SPP-MISO 2024-25 Coordinated System Plan Study Report

DRAFT – March 2026

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Executive Summary

Purpose | This report documents the completed analyses and findings from the SPP-MISO 2024–25 CSP Study, conducted to identify interregional transmission solutions that improve reliability, increase transfer capability, and reduce congestion along the southern seam (OK, AR, TX, LA).

Approach | The RTOs developed blended 10- and 15-year reliability and economic models and executed steady-state reliability (N-1) analysis, bi-directional transfer capability studies across seasonal models, and economic congestion analysis.

Key Findings | The study results indicate meaningful opportunities to strengthen interregional transmission in the focus area. The study's reliability, economic, and transfer analyses highlight the following key findings.

> ***Reliability |*** The study identifies thermal overloads along the seam and near new load growth centers in both RTOs. Steady-state analysis shows the potential for interregional projects to alleviate persistent tie-line issues and limitations around Arkansas Nuclear One and creates the opportunity for further expansion in regional planning processes.
>
> ***Economic |*** Congestion patterns intensify over time, driven by a handful of high-impact flowgates, including Harrison – Omaha, Morrilton – Gleason, Dardanelle Dam – Clarksville, and Patmos West – Fulton. Several constraints show higher shadow prices and increased binding hours in 2039, signaling growing economic inefficiency if unaddressed.
>
> ***Transfer Capability |*** Transfer analyses reveal that bi-directional flows across the southern seam are consistently constrained by a small set of limiting high-voltage elements, such as Arkansas Nuclear One – Fort Smith 500kV and Diana – Southwest Shreveport 345kV. These constraints suppress import and export capability in all seasons and persist across both the 10- and 15-year models.

Solution Evaluation | In total, 70 solution proposals were considered for the CSP study: 46 stakeholder solutions were submitted, and 24 alternative solutions were proposed. Based on initial results, three key corridors were identified within the study focus area in need of transmission support to address load growth and generation additions:

- **Area A:** Norther Arkansas – Oklahoma
- **Area B:** Texarkana / Southwest Arkansas
- **Area C:** Northwest Louisiana

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Recommendations | The CSP study resulted in two potential transmission combinations identified by MISO and SPP for the study focus area (Section 8). Utilizing reliability, economic, and transfer capability screening criteria, both combinations show positive outcomes for both RTOs. In summary, the Core+ combination has a higher-cost portfolio ($3.6B) that fixes more MISO and tie-line reliability issues and delivers the greatest 2034 congestion relief particularly in SPP, while providing moderate import capability gains. The Core combination has a lower-cost portfolio ($1.3B) that emphasizes import capability (particularly into MISO), resolves fewer MISO/tie-line issues but more in SPP, and delivers lower congestion relief than Core+.

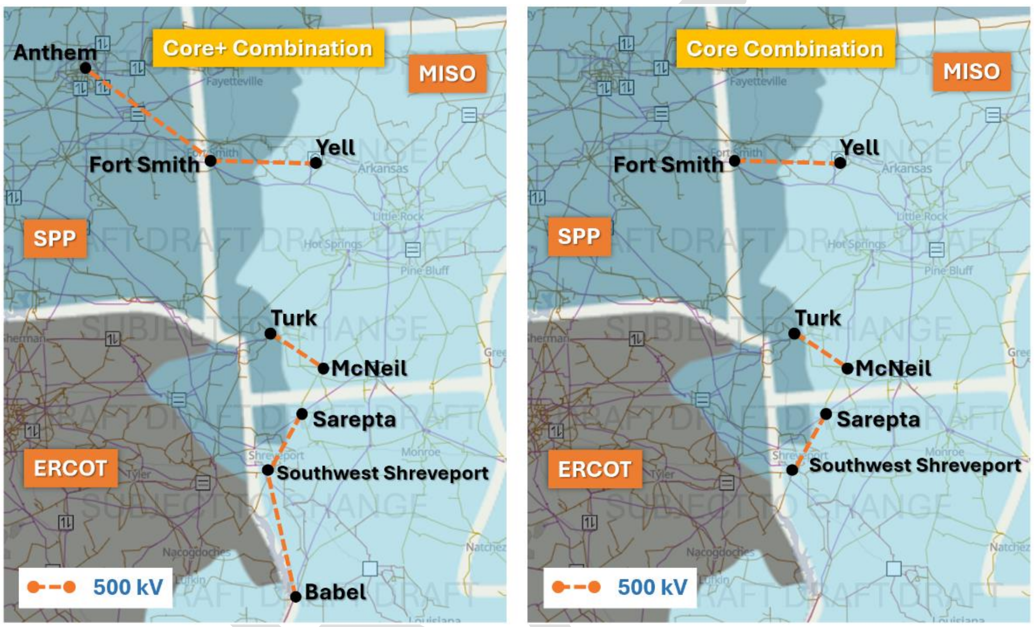

Figure 1: MISO & SPP Recommended Combination Projects for Further Benefit Evaluation

Next Steps | MISO and SPP are requesting feedback from stakeholders on these two combinations as RTOs evaluate solution justification and necessary next steps (Section 4.5). As needed, RTOs will pursue JOA/Tariff enhancements for interregional cost allocation (Section 4.6) and seek solution endorsement at the MISO-SPP Interregional Planning Stakeholder Advisory Committee (IPSAC), as well as approvals at SPP's Markets and Operations Policy Committee (MOPC), MISO's Planning Advisory Committee (PAC), and both RTO Boards.

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Revision History

Date	Author	Change Description
3/6/26	SPP & MISO Staff	First draft final report

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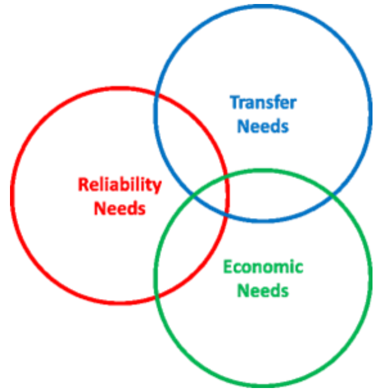
1 Overview

This report presents the completed work, analyses, and findings for the SPP-MISO 2024-25 Coordinated System Plan (CSP) Study. As required by the SPP-MISO Joint Operating Agreement, a CSP study is performed every two years. Following stakeholder input through the IPSAC (February 22, 2024) and JPC discussions (March – August 2024), the JPC pursued a CSP focused on reliability, economics, and interregional transfer capability. Analyses were conducted throughout 2025; results, recommendations, and implementation steps are consolidated herein.



2 Purpose of Study

The RTOs aimed to identify interregional transmission enhancements that mitigate constraints, improve reliability, and increase transfer capability. This study informs a robust, future-ready grid and supports long-term planning expectations under FERC Order 1920. Solutions may be advanced once benefit metrics are applied and solution justification is determined.

