

2023 ITP Needs Assessment Posting Information

As part of the Integrated Transmission Planning (ITP) assessment, SPP conducts economic, reliability, public policy, short circuit, and operational needs assessments, as detailed in section 4 of the [ITP Manual](#), which results in a comprehensive list of needs being posted for SPP stakeholders.

DPP Submittal Form Updates

The Detailed Project Proposal (DPP) Submittal form has been updated for 2023. There were no field changes for the 2023 DPP submittal form. The updates were only for study year and references to software versions.

SPP Submittal Form Changes:

- ITP Study Year 2022 - updated to 2023
- PSS[®]E version 34.7 IDEV - updated to 34.8.2 IDEV
- PROMOD version 11.5 XML reference
- Interface Rating Changes on the section 4 tab are not applicable to the 2023 ITP

Instructions Changes:

- Updated the [SPP Request Management System \(RMS\)](#) instructions to use the new RMS template

SPP uses automation to complete a data verification process and identify situations in which the DPP contains errors associated with the application of files. This process is unable to ensure the correct format/syntax was used. There is a possibility that data using incorrect format/syntax passes through the verification process without producing an error. This may result in the IDEV file not being applied in the way the submitter intended. The risk of improper application resides with the submitter. SPP recommends that PSS[®]E IDEV files be submitted using commands or syntax in the recommended versions to avoid the risk of improper application of desired solutions.

For the 2023 ITP Assessment, the following versions were used and are the recommended version for any data supplied to SPP in support of a submitter's DPP:

- PSS[®]E: Version 34.8.2

2023 ITP Needs Assessment

SPP Evaluation of Model Changes Not Included in the Approved Model Set

SPP staff will evaluate the impacts of model changes submitted during the 2023 ITP DPP window, as appropriate. As noted in the DPP form, please check the box if your submittal

includes a model correction. This includes model corrections submitted after the models were approved by either the TWG or ESWG, known Notification to Construct (NTC) projects not included in the approved model set, and modeled NTCs that have been withdrawn or that will be withdrawn during the development of transmission portfolios.

- No changes will be made to the current base models to capture the impacts of model changes during initial project screening, specifically:
 - Model corrections should be submitted independent from solution submittals
 - Provide cross-references between model corrections and solution submittals, as needed
 - Defined needs will be based on the current approved models
 - All solutions will be screened against the approved reliability models without consideration of model changes
 - The impacts of all model changes will be captured and considered in development of the transmission portfolio
 - No new needs will be identified due to the impact of any model changes; any new violations will be assessed in future studies
 - Model corrections will be evaluated to determine the impact on posted transmission needs and either utilized to invalidate system needs or as solutions in development of the transmission portfolio(s)
 - Current NTCs not already modeled will be evaluated and utilized as potential solutions to transmission needs; this is not to be considered a re-evaluation of those existing NTCs

Economic Event File Update

During the 2023 Economic Needs Assessment, SPP identified an error in the event file based upon SPP's approved constraint assessment milestone. The Red Willow to Mingo 345 kV base case constraint had limits reflecting flow in the opposite direction.

Alternate Event File for Assessing Persistent Economic Operational Needs

SPP has posted a second event file that includes the addition of four persistent economic needs. The constraint assessment milestone did not identify these as economic constraints for inclusion in the 2023 ITP MEM event files. SPP will make a recommendation to the ESWG during their March 1, 2023, meeting to utilize this alternate event file for analyzing solutions submitted to address persistent economic operational needs not identified in the approved 2023 Constraint Assessment. The recommendation is consistent with section 3 of the approved [2023 ITP Scope](#), which says SPP will make a recommendation whether to address unresolved persistent economic operational congestion. This will allow SPP the opportunity to pursue solutions for these operational needs in the 2023 ITP assessment. These persistent economic needs are as follows:

- Benton to Wichita for the loss of the Wolf Creek Generating Station
- Viola 345/138 kV transformer for the loss of Wichita to Viola 345 kV
- Northwest 345/138 kV transformer #1 for the loss of Northwest 345/138 kV transformer #2
- County Line to Tecumseh Hill 115 kV for the loss of Sibley to Overton 345 kV

Short Circuit Needs

The 2023 ITP will evaluate the system and develop solutions to address short circuit needs. Short circuit needs are reliability needs identified when maximum available fault current exceeds the respective equipment fault-interrupting duty capability.

Local Planning Criteria violations

The ITP studies include local planning criteria to monitor facilities at a more stringent voltage criteria as well as implement local planning requirements. Attachment O, section II.5 of the SPP Tariff requires that SPP TOs provide their local planning criteria to the Transmission Provider at least once a year, by April 1, in order for Zonal Reliability Upgrades to be assessed and included in the SPP Transmission Expansion Plan. The local planning criteria potential violations have been included in the Needs Assessment posting, and are demarcated as Local Planning Criteria

Violations via the “Local Planning Criteria Violations” column in the applicable worksheets of the *2023 ITP Needs Assessment.xlsx* workbook.¹

Informational Needs

Various needs have been included for informational purposes only. Please refer to the “Overview” and “Legend” tabs of the *2023 ITP Needs Assessment.xlsx* workbook for identification and additional description of these needs.

Seams Consideration(s)

Seams evaluation in the ITP assessment will be performed according to details in the [ITP Manual](#), sections 5.3.1 and 5.3.2. Economic projects interconnecting SPP with a non-SPP TO or with an APC benefit to a neighboring entity of at least 20% of total benefit will be evaluated as a seams project. Economic projects meeting this criteria will be evaluated with at least 20% of the cost applicable to the neighboring entity. As solution development moves forward, SPP staff will coordinate with the applicable neighboring entity to determine a more accurate level of cost sharing for any potential reliability and economic seams projects.

