

By the Future Grid Strategy Advisory Group

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Grid of the Future

2024 Addendum

# Revision History

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| --- | --- | --- | --- |
| Date or version number | Author | Change Description | Comments |
| 0.1 | Sam Ellis | Initial draft consolidating internally developed white-papers. |  |
| 0.2 | Sam Ellis / Mark Hodges / April Wingfield | Added appendix tables and introduction paragraphs. Initiated additional change tracking and published for additional input. |  |
| 0.3 | Sam Ellis | Changes to address feedback from 6/24/24 FGSAG meeting and other minor edits |  |
| 0.4 (Revised) | Sam Ellis | Update recommendation with language proposed by staff.  Further revised to reflect edits by Mark Ahlstrom prior to 8/12/24 FGSAG discussion. |  |
| 0.5 | Sam Ellis | Address revisions by FGSAG during the 8/12/24 meeting |  |
| 0.6 | Sam Ellis | Reflects further edits from FGSAG members |  |
| 1.0 | Mark Hodges | Moved to release version 1.0. This version is the approved version as voted by the FGSAG Members in the FGSAG Meeting held 10/1/2024.  This version also includes prioritization levels for each recommendation as voted by the FGSAG members for those items able to be prioritized. For recommendations reflect agreement to continue involvement or develop future recommendations, those do not include a prioritization level but were all unanimously accepted by the FGSAG Members. |  |

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# FGSAG REport 2024 Addendum

## Overview

The Future Grid Strategy Advisory Group’s (FGSAG) initial recommendation report was published in April 2023. The recommendations from the report have been instrumental in informing the strategic efforts of SPP, but the future needs of the grid continue to evolve at a rapid pace and new challenges are emerging that were not fully contemplated in the initial report. This addendum is intended to capture these evolving needs and update the recommendations.

## Recommendations from the 2023 Report

The original report contained 32 recommendations that were prioritized as high (14), medium (15) or low (3). Since the publication of the original report, six high priority items are already underway with another seven added to the SPP roadmap process and aligned with future projects. One high priority item is under review.

All items prioritized as medium and low have been refined to clarify the work product expected from those recommendations. As a result, two medium priority recommendations were consolidated into one (IC2 retired and merged with IC3); and two medium priority recommendations specific to FGSAG education were removed from the recommendation list and added to the action item list for FGSAG.

The current alignment of recommendations as detailed in the appendix of this document includes 14 high priority recommendations, 12 medium priority recommendations and three low priority recommendations (for a total of 29). This list will be updated based on the output and prioritization of recommendations contained in this document.

## Changes in the Current Outlook

### Legal and Regulatory Landscape

Evolution in legislation and regulation is a significant driver of change since the original report. SPP has been monitoring and determining how changing legal and regulatory policies can impact reliability for the region. Two areas that have recently gained attention are the U.S. Environmental Protection Agency’s (EPA) regulations of greenhouse gas emissions and the implications of the Inflation Reduction Act.

Recent developments in legal and regulatory landscape that will drive change are discussed in more detail Appendix 1. While the FGSAG does not currently see the need to add new recommendations in response to these legal and regulatory developments, they may result in expanded scope for SPP’s planned work and may require SPP to change its approach for addressing certain issues in the future. Such developments may affect the priority of currently planned activities.

### Assessing Future Energy and Resource Needs

The scale and scope of the energy and electrification transition is daunting. In the Future Energy & Resource Needs Study (FERNS), SPP is examining the key drivers of the outlook for the future grid: new large loads, electrification of the demand, and expansion of carbon free generation resources. Five scenarios have been constructed envisioning different views of the future. Electrification depends on factors affecting the cost of conversion and/or policies that may impact the speed of this conversion. Similarly, the pace of lower-carbon generation expansion depends on many factors including the cost of the technology, policy choices and technological innovations. Also, supporting policies at the local, state and federal level are affected by the degree of cooperation between the local, state and federal governments and the strength of interest groups and public support.

FERNS is analyzing the gradual transformation of the grid under different scenarios. The results will serve to inform some of the approaches, changes, and regulations that may be key to economic and reliable transformation of the grid.

FERNS assumes that only current commercially viable technologies are available to replace retiring conventional generation. This avoids uncertainty from assuming availability of breakthrough technologies that could provide an overly optimistic view of the future, but could similarly provide a view that is too conservative in the pace of transformation and decarbonization from technologies that are not commercially viable today but emerge within the study timeframe.