Specific objectives:

- Develop blended future study models reflecting both RTO assumptions.
- Identify top transmission issues along the southern seam.
- Propose solutions that reduce congestion, increase transfer capability, and improve reliability/resilience while balancing investment in each RTO.

3 Drivers

The 2024 IPSAC Annual Issues Review[1] cataloged stakeholder priorities highlighting an urgent need for robust interregional transmission on the MISO-SPP seam and flexible cost-sharing. Each RTO's planning cycles and resource availability informed the study scope, sequencing, and timelines.

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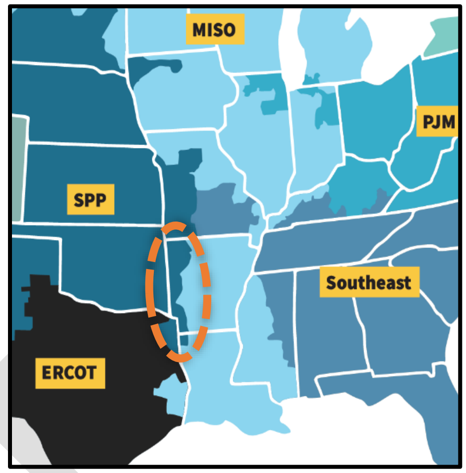
[1] February 22, 2024 MISO-SPP Annual Issues Review IPSAC Meeting

4 Scope



4.1 Study Area:

The study monitors the Eastern Interconnection and focuses on the southern seam of MISO and SPP encompassing Oklahoma, Arkansas, Texas, and Louisiana.

4.2 Methodology

The study performed reliability, transfer capability, and economic analyses.

4.3 Transmission Planning Models

Blended 10- and 15-year models were built on the latest reliability/economic planning cases, including forward-looking assumptions (generation expansion, large loads). As new regional upgrades were approved, blended models were updated (ITP25, MTEP25 portfolios ≥230 kV; ERAS units; GIAs; large load EPRs through Nov 1, 2025). Updates were applied first to transmission topology (Dec 2025) and then to generation and load (Jan 2026) across reliability and economic models. Generation dispatch reflected in MTEP and ITP cases is derived from a regional tiered merit order list.

4.3.1 Reliability Models

Blended Reliability Model: Combines SPP's 2025 ITP base reliability models and MISO LRTP F2A core models at the seam, with recently approved facilities and reasonable future generation/load assumptions to maintain alignment.

Extreme Cold Weather Event Models: Winter Storm Uri-like stress adapted to the 2034 blended winter model (MISO) and SPP resiliency power flow models (2025 ITP) used to evaluate performance under severe conditions.

4.3.2 Economic Models

Blended Economic Model: Combines SPP's 2025 ITP market models (two futures by study year) and MISO Series 1A Future 2A assumptions, updated with MTEP25 transmission.

4.4 Analysis

4.4.1 Reliability Analysis

Steady-state N-1 analysis identified thermal violations using a consolidated contingency set relevant to the seam. Loadings >100% in base and post-contingent scenarios were reported. Select NERC TPL single-event contingency category P1, P2, and P7 were applied for the analysis. The study uses PSS/E and TARA tools for analysis.

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4.4.2 Transfer Analysis

Transfer capability analysis identifies weaknesses and limiting facilities that could impact the bulk electric system's ability to reliably transfer energy between MISO and SPP in the future transmission planning horizon. Bi-directional transfers were evaluated using 10-year-out (2034) and 15-year-out (2039) seasonal models (Winter, Summer, Light Load) across:

- MISO South ↔ SPP South (AR, OK, LA, TX)
- MISO LRZ 8 ↔ SPP AR/OK
- MISO LRZ 9 ↔ SPP LA/TX

The study uses TARA and PSS/E power system analysis tools. TARA performs transfer simulations using proportional generator scaling; with nuclear/renewables/storage excluded from the scaling process. N-1 contingencies (NERC category P1, P2, P7) are applied to assess transfer capability. The scenarios identified limiting transmission elements and are used to rank transfer capabilities.

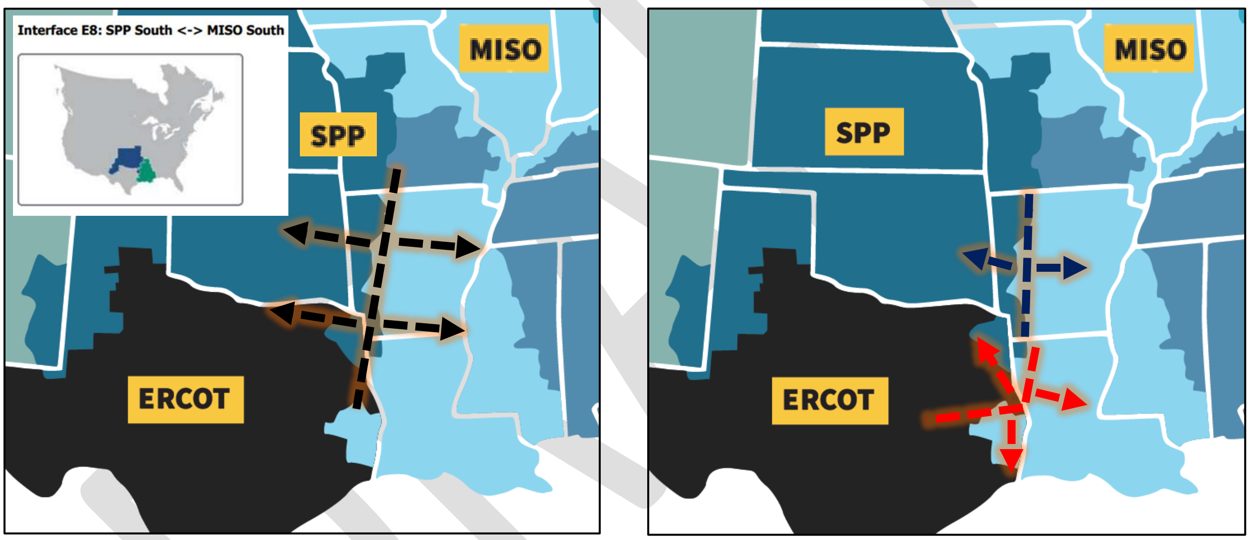

Figure 2: Transfer scenarios

4.4.3 Economic Analysis

Blended and native economic models were used to evaluate congestion within the focus area. Solutions prioritized highest-congestion facilities.

4.4.4 Extreme Cold Weather Event Reliability Analysis

Supplemental cases highlighted solution performance under stressed conditions (high transfers, elevated loads, generation derates).

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4.4.5 Screening Metrics

This section outlines the quantitative metrics used to perform an initial screening of potential interregional transmission solutions. These metrics help identify which proposals resolve issues (reliability, transfer capability, and congestion) in the study area and are likely to deliver meaningful benefits.

Across all metrics, the goal is the same: compare a base case to a change case to understand how each proposal affects system performance on the MISO-SPP seam.

