



Southwest Power Pool

Economic Studies/Transmission Working Group Joint Meeting

October 23, 2018

Webex/Conference Call

• SUMMARY OF ACTIONS TAKEN •

1. Approved the ITP Siting Manual with revision to exclude the limit on renewables

Southwest Power Pool
ECONOMIC STUDIES/TRANSMISSION WORKING GROUP JOINT MEETING

October 23, 2018

WEBEX/CONFERENCE CALL

• MINUTES •

Agenda Item 1 – Administrative Items

Agenda Item 1a - Call to Order, Introductions

ESWG Chair Alan Myers (ITC) and TWG Vice-Chair Nathan McNeil (MIDW) called the meeting to order at 1:35 p.m., welcomed those in attendance, and asked for introductions.

There were 74 web conference participants, representing 12 of 17 ESWG members and 18 of 24 TWG members. (Attachment 1a – October 23, 2018 Attendance List)

Agenda Item 1b – Receipt of Proxies

Alan Myers and Nathan McNeil asked for any proxy statements; seven proxies were identified.

ESWG

- Gayle Nansel (WAPA) named Chris Colson (WAPA) as her proxy
- John Olsen (Evergy) named Derek Brown (Evergy) as his proxy

TWG

- Travis Hyde (OGE) named Steve Hardebeck (OGE) as his proxy
- John Knofczynski (EREC) named Matt Stoltz (Basin) as his proxy
- Dan Lenihan (OPPD) named Steve Hohman (OPPD) as his proxy
- Gayle Nansel (WAPA) named Josie Dagget (WAPA) as her proxy
- John Payne (KEPCo) named Shawn Geil (KEPCo) as his proxy

Agenda Item 1c – Review of Agenda

Alan Myers and Nathan McNeil presented the agenda for review and asked for any additions or corrections. (Attachment 1c – June 29, 2018 ESWG Agenda).

ESWG: Kurt Stradley (LES) made a motion; seconded by Natasha Henderson (GSEC) to approve the agenda. The motion was approved unanimously.

TWG: Alan Myers (ITCGP) made a motion; seconded by Matt McGee (AEP) to approve the agenda. The motion was approved unanimously.

Agenda Item 1d – Antitrust Reminder

Amber Greb (SPP) provided an antitrust reminder to the group.

Agenda Item 2 – Wolf Creek Issues

Kelsey Allen, SPP staff, reviewed a presentation (Attachment 2 – Wolf Creek Issues) with the groups pertaining to the issues around Wolf Creek for the 2018 ITPNT, as well as, what staff is proposing to do for this area in the 2019 ITP. Kelsey provided background information on the issues seen in the 2018 ITPNT and gave some details regarding the choice to utilize the Operating Guide as the solution to these issues. Kelsey then presented to the groups what analysis staff is proposing to perform for the 2019 ITP with Wolf Creek being a target area. He provided the groups with high-level details about the reliability, economic and stability analysis that would be performed. A question was asked about whether or not this



area was being proposed as a target due to the Operating Guide no longer being effective. Kelsey explained that it was not the main reason this was being proposed as a target area, he stated that during our early looks there were issues still being seen around Wolf Creek. Staff sees value in proposing this as a target area. Jody Holland, Gridliance High Plains, requested that the minutes reflect there is a functional op guide in the area, which has been on file for years, and he felt any transmission solution determined by this analysis should be a competitive project. It was explained that this area is experiencing issues in real-time and support of Wolf Creek as a target area was voiced by some on the call.

Agenda Item 3 – ITP Siting Manual (Approval Item)

Liz Gephardt, SPP staff, provided a presentation to the group on the Resource Siting Manual (Attachment 3 – ITP Resource Siting Manual_v2). She discussed what staff was proposing to include in the Resource Siting Manual to address the lesson learned in the 2019 ITP. There was a lot of discussion about the inclusion of a 1000MW cap on renewable resource capacity at a site. The recommendation brought to the group by SPP staff was revised to take out the additional language limiting renewable resources capacity at a site.

ESWG: Anita Sharma (AEP) made a motion to approve the revised recommendation; seconded by Tim Owens (NPPD). The motion was approved unanimously.

TWG: Derek Brown (WERE) made a motion to approve the revised recommendation; seconded by Matt McGee (AEP). The motion was approved unanimously.

Closing Items

There were no action items from the meeting.

The meeting was adjourned at 2:41 PM.

Respectfully Submitted,

Amber Greb

ESWG Secretary

Kirk Hall

TWG Secretary

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ECONOMIC STUDIES/TRANSMISSION WORKING GROUP JOINT MEETING

October 23rd, 2018

Conference Call

• A G E N D A •

1. Administrative Items
 - a. Call to Order, Introductions.....Alan Myers/Travis Hyde (5 minutes)
 - b. Receipt of ProxiesAmber Greb/Kirk Hall (1 minute)
 - c. Review of Agenda¹ Alan Myers/Travis Hyde (1 minute)
 - d. Antitrust ReminderAmber Greb/Kirk Hall (1 minute)
2. Wolf Creek Issues..... Kelsey Allen (60 minutes)
3. ITP Siting Manual¹ (Approval Item) Liz Gephardt (30 minutes)
4. Closing Items All (5 minutes)
 - a. Summary of Action Items (Amber Greb/Kirk Hall)

¹ Background Material Included

Antitrust: SPP strictly prohibits use of participation in SPP activities as a forum for engaging in practices or communications that violate the antitrust laws. Please avoid discussion of topics or behavior that would result in anti-competitive behavior, including but not limited to, agreements between or among competitors regarding prices, bid and offer practices, availability of service, product design, terms of sale, division of markets, allocation of customers or any other activity that might unreasonably restrain competition.