The study objectives are to:

1. Investigate transformation of the grid in terms of both supply and demand.
2. Identify potential short- and long-term options based on high-level cost estimates of certain elements of electrification.
3. Discuss options to maintain and enhance bulk electric system reliability in the grid of the future:
   1. Understanding the Planning Reserve Margin (PRM) requirements and the potential changes to PRM over the next three decades, or how our approaches to system reliability and system adequacy must change from PRM to other metrics;
   2. Recommendations on potential changes in the policies, incentives and societal behaviors that may support system reliability enhancement in the grid of the future.

To better understand the path of the grid transformation, different scenarios will be studied to examine the path toward greater amounts of decarbonization and electrification by 2050. The results of the study can help inform decision makers as the SPP region gradually departs from conventional resources and technologies which have served the SPP grid for over a century.

The progress of the study is currently tracking toward completion in early 2025. A technical review committee is overseeing the study and providing technical assistance where needed. This committee includes representatives from the ESWG, CPPTF, SAWG, REAL team and FGSAG.

#### Recommendations

The FERNS will help address several recommendations that are currently underway and the FGSAG has been tasked with overseeing the study.

* **Recommendation AD24-1 (Accepted)**: FGSAG will continue oversight of the Future Energy & Resource Needs Study (FERNS) and make recommendations based on study results.

### Load of the Future

Since publishing FGSAG’s initial recommendation report, SPP has continued to increase its focus on how to better anticipate and react to operational and planning impacts for the load of the future.

A Load of the Future Assessment is underway, which includes compiling and assessing an array of SPP’s current processes regarding behind-the-meter generation, demand response, market storage resources, storage as transmission only assets, co-located load and generation in markets, operations, transmission planning within the ITP, transmission service, generator interconnection, resource adequacy, and settlements. The objective of the assessment is to ensure consistency across the RTO systems and studies as appropriate and to evaluate any policy modifications identified for each area and process.

Load growth is expected to occur at unprecedented levels, and renewable energy will likely continue increasing penetration, which presents different challenges and opportunities. Future policies should be in place to incentivize optimal outcomes for the SPP region. These include incentivizing load to locate within SPP, co-locating resources to serve load, and functionality to interrupt large unconventional loads during emergency conditions, among others. Assessment of these processes will be comprehensive and will assess the effectiveness of the changes being proposed.

Evolved Energy Research (EER) is compiling a taxonomy overview to clarify investment drivers and key needs of these loads. Additionally, they are developing estimates of unconventional load growth quantities and spatial prediction models.

SPP will develop a white paper to outline the assessment of our processes and establish principles for future policies based on SPP’s evaluations and EER’s findings. The white paper should also consider actions that states and member utilities are undertaking to accommodate large loads.

#### Recommendations

* **Recommendation AD24-2 (Accepted)**: FGSAG should monitor the development of the Load of the Future white paper, review the analysis conducted by EER, and help to establish the guiding principles for future SPP policies.
* **Recommendation AD24-3 (High):** SPP will consider adding the locations of large loads identified in the Load of the Future efforts into future transmission planning scenarios. The FGSAG recommends that (1) SPP develop a methodology for adding the locations of large loads and (2) include in transmission planning studies an objectively-derived long-term load forecast to identify the transmission needs of future loads.
* **Recommendation AD24-4 (Medium)**: SPP will determine what mechanisms and market-design incentives could be implemented to encourage demand flexibility in order to achieve more efficient load profile for SPP.
* **Recommendation AD24-5 (High):** SPP will determine mechanisms for the flexibility of load, including emerging large, flexible loads, to help meet SPP’s regional needs with the impacts on energy and resource adequacy, in addressing issues with connecting new loads.

### Artificial Intelligence’s Role in Managing the Grid

The capabilities of artificial intelligence (AI) and AI-assisted applications are increasing at a rapid pace. There are use cases in development that will help describe methods for using AI in better managing the grid. Areas where AI can help with the grid include:

* **Visibility.** AI may help operators understand the behavior and configuration of elements of the power grid that otherwise are not directly measurable.
* **Prediction.** AI may be used to predict the future state of key variables that are needed to operate and optimize the system, or to do so more quickly than is possible with traditional modeling methods.
* **Optimization.** Operations and planning may use AI to quickly identify better solutions to complex problems that help optimize the grid.