The screening metrics fall into three categories:

- **Transfer Capability** (average import capability change) – This metric measures the change in import capability for each RTO averaged across seasons. The approach is to first determine incremental transfer limit MW in the base case and the new first limit MW in the change case. Contingencies considered are NERC P0 and P1.
  - **Calculation:** Change case MW – Base case MW = Δ Avg. Import Capability
- **Reliability** (net issues resolved) – This metric quantifies the net change in the count of thermal loading issues in steady-state power flow analysis. It is calculated as the difference between the number of resolved reliability issues (mon./con. pairs) and the number of newly introduced reliability issues when comparing the change case to the base case. Transmission elements with loading greater than 100% are counted as issues.
  - **Calculation:** # resolved reliability issues – # newly introduced reliability issues when comparing the change case to the base case
- **Economic** (congestion relief) – This metric measures the change in total congestion measure within the study focus area summarized by RTO.
  - **Congestion Relief Calculation** (for each RTO): Base Case Total Congestion Measure – Change Case Total Congestion Measure
  - **Total Congestion Measure Calculation:** Avg Shadow Price * Binding Hours for all flowgates within the study focus area

4.5 CSP Solution Justification Evaluation

Solution justification discussions have begun in IPSAC meetings. After the conclusion of this CSP study, the RTOs will continue discussions with stakeholders on evaluating benefit metrics and determine a path forward for project approvals. This could include existing JOA evaluation methods, a modified business case framework with multi-benefit metrics aligned to FERC Order 1920, or other approaches as appropriate.

4.6 Interregional Cost Allocation

Following the conclusion of this CSP study, SPP and MISO will work with states and stakeholders to consider any JOA or Tariff enhancements that may be needed to support interregional cost allocation and joint approvals for the final project recommendation.

5 Stakeholder Involvement

The IPSAC met quarterly at key milestones (models progress, initial analysis completion, solution evaluation, recommendations), with stakeholder feedback requested at each meeting. Materials and notices were posted via RTO web pages and distribution lists (SSC Exploder; MISO Planning Superlist). Continuous coordination with solution submitters and interested stakeholders occurred throughout the study.

6 Milestones and Timelines

Table 1: CSP Milestones

SPP-MISO CSP Milestones
1. Determine study approach – **Completed August 2024**
2. Develop & finalize study scope – **Completed December 2024**
3. Review models progress – **Completed March 2025 *(IPSAC)***
4. Post draft models – **Completed April 2025**
5. Finalize models a. Finalize 10-year models – **Completed June 2025** b. Finalize 15-year models *[added due to waiver denial]* – **Completed November 2025**
6. Complete analysis & determine transmission needs – **Completed August 2025 *(IPSAC, stakeholder solution window opened)***
7. Develop & evaluate initial transmission solutions – **Completed September/October 2025**
8. Share draft solutions & initial screening results – **Completed October 2025 *(IPSAC)***
9. Provide solution evaluation results – **Completed December 2025 *(IPSAC)***
10. Provide recommendation(s) to IPSAC & complete CSP study – **March 2026**

Table 2: Preliminary Target Post Study Milestones

SPP-MISO CSP Study Results Implementation Milestones (Post Study) – *Preliminary*
1. Evaluate solution justification and next steps – **Q2 2026**
2. If necessary, propose interregional cost allocation; develop JOA changes and file at FERC – **Q3 / Q4 2026**
3. Request approvals at MOPC (SPP), PAC (MISO), & RTO Board of Directors – **Q4 2026 / Q1 2027**

7 Study Results

The Venn diagram reflects areas of analytical overlap identified through the transfer, reliability, and economic evaluations. The overlaps indicate where the same project elements influence more than one analytical lens.

- Some impacts are unique to a single category.
- Some appear in two categories, indicating that the same infrastructure element influences both analyses.
- A smaller portion appears across all three categories, reflecting interactions across transfer capability, reliability performance, and economic congestion patterns.

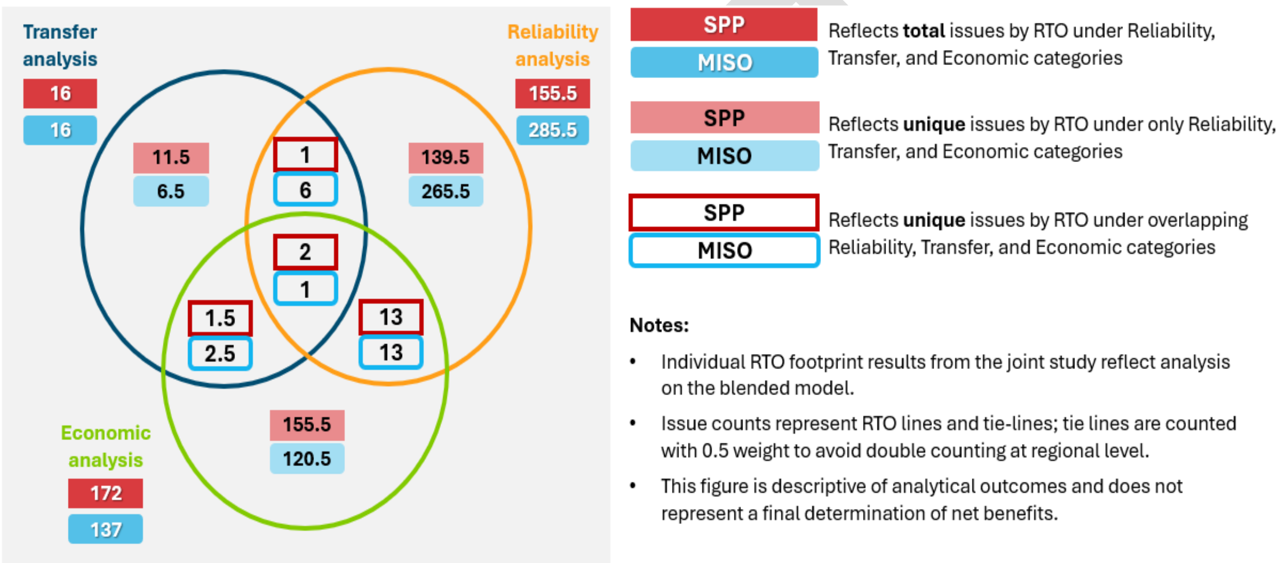

Figure 3: Issues Venn Diagram

7.1 Reliability Results

Reliability analysis results indicate thermal overload violations in steady-state power flow for P0, P1, P2 and P7 contingencies across summer, winter and light load power models.

Issues Identified (Base Case) | The study identifies future transmission infrastructure thermal violations for 10-year-out (year 2034) and 15-year-out (year 2039) scenarios, covering voltage levels from 99 kV to 800 kV. A number of reliability issues can be attributed to additions of new spot loads and generation as the models were adapted over time. Many of the constraints went through further validation processes to ensure whether they or the contingencies they were caused by were applicable to the study region.

