Book 3 / Policy Landscape
Section 7: Regional Studies

Book 3 Introduction: Policy Landscape Overview

Regional Studies

7.1 MISO PJM Joint Modeling Analysis

7.2 MVP Triennial Review

7.0 Policy Landscape Overview

MISO's generation fleet continues to evolve toward a decreased reliance on coal generation and an increased reliance on natural gas and renewable generation, despite current regulatory policy uncertainty. Both economic factors and generation fleet characteristics have important impacts on these trends.

Coal plant retirements continue to be announced in the MISO region as MISO's coal fleet ages. Based on industry and MISO fleet data, coal units generally retire by 65 years of age. MISO estimates that age-related coal unit retirements in the MISO fleet could result in the retirement of about 15 percent of the MISO coal fleet over the next 15 years. There have been no major reversals in announced retirements, despite decreased likelihood in near-term federal carbon regulations. Coal prices and production currently are at all-time low levels. In addition, several nuclear units within the MISO footprint have publically announced potential retirement. However, recent discussions at the federal level about assessing the importance of preserving coal and nuclear generation for baseload fuel diversity as well as state policies could potentially extend the life of existing plants.

As coal generation retires and natural gas prices remain low, natural gas generation has comprised a growing share of MISO's thermal generation. As MISO's reliance on natural gas increases, MISO is focusing on gas-electric coordination to increase MISO's understanding of energy industry trends and the relationships between gas market drivers and electric system dispatch.

Industry analysis predicts continued reductions in capital costs for renewable resources. Relative to wind, a more significant decline in solar costs is predicted over the next 15 years as solar technology continues to mature. MISO is also studying trends of increasing distributed solar resources for future system impacts. Although the future of the current Production Tax Credit and Investment Tax Credit is unsure, the underlying costs are still declining. MISO continues to see wind and solar resource additions in the MISO region. The system currently has about 16 GW of wind generation with 31 GW in the interconnection queue and about 200 MW of solar generation with 8 GW in the interconnection queue[1].

In addition to distributed solar generation, MISO is studying emerging technologies, such as energy storage, and their system impacts. With predictions of declining costs for energy storage resources, this will likely continue to be a key industry trend with the potential for future policy implications. Potential growth in energy efficiency and demand response programs will also have an impact on MISO's future energy mix. Based on analysis from Applied Energy Group, from 10 to 26 GW of technical potential for energy efficiency and 8 to 12 GW of technical potential for demand response could be feasible in the MISO region over the next 15 years.

The possibility of federal carbon regulation has decreased notably since the 2017 Executive Order dismantling the Clean Power Plan. However, the possibility of future carbon regulation remains and should be considered in prudent long-term planning. Overall, carbon dioxide emissions decreased about 15 percent from 2005-2015 across the MISO region due to industry trends and economics. MISO also continues to track and study state policies including renewable portfolio standards and energy efficiency mandates and goals. MISO will continue to follow federal and state policy as well as monitor fuel prices, plant retirements and announced member plans for any changing industry trends.

[1] Interconnection Queue data as of June 2017

7.1 MISO PJM Joint Modeling Analysis

In a precident-setting move, MISO coordinated with PJM to perform interregional analysis on the effects of environmental regulations and policy on grid operations.

Building off of studies previously performed individually on their respective footprints, MISO and PJM coordinated on an interregional assessment of the impact of environmental regulations and policy on grid operations. The assessment utilized the most relevant information and features from the individual studies along with a common set of assumptions and a common modeling tool. The RTOs considered economic interchange, congestion on the transmission system, utilization of generation resource types, generation production costs and energy market costs. They also examined the effects of external drivers such as the price of natural gas, the effects of varying the size of the emissions trading region and the effects of using energy efficiency as a compliance mechanism.

From this joint analysis, MISO and PJM made the following key observations:

- External economic drivers may overshadow state policy choices. Natural gas prices heavily influence the cost and impact of state policy objectives by influencing resource economics (zero-emitting project viability).
- Standardization of state policy decisions may reduce associated program costs. Standardization of energy efficiency measurement and verification facilitates commoditization of credits across broader markets; and would enhance energy efficiency's value to consumers by offsetting deployment costs.
- Non-similar state policies can drive significant economic distortions along the MISO-PJM seam and exacerbate transmission cost impacts. Conversely, the ability to transact fungible products among states results in greater market efficiency.