#### the Operating Horizon

In the operating horizon, AI could give indications of the behavior of assets that are not directly telemetered to the system. This can help respond to changes in distributed energy resources (such as rooftop solar) and distributed demand response.

Furthermore, SPP is investigating the use of AI to more quickly and accurately predict demand, variable energy resources and other aspects of the grid in both near-real-time and mid-term time horizons.

SPP is currently investigating the use of AI-based large language models to help in several areas including:

* Allowing operations support staff to quickly determine responses based on previously compiled knowledge regarding how to respond to certain unusual situations, and
* Quickly extracting answers from complex documents, such as the tariff, market protocols and operating guides.

#### The Planning Horizon

In the long term, SPP is investigating the involvement of AI in transmission planning and resource adequacy processes. One possibility is using AI to learn the attributes of the transmission system and predict its response under unknown conditions, which is also known as creating a “digital twin.”

With traditional engineering tools and methods, examining an extensive collection of operational conditions is prohibitively expensive and cannot be accomplished in the current study cycles. AI can assist with the analysis of many more sets of operational conditions, potentially leading to a faster determination of the most effective system upgrades.

AI enabled tools and models hold the promise of transforming the analyses and studies in electric power engineering and ultimately the efficiency and effectiveness of the planning solutions. As demonstrated in other industries, when trained with sufficient information and examples even when the relationships may not be explicitly understood or identified, AI-enabled analysis may find relationships and solutions that are not constrained by the limits of established engineering knowledge or modeling capabilities. AI approaches can help to gain insights into complex issues and related solutions that might not otherwise be easily identifiable.

#### Recommendations

* **Recommendation AD24-6 (Accepted)**: SPP should explore opportunities for AI through workshops and discussion forums and make proposals to the FGSAG and Strategic Planning Committee regarding the strategic opportunities and challenges that AI poses.

### Grid Enhancing Technologies: SPP “GETs” it

A modern grid requires modern infrastructure, such as digital technology devices and new electricity pathways. Grid Enhancing Technologies (GETs) maximize electricity transmission efficiency through a family of different technologies that include sensors, power flow control devices, and analytical tools. GETs can be applied to today’s system to save ratepayers money as the grid transitions.

#### What are GETs?

GETs maximize electricity delivery through a host of different cost-effective technologies. GETs are also known as Non-Transmission Expansion Alternatives (NTAs) or Non-Transmission Expansion Solutions that generally encompass new technology used to enhance the existing grid infrastructure.[[1]](#footnote-2) GETs can include a vast array of equipment and processes, including static VAR compensators (SVCs), phase-shifting transformers (PSTs) capacitors, synchronous condensers (SCs), dynamic line ratings, topology optimization, advanced conductors, demand response, distributed generation and many others.

Many GETs devices have been utilized for decades. The SPP system currently has static VAR compensators installed to control system voltage and allow more reliable power transfers, phase-shifting transformers installed to control and re-route system real power flows and synchronous condensers to support system voltage. SPP has also implemented limited use of topology optimization and dynamic line rating equipment in select areas of the system.

#### Opportunities for the Future Grid

GETs devices are a cost-effective way to maximize use of the transmission system. Many operational opportunities exist that can bring economic and reliability value by addressing system bottlenecks and providing operational flexibility. While their value is recognized and is often very useful for enhancing the capabilities of existing transmission or deferring immediate upgrades for transmission bottlenecks, SPP believes that GETs should not be used in the planning horizon as a way to suppress the planning and building of new transmission capacity.

#### Operating Horizon

More widespread implementation of GETs, such as advanced power flow controllers, dynamic line ratings and topology optimization, would bring needed value to the system today. Many areas of the system experience congestion that could be managed more efficiently with more dynamic rating of transmission lines beyond the fixed seasonal ratings used historically and expansion of current topology optimization efforts. FERC Order 881 required the implementation of operational systems to accept Ambient Adjusted Ratings (AAR) that can also provide more efficient system use, but more can be done.

Current operational issues will be addressed in part by future transmission expansion identified in the ITP assessments, some of which is already underway; but with the challenge of recent supply-chain barriers, implementing interim GETs solutions can provide a cost-effective solution until such time as new transmission capacity can be built. SPP is ready to embrace newer technologies like dynamic line ratings and enhance current GETs like topology optimization for all real-time business functions in SPP Operations and Markets.