Table 3: Reliability issues by season identified in year 10 and year 15 base cases

Season	Year 10			Year 15		
	MISO	SPP	Tie	MISO	SPP	Tie
Summer	302	68	32	536	218	90
Winter	55	50	10	714	30	69
Light Load	302	37	44	289	46	22

Key Monitored Elements | Key thermal overload transmission elements of the study focus area near the seam or near relevant load additions are identified from the 2,914 transmission elements. Thermal overload of these elements varies with seasonal generation dispatches, load, and other transmission constraints. Some of these transmission elements are overloaded with multiple contingencies, and the maximum thermal overloaded case is reported in Table 4.

Table 4: Thermal loading of key monitored elements by season in year 10 and year 15 base cases

Monitored Facility	RTO	Y10 Max Thermal Overloading			Y15 Max Thermal Overloading		
		SUM	WIN	LL	SUM	WIN	LL
[AEPW] Tulsa N 345 kV – [AEPW] Anthem 345 kV	SPP	112	-	126	114	-	139
[AEPW] Pittsburg 345 kV – [OKGE] Seminole 345 kV	SPP	121	-	-	139	-	-
[OKGE] FT Smith 161 kV – [OKGE) Arklahoma 161 kV	SPP	93	-	-	109	-	-
[EES] Patmos West 115 kV – [AEPW] Fulton 115 kV	Tie Line	167	132	-	169	137	-
[EES] Lewisville 115 kV – [EES] Patmos West 115 kV	MISO	162	130	-	164	144	-
[EES] Harvey Couch 115 kV – [EES] Lewisville 115 kV	MISO	146	115	-	147	130	-
[AEPW] Diana 345 kV – [AEPW] SW Shreveport 345 kV	SPP	96	-	-	99	-	-
[AEPW] Noram 138 kV – [AEPW] Longwood 138 kV	SPP	112	-	-	107	-	-
[AEPW] Lieberman138 kV – [AEPW] Jefferson IPC 138 kV	SPP	116	-	-	113	-	-

The study evaluates thermal issues resolved for multiple transmission project proposals submitted by transmission owners. The results are posted on MISO Sharefile and SPP Globalscape.

Table 5: Resolved reliability violations

Monitored Facility	RTO	# Violations Base Y10	# Violations Core+	# Violations Core
[AEPW] Tulsa N 345 kV – [AEPW] Anthem 345 kV	SPP	5	4	5
[AEPW] Pittsburg 345 kV – [OKGE] Seminole 345 kV	SPP	7	2	3
[OKGE] FT Smith 161 kV – [OKGE) Arklahoma 161 kV	SPP	1*	-	1
[EES] Patmos West 115 kV – [AEPW] Fulton 115 kV	Tie Line	22	4	6
[EES] Lewisville 115 kV – [EES] Patmos West 115 kV	MISO	21	4	4
[EES] Harvey Couch 115 kV – [EES] Lewisville 115 kV	MISO	14	2	2
[AEPW] Diana 345 kV – [AEPW] SW Shreveport 345 kV	SPP	5*	-	-
[AEPW] Noram 138 kV – [AEPW] Longwood 138 kV	SPP	3	-	-
[AEPW] Lieberman 138 kV – [AEPW] Jefferson IPC 138 kV	SPP	6	-	-

Multiple thermal overload issues of the top 10 elements are resolved by the proposed transmission projects. Table 5 includes the number of overload thermal violations (>100%) from steady-state contingency analysis for the 10-year-out base model and after the application of each transmission solution combination. For example, a recurring overload issue, Patmos West to Fulton 115 kV transmission line (a tie-line between MISO and SPP), has 22 thermal overload issues under multiple contingencies for the 10-year-out base case model. The Core+ combination resolves 18 of those issues, leaving 4 remaining. The Core combination resolves 16 issues, leaving 6 thermal overload issues remaining. Some elements do not have overload violations but have high reported post-contingent loading (>90%). These are marked with an asterisk. Application of the Core and Core+ combinations resolve a significant number of the contingent constraints in corridors B and C and improve corridor A with possible further expansion as that region connects to a significant number of new spot loads in both MISO and SPP.

7.2 Transfer Capability Results

Transfer capability analysis results indicate weakness and limiting facilities that could impact the bulk electric system's ability to reliably transfer energy between MISO and SPP in the future transmission planning horizon. Six transfer scenarios are analyzed for the 10-year-out (2034) and 15-year-out (2039) future transmission infrastructure scenarios. Summer, Winter, and Light Load seasonal transmission simulation models are used in the study.

*Table 6: **MISO S ↔ SPP S** – 2034 Base seasonal transfer limits (MW) and associated limiting transmission elements*

Scenario	Season	Limiting Element	Transfer Limit
MISO South – SPP South	Summer	ANO – Ft. Smith 500kV	2,164 MW
MISO South – SPP South	Winter	ANO – Ft. Smith 500 kV	6,314 MW
MISO South – SPP South	Light Load	Babel – Layfield 500 kV	6,854 MW
SPP South – MISO South	Summer	Diana – SW Shreveport 345kV	1,060 MW
SPP South – MISO South	Winter	Dolet Hills – Dolet Hills 345/230kV	4,458 MW
SPP South – MISO South	Light Load	Longwood – Sarepta 345kV	3,638 MW

*Table 7: **LRZ 8 ↔ SPP AR/OK** – 2034 Base seasonal transfer limits (MW) and associated limiting transmission elements*

Scenario	Season	Limiting Element	Transfer Limit
MISO LRZ 8 – SPP AR/OK	Summer	ANO – Fort Smith 500 kV	1,469 MW
MISO LRZ 8 – SPP AR/OK	Winter	ANO – Fort Smith 500 kV	6,316 MW
MISO LRZ 8 – SPP AR/OK	Light Load	Cathrine – Arklahoma 115 kV	6,006 MW
SPP AR/OK – MISO LRZ 8	Summer	Diana – SW Shreveport 345 kV	1,060 MW
SPP AR/OK – MISO LRZ 8	Winter	No limiting element	N/A
SPP AR/OK – MISO LRZ 8	Light Load	No limiting element	N/A

Table 8: **LRZ 9 ↔ SPP LA/TX** – 2034 Base seasonal transfer limits (MW) and associated limiting transmission elements

Scenario	Season	Limiting Element	Transfer Limit
MISO LRZ 9 – SPP LA/TX	Summer	Pittsburg – Seminole kV	1,075 MW
MISO LRZ 9 – SPP LA/TX	Winter	Montgomery – Clarn 500 kV	2,071 MW
MISO LRZ 9 – SPP LA/TX	Light Load	Elk City 138/230 kV	1,605 MW
SPP LA/TX – MISO LRZ 9	Summer	No limiting element	N/A
SPP LA/TX – MISO LRZ 9	Winter	Dolet Hills 230 kV/345 kV transformer	4,227 MW
SPP LA/TX – MISO LRZ 9	Light Load	Draper – Seminole 345 kV	423 MW

Seasonal Detail | Seasonal transfer capability changes between Year 10 and Year 15 are also compared. MISO and SPP South regional transfer capability are shown in Table 9.