HELPING OUR MEMBERS WORK TOGETHER
TO KEEP THE LIGHTS ON... TODAY AND IN THE FUTURE.

Wolf Creek Evaluation

SPP Staff

Objective

- Recap TWG discussion
- Potential Analysis
 - Steady-State Reliability
 - Economic
 - Angular Stability
- Potential schedule and resource requirement

TWG Discussion

- **Wolf Creek 345/69 kV transformer identified as a need in the 2018 ITPNT**
 - SPP proposed use of the current operating guide requiring a reduction of the output of Wolf Creek as a competing solution to the replacement of the transformer (top new construction project)
 - Westar discussed increasing stability concerns at the plant and proposed a solution (new Wolf Creek – Emporia 345 kV line) expected to address those concerns
- **TWG voted to utilize the operating directive* rather than a transmission solution in the 2018 ITPNT, but to continue discussion on how to move forward with evaluating the issues around the plant**

*Alternative interim mitigation subsequently provided by Westar

Analysis: Steady-State Reliability

- Analysis will be conducted consistent with ITP Manual section 4.2 (Reliability Needs Assessment) to identify reliability criteria violations:
 - 4.2.1 (Base Reliability Model)
 - 4.2.2 (SPP BA Powerflow Model)
 - 4.2.5 (Violation Filtering)
 - 4.2.6 (Local Planning Criteria)
- 2019 ITP criteria violations likely to include
 - Wolf Creek 345/69 kV transformer overload
 - Butler – Altoona 138 kV overload
 - Wolf Creek 345 kV high voltage (LPC)

Analysis: Economic

- Analysis will be conducted consistent with ITP Manual section 4.1 (Economic Needs Assessment) to identify top congested flowgates
- 2019 ITP highly congested flowgates likely to include
 - Butler – Altoona 138 kV
 - Neosho – Riverton 161 kV

2019 ITP Target Area

- ITP Manual section 4.1.2 describes potential analysis of “target areas”, or areas of increased focus with additional analysis
- Potential Southeast Kansas Target Area for 2019 ITP
 - Previously stated stability concerns at Wolf Creek
 - Expected steady-state reliability violations
 - Expected economic congestion

Target Area Analysis: Economic

- Additional benefit may be quantified by
 - Adjusted Production Cost (APC) savings through adjustment or removal of the Wolf Creek angular stability transmission operating directive (TOD)
 - APC savings due to reduction of marginal energy losses
 - APC savings due to mitigation of transmission outages
 - Avoided reliability cost savings through replacement of a Base Reliability project with an economic project
 - NOTE: SPP staff investigating approach to apply this metric to all economic projects during portfolio optimization
- Wolf Creek TOD
 - Implement an approximation of the TOD in the economic model (transmission outages, Wolf Creek derate, and curtailment of Waverly wind farm)
 - Quantify the projected APC savings of lowering or removing the TOD derate requirement
 - Solutions expected to improve or mitigate angular stability issues will include this APC savings in addition to APC savings through relief of congested flowgates

Target Area Analysis: Stability

- **Conditions warranting analysis**
 - Project is expected to improve angular stability margins at Wolf Creek, and
 - Is included in the list of top projects addressing a steady-state reliability need, or
 - Is included in the list of top projects addressing economic congestion
- **Analysis will be conducted consistent with SPP's study process to meet the requirements of TPL-001-4 R4**
- **Models**
 - 2018 MDWG stability base and sensitivity cases
 - Potential: modified 2018 MDWG stability sensitivity case
 - Local area high wind dispatch
 - Local area transmission outages

Schedule and Resource Requirement

Task	Start Date	Completion Date	Required Hours
Develop Wolf Creek TOD implementation (Economic Model)	10/15/2018	1/7/2019	40
Develop stability models	1/1/2019	4/1/2019	40
Target Area Analysis (Economic/Reliability)	1/8/2019	5/14/2019	100
Identify candidate projects for stability analysis	4/24/2019	5/14/2019	8
Perform stability analysis on candidate projects	5/14/2019	6/14/2019	120

- SPP believes these tasks and required hours are already accounted for as a part of the additional analysis of a target area



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ITP Resource Siting Manual

ESWG/TWG

October 23, 2018



SouthwestPowerPool



SPPorg



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Objective

- Discuss potential solution to lesson learned in 2019 ITP
- Vet Resource Siting Manual

Background

- ITP Manual
 - States siting guidelines and prioritization are documented in the Resource Siting Manual
- Resource Siting Manual
 - ESWG and TWG co-own Resource Siting Manual
 - June 29, 2017 ESWG Meeting
 - Initial version approved
 - Action Item #185 initiated to complete Manual
 - July 26, 2018 ESWG Meeting
 - Direction to update Manual with 2019 ITP siting process

2019 ITP Lesson Learned

Background

- Large amounts of proxy generation at a single site could lessen confidence in the recommended portfolio in cases where some GI requests change in status and/or public announcements about generation projects are made

Proposed Solution

- Posting included additional language to address this item
 - General Siting Philosophy: “Limit renewable resource capacity to 1,000 MW at each site”
 - Site Prioritization by Technology: “The maximum amount of renewable capacity sited (including existing and projected) at any given site will be capped at 1,000 MW in order to minimize the impact to the ITP transmission plan in cases where GI queue requests change in status or via other attributes over the time that the study is conducted.”