Observations from the analysis are intended to help states in the MISO and PJM regions better understand how interregional coordination can help states achieve policy objectives with the least-adverse impacts to power system operation and at the lowest cost. The economic fundamentals rooted in the operation of organized wholesale electric markets can easily be extended to evaluation of emissions policy. States, utilities and other entities can consider the observations made from this analysis within the specific context of the Clean Power Plan or in a broader context as they consider other policy goals that can influence already dynamic economic interactions in modern wholesale electric markets.

Purpose and Background of the MISO PJM Joint Modeling Analysis[2]

The energy landscape in the MISO footprint has changed in recent years due to a combination of economic, regulatory and policy drivers. These drivers affect generation mix, reserve margins, grid reliability, dispatch and operations. These effects are expected to continue, fundamentally transforming the electric utility industry over the coming decades.

Some of the main regulatory drivers are developed by the U.S. Environmental Protection Agency (EPA) and include the Mercury and Air Toxics Standards (MATS), the National Ambient Air Quality Standards (NAAQS), the Clean Power Plan[3] (CPP) and the Cross-State Air Pollution Rule (CSAPR). This year,

[2] For the MISO/PJM Joint Modeling Analysis full report
[3] For the Clean Power Plan Final Rule Study full report

MISO continued to analyze the effects of environmental regulations and policy on grid operations by embarking upon an interregional assessment in coordination with PJM.

When introduced, the CPP was widely recognized to have a potential transformative impact on the sources of power supply with its regulation of carbon dioxide emissions from the electric power sector. By request of their states and stakeholders, MISO and PJM analyzed the CPP independently in order to provide their state agencies with objective analysis they could consider in developing CPP compliance plans.

Since its introduction as a proposed rule, the CPP has garnered a significant amount of opposition, and the current political environment makes it unlikely that it will survive in its current form. The CPP, however, is only one of many policy and market drivers that states are faced with as they think about current and future electric supply.

As a follow-up to their initial studies, MISO and PJM both saw a benefit to conducting an additional joint policy evaluation using the CPP as a case study. The MISO and PJM footprints are adjacent and share a significant electrical seam. The various ways in which states could have developed compliance plans with the CPP could add additional complexity to operating generation and transmission; thus, the CPP provides a good stress test to illustrate not only the value of interregional coordination but state coordination as new policies and/or regulations are considered.

The observations of the joint modeling analysis are not recommendations for complying with the CPP and will not be used to identify transmission upgrades for inclusion into either RTO's future transmission expansion plan. However, states, utilities and other entities can consider the observations made from this analysis within the specific context of the CPP or in a broader context as they consider other policy goals that can influence already dynamic economic interactions in electric markets.

7.2 MVP Triennial Review

>> Note: Information in this section will be updated, pending the results of additional studies. Complete information anticipated in September.

Book 3 / Policy Landscape

Section 8: Interregional Studies

8.1 PJM Interregional Study

>> Note: Information highlighted in this section will be updated.

MISO and PJM Interconnection, a Pennsylvania-based regional transmission operator (RTO) are in the second year of their two-year Coordinated System Plan Study aimed at identification of Interregional Market Efficiency Projects. The first year, 2016, focused on issue identification and 2017 focuses on project solicitation at evaluation.

MISO published regional issues, for interregional project consideration, on January 16, 2017. MISO solicited interregional projects from stakeholders through the end of February 2017, running concurrent with PJM's regional project solicitation window. MISO and PJM are evaluating interregional project proposals submitted to both regional processes.

The RTOs received eight interregional project proposals from six proposing entities. Three projects are upgrades and five are greenfield. The cost ranges between $1 million and $198 million (in-service year dollars). Notably, half of the projects are sub-345 kV, which now qualify as MISO Market Efficiency Projects after FERC's EL13-88 ruling. Analysis is expected to continue through the summer of 2017, with any potential Interregional Market Efficiency Projects recommended for MTEP17 and RTEP17 inclusion.