Table 9: Year 10 vs. Year 15 seasonal transfer capability

RTO	Year 10			Year 15		
	Summer	Winter	Light Load	Summer	Winter	Light Load
MISO import	1,060 MW	4,458 MW	3,638 MW	3,005 MW	4,215 MW	4,048 MW
SPP import	2,164 MW	6,313 MW	6,853 MW	1,313 MW	6,039 MW	9,312 MW

Limiting Elements | Transfer capability of future transmission infrastructure scenarios varies with seasonal generation dispatch changes and localized transmission constraints. Table 10 includes a list of transmission elements identified in the Year 10 and Year 15 study models. The study excludes certain limiting transmission elements that are expected to be upgraded with new facilities in the near future.

Table 10: Transfer limiting elements

Season	Scenario	Model Year	Limiting Element	Transfer Limit (MW)
Summer	MISO import	10	Diana – SW Shreveport 345kV	1,060
Winter	MISO import	10	Dolet Hills 345kV/230kV	4,458
Light Load	MISO import	10	Longwood – Sarepta 345kV	3,638
Summer	SPP import	10	ANO – Fort Smith 500kV	2,164
Winter	SPP import	10	ANO – Fort Smith 500kV	6,313
Light Load	SPP import	10	Babel – Layfield 500kV	6,853
Summer	MISO import	15	Dolet Hills 345kV/230kV	3,005
Winter	MISO import	15	Longwood – Sarepta 345kV	4,215
Light Load	MISO import	15	Dolet Hills 345kV/230kV	4,048
Summer	SPP import	15	ANO – Fort Smith 500kV	1,313
Winter	SPP import	15	ANO – Fort Smith 500kV	6,039
Light Load	SPP import	15	ANO – Fort Smith 500kV	9,312

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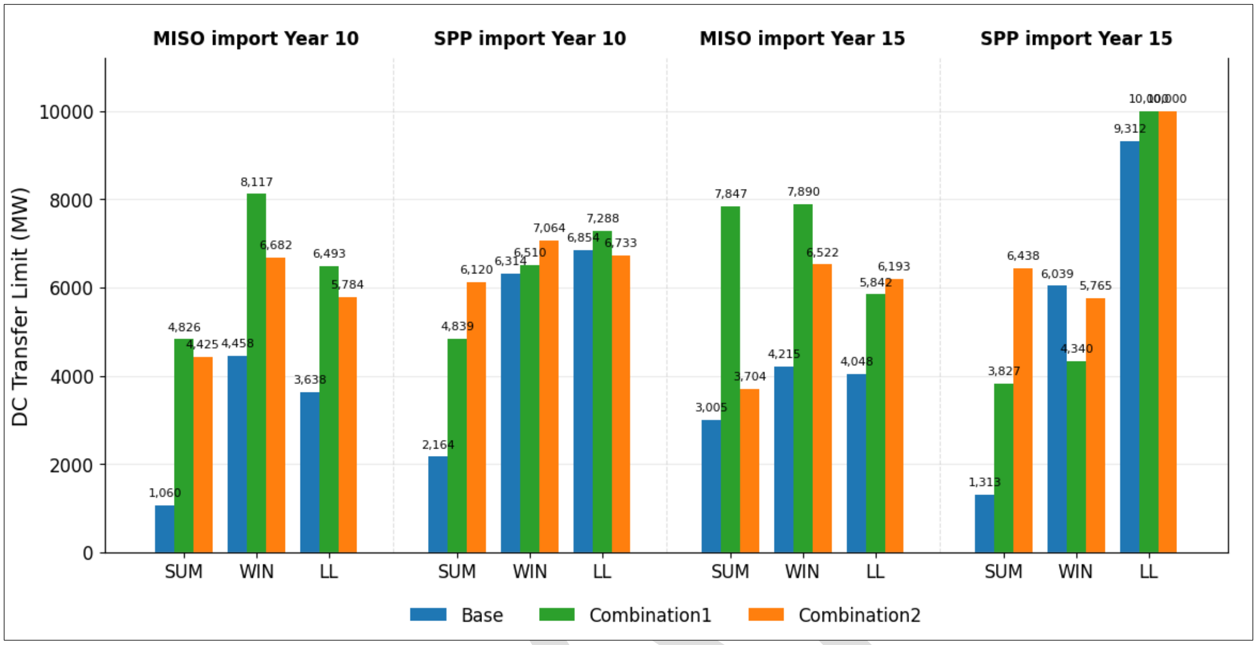
Transfer Capability Comparison | Power transfer capabilities for the project recommendations provided by transmission operators are compared in Year 10 and Year 15 models across three seasonal transmission models.

Figure 4: Transfer capability comparison



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7.3 Economic Results

Economic evaluation of the Production Cost Modeling (PROMOD) models for the study focused primarily on congestion measure. With the incorporation of large load EPRS, ERAS generation, and 2025 board-approved MISO and SPP topology, additional contingency analysis was performed to identify new flowgates that became relevant due to such changes. Utilizing PROMOD outputs, the PROMOD Analysis Tool (PAT) was leveraged to identify congestion across the list of monitored elements and corresponding contingencies within the PROMOD event file. The RTOs developed a list of the top 15 flowgates within the study area for the 2034 and 2039 study periods ranked by a summed congestion measure for 2034 and 2039 study years, which is the average shadow price * the number of binding hours. The top five flowgates from each region (MISO, SPP, and tie-lines) within the bounds of the study area were selected to determine major focus areas for further evaluation and solution testing.

The top five MISO flowgates, as shown in Table 11, were determined as the top binding flowgates near the seam for years 2034 and 2039. Much of the congestion in the area follows similar themes since before the incorporation of modelling updates; however, there have been some slight changes to the top five flowgates within the study region, with Reed – Dumas 115 kV being a new flowgate that solely binds in the 15-year case.

Table 11: Top 5 MISO Flowgates

MISO Top Five Flowgates					
	2034		2039		
Flowgate Name	Average Shadow Price ($/MWh)	# Binding Hours	Average Shadow Price ($/MWh)	# Binding Hours	Total Congestion Measure ($)
HARRISON EAST – OMAHA 161 kV	483.082	519	466.033	357	$417,093
MORRILTON EAST – GLEASON 161 kV	487.286	616	309.269	362	$412,124
REED – DUMAS 115 kV	0	0	279.328	1450	$405,026
BUNCH GULLY – COLONIAL ORANGE 138 kV	105.313	3462	87.859	146	$377,421
WALNUT RIDGE TRANSFORMER 161/115 kV	66.847	2221	73.658	2221	$312,062

The top five SPP flowgates are shown in Table 12. A majority of these flowgates have remained consistent throughout the study. Some slight shifts result from focusing more closely on flowgates that are closer to the seam, as well as the incorporation of updates to the economic models.