Note: The highest existing renewable capacity at a single site in the 2019 ITP is 726 MW. The highest existing *and* resource plan renewable capacity at a single site in the 2019 ITP is 1066 MW.

Recommendation

SPP recommends the approval of the ITP Resource Siting Manual, without the additional language limiting renewable resource capacity at a site.

**INTEGRATED
TRANSMISSION PLAN
RESOURCE SITING
MANUAL**



REVISION HISTORY

Date	Author	Change Description
06/20/2017	SPP staff	Initial Creation
<u>10/4/2018</u>	<u>SPP Staff</u>	<u>Incorporation of approved siting methodology</u>

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Section 1: SITING PROCESS

Section 2: SECTION 1: INTRODUCTION

As part of the Integrated Transmission Plan (ITP) assessments, SPP staff, with feedback from stakeholders, will create resource expansion siting plans for each future to ensure public policy compliance and resource adequacy in long-range planning models. Both phases of the resource plan will identify necessary resource additions. These resources will be sited in order to meet study objectives in areas with appropriate potential pursuant to the guidelines established herein. The sites will be developed utilizing sites selected in previous studies, the generation interconnection (GI) queue, and sites developed by SPP staff and stakeholders using specific resource technology information. SPP staff will give stakeholders ample opportunities to provide feedback throughout the process and will directly engage stakeholders as needed to ensure that siting assumptions are reasonable. The siting effort will be conducted as a screening-level exercise to identify sites that generally comply with the criteria and will not be intended to provide or replace a fully-scoped power plant siting study. A physical spatial location and electrical point of interconnection (POI) for each new resource within the SPP region will be selected. The new resources will be spatially located within the SPP with the aid of the following:

- GI queue and studies
- Geographic information system (GIS) databases showing locations of transmission lines, natural gas pipelines, railroads, waterways, substations, and current land use
- Repositories of prior study sites and conceptual sites
- Stakeholder feedback and surveys
- Public Policy information
- Environmental maps and data
- NREL datasets, studies and information on renewable potential
- Load density maps
- Load pocket information and studies
- Historic congestion and energy prices
- Other data specific to each resource technology

The point of interconnection for new resources will be determined based on the following:

- GI queue and studies
- Scope and scale of generation leads
- Nearby substations with the best Available Transfer Capability (ATC)
- Transmission interconnection feasibility of existing substations
- New substation requirements to access existing transmission lines nearby
- Voltage level of interconnection
- Distribution interconnection feasibility for smaller sized renewable resources

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A priority-based approach to siting new resources will generally be used to provide a logical order to locating generation. The source of prospective new resource sites will be the GI queue, stakeholders, SPP staff, and publicly-available information. The prioritization and ranking criteria and siting results will generally follow guidelines documented in this Manual. However, this process may be changed from study to study to meet the study-specific objectives to best deal with evident risks and uncertainties presented by trapped generation potential, load pockets, bulk transfers, and other transmission limits of interest on a case-by-case basis. Any such changes will be vetted by the ESWG.

The final resource siting plan should result in a practical balance of resource additions across SPP in such a way that the study can investigate and solve transmission limitations to best benefit the region. The prioritization and ranking criteria is based on both objective and subjective information and approved by the ESWG.

DRAFT

SECTION 2: GENERAL SITING PHILOSOPHY

The siting philosophy for new resources will incorporate the following general guidelines:

- Understand study objectives and how best to select practical sites to enable a study's ability to assess transmission system limitations
- Avoid excessive concentration of generation in one unit, at one physical or electrical location, or in one area in order to maintain a balanced design of the electric system
 - Limit conventional resource capacity to 1,500 MW at each site
 - Limit renewable resource capacity to 1,000 MW at each site
- Recognize assumptions for proxy generation and generator outlet facilities (GOFs) can unintentionally mask critical transmission needs and can hinder the study's ability to assess transmission system limitations
- Site new jointly-owned resources in the pricing zone or state of operation of entities with the highest capacity need unless it hinders the study's ability to assess transmission system limitations or there is substantiating evidence to support otherwise, such as a limited amount of suitable sites or more attractive sites elsewhere
- Use transmission availability and resource deliverability to rank site alternatives and minimize GOF assumptions
- Maintain a reasonable balance of remaining renewable technical potential across SPP system
 - Consider areas of the system with insufficient transmission availability to prevent trapped generation potential

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SECTION 3:PROCESS FLOW

The siting process will generally adhere to the following steps:

- Update the site repositories with the latest power flow and GI queue information to account for actual resource development between planning cycles
- Post repositories and request applicable stakeholders to provide feedback and additional sites for consideration and supportive rationale
- Assess whether the site repositories include adequate and diverse amount of sites to fulfill the requirements of the resource plan and are representative of remaining technical renewable potential across SPP
- Develop additional conventional resource sites and conceptual solar and wind resource sites as needed
- Rank and select sites
- Post site prioritization and selections for review
- Make any necessary adjustments and repost for approval

Section 3: SECTION 4: SITE REPOSITORY

A site repository will be developed and maintained for each resource type to track sites, usage, suitability attributes, prioritization, and stakeholder feedback from study to study. The repository will be provided to stakeholders throughout the siting process for review to provide additional sites for consideration and targeted feedback. The repository will include sites from prior studies, the GI queue, and additional conceptual sites. Each site will be classified by technology type and include applicable qualitative and quantitative site suitability attributes and qualifications to rank and choose sites and build confidence in the siting plan. The repository will consider existing and retired generation sites, GI queue sites, and conceptual greenfield sites that will periodically be removed or adjusted to account for actual resource development.