Also for 2017, MISO and PJM focused their joint study efforts on codification of the Targeted Market Efficiency Project in the MISO-PJM Joint Operating Agreement and regional Tariffs; FERC Order compliance; and continuation of stakeholder interaction in the Interregional Planning Stakeholder Advisory Committee (IPSAC). PJM performs a similar report to MTEP, which it calls the Regional Transmission Expansion Plan (RTEP).

Targeted Market-to-Market Congestion Study

In 2016, due to appreciable levels of market-to-market congestion, MISO and PJM decided to continue their annual focus on resolving historical congestion while helping to inform future metric and process enhancements. This near-term study evaluates historical market-to-market congestion to find small but important fixes, and was initially dubbed Quick Hits.

For the 2016 study, MISO and PJM analyzed historically congested market-to-market flowgates. Flowgates with significant congestion — day-ahead plus excess congestion fund — in 2014 and 2015 were considered initially. MISO and PJM worked to identify valuable projects on the seam. A valuable project would relieve known market-to-market issues; be completed in a relatively short time frame; have a quick payback on investment; and not be a greenfield project. MISO and PJM coordinated with facility owners to identify the limiting equipment and potential upgrades. Limited reliability and production cost analyses were used to confirm the projects' effectiveness in relieving congestion. Potential projects are expected to be recommended to the MTEP and PJM's RTEP by the end of 2017, pending the filing of the new Targeted Market Efficiency Project (TMEP) type (discussed in the Targeted Market Efficiency Project Type section).

As of December 2016, MISO and PJM had narrowed down the potential upgrades (Table 8.1-1). Due to confidentiality concerns, the specific upgrade details will be shared with stakeholders after MISO/PJM board approval, expected by the end of 2017. The Market-to-Market flowgates are identified with preliminary project cost, expected project benefits, and RTO cost share. These are preliminary results and may be subject to change before final project recommendation.

Facility	Transmission Owner(s)	TMEP Cost	TMEP Benefit	Benefit Allocation (%PJM / %MISO)
Burnham – Munster 345 kV	CE, NIPS	$7,000,000	$32,000,000	88 / 12
Bayshore – Monroe 345 kV	ATSI, ITC	$1,000,000	$17,000,000	89 / 11
Michigan City – Bosserman 138 kV	NIPS, AEP	$4,600,000	$29,600,000	90 / 10
Reynolds – Magnetation 138 kV	NIPS	$150,000	$14,500,000	41 / 59
Roxana – Praxair 138 kV	NIPS	$4,500,000	$6,500,000	24 / 76

Table 8.1-1: MISO-PJM Targeted Market Efficiency Projects

Targeted Market Efficiency Project Type

The MISO-PJM Interregional Planning Stakeholder Advisory Committee (IPSAC) has continued to be committed to interregional metric and process enhancements. In this effort, MISO and PJM have worked with stakeholders to identify changes to lower or remove undue hurdles to approve interregional projects.

Beginning in March 2016, MISO and PJM presented to IPSAC stakeholders a new interregional project. The new project type, Targeted Market Efficiency Project, gives more definition around the benefits and approval of projects found in the Targeted Market-to-Market Congestion or Targeted Area interregional studies. In the proposal, projects approved as Targeted Market Efficiency Projects by the Joint RTO Planning Committee (JRPC) would go directly to the RTOs' Boards for approval, obviating the need for separate regional analyses.

MISO and PJM worked extensively with stakeholders at the IPSAC and MISO's Regional Expansion Criteria and Benefits Working Group to develop qualification criteria and benefits for the Targeted Market Efficiency Projects. On December 30, 2016, MISO and PJM jointly filed changes to the MISO-PJM Joint Operating Agreement to incorporate the new project type. MISO is expecting to file accompanying regional Tariff changes with FERC in the third quarter of 2017. Meanwhile, FERC held a Targeted Market Efficiency Project workshop on June 13, 2017 to better understand the RTOs' proposal. MISO will wait for FERC approval of the filings before recommending the five identified Targeted Market Efficiency Projects in Table 8.1-1 to the Board of Directors for inclusion in MTEP17.