Table 12: Top 5 SPP Flowgates

SPP Top Five Flowgates					
	2034		2039		
Flowgate Name	Average Shadow Price ($/MWh)	# Binding Hours	Average Shadow Price ($/MWh)	# Binding Hours	Total Congestion Measure ($)
LAWTON SHERIDAN – FTSIL_TP 138 kV	800.735	481	1514.961	791	$1,583,488
FORT HUMBUG – TRICHEL 138 kV	964.954	404	878.773	899	$1,179,858
TULSA NORTH – ANTHEM 345 kV	87.097	3167	82.883	3767	$588,056
VALLIANT TRANSFORMER 345/138 kV	1814.925	143	2159.875	129	$538,158
DARDANELLE DAM – CLARKSVILLE 161 kV	355.847	751	392.349	511	$467,731

The top five tie line flowgates are shown in Table 13. These lines were determined as the top binding flowgates shared across the seam between MISO and SPP areas for the study. The specific flowgates shown remain unchanged in ranking from previous IPSAC presentations.

Table 13: Top 5 Tie Line Flowgates

Tie Line Top Five Flowgates					
	2034		2039		
Flowgate Name	Average Shadow Price ($/MWh)	# Binding Hours	Average Shadow Price ($/MWh)	# Binding Hours	Total Congestion Measure ($)
PATMOS WEST AECC – FULTON 115 kV	198.987	1258	233.628	1412	$580,208
RUSSELVILLE SOUTH – DARDANELLE DAM 161 kV	152.44	459	167.956	520	$157,307
SOUTHLAND – NORFORK 161 kV	331.248	89	349.624	159	$85,071
ARKANSAS NUCLEAR ONE – FT SMITH 500 kV	123.476	192	173.039	88	$38,935
SOUTH LEAD HILL – BULL SHOALS DAM 161 kV	383.317	11	461.878	19	$12,992

To address the limitations on these top identified flowgates, stakeholders submitted solutions targeting these areas to alleviate congestion. Evaluation of economic benefit for projects leveraged an iterative process of economic congestion relief assessment to identify and compare solution performance.

Table 14: Economic congestion relief

Economic Congestion Relief					
Solution Name	Congestion Measure ($)	Total Congestion Relief ($K)	MISO Relief ($K)	Tie Line Relief ($K)	SPP Relief ($K)
Anthem – Ft Smith – Yell	$24,109,805	$1,334	$120	$78	$1,136
Ft Smith – Yell	$25,095,923	$349	($105)	($23)	$477
Chambers Springs – Yell	$24,872,483	$573	($56)	$12	$617
Lydia – Lewisville – McNeil	$24,993,065	$452	$105	$102	$245
McNeil – Turk	$24,702,260	$743	$132	$307	$304
Welsh – Lewisville – McNeil	$25,344,445	$100	$101	($28)	$27
Turk – Sarepta – Shreveport – Layfield	$24,545,580	$899	$90	$310	$499
Turk – Sarepta – SW Shreveport	$24,722,324	$723	$65	$310	$348
Shreveport – Layfield	$25,140,117	$306	$50	$25	$231
Babel – Gateway	$25,310,791	$135	$26	$13	$96
Sarepta – Shreveport – Babel	$25,119,513	$326	$56	$24	$246
Combination A	$23,366,221	$2,078	$311	$343	$1,424
Combination B	$23,825,608	$1,619	$253	$291	$1,075
Core+ Combination	$23,289,015	$2,156	$297	$337	$1,522
Core Combination	$24,163,130	$1,282	$83	$304	$895
Core+ Combination – 15 Year	$32,002,057	$2,132	$111	$771	$1,250
Core Combination – 15 Year	$33,175,204	$960	($311)	$711	$560

All results shown in Table 14 are for the MISO-SPP 2034 year unless otherwise stated. Most solutions saw congestion relief in each region. Anthem – Fort Smith – Yell provided the most congestion relief from any individual solution, ultimately making it a strong candidate to be a segment in the Core+ draft recommendation. Core+ total congestion relief was the highest amongst all other tested solutions, with similar results for the 2039 study year.

7.4 Extreme Cold Weather Event

MISO's extreme cold weather event model was designed based off Winter Storm Uri-like conditions adapted to the winter 10-year model using assumptions based on operational data during the historical storm. Data factored included available generation, outages, derates during the storm, and regional loading. During the storm, there was an increase in load of nearly 6% above predictions and nearly 30% of generation was unavailable leading to a significant shortfall and increased cross regional transfer. Applied to the higher loading of MISO's F2A scenario and adapting the generation mix to the futures predictions is shown below in Table 15. Given the much larger import in the future extreme weather case, many of the limiting constraints seen in the transfer capability study are further exacerbated and become reliability violations. Continual

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reliability testing and assessment of the solutions will include impact on the extreme weather case and identifying new reliability constraints mitigated during benefit analysis.

Table 15: MISO South winter storm Uri dispatch information

MISO South Dispatch Information		
Dispatch Type	**Winter Storm Uri (Actual) (GW)**	**Adapted CSP (Target) (GW)**
Load	29	36.6
Generation	27.3	32.4
Coal	3.3	0.7
Gas	17.9	24.4
Nuclear	4.9	4.9
Other (incl. hydro, solar, battery)	1.2	2.4
(Net Import)	(1.7)	(4.2)

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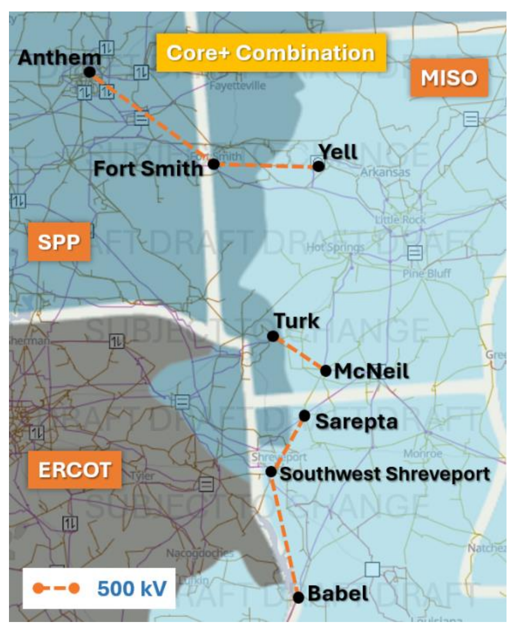
8 Recommended CSP Solutions

8.1 Solution Portfolio Summary

The CSP study resulted in two potential transmission combinations for recommendation as identified by MISO and SPP for the study focus area. See descriptions below for both combinations.