The site repository could include ~~the following site-specific information, but is not limited to:~~

- Spatial ~~location of site (GPS or physical location)~~
- Electrical ~~location of site~~ (bus, bus kV, ~~and~~ bus name)
- ~~Site p~~ricing zone, state, nearest town, and county location
- ~~Amounts Capacity~~ and ~~dates~~ of expected generation retirements
- First-~~C~~ontingency ~~h~~incremental ~~T~~ransfer ~~C~~apability (FCITC) analysis results that prescreen generator outlet capability and/or deliverability of new resource to the SPP footprint
- GI queue number, ~~point of interconnection~~ POI, status, interconnection costs, and available capacities
- Stakeholder survey results
- Site classification such as brownfield, retired, or greenfield ~~sites~~
- ~~Data s~~ource ~~of site~~ (~~provided by GI queue, SPP staff, or SPP stakeholder, or publicly-available data~~)
- SPP staff and stakeholder prioritization ~~of site~~ and rationale
- Location in relation to modes of fuel transportation (railroad, navigable waterway, gas pipeline, etc.)
- Location in relation to ~~F~~requently ~~C~~onstrained ~~A~~reas (FCA), load pockets, load centers, and ~~historical~~ congestion
- Renewable resource capacity factors
- Fuel supply, substation interconnection, and air permitting feasibility
- Available land and feasibility of changes in land use

- Historical LMPs
- SPP staff and stakeholder feedback and comments
- Other items as needed to ensure sites have been properly vetted by SPP staff and stakeholders

DRAFT

Section 4: GENERAL SITING PHILOSOPHY

The siting philosophy for new resources will incorporate the following general guidelines:

- Understand study objectives and how best to select practical sites to enable a study's ability to assess transmission system limitations
- Avoid excessive concentration of generation in one unit, at one location, or in one area in order to maintain a balanced design of the electric system
- Recognize that assumptions for proxy generation and generator outlet facilities (GOF) assumptions can unintentionally mask critical transmission needs and can hinder the study's ability to assess transmission system limitations
- Site new jointly owned resources in the pricing zone or state of operation of entities with the highest capacity need unless it hinders the study's ability to assess transmission system limitations or there is substantiating evidence to support otherwise, such as a limited amount of suitable sites or more attractive sites elsewhere
- Use transmission availability and resource deliverability to rank site alternatives and minimize generator outlet facility assumptions
- Maintain a reasonable balance of remaining renewable technical potential across SPP system
 - Consider areas of the system with insufficient transmission availability to prevent from having trapped generation potential
- Limit siting of low cost resources near load centers
- Limit conventional site capacity to less than 1,500 MW

Section 5: GENERAL PRIORITIZATION AND RANKING

A priority based approach to siting new resources will generally be used to provide a logical order to locating generation. The prioritization will begin by ranking prospective new resource sites by data source and site category. The source of prospective new resource sites will be the GI queue, stakeholders, SPP staff, and publically available information. The prioritization and ranking criteria and siting results may be changed as needed from study to study to meet the specific objectives of each study to best deal with evident risks and uncertainties presented by trapped generation potential, load pockets, bulk transfers, and other transmission limits of interest on a case by case basis. The final resource siting plan should result in a practical balance of resource additions across SPP in such a way that the study can investigate and solve transmission limitations to best benefit the region. The prioritization and ranking criteria will be based on both objective and subjective information and approved by stakeholders.

5.1: GI Queue

Preference will be given to sites in the GI queue. The generators will be ranked according to their status. The GI queue prescreens obstacles such as transmission capacity availability, land availability, and customer interest due to incentives or opposition. Listed below are the statuses, ranked from high to low:

- Interconnection agreement (IA) fully executed/Commercial Operation. The Generator Interconnection Agreement (GIA) is executed and the project has achieved commercial operation.
- IA fully executed/Commercial Operation not fully on line. This is not a SPP GI Queue status. The GIA is executed and the project has achieved commercial operation for a portion of the requested capacity. Subsequent phases of the project may have a later operational date.
- IA fully executed/on schedule. The GIA is executed and the agreement milestones are being met.
- IA fully executed/on suspension. The GIA is executed however the GI customer has requested that facility construction work be suspended.
- IA pending. The facility study is completed for the GI request. SPP, the interconnection customer, and the transmission owner(s) (TOs) are negotiating and drafting the GIA.
- Facility Study Stage. The system impact study has completed for the GI request. The TOs are further studying the required facilities.
- Definitive Interconnection System Impact Study (DISIS)
- Preliminary Interconnection System Impact Study (PISIS)
- Withdrawn

GI customers and/or applicable TOs will be surveyed, as needed, to gather information regarding prospective generation in the GI queue. The objective of the survey will be to better understand the likelihood of a resource proceeding to full commercial operation and will aid in the prioritization. The GI queue site priority and ranking will be adjusted, as needed, to meet study objectives, prevent from having potential load pocket and trapped generation potential issues, and allow the study to assess transmission system limitations and transmission solutions that may have regional economic and reliability benefits. Other information such as IA milestone and market registration progress, historic average costs to interconnect, local incentives, local opposition, and historic congestion and energy prices may be used to adjust the rank of GI queue sites with equal or lower GI queue statuses. GI queue sites with less certain statuses will be given equal priority to sites provided by stakeholders, SPP staff, and publically available information considering site suitability qualities, impact to the system, market impact, or likelihood of commercial operation.