FERC Order 1000

On October 28, 2016, FERC conditionally accepted, subject to further compliance, MISO and PJM's June 20, 2016 Third Compliance Filing under the Order 1000 interregional docket. MISO submitted its Fourth Compliance Filing on November 22, 2016. FERC accepted the revisions on January 9, 2017 with no additional compliance directives, thus concluding FERC Docket ER13-1943.

FERC Order EL13-88

Following an initial September 11, 2013, "206" complaint by Northern Indiana Public Service Co. (NIPSCO) on how MISO and PJM perform interregional transmission planning, and subsequent June 15, 2015, FERC technical conference, FERC issued an Order on Complaint and Technical Conference in Docket EL13-88 (NIPSCO Order) on April 21, 2016. MISO and its filing partners complied with all directives and status updates through filings in June, August, October, and December of 2016.

FERC issued an Order on Rehearing and Compliance on January 19, 2017. It accepted the June and December MISO-PJM Joint Operating Agreement and Tariff changes, ruled on open rehearing and

clarification requests, and ordered seven additional compliance directives. Notable changes that were accepted by the filing were the removal of an interregional benefit-to-cost ratio (i.e. the “third hurdle”); the use of regional benefits as the interregional cost split; and the removal of the $5 million threshold and lowering of the 345 kV threshold to 100 kV for Interregional Market Efficiency Projects with PJM. In ruling on the clarification requests, FERC confirmed that the Interregional Market Efficiency Project thresholds were only lowered on the seam with PJM and added a compliance directive for MISO to determine the cost allocation for sub-345 kV Interregional Market Efficiency Projects.

On April 24, 2017, MISO and PJM submitted compliance directives for the January 19, 2017, order. MISO and the MISO TOs requested, and were granted from FERC, an 18-month extension request on the regional cost allocation of sub-345 kV Interregional Market Efficiency Projects. This extension aligns with a broader cost allocation reform occurring at the Regional Expansion Criteria and Benefits Working Group, expected to conclude in the second half of 2018.

Interregional Planning Stakeholder Advisory Committee

In additional to the previously mentioned interregional efforts, all discussed at the IPSAC, MISO and PJM performed their 2017 annual issues review focused on reliability projects. The RTOs found no opportunities for an Interregional Reliability Project and shared their conclusion at the March 24, 2016, IPSAC.

8.2 Southwest Power Pool Coordinated System Plan

>> Note: Information highlighted in this section will be updated.

The 2016 MISO-SPP Coordinated System Plan (CSP) study was performed to evaluate the combined MISO and Southwest Power Pool (SPP) transmission systems in an effort to identify mutually beneficial transmission improvements. The study was a nearly yearlong effort that began on May 31, 2016. MISO and SPP staff focused efforts on an economic analysis of a targeted set of transmission needs identified by MISO and SPP's respective regional planning processes along the MISO and SPP border.

MISO and SPP evaluated seven unique transmission needs in the 2016 CSP that were identified in each company's transmission planning process: MISO's MTEP 16 and SPP's 2017 Integrated Transmission Planning 10-year assessment (2017 ITP10). This approach of targeting transmission needs identified by the regional planning processes was chosen in response to stakeholder feedback and to make the joint study process more efficient by leveraging much of the regional study work. MISO and SPP used this approach to determine the existence of more efficient or cost-effective interregional transmission solutions beyond any regional solutions within 2017 ITP10 and MTEP16. Beginning with the list of seven targeted needs, staff and stakeholders collaborated to propose potential Interregional Projects to solve the identified transmission issues. The proposed Interregional Projects were then tested for Adjusted Production Cost (APC) benefits. Based on those results, MISO and SPP identified one transmission project for consideration as an Interregional Project:

- Loop One Split Rock to Lawrence 115 kV circuit into Sioux Falls

The 2016 CSP study demonstrated this project provides benefit to both MISO and SPP as well as APC benefits that exceed the cost of the project over the initial 20 years of the project's life. As a result the Loop One Split Rock to Lawrence 115 kV circuit into Sioux Falls project was recommended by MISO and SPP to the Interregional Planning Stakeholder Advisory Committee (IPSAC) for endorsement to move from the interregional portion of the study into the regional review process of each respective region. Both the MISO and SPP portions of the IPSAC[4] endorsed this recommendation with no opposition. Based on that recommendation, the MISO-SPP Joint Planning Committee (JPC) voted in favor of approving this project for review in both the MISO and SPP regional review processes.