Core+ Combination:

- Construct new 500kV double circuit transmission lines approximately 120 miles in length from Anthem station to Fort Smith station, connecting to the new Anthem station recently approved in SPP's ITP25 as part of their 765kV portfolio, and Anthem 345kV substation with one 500/345kV transformer
- Construct an additional 500kV single circuit transmission line approximately 80 miles in length from Fort Smith to a new Yell station – a single circuit transmission line currently exists between Fort Smith and Arkansas Nuclear One (ANO)
- Construct new Turk 500kV substation with two 345kV/500kV transformers, and new 500kV single circuit transmission lines approximately 50 miles in length from Turk to McNeil station



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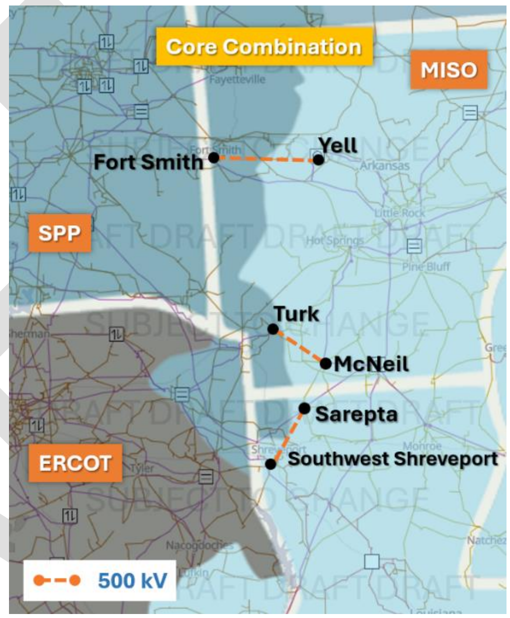
- Construct new SW Shreveport 500kV substation with one 500kV/765kV transformer and new 500kV single circuit transmission lines approximately 40 miles in length from Sarepta to SW Shreveport
- Construct new 500kV single circuit transmission line approximately 120 miles in length from Southwest Shreveport station to new Babel station, a recently approved MTEP25 project

Core Combination:

- Construct an additional 500kV single circuit transmission line approximately 80 miles in length from Fort Smith to a new Yell station – a single circuit transmission line currently exists between Fort Smith and Arkansas Nuclear One (ANO)
- Construct new Turk 500kV substation with two 345kV/500kV transformers, and new 500kV single circuit transmission lines approximately 50 miles in length from Turk to McNeil station
- Construct new SW Shreveport 500kV substation with one 500kV/765kV transformer and new 500kV single circuit transmission lines approximately 40 miles in length from Sarepta to SW Shreveport



8.2 Screening Results

See Section 4.4.5. for screening metrics descriptions.

Table 16: Solution combinations screening metrics results

Solution Combination	Project Cost $M	Reliability (Net Issues Resolved)			Economic – 2034 (Congestion Relief $K)			Transfer Capability (Avg. Import Capability Increase MW)	
		MISO	Tie Lines	SPP	MISO	Tie Lines	SPP	MISO	SPP
Core+	2,416	94	32	75	$297.4	$336.6	$1,522.0	3,427	1,102
Core	1,364	53	6	89	$82.9	$303.9	$895.0	2,578	1,529

8.3 Portfolio Balance & Siting Considerations

Geographic Balance | MISO and SPP considered the balance of projects across MISO LRZs 8 and 9 and SPP South focused in areas of greatest need.

Feasibility & Constructability | MISO and SPP met with solution submitters multiple times to discuss the feasibility and constructability of proposed projects. While formal feasibility studies will still be required, these discussions indicate a high level of confidence in the viability of the concepts presented.

Approved Transmission Alignment | With the inclusion of the most recently approved transmission proposals, MISO and SPP were able to ensure that the project recommendations are complementary and support the expected infrastructure.

9 Conclusion

Conclusion | The recommended CSP study solutions provide meaningful reliability improvements, expanded bi-directional transfer capability, and material congestion relief that collectively support RTO and stakeholder objectives.

Following stakeholder feedback on these recommendations, MISO and SPP will evaluate solution justification and determine the appropriate next steps.

Appendix – CSP Study Evaluated Projects

#	Project Proposal	Est. Cost	Determination
1	Yell 500kV station	$61.2M	Studied in final set of solutions; station is included in draft recommendation
2	Ft. Smith – Yell 500kV	$488.3M	Studied in final set of solutions; segment is included in draft recommendation
3	Ft. Smith – Yell – Hot Springs EHV 500kV	$834.7M	Eliminated from study; studied in final set of solutions; lower performer
4	McNeil – Turk 500kV	$426M	Studied in final set of solutions; segment is included in draft recommendation
5	Babel – Gateway 500kV	$705.5M	Eliminated from study; studied in final set of solutions; lower performer
6	Yell – Anthem Double Circuit 345kV	$812M	Eliminated from study; studied in final set of solutions; variant is included in draft recommendation
7	Pittsburg – Welsh – Lewisville – McNeil 345kV with Patmos – Fulton 115kV reconductor and Layfield – Western Kraft 230kV reconductor	$557.8M	Submitter agrees other solutions resolve more overloads in this area; variant studied in final set of solutions
8	Pecan Creek – White Bluff 500kV with R.S.S.-7 – Pecan Creek 345kV reconductor	$1,297M	Eliminated from study; lower performer; evaluated more cost-effective solutions

#	Project Proposal	Est. Cost	Determination
9	Shreveport – Layfield 500kV with Layfield – Western Kraft 230kV reconductor	$343M	Eliminated from study; lower performer
10	North Tulsa – White Bluff 500kV	$1,561M	Eliminated from study; lower performer; evaluated more cost-effective solutions
11	Hugo – El Dorado 765kV	$1,298M	Eliminated from study; lower performer; evaluated more cost-effective solutions
12	Valliant – McNeil 345kV	$559.6M	Eliminated from study; lower performer
13	Muskogee – Tahlequah 345kV and Hawthorn – Tahlequah – Independence 500kV	$1,610M	Eliminated from study; lower performer
14	Tulsa North – Ft Smith 500kV with Ft Smith – Yell 500kV reconductor	$784.4M	Eliminated from study; lower performer
15	Northwest Texarkana – Patmos – McNeil 345kV with Patmos – Fulton 115kV reconductor	$372.2M	Local issue; recommend regional review
16	Hugo – Turk – Sunnyside 345kV and Valiant – Turk – McNeil 345kV DCT	$2,153.7M	Cost likely outweighs benefits
17	Tulsa North – Inola – Independence 500kV	$1,520.6M	Far from focus area; cost likely outweighs benefits
18	Valliant – Sarepta 345kV	$521.6M	Lower performer; Submitter agrees to remove solution from further consideration
19	Midwest Power Corridor Project: Holcomb – Buffalo Flats – North Branson – Labadie 765kV line with Harrison East – Omaha 161kV reconductor	$4,390.1M	Out of study scope
20	Tontitown – Yell 500 kV with Mayflower – Mabelvale 500kV reconductor and Morilton East – Gleason 161kV reconductor and ANO – Pleasant Hill reconductor 500kV	$614.4M	Lower performer; Submitter agrees to remove solution from further consideration
21	Sibley – Morgan 345kV DCT and Brookline – Bull Shoals – Yell 345kV DCT	$2,148.6M	Out of study scope
22	Hugo – El Dorado 345 kV	$723.6M	Submitter agrees with 765kV variant instead of 345kV
23	Muskogee – Yell 500kV with Mayflower – Mabelvale 500kV reconductor and ANO – Pleasant Hill 500kV reconductor	$859M	Lower performer; Submitter agrees to remove solution from further consideration
24	SW Shreveport – New Station – Dolet 345kV and Mansfield – New Station – International Paper – Wallace Lake 138kV	$256M	Lower performer; Submitter agrees to remove solution from further consideration