5.2: Renewables

The renewable GI queue sites will be ranked by queue status, capacity factor, survey results, and transmission interconnection cost. The GI queue sites will be selected from the ranked list, while maintaining a reasonable balance in remaining renewable technical potential across the SPP system. This may involve selecting conceptual renewable sites not in the GI queue or excluding any significant GOFs associated with sites needed to help maintain this balance. GOFs intentionally ignored may require additional criteria and analysis to allow the study to assess transmission system limitations and transmission solutions. The information, criteria, and methods used to maintain this balance will be discussed with the ESWG to determine the reasonableness of assumptions.

5.3: Site Categories

Each site will be categorized and additionally ranked as follows:

1. Existing **b**Brownfield sites
 - 1.1. With scheduled retirements
 - 1.2. With projected retirements
 - 1.3. Without retirements
2. Mothballed or **r**Retired **b**Brownfield sites
3. Greenfield sites
 - 3.1. Cancelled or postponed projects
 - 3.2. Conceptual projects

Existing brownfield sites include existing power plants in operation that are expandable and may have some or all units scheduled or projected for retirement. Retired/mothballed brownfield sites include power plants which have not been reused and could be recommissioned. Not all of these brownfield sites may be ideal for new capacity or differing technology. GIS information and stakeholder feedback will be used to help assess feasibility and prioritization of these sites. Generators needed for the study that would require a change in technology at brownfield sites will be given less priority than those where the technology would be the same. Greenfield sites are conceptual sites with no existing or planned development. Generators analyzed in the GI process at greenfield sites that were cancelled or postponed will be given more priority. The reasons why a project was cancelled will be investigated to determine the site's viability relative to other sites.

5.4: Transmission Availability

Transmission availability and resource deliverability will be used to rank sites and to limit generator outlet facility GOF assumptions. Generator outlet facility GOF assumptions can be avoided by either selecting another site of equal stature or changing the point of interconnection to one with greater available transfer capability. The siting process will include performing DC FCITC analysis as needed to

help develop conceptual sites, prescreen generator outlet facility GOF requirements, and prioritize sites.

5.5: Site Assignment

Conventional and renewable sites will be ranked by pricing zone, state, sub-region, and region. The sites will be assigned based on the origin of a need for a new resource and criteria that can be applied uniformly across SPP and adjusted as needed to meet study objectives. Resource needs are generally determined by pricing zone but may be determined geographically by state, sub-region, or region, or by utility type and size to mimic joint participation and ownership practices of smaller and larger utilities. Generation will be located in an entity's pricing zone or state(s) of operation. However, attractive sites in other areas can and will be used if they present a cost effective advantage to sites within the entity's zone or state(s) of operation or to balance new resource additions across SPP. This matching of need to site is performed with the goal of spreading out the best sites and meeting study objectives. The criteria and exceptions to assumed ownership and selection of sites will be discussed with the ESWG and directly impacted stakeholders to determine the reasonableness and impact of assumptions.

5.6: Load Pocket Analysis

A ranked list of load pockets will be developed and maintained using information from historic studies and system operation, load density maps, and stakeholders. Generation, load, and generation to load profile ratios of the top ranked load pockets will be reviewed as needed to ensure reasonable balances in generation and load¹. Criteria will be developed and approved by stakeholders to determine when not to site new generation near these load pockets. Both conventional and renewable resource additions and sites may be adjusted to prevent from having potential load pocket issues and allow the study to assess transmission solution alternatives. Adjustments may include but not limited to:

- Selecting a site remote from a load pocket over a site near a load pocket
- Excluding a new resource addition
- Changing the technology of a new resource addition near a load pocket
- Assuming less aggressive growth in renewable resource additions near a load pocket

These adjustments may require additional analysis to be scoped as part of the study such as comparing transmission solutions to new generation as a non-transmission solution. Careful consideration will be

¹ See Appendix 5.4: List of Studies with Identified Load Pockets and Load Density Map Example

given to a load pocket's real and reactive power requirements to identify any need for new generation to provide local voltage support.

5.7: Additional Expectations

Stakeholders and SPP staff will supply new generation sites for consideration along with site suitability information and ranking relative to other sites in the site repositories. A combination of brownfield and greenfield sites will be selected to ensure balance and diversity in site types and locations. Other quantitative and qualitative information such as expected costs, impact to the system, market impact, and likelihood of commercial operation will be considered in prioritizing and ranking sites. Information gathered from stakeholders will include, but is not limited to, preferred ranking and applicable site suitability qualities. Conventional site suitability should include information such as access to land, air permitting, cost effective fuel delivery and supplies, cooling water, substation interconnection feasibility, and site construction logistics to limit interruptions to current site operations.

Section 6: PROCESS FLOW

The siting process will generally adhere to the following steps:

- Update the site repositories with the latest power flow and GI queue information to account for actual resource development between planning cycles
- Post repositories and request applicable stakeholders to provide feedback and additional sites for consideration and supportive rationale
- Assess whether the site repositories include adequate and diverse amount of sites to fulfill the requirements of the resource plan and are representative of remaining technical renewable potential across SPP
- Develop conventional resource sites and conceptual solar and wind sites as needed
- Rank and select sites
- Post site prioritization and selections for review
- Make any necessary adjustments and repost for approval

Section 7: SECTION 5: GENERAL SITE SCREENING CRITERIA PRIORITIZATION BY TECHNOLOGY

Sites will generally be ranked by the following criteria for initial review by the ESWG. Stakeholder-requested exceptions to the results of these technology-specific rankings will be reviewed by the ESWG for potential inclusion to account for additional information not captured by this ranking.

Generator outlet capability will be considered at some point for each technology. Generator outlet capabilities of individual sites may be exceeded, but the goal in any case would be to minimize the number and size of GOFs required by the siting plan.