Study Process

The Joint Operating Agreement (JOA) establishes a Joint Planning Committee (JPC) comprised of representatives of both MISO and SPP. The JPC is the decision-making body that is responsible for all aspects of coordinated interregional transmission planning, including the development of a CSP. The JPC is charged with verifying that the study is conducted in accordance with the requirements of the JOA and that the results of the study are accurate and meet the expectations of the JPC and IPSAC based on the study scope.

The IPSAC provides a forum and an opportunity for stakeholders to review the development of the CSP study and to provide guidance and recommendations to the JPC. IPSAC participation is open to all stakeholders.

[4] The MISO portion of the IPSAC is made up of the voting sectors of the Planning Advisory Committee (PAC) and SPP's portion of the IPSAC is made up of the Seams Steering Committee (SSC) and non-SSC transmission owners interconnected with MISO.

On an annual basis, MISO and SPP have agreed to review potential transmission issues identified by each Regional Transmission Operator or any stakeholder at an IPSAC meeting as part of an Annual Issues Review process. The Annual Issues Review is administered by the JPC in coordination with the IPSAC to determine whether there is a need for MISO and SPP to perform a CSP study. When MISO and SPP determine a CSP study is warranted, the Order 1000 interregional coordination procedures outlined in the JOA are used to guide the study process.

The purpose of the MISO-SPP CSP study is to jointly evaluate seams transmission issues and to identify if there are transmission solutions that provide benefit to both MISO and SPP and are more efficient or cost effective than regional transmission solutions. This study incorporates an evaluation of economic seams transmission issues and an assessment of potential reliability violations.

At the completion of the CSP study, the JPC produces a draft report documenting the study, including transmission issues evaluated, studies performed, solutions considered, and if applicable, the recommended Interregional Projects with the associated interregional cost allocation. The draft report is made available for stakeholder review. Taking into consideration the recommendation of the IPSAC, the JPC shall meet and vote on whether to recommend any Interregional Project(s) and the associated interregional cost allocation identified in the CSP study report to both MISO's and SPP's respective regional review processes for review and approval by the respective Board of Directors.

The Annual Issues Review IPSAC meeting was held on March 9, 2016, at the SPP offices in Little Rock, Ark. Multiple stakeholders, along with MISO and SPP staff, presented proposed transmission issues that were considered for evaluation in the CSP study. The feedback from stakeholders at this meeting indicated that there was a strong consensus for moving forward with a CSP study starting in 2016.

Following the IPSAC, the JPC held a meeting to decide if a CSP study would be performed in 2016. The 2016 CSP study was formally initiated on May 31, 2016, when the JPC voted in favor of performing a 2016 CSP Study. The JPC's decision was based upon the recommendation of the IPSAC which voted to recommend to the JPC to commence a joint study in 2016. While the JOA allows for up to 18 months to complete the study, SPP and MISO staff committed to and acheieved a completion date of April 2107.

Economic Analysis

Solution Identification and Development

To start the CSP process, MISO and SPP first analyzed their regional studies to find areas of congestion along the seams that could potentially be solved by an interregional project. Once those lists were created, MISO and SPP staff collaborated with stakeholders to compare the regional needs in order to identify areas of common congestion that were most likely to benefit from the collaboration. MISO and SPP agreed to evaluate seven need areas as part of the 2016 CSP study, which were presented at the September 7, 2016, IPSAC meeting (Table 8.2-1 and Figure 8.2-1).