##### Planning Horizon

As mentioned above, SPP does not believe all GETs should be considered the replacement for long-term transmission capacity needs. In certain cases, they could be considered a preferred solution, but selecting devices that maximize the use of the existing transmission system can decrease operating margins, making it more challenging to reliably operate the transmission system, and can mask transmission line upgrades and additions that may be the best long-term solution.

New transmission is taking longer and longer to build today, which is compounded by the need for more higher voltage transmission expansion within the SPP footprint as the grid continues to transform. GETs could have a valuable place in long-term planning as an interim solution. Pairing GETs solutions with new transmission capacity could help address current operational issues much faster while new infrastructure is being constructed. The most valuable GETs not already included in the planning process are technologies like dynamic line ratings and advanced power flow controllers.

##### Potential Challenges

Consideration of GETs in business functions can present different types of challenges. In the development of new processes to incorporate GETs, regulatory direction must be incorporated. FERC Orders 2023 and 1920 require consideration of alternative solutions in generator interconnection and long-term planning processes.

Technical challenges arise with certain types of GETs that require more detailed and time-consuming analysis. For series compensation GETs, there can be sub-synchronous resonance (SSR)[[2]](#footnote-3) interactions with specific types of generation resources and load based on placement.

Process challenges can arise as well. While SPP has stated that GETs should not be a replacement for future new transmission capacity, new methods to justify competing solutions and determine whether short-term GETs implementation provides value would need to be developed.

The industry itself also faces challenges with GETs. More research and development are needed to identify best practices and methodologies for usage, improve data requirements for improved functionality and advance the technologies to achieve efficiency and cost effectiveness.

##### Previous and Ongoing Efforts

As part of SPP’s compliance with Order 841, SPP increased integration of energy storage into different business functions. Storage As a Transmission Only Asset (SATOA) was integrated into planning processes as a viable solution to identified transmission system constraints. While not specifically considered a GETs device, SATOA can function as a valuable non-transmission alternative.

SPP performed joint case studies[[3]](#footnote-4) with ERCOT, NewGrid and The Brattle Group in 2020 to analyze transmission topology optimization and its ability to improve market efficiency, reliability and resilience.

SPP went to great effort to consider GETs in the regional planning process. The Strategic and Creative Re-Imagining of Integrated Planning Team (SCRIPT), an SPP Board task force, recommended SPP staff and stakeholders to define acceptable use of Non-Transmission Solutions (NTS) in the Integrated Transmission Planning (ITP) assessment. The stakeholder groups determined that certain types of GETs could be used to address transmission system issues identified in long-term planning by defining their use in the ITP manual.

In 2024, key members of SPP’s Planning Policy and Research Team and SPP’s Principal of Grid Strategy published an IEEE paper titled “Non-Transmission Expansion Alternatives for Southwest Power Pool”[[4]](#footnote-5), exploring the role of non-transmission alternatives (NTA) in addressing electricity grid constraints and transmission expansion planning in the future.

#### Recommendations

* **Recommendation AD24-7 (Medium):** SPP will educate stakeholders and further develop opportunities for GETs, outlining specific technologies and their role in determining short-term and long-term transmission and operational solutions for the technologies identified.
* **Recommendation AD24-8 (High):** Consider GETs to address NTC delays and/or to address ITP reliability and/or congestion needs sooner.

## Appendices

### Recent Changes in Legal and Regulatory Landscape

#### Environmental Regulation

On April 25, 2024, the EPA issued final regulations under Section 111 of the Clean Air Act (CAA) regarding greenhouse gas emissions from fossil-based electric generating units (Final Rule).[[5]](#footnote-6) SPP and other interested parties including other regional transmission organizations submitted comments in the rulemaking docket and engaged in discussions with EPA staff regarding the rule as initially proposed. The Final Rule reflected certain changes that EPA staff attributed to concerns raised in comments and discussions, including the removal of existing gas turbines from the scope of the Final Rule. The Final Rule covers two categories of generating units: existing coal-based units and new natural gas-based units. For existing coal-based units, the new emissions limits will take effect in 2032 and the BSER[[6]](#footnote-7) is carbon capture and sequestration. Under the Final Rule, coal-based units that plan to retire before 2039 can opt to be placed in a subcategory in which emissions limits based on gas co-firing will be required starting in 2030. The Final Rule groups new gas generation into three different categories based on capacity factors, with differing emissions limits and BSERs applied to each category. On May 20, 2024, SPP issued to its member utilities a statement expressing concern that, because of the critical role dispatchable thermal generation plays in the integration of renewable energy resources, the Final Rule could negatively impact SPP’s ability to provide consumers with reliable electric service during a time when additional generating capacity is already needed to ensure reliability.