Although the primary types of resources added to the ITP assessments will be gas-fired conventional, wind, and solar; other types may be considered for future policy standards, technological advancements, or other drivers. If resources falling into categories outside of those discussed above are added through the ITP resource plan, coordination between SPP staff and stakeholders will drive where these resources are sited.

5.1: Utility-Scale Solar Photovoltaic

Due to a somewhat limited, but increasing quantity of solar PV sites requested in the SPP GI queue, the initial set of utility-scale solar sites to be considered will include (in order of preference) those from multiple site sources: the SPP GI queue, additional sites identified by stakeholders during the repository review, previous ITP sites, and other NREL conceptual sites. Utility-scale solar sites will initially be narrowed to those within the zone of majority ownership (as assigned in the resource expansion plan). If there are no sites within the zone or only sites with limited generator outlet capability, this list will be expanded to sites within zones adjacent to the zone with majority ownership. Within each site source, starting with the most preferred (as mentioned above), the sites with the highest capacity factors and generator outlet capabilities will be selected until the sites for the given source are exhausted. If a zone's resulting average capacity factor for projected solar is less than one standard deviation below the SPP average, sites with higher capacity factors in other zones may be considered.

The maximum amount of renewable capacity sited (including existing and projected) at any given site will be capped at 1,000 MW in order to minimize the impact to the ITP transmission plan in cases where GI queue requests change in status or via other attributes over the time that the study is conducted.

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5.2: Wind

Due to the large quantity of wind sites requested in the SPP GI queue, the initial set of wind sites to be considered are those requested in the queue that are not withdrawn, on suspension, or are past their active GIA commercial operation date. This set of sites will be ranked according to the most current network upgrade costs per MW of capacity requested; these assigned amounts would include consideration of potentially-directly assigned upgrades needed, unknown third-party system impacts, and the generator outlet capability and corresponding GOF(s) needed to accommodate the interconnection.

When the generator outlet capability of the requests with assigned costs are trending to values less than that of requests without costs yet assigned, these interconnection requests in DISIS/PISIS (ranked from highest generator outlet capability to the lowest) will be considered for wind siting. In addition to generator outlet capability, recurring issues and/or significant upgrades within GI groupings will be taken into consideration as they relate to requests in DISIS or PISIS study at the time.

The maximum amount of renewable capacity sited (including existing and projected) at any given site will be capped at 1,000 MW in order to minimize the impact to the ITP transmission plan in cases where GI queue requests change in status or via other attributes over the time that the study is conducted.

This wind ranking methodology was developed during a study where projected wind was generally assumed a non-firm energy resource without zonal ownership, thus this criteria does not consider siting within the zone of majority ownership.

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7.1: The following screening criteria will be used to identify potential sites for further ranking and vetting by SPP staff and applicable stakeholders. GIS software will be used to determine suitable locations by generator technology. The GIS software will include locations of gas pipelines, restricted areas such as federal and state class I lands, air quality non-attainment regions, and other geographic information needed to develop sites.

7.2: Natural Gas Fired Combined Cycle Screening Criteria:

7.3: Required criteria:

7.4: In close proximity to gas pipelines

7.5: Outside State, Federal Class I lands and air quality non-attainment region

7.6: Optional criteria:

7.7: In close proximity to major urban area and load centers with high load factors

7.8: In close proximity to a railroad, navigable waterway, or alternative fuel supply

7.9: In close proximity to a river or a lake

7.10: In close proximity to transmission and gas pipeline intersections

7.11: Natural Gas Fired Simple Cycle Screening Criteria:

7.12: Required Criteria:

7.13: In close proximity to gas pipelines

~~7.14: Outside State, Federal Class I lands and air quality non-attainment region~~

~~7.15: Optional Criteria:~~

~~7.16: In close proximity to major urban area and load centers~~

~~7.17: In close proximity to a railroad, navigable waterway, or alternative fuel supply~~

~~7.18: In close proximity to transmission and gas pipeline intersections~~

~~7.19: Base load Steam Coal or IGCC screening criteria:~~

~~7.20: Required Criteria:~~

~~7.21: In close proximity to a railroad or navigable waterway~~

~~7.22: In close proximity to a major river or lake~~

~~7.23: Outside State, Federal Class I lands, air quality non-attainment region, and major urban areas~~

~~7.24: Optional Criteria:~~

~~7.25: In close proximity to a mine~~

~~7.26: In close proximity to a gas pipeline~~

~~7.27: In close proximity to multiple railroad lines~~

~~7.28: Nuclear screening criteria:~~

~~7.29: Required Criteria:~~

~~7.30: Use existing nuclear sites~~

7.31: Use proposed nuclear sites

7.32: In close proximity to a major river or lake

5.3: Locate in geologically stable areas**Natural Gas-Fired Conventional**

Conventional sites will initially be narrowed to those within the zone of majority ownership (as assigned in the resource expansion plan). If there are no sites within the zone or only sites with limited generator outlet capability, this list will be expanded to sites within zones adjacent to the zone with majority ownership. Barring any restrictions in generator outlet capability, the ranking of sites will be based on any stakeholder rankings provided during the repository review. If there are limited or no rankings for the applicable zone(s), preference will then be given to retirement sites then previous ITP sites, within the sites' generator outlet capabilities.

Due to the increased NERC CIP-002-5.1 implications of interconnections totaling 1,500 MW or more of conventional generation, total conventional generation at a single site (including existing and projected) will be capped at this amount.