2016 MISO-SPP CSP Joint Needs List		
Need	**Constraint**	**Location**
1	Rugby WAUE - Rugby OTP Tie FLO Rugby – Balta 230 kV	SPP-MISO Tie
2	Hankinson - Wahpeton 230 kV FLO Jamestown - Buffalo 345 kV	MISO
3	Sub3 - Granite Falls 115 kV Ckt1 FLO Lyon Co. 345/115 kV transformer	SPP-MISO Tie
4	Sioux Falls - Lawrence 115 kV FLO Sioux Falls - Split Rock 230 kV	SPP-MISO Tie
5	Northeast - Charlotte 161 kV FLO Northeast - Grand Ave West 161 kV	SPP
6	Neosho - Riverton 161 kV FLO Neosho - Blackberry 345 kV	SPP
7	Brookline 345/161 kV Ckt 1 Transformer FLO Brookline 345/161 kV Ckt 2 Transformer	SPP

Table 8.2-1: 2016 MISO-SPP CSP joint needs list

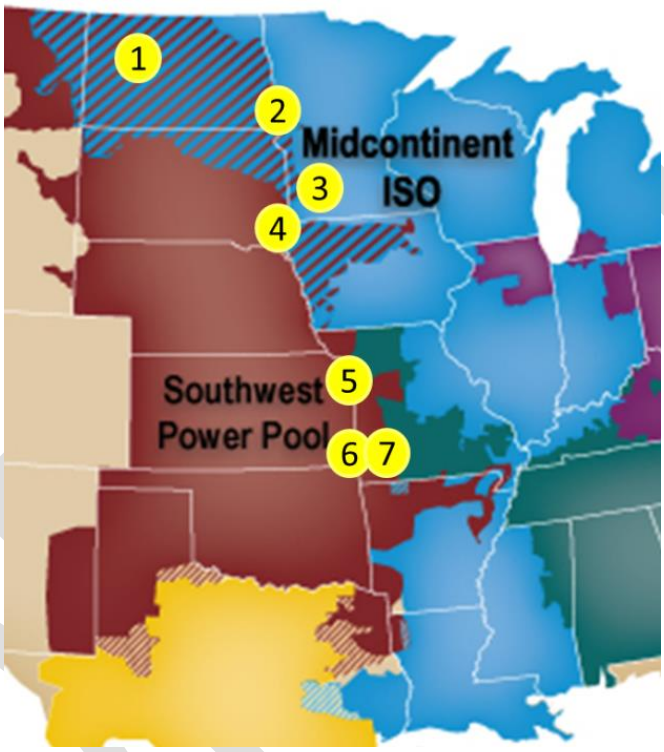

Figure 8.2-1: 2016 MISO-SPP CSP needs map

The seven needs targeted in the 2016 CSP study guided the development and evaluation of interregional transmission solution ideas. Solutions were solicited through the MISO-SPP IPSAC meetings, and each respective Regional Transmission Operator staff and stakeholders proposed transmission projects. SPP and MISO staff also leveraged proposed solutions that had been previously submitted into their respective regional processes.

By the October 2016 deadline, stakeholders submitted a total of 36 projects (34 unique) for evaluation in the 2016 CSP study (Table 8.2-2). In addition to stakeholder submissions, MISO and SPP staff submitted 10 additional projects for consideration. No stakeholder-developed solutions were submitted for need No. 5, so MISO and SPP staff used staff-proposed solutions to evaluate that particular need.

2016 MISO-SPP CSP Project Summary		
Need	**Constraint**	**Number of Stakeholder Solutions**
1	Rugby WAUE Rugby OTP Tie FLO Rugby – Balta 230 kV	2
2	Hankinson Wahpeton 230 kV FLO Jamestown Buffalo 345 kV	11
3	Sub3 Granite Falls 115 kV Ckt1 FLO Lyon Co. 345/115 kV transformer	2
4	Sioux Falls Lawrence 115 kV FLO Sioux Falls Split Rock 230 kV	7
5	Northeast Charlotte 161 kV FLO Northeast Grand Ave West 161 kV	0
6	Neosho Riverton 161 kV FLO Neosho Blackberry 345 kV	8
7	Brookline 345/161 kV Ckt 1 Transformer FLO Brookline 345/161 kV Ckt 2 Transformer	6