#### Inflation Reduction Act

In 2023, one year after Congress passed the Inflation Reduction Act (IRA), the U.S. added 32 gigawatts of clean electricity to the U.S. grid in the form of new solar, battery storage, wind and nuclear power.[[7]](#footnote-8) To meet the law’s expected emissions reductions, the nation will need to add roughly 70 to 126 gigawatts of renewable electricity capacity between 2025 and 2030.[[8]](#footnote-9) The biggest obstacles facing renewable electricity are logistical; wind and solar projects are facing lengthy waits in the interconnection queue to connect to electric grids, particularly because these renewable energy projects represent a more distributed network of generation with smaller projects trying to connect in more places.[[9]](#footnote-10) Moreover, it can take a decade or more to get permits for transmission lines and build them.[[10]](#footnote-11) Another obstacle, too, is the backlog in supply chains for developers and manufacturers of solar panels and other clean energy equipment.[[11]](#footnote-12)

#### DOE transmission corridors

The Federal Power Act authorizes the Secretary of Energy to designate any geographic area as a National Interest Electric Transmission Corridor (NIETC) if: (1) the Secretary finds that consumers are harmed by a lack of transmission in the area, and (2) that the development of new transmission would advance important national interests in that area, such as increased reliability and reduced consumer costs. NIETCs are designated based on (1) findings from the National Transmission Needs Study, DOE’s state-of-the-grid report; (2) public input gained through collaboration with affected states, Tribes, local communities, industry and stakeholders; (3) information and recommendations relevant to transmission capacity constraints or congestion that harms consumers currently or in the future, and ongoing roadblocks to transmission development in those areas, such as permitting, siting, or regulatory issues; and (4) information on whether one or more transmission projects are already under development in those areas. A NIETC designation can unlock federal financing tools, specifically through the $2.5 billion Transmission Facilitation Program and the $2 billion Transmission Facility Financing Program. NIETC designation does not constitute selection of or a preference for a specific transmission project for financial purposes. A NIETC designation also allows FERC to issue permits for the siting of transmission lines within the NIETC under circumstances where state siting authorities do not have authority to site the line, have not acted on an application for over one year, or have denied an application.

The preliminary list of potential NIETCs released in May 2024 includes ten potential NIETCs. The DOE intends to narrow the list of potential NIETCs that proceed to the next phase of the NIETC designation process.

#### FERC Order 1920

Order No. 1920 implements major reforms to transmission planning requirements applicable to transmission providers. The reforms are intended to preserve reliability and keep electricity rates down amid factors affecting the electric power sector, including more frequent and intense extreme weather events, load growth associated with electrification and new technologies, and the evolution of the country’s generation resource mix to meet public policy and customer demands for lower carbon emissions and an increase in renewable resources. The Order requires transmission providers to produce a regional transmission plan for a minimum of at least 20 years to identify long-term transmission needs. Transmission providers must conduct this long-term planning every five years using a plausible and diverse set of at least three long-term scenarios and use the “best available data” to evaluate long-term regional transmission needs. Order 1920 also requires transmission providers to file an *ex-ante* cost allocation method for the long-term projects identified. Transmission providers must add provisions to their tariffs allowing for a six month “engagement period” giving relevant state entities time and a forum to discuss and negotiate on a cost allocation method. Finally, the Order requires transmission providers in each transmission planning region to consider whether selecting transmission facilities that incorporate dynamic line ratings and advanced power flow control devices would be more efficient or cost-effective than selecting transmission facilities that do not incorporate these technologies. SPP is reviewing Order No. 1920 and determining next steps for compliance.

#### FERC Order 2023

FERC Orders 2023 and 2023-A include several key areas of reforms to the generator interconnection process, including (1) institution of a first-ready-first-served cluster study process with increased financial commitments for interconnection customers, (2) imposition of firm deadlines and penalties if transmission providers fail to complete their interconnection studies on time, (3) incorporation of technological advancements into the interconnection process including consideration of advanced transmission technologies in the interconnection study process, and (4) an update of modeling and performance requirements for inverter-based resources to ensure continued system reliability.