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Wind-screening criteria:

Required Criteria:

- Outside airports, State, Federal Class I Lands, and major urban areas
- Use required acres per MW
- Use geographic areas with higher than average/annual wind speeds
- Use remaining technical potential by pricing zone, state, sub-region, or region
- Use practical sizes per interconnection voltage

Optional Criteria:

- Use cleared land
- Use land higher in elevation relative to immediate surroundings
- Use local, state, and federal public policies
- Use other Federal Aviation Administration permitting criteria
- Use 230 kV and 345 kV buses for larger conceptual sites
- Use conceptual sites from NREL
-

Utility Scale Solar photovoltaic screening criteria:

Required Criteria:

- Outside State and Federal Class I Lands
- Use required acres of level land per MW
- Use geographic areas with higher than average/annual insolation or irradiance
- Use remaining technical potential by pricing zone, state, sub-region, or region
- Use practical sizes per interconnection voltage

Optional Criteria:

- Use cleared land
- Use 230 kV and 345 kV buses for larger conceptual sites
- Use conceptual sites from NREL

7.33: Optional Screening Criteria:

- Use applicable local, state, and federal public policies
- Use other applicable land use constraints
- Use applicable environmental constraints

Although the primary types of resources added to the ITP assessments will be conventional gas-fired, wind, and solar, other types may be considered for future policy standards, technological advancements, or other drivers. If resources falling into categories outside of those discussed above are added through the ITP resource plan, coordination between SPP staff and stakeholders will drive where these resources are sited.

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Section 8: SECTION 6: SITING FOR EXTERNAL REGIONS

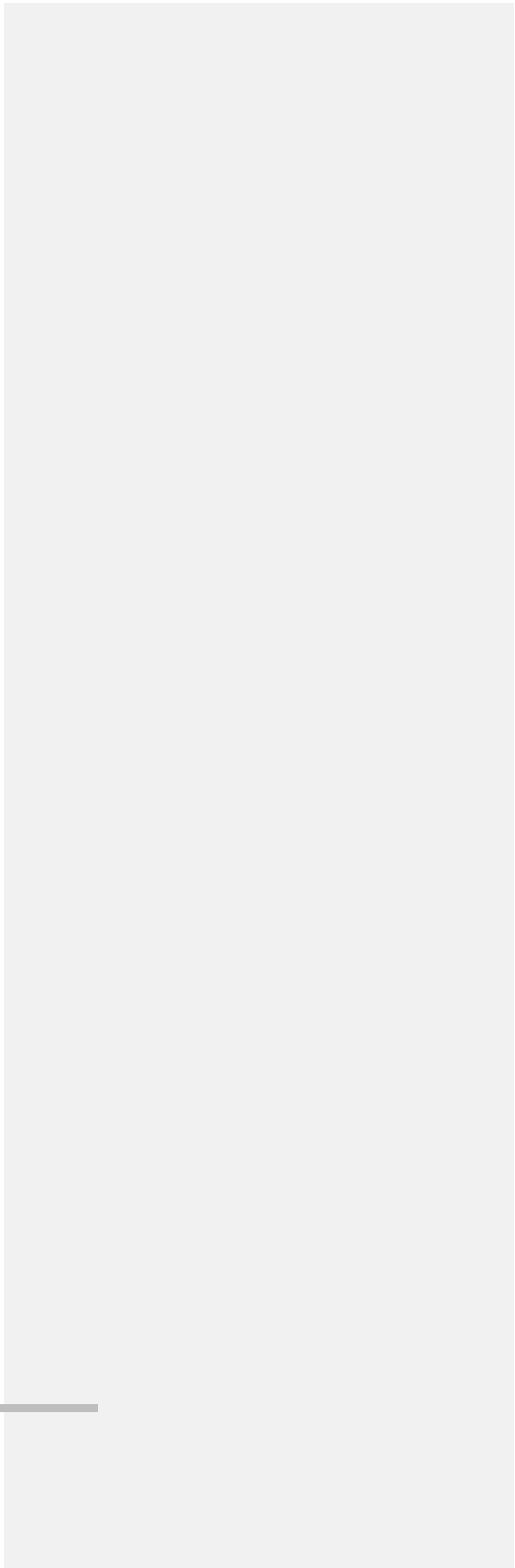
The resource siting plan for each of the modeled regions external to SPP will be based on the corresponding company's resource plan in their most current regional planning study, as available and appropriate. If this data is not available or appropriate, as determined by SPP and the ESWG stakeholders and SPP staff, the mix of conventional resource additions SPP will coordinate with the corresponding entity, be added to each external region as close as possible to closely resemble the same logic as those sited added through the SPP region's resource siting plan.

Publicly-known efforts to site future generation at particular locations would be the most reliable source for external siting information. For consistency across planning studies, locations utilized in other regional planning processes will also be considered.

If these sources do not result in sufficient siting information for resource plan generation, EHV buses near or at existing generation in the appropriate company's footprint will be used ; it is assumed that with the assumption that transmission capacity in these areas are sufficient for adequate power transfer without in-depth transfer analysis. For siting of resources in these external regions, the following priority will be used:

- Publicly available siting data from company integrated resource plans (IRPs),
- Locations utilized in other external regional processes, and
- EHV buses near other generation

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SECTION 7:SITE ATTRIBUTE BACKGROUND

The general prioritization of sites are based on varying site attributes, some of which are associated with additional data that may not be incorporated (whether fully or in part). For example, the load pocket analysis was considered for the current methodology, however, the trend of requests in the GI queue indicate generation developers are taking advantage of areas of the system that would likely be avoided as a result of the load pocket analysis documented in this section. Thus, the current process does not consider this, however, there could be value in this analysis if and when trends change in the future.