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#	Project Proposal	Est. Cost	Determination
25	Heartland Spirit Connector HVDC and Hitchland – Pecan Creek HVDC, Pecan Creek – White Bluff 500kV	$3,969M	Lower performer; evaluating more cost-effective solutions
26	City of Hope 115kV Reconfiguration	$23.7M	Local issue; recommend regional review
27	Dolet Hill 2nd 345/230kV Transformer	$16.4M	Local issue; recommend regional review
28	Hugo – Valliant 138kV Series Reactor	$1.5M	Local issue; recommend regional review
29	Keefeton 345kV Station and Keefeton – Pecan Creek 345kV	$50.9M	Local issue; recommend regional review
30	Upgrade Valliant 345/138kV XFMR 1 and 2	$20.4M	Local issue; recommend regional review
31	Turk – McNabb 115kV Series Reactor	$1.5M	Local issue; recommend regional review
32	Anthem 345kV to Northeastern – Oneta 345kV, New 345kV from Cleveland – Wekiwa – Riverside – Anthem, Rebuild 345kV Wekiwa – Sapulpa Road – Riverside – Oneta – Anthem 345kV	$334M	Lower performer
33	Seminole to Southwest Shreveport 345kV Double Circuit Rebuild	$1,640M	Lower performer; 765kV solution approved in SPP's ITP25
34	Ft. Smith to Turk to McNeil 345kV and Double Circuit Rebuild Turk to Southwest Shreveport 345kV1	$1,412M	Lower performer; evaluating more cost-effective solutions
35/42	Ft. Smith to Pittsburg 345kV and Double Circuit Rebuild Seminole to Southwest Shreveport 345kV	$1,935M	Not an interregional issue
36	Ft. Smith – Magnet Cove 500kV	$632M	Lower performer
37/43	Ft. Smith – Turk – Sarepta 345kV + Double 2nd Circuit Sarepta – Longwood 345kV	$664M	Lower performer
38	SW Shreveport – Sarepta 345kV	$133M	Lower performer; 500kV solution tested in final solution set
39	Seminole – Southwest Shreveport 345kV Double Circuit Rebuild	$1,640M	765kV project approved via SPP ITP 2025
40	Two (2) New Layfield 500/345kV + Double Circuit SW Shreveport – Layfield 345kV	$239M	Lower performer; variants tested in final solution set
41	Ft. Smith – Turk – McNeil 345kV + Double Circuit Rebuild Turk – Southwest Shreveport 345kV	$1,412M	Lower performer; variants tested in final solution set
44	North Branson – Independence 500kV	$945M	Out of study scope

#	Project Proposal	Est. Cost	Determination
45	Tonnece – Chambers Springs 345 kV + Chambers Spring – Yell 500 kV, + Yell – Holland Bottom 500 kV	1,271M	Lower performer; variants tested in final solution set
46	McNeil – Turk 345kV	$325M	Studied in final set of solutions; variant included in final recommendation
47A	Anthem – Yell 345kV + Anthem – Holland Bottom 500kV	N/A	Studied in final set of solutions; lower performer
48A	Turk – Welsh 500kV	N/A	Studied in final set of solutions; lower performer
49A	Shreveport or Gateway – Babel – Layfield	N/A	Studied in final set of solutions; lower performer
50A	Ft Smith – Yell – Hot Springs 500kV + McNeil – Turk 500kV	N/A	Studied in final set of solutions; lower performer
51A	Ft Smith – Yell – Hot Springs 500kV + Turk – McNeil – Sarepta 500kV	N/A	Studied in final set of solutions; lower performer
52A	Ft Smith – Yell – Hot Springs – Turk – McNeil – Sarepta – SW Shreveport 500kV	N/A	Studied in final set of solutions; lower performer
53A	Welsh – Lewisville – McNeil 345kV	N/A	Studied in final set of solutions; lower performer
54A	SW Shreveport to Sarepta 345kV connecting to SPP ITP 765kV	N/A	Studied in final set of solutions; lower performer
55A	Babel – Layfield	N/A	Studied in final set of solutions; lower performer
56A	Sarepta – El Dorado conversion from 345kV to 500kV	N/A	New paths to El Dorado were not feasible
57A	Anthem – White Bluff 500/765kV or alternate AR endpoint	N/A	Variant was studied in final set of solutions
58A	Lydia – Lewisville – Sterlington 500kV	N/A	Variant was studied in final set of solutions
59A	Welsh – Turk – Lewisville – Sterlington 500kV	N/A	Variant was studied in final set of solutions
60A	Anthem – Ft Smith 345kV + Ft Smith – Yell 500kV	N/A	Variant was studied in final set of solutions
61A	Chambers Springs – Yell 500kV	N/A	Studied in final set of solutions; feasibility/constructability concerns, new reliability issues created, and negative congestion relief
62A	Lydia – Lewisville – McNeil 500kV	N/A	Studied in final set of solutions; lower performer
63A	Welsh – Lewisville – McNeil 500kV	N/A	Studied in final set of solutions; lower performer
64A	Turk – Sarepta 345kV + Sarepta – SW Shreveport 500kV + step up to 765kV at SW Shreveport	N/A	Studied in final set of solutions; lower performer
65A	SW Shreveport – Layfield 500kV	N/A	Studied in final set of solutions; lower performer
66A	Turk – Sarepta 345kV + Sarepta – SW Shreveport 500kV + SW Shreveport – Layfield 500kV + step up to 765kV at SW Shreveport	N/A	Studied in final set of solutions; lower performer

#	Project Proposal	Est. Cost	Determination
67A	Anthem – Ft Smith 345kV + Ft Smith – Yell – Hot Springs 500kV + Turk – McNeil – Sarepta 500kV	N/A	Studied in final set of solutions; lower performer
68A	Ft Smith – Yell – Hot Springs 500kV + Turk – McNeil 500kV + SW Shreveport – Babel 500kV	N/A	Studied in final set of solutions; lower performer
69A	Anthem – Ft Smith – Yell 500kV + Turk – McNeil 500kV + Sarepta – SW Shreveport – Babel 500kV	$3,607M	Studied in final set of solutions; 1 of 2 recommended combinations
70A	Ft Smith – Yell 500kV + Turk – McNeil 500kV + Sarepta – SW Shreveport 500kV	$1,312M	Studied in final set of solutions; 2 of 2 recommended combinations

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