To incorporate technological advancements into the interconnection process, the Final Rule revised the *pro forma* interconnection procedures and agreements aimed at increasing flexibility in the generator interconnection process, including: (1) allowing generating facilities behind one-point of interconnection to co-locate, (2) revising the modification process to allow interconnection customers to request the addition of a generating facility to an existing interconnection request, (3) increasing the availability of surplus interconnection service, (4) allowing interconnection customers to propose operating assumptions for their generating facilities, and (5) requiring transmission providers to evaluate alternative transmission technologies when conducting a cluster study. SPP submitted its compliance filing in May 2024.

### 2023 Report Recommendations by Priority

#### High priority

|  |  |  |
| --- | --- | --- |
| Initiative | Description of Work Product | SIR / Aligned with: |
| EA1: Assess Evolving Energy and Resource Adequacy | * Complete all phases of the FERNS  study and implement outcomes in  planning studies. * Periodically update the FGSAG on  FERNS study milestones and  progress. | SIR: 365 / 0219.6/ 0219.4  (In Progress – Est Completion 12/2024) |
| EA2: Evaluate the Need for RTO Backstop Authority | * Receive update from REAL team on  Seasonal PRM policy. * Receive update from REAL team on  Performance-Based Accreditation policy. * Receive update from REAL team on  Resource Retention policy. * Receive update on Effective Load Carrying  Capability policy. * Determine the need for a backstop capacity  procurement authority, and if need exists,  draft policy in conjunction with appropriate  stakeholder groups. | NO sirs: Not Started |
| EA7: Enhance Risk Based Planning for Extreme Weather / Resource Diversity | * Determine the role that the FGSAG will have in implementing this recommendation. * Determine if FERC Orders 896 and 897,  EPRI Climate Readi Team, WWE Analysis,  SCRIPT O6 satisfy this recommendation. * Determine whether any remaining work  is necessary to satisfy this recommendation. | SIR: 220 / 208 (In Progress) |
| GS1: Assess Essential Reliability Services Necessary for Reliable Grid Operation | * Complete all phases of the FERNS  study and implement outcomes in planning studies. Educate FGSAG members on ERS/ORS  work as part of the HITT program. * Receive updates from the REAL team  work on the IRATF recommendations. * Determine what remaining work may be  needed to satisfy this recommendation  and take appropriate action. | SIR: 209.5 / 219.2 / 205 / 16  (In Progress) |
| GS5: Prepare for the Integration and Utilization of Storage and Hybrid Resources | * Complete all phases of the FERNS study  and implement outcomes in planning studies. * Assess how market storage  resources/energy storage resources  are performing in the Integrated Marketplace. * Determine whether any additional market  modifications are necessary to improve  their performance. * Improve how energy storage resources are  incorporated into transmission planning studies. * Develop a policy for long-duration storage  in the SPP footprint. | SIR: 187 / 189 / 191 / 192 / 193 / 195  (In Progress) |
| TR1: Expand Transmission Planning Scenarios | * Revisit and assess tools and assumptions of  reliability and economic studies. * Identify most important market drivers that  can impact the reliability and economic  metrics of the bulk power system. * Structure necessary number of scenarios  that can sufficiently determine the  transmission needs based on changes in  the market drivers. | SIR: 140 / 144 / 188  (In Progress) |
| TR6: Enhance Transmission Visibility and Control with Applicable Tools and Processes | * Develop metrics for visibility and control  of transmission infrastructure. * Assess current tools and methods. * Make necessary changes to improve  transmission visibility and control. | SIR: 11 / 62 (In Progress) |
| DR4: Establish Visibility for Distributed Energy Resources | * Determine ways that SPP can leverage  existing stakeholder groups or regulatory  authorities to access the DER information  in the distribution system. | SIR: 8 (Not Started) |
| DR5: Facilitate the Support of Dispatchable Load | * Study the potential size of the dispatchable  load in SPP region over short-term and  long-term. * Determine the requirements of utilizing dispatchable load in the region. * Report the necessary requirements for  support of dispatchable load to relevant  stakeholder groups. | SIR: 8 (Not Started) |
| DR6: Quantify the Benefits and Limits of Demand Response | * Study the potential size of demand  response in the SPP region. * Determine the planning and operational requirements of utilizing demand response  relative to its potential size. * Determine methods that can be used to  estimate the benefits relative to the  potential size of demand response. | SIR: 371 / 377 / 378 (Not Started) |
| DR7: Build Demand Response Enabling Infrastructure | * Study the potential size of demand response  in the SPP region. * Determine the planning and operational requirements of utilizing demand response  relative to its potential size. * Determine the required enabling  infrastructure relative to potential size of  demand response in the SPP region. | SIR: 377 / 378 (Not Started) |
| IC1: Transmission Expansion Coordination and Joint Action | * Continue participation in industry groups  focused on transmission expansion activities  and implement best practices in SPP processes. * Determine what enhancements can be added  to coordinated system planning studies/affected system planning studies. * Identify what additional studies may be  needed focused on the Western Interconnect. * Identify solutions to address transfer  capability issues. | SIR: 660 (Not Started) |
| IC4: Advocate for an Adequate Fuel Pipeline Infrastructure | * Complete all phases of the FERNS study  and determine next steps for  fuel pipeline advocacy. * Participate in the DOE fuel availability  study and determine impacts for  SPP region. * Receive update from REAL team on  fuel assurance efforts. | SIR: 205 / 208 (In Progress) |
| IC5: Participate and Collaborate with Standards Development | * Continue participation with NERC technical  groups focused on Inverter Based Resources  and implement outcomes in SPP processes. * Continue participation with NERC reliability standards drafting projects. | SIR: 208 / 209 (In Progress) |