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This section documents background on the attributes leveraged in the approved methodology, as well as areas that may warrant consideration in future ITP studies. Any changes to the general prioritization of sites documented in this Manual will be vetted through the ESWG.

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7.1: GI Queue

The GI queue prescreens obstacles such as transmission capacity availability, land availability, and customer interest due to incentives or opposition. Listed below are the queue statuses, listed from those generally indicating the most to least mature:

- Interconnection Agreement (IA) Fully Executed/Commercial Operation – The Generator Interconnection Agreement (GIA) is executed and the project has achieved commercial operation. In terms of this siting process, this status indicates the generator is operating at its requested capacity.
- IA Fully Executed/Commercial Operation Not Fully On-Line – This is not an official SPP GI queue status. The GIA is executed and the project has achieved commercial operation for a portion of the requested capacity. Subsequent phases of the project may have a later operational date.
- IA Fully Executed/On-Schedule – The GIA is executed and the agreement milestones are being met.
- IA Fully Executed/On-Suspension – The GIA is executed; however, the GI customer has requested that facility construction work be suspended.
- IA Pending – The facility study is completed for the GI request. SPP, the interconnection customer, and the transmission owner(s) (TOs) are negotiating and drafting the GIA.
- Facility Study Stage – The system impact study has been completed for the GI request. The TOs are further studying the required facilities.
- Definitive Interconnection System Impact Study (DISIS)
- Preliminary Interconnection System Impact Study (PISIS)

- Withdrawn

GI customers and/or applicable TOs will be surveyed, as needed, to gather information regarding prospective generation in the GI queue in order to better understand the likelihood of a resource proceeding to full commercial operation and aid in the prioritization.

7.2: Site Development Categories

Each site's development will be categorized as follows:

1. Existing brownfield sites
 - 1.1. With scheduled retirements
 - 1.2. With projected retirements
 - 1.3. Without retirements
2. Mothballed or retired brownfield sites
3. Greenfield sites
 - 3.1. Cancelled or postponed projects
 - 3.2. Conceptual projects

Existing brownfield sites include existing power plants in operation that are expandable and may have some or all units scheduled or projected for retirement. Retired/mothballed brownfield sites include power plants which have not been reused and could be recommissioned. Not all of these brownfield sites may be ideal for new capacity or differing technology. GIS information and stakeholder feedback will be used to help assess feasibility and prioritization of these sites. Generators needed for the study that would require a change in technology at brownfield sites will be given less priority than those where the technology would be the same. Greenfield sites are conceptual sites with no existing or planned development. Generators analyzed in the GI process at greenfield sites that were cancelled or postponed will be given more priority. The reasons why a project was cancelled will be investigated to determine the site's viability relative to other sites.

7.3: Generator Outlet Capability

Generator outlet capability will be used to rank sites and to limit GOF assumptions. GOF assumptions can be avoided by either selecting another site of equal status or changing the POI to one with greater available transfer capability. The siting process will include performing DC FCITC analysis as needed to help develop conceptual sites, prescreen GOF requirements, and prioritize sites.

7.4: Site Assignment

Conventional and renewable sites could be ranked by pricing zone, state, sub-region, and region. The sites will be assigned based on the origin of a need for a new resource and criteria that can be applied uniformly across SPP and adjusted as needed to meet study objectives. Resource needs are generally

determined by pricing zone, and generation will be located in an entity's pricing zone or state(s) of operation. However, attractive sites in other areas can and will be used if they present a cost effective advantage to sites within the entity's zone or state(s) of operation or to balance new resource additions across SPP. This matching of need to site is performed with the goal of spreading out the best sites and meeting study objectives. The criteria and exceptions to assumed ownership and selection of sites will be discussed with the ESWG and directly impacted stakeholders to determine the reasonableness and impact of assumptions.

7.5: Load Pocket Analysis

A ranked list of load pockets will be developed and maintained using information from historical studies and system operation, load density maps, and stakeholders. Generation, load, and generation to load profile ratios of the top ranked load pockets will be reviewed as needed to ensure reasonable balances in generation and load. Criteria will be developed and approved by stakeholders to determine when not to site new generation near these load pockets. Both conventional and renewable resource additions and sites may be adjusted to prevent from having potential load pocket issues and allow the study to assess transmission solution alternatives. Adjustments may include but not limited to:

- Selecting a site remote from a load pocket over a site near a load pocket
- Excluding a new resource addition
- Changing the technology of a new resource addition near a load pocket
- Assuming less aggressive growth in renewable resource additions near a load pocket

These adjustments may require additional analysis to be scoped as part of the study such as comparing transmission solutions to new generation as a non-transmission solution. Careful consideration will be given to a load pocket's real and reactive power requirements to identify any need for new generation to provide local voltage support.

7.6: Additional Considerations

Stakeholders and SPP staff will supply new generation sites for consideration along with site suitability information and ranking relative to other sites in the site repositories. A combination of brownfield and greenfield sites will be selected to ensure balance and diversity in site types and locations. Other quantitative and qualitative information such as expected costs, impact to the system, market impact, and likelihood of commercial operation will be considered in prioritizing and ranking sites. Information gathered from stakeholders will include, but is not limited to, preferred ranking and applicable site suitability qualities. Conventional site suitability should include information such as access to land, air permitting, cost effective fuel delivery and supplies, cooling water, substation interconnection feasibility, and site construction logistics to limit interruptions to current site operations.

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