To satisfy the requirement for a 2023 MISO-SPP Coordinated System Plan (CSP) study, as well as progress on initiatives related to the SPP Planning Roadmap, MISO and SPP are developing a Targeted Market Efficiencies Projects (TMEPs) study and will conduct the first study during the 2023 calendar year in lieu of the traditional CSP. SPP and AECI will also coordinate to complete the 2023 SPP-AECI Joint Coordinated System Plan (JCSP).

2023 ITP Staff Solution Development

SPP staff intends to create solution versions of top-performing DPPs based upon Minimum Design Standard Ratings. This removes bias introduced by various submitters utilizing different DPP ratings and impedances while being screened with the same conceptual cost estimate (*e.g.*, 3000 amps vs. 4000 amps). Staff will generally prefer minimum design characteristics unless a measureable increase in benefit is expected for a solution with a rating higher than minimum design standards. In these cases, staff may request a study level cost estimate for both sets of design characteristics for a better evaluation to ensure the best project is selected.

- Existing Facilities
 - Determine most limiting element in series and develop staff solution to address most limiting elements. For example, if line conductor is most limiting then staff solution may either:
 - Achieve minimum amperage

¹ Zonal Reliability Upgrades resolving Local Planning Criteria violations do not fall under the definition of a Competitive Upgrade as defined in Attachment Y, section I.

- If existing line is already at minimum amperage, then use next minimum amperage (1200 -> 2000 amp 138 kV, 161 kV, and 230 kV)
- New Facilities
 - Develop staff solutions to supplement DPPs as needed
 - Develop staff solution versions of top performing DPPs using minimum emergency rating amperages and typical impedances as needed to evaluate solutions on consistent basis. For example, a staff solution using minimum amperages and typical impedances with same new line terminations as DPP.

SPP Staff Standard Impedance Solution Development Information

Standard impedance information is being provided in order to improve stakeholder transparency and consistency in the data utilized by SPP staff. This data is utilized for solution development work performed during SPP’s ITP Solution Development and Evaluation and Portfolio Development processes outlined in the ITP Manual.

Data used for SPP staff solutions:

- Emergency Rating Amperage from Minimum Transmission Design Standards for Competitive Upgrades by kV level
- Impedances from previous version of SPP MDAG Manual by kV level

Facility Ratings²

The minimum amperage capability of phase conductors shall meet or exceed the values shown below, unless otherwise specified by SPP. If otherwise specified by SPP, the SPP value shall govern. The amperage values shown in the table shall be considered to be associated with emergency operating conditions.

The emergency rating is the amperage the circuit can carry for the time sufficient for adjustment of transfer schedules, generation dispatch, or line switching in an orderly manner with acceptable loss of life to the circuit involved. Conductors shall be selected such that they will lose no more than 10 percent of their original strength due to anticipated periodic operation above the normal rating.

Voltage (kV)	Emergency Rating (Amps)
100 - 200	1,200

² [Minimum Transmission Design Standards for Competitive Upgrades, Rev.2 012617](#)

Voltage (kV)	Emergency Rating (Amps)
230	1,200
345	3,000
500	3,000
765	4,000

The conversion from conductor ampacity to conductor temperature shall be based on [SPP Planning Criteria](#), section 7.2.; however, any subsequent request for proposal (RFP) would specify the design wind speed and direction.

Data used for SPP ITP Staff Solutions

Typical Branch Impedance Table						
kV	R/mi	X/mi	B/mi	Amps	MVA	X/R
69	0.0054	0.0143	0.0003	600	71	2.6
115	0.00064	0.005	0.00084	1200	239	7.8
138	0.00045	0.0038	0.0012	1200	286	8.4
161	0.0002	0.0019	0.0022	2000	557	9.5
230	0.0001	0.001	0.004	2000	796	10
345	0.00004	0.00048	0.0091	3000	1792	12
500	0.00002	0.00026	0.017	3000	2598	13
765	0.000004	0.000084	0.051015	4000	5300	21

SPP will use the same impedance per kV for higher amperage line.

Typical Transformer Impedance Table				
kV	R	X	Rate A	Rate B
765/345	0.00006	0.00799	2877	3174
345/230	0.00082	0.0307	675	675
345/161	0.00022	0.03009	400	440
345/138	0.00052	0.00485	493	493
345/115	0.00078	0.00685	435	435
230/138	0.00109	0.07741	168	193
230/115	0.00028	0.05181	280	308
161/138	0.00032	0.01983	150	165

Typical Transformer Impedance Table				
kV	R	X	Rate A	Rate B
161/115	0.0005	0.00616	168	185
138/115	0.00052	0.00124	200	250
500/115	0.0002	0.03	600	600
500/230	0.0002	0.03	600	600
500/345	0.0002	0.03	600	600
138/69	0.00052	0.00124	200	250
115/69	0.004458	0.143531	84	96

SPP will use same impedance per kV for larger or smaller transformers.

Conceptual Cost Estimates

SPP calculates its own conceptual cost estimates as part of the DPP validation efforts. This provides each solution with a +100/-50% cost estimate utilized for the solution screening process. These cost estimates are based upon historical projects directed by SPP and completed by its members. The data is not available at a level of granularity that allows for conceptual cost estimates to differentiate electrically similar solutions with a significant differences in ratings, therefore staff is likely to prefer a project with a lower rating over a project with a larger rating unless the project with a larger rating performs significantly better overall than the lower rated project.