#### Medium Priority

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| --- | --- | --- |
| **Initiative** | **Description of Work Product** | **SIR / Aligned with:** |
| **EA3: Enhance Interregional Resource Adequacy and Resiliency Coordination** | Publish document to stakeholder groups that either outlines coordinated outage planning methodology with neighboring regions or why C.O.P. is not possible. This document will reconcile feedback from EIPC, DOE NTPS, and ESIG Resiliency task force>  *Preceding Dependency: completion of Recommendation O6 from SCRIPT* | SIR:155 |
| **EA4: Address Aging Infrastructure and Changing Usage** | No new document will be developed. Instead we are making a recommendation for a change to the language in the ITP Manual. An RR will be developed following TWG approval. Develop position / policy document for members to engage at their jurisdictional level to understand how policies would account for aging infrastructure. Policy document to be developed through:   * Assessing the work of TWG’s Aging Infrastructure and determine if any portion can be included in consolidated planning process * Determination of the extent that the distribution system will be impacted by considerations for aging infrastructure * Determination of how the distribution system interrelates with the transmission system for obscure resources | SIR:152 |
| **EA6: Enhance Software Tools, Analysis, and Computational Capacity** | Develop gap analysis document detailing legacy software platforms currently in-use and their ability to scale to future needs and data computation  Suggest removal of “fully implement SCRIPT recommendations C1, C2 and S2.1” from this initiative – OR list these recommendations and their implementation as required predecessors.  A load forecasting team is being formed for 2025. | SIR: 189 / 208 / 209 / 368 |
| **GS2: Evaluate Mechanisms for Co-Located Loads** | Develop policy document to be used in preparation for policy discussions with state regulators through a defined group that addresses mechanisms for the interconnection of Co-located loads.  Part of the Load of the Future and to be worked alongside EA5 and TR7. |  |
| **GS3 (Now Action Item): Develop Performance Assessments of Resources to Provide Services** | Schedule education sessions for FGSAG members focused on:   * training ERS / ORS work as part of the HITT program * work related to ramp flexibility, fuel assurance, voltage inertia and frequency response   Target group: FGSAG members | <<Not a Roadmap Item>> |
| **GS4: (Now Action Item) Obtain ERS Through Market Products or Other Necessary Means** | Develop and provide to FGSAG members educational sessions covering   * Ramp flexibility * Fuel assurance * Voltage * Inertia * Frequency response | <<Not a Roadmap Item>> |
| **GS6: Enhance Behind-the-Meter Forecasting Capabilities** | Produce and deliver a report / position document focused on:   * An improved solar forecast for distributed energy resources * A point-of-view on how order 2222 will impact Behind-the-Meter resources as well as accreditation of Demand Response Resources. This POV should includes EPRI Climate Readi findings in development of SPP’s Behind-the-Meter solar forecast * Develop and publish a gap report of the DER planning efforts with mitigation recommendations for identified gaps * DEPENDENCIES / CONSIDERATIONS: SCRIPT Recommendation DQ4 * Part of the 2025 Load Forecasting effort | SIR: 158 |
| **TR2: Improve Coordination of Regional Transmission Planning and Member Resource Planning** | Develop gap report that utilizes necessary member information for regional transmission / member resource planning to identify and document current gaps in process. Present report to SPP. | SIR: 144 |
| **TR3: Identify and Assess Approaches to Increase Connectivity of the Eastern and Western Interconnections** | At the academic research stage. Planning a FERNS West study in 2025.  Document and provide a report that:   * Evaluates and identifies the technical / reliability needs for Eastern and Western interconnects connectivity * Assesses the economic needs and impacts of such connectivity * Determines a directional cost allocation approach for this connectivity |  |
| **TR5: Increase Leadership in Interregional and National Coordination** | Participation in annual summit for North American RTOs along with quarterly touchbases.  Develop and document an engagement strategy for policy advocacy that addresses:   * Technical, reliability and economic needs for more interregional and national transmission expansion * Identifies the most relevant authorities and organizations for more engagement | SIR: 169 / 170 |
| **DR1: Encourage Electrification** | Perform studies that evaluate different demand electrification scenarios in the region and determine underlying policies that can result in different levels of demand electrification. Provide reporting back from studies to educate LRE’s and regulatory authorities on demand electrification possibilities.  FERNS report in development and will be shared with Working Groups. | SIR: 8 |
| **DR2: Encourage, Integrate, and Use Electric Vehicle Charging** | Publish point-of-view document that utilizes the demand electrification study to determine and document demand electrification scenarios of the transportation industry. POV document must include a reasonable number of appropriate electrification scenarios. Falls under Load Forecasting Task Force. |  |
| **DR3: Plan for a Variable Pace of Customer Adoption** | Utilize demand electrification study of FERNS to develop a point-of-view document that details possible paths of customer adoptions. Falls under Load Forecasting Team studies and analysis. |  |
| **IC2: (Merged with IC3)** |  |  |
| **IC3: Encourage Innovation and Adoption of New Technologies (through evaluation of global best practices)** | Develop a process document that advocates for the development of beneficial grid technologies and advocate for adoption across the industry. Document should include a suggested method of capture and documentation of global best practices. |  |

