strategic plan, budgeting and portfolio management.
- Ensure focus on greatest areas of need.
- Enhance internal coordination and support.

The initiative has been a joint effort of the Market Working Group and affected stakeholders and, upon approval by the SPC and MOPC in July 2020, will be reviewed and monitored on a monthly basis by the CPRG.

The diagram below illustrates the proposed process:



APPENDIX 1: SPP WORKING GROUPS



APPENDIX 2: SPP STAFF ORGANIZATION