#### Low Priority

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| **Initiative** | **Description of Work Product** | **SIR / Aligned With:** |
| **EA5: Mitigate the Risks of Stranded Costs for Unconventional Loads** | Empanel task force to develop and publish **Policy document** focused on unconventional loads that can be used for policy discussions with state regulators |  |
| **TR4: Promote Equitable Process for Siting Transmission Lines** | Develop and publish **Position document** focused on siting processes, known challenges to equitable siting processes, and action plan for policy maker engagement with a goal of eliminating or limiting identified roadblocks. |  |
| **TR7: Facilitate the Development of Microgrids** | **Develop Microgrid Requirements document** that includes:   * Microgrid definition * metrics of measurement for reliability and resiliency * identification of areas in SPP region that fit the definition * Required changes in transmission planning to enable enhancement within each microgrid * Transmission planning requirements and needs between microgrids |  |

1. “Grid-Enhancing Technologies: A Case Study on Ratepayer Impact”, US DOE report, Feb. 2022 [↑](#footnote-ref-2)
2. Undesired energy exchange between electrical and mechanical systems [↑](#footnote-ref-3)
3. https://www.ferc.gov/sites/default/files/2020-06/W3-1\_Ruiz\_et\_al.pdf [↑](#footnote-ref-4)
4. https://ieeexplore.ieee.org/document/10520486 [↑](#footnote-ref-5)
5. New Source Performance Standards: Greenhouse Gas Emissions From New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions From Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule. 89 Fed. Reg. 39798. [↑](#footnote-ref-6)
6. The CAA requires the EPA to base emissions limits on what the EPA determines is the best system of emission reductions (“BSER”). [↑](#footnote-ref-7)
7. Deese, Brian. “The Next Front in the War Against Climate Change.” *The Atlantic*, May 24, 2024. [↑](#footnote-ref-8)
8. Plumer, Brad. “Here’s Where Biden’s Climate Law is Working, and Where It’s Falling Short.” *The New York Times*, February 21, 2024. [↑](#footnote-ref-9)
9. *Id*. [↑](#footnote-ref-10)
10. *Id*. [↑](#footnote-ref-11)
11. Kaufmann, K. “Biden Double Down on Support for U.S. Solar Manufacturing.” *RTO Insider*, May 19, 2024, <https://www.rtoinsider.com/78849-biden-doubles-down-suport-us-solar-manufacturing/>. [↑](#footnote-ref-12)