Table 8.2-2: Stakeholder project submission summary

Economic Transmission Solution Evaluation

APC Methodology

MISO and SPP used an agreed-upon Adjusted Production Cost (APC) metric over a multi-year analysis to jointly evaluate the benefits to the combined MISO-SPP region and to each region individually. The APC is calculated for each simulated year (2020, 2025 and 2030) and interpolated benefits for intermediate years. Benefits for years beyond the last simulated year were based on extrapolation. The total project benefit was determined by calculating the present value of annual benefits for the first 20 years of project life after the projected in-service date.

The APC benefit metric is based upon the impact of the project on adjusted production cost, which is adjusted to account for purchases and sales. Both MISO's and SPP's APC represent the summation of the APC for the defined areas in each region. Each area's production cost was adjusted for purchases and sales two ways:

- For each simulation hour in which an area is selling interchange, the APC was calculated by multiplying the interchange sales MW by the area's generation-weighted Locational Marginal Price (LMP) and then subtracting this value from the area's production cost
- For each simulation hour in which an area is purchasing interchange, the APC was calculated by multiplying the interchange purchase MW by the area's load-weighted LMP and then adding this value to the area's production cost

While the JOA outlines how APC should be calculated for evaluating benefits for purposes of determining interregional cost allocation of potential Interregional Projects, MISO calculates APC differently in its regional planning processes than the method used by SPP and stated in the JOA. Instead of using load-weighted LMP to price purchases and generation-weighted LMP to price sales, generation-weighted LMP is adopted for pricing both purchases and sales in current MISO regional APC metrics. The difference in pricing mechanisms can lead to varying results between the benefits calculated in the CSP and the benefits determined by MISO's regional review process.

Screening Process

A preliminary screening analysis was performed on all proposed transmission solution ideas to determine the solution ideas that have the most potential and warrant further evaluation. All transmission solution ideas with potential value were evaluated for APC benefits to MISO and SPP (Table 8.2-3). If there were projects that appeared to be electrically equivalent, only one of the projects was evaluated.

For the preliminary screening analysis, the benefit-to-cost ratio (B/C) for each proposed project was calculated by using APC benefit results of the 2025 model year compared to the 2025 model year estimated costs. If the one-year B/C was at least 0.5, the project was considered to have passed the preliminary screening analysis. A complete list of screening results can be found in Appendix A.

Solution ID	Solution Description	Addressed Need ID #	SPP & MISO B/C
I-1	Rugby 115 kV Breaker/Line Addition	1	5.23
I-1_2	Closes NO switch at North Harvey 115	1	64.62
I-2	Rolette 230 kV station	1	0.86
I-4	Jamestown 345 kV (OTP) to Jamestown 230 kV (WAPA) 230 kV Tie	2	0.92
I-5	Replace Hankinson and Wahpeton wavetraps	2	20.08
I-6	Spiritwood 115 kV to Jamestown 115 kV line	2	1.00
I-9	Construct new Rose substation at the juncture of the Jamestown - Buffalo 345 kV and Jamestown (WAPA) - Pickert 230 kV line	2	0.63
I-11	Hankinson - Wahpeton 230 kV Rebuild	2	1.66
I-12	Hankinson - Maple River 230 kV	2	1.26
I-14	2nd Lyon County 345/115 kV Transformer	3	1.57
I-17	Lawrence - Sioux Falls 115 kV Terminal Equipment Upgrades	4	6.68
I-18	Loop One Split Rock - Lawrence 115 kV Ckt into Sioux Falls	4	1.89
I-18c	Loop Sioux Falls - W. Brandon 115 kV into Split Rock	4	0.82
I-18d	Loop Sioux Falls - Beresford 115 kV into Lawrence	4	1.01
I-18e	De-energize Lawrence - Sioux Falls 115 kV	4	45.78
Staff Sol 1	Northeast - Charlotte 2 ohm series reactor	5	27.97
Staff Sol 2	Crosstown - Blue Valley 161 kV line	5	2.59
I-19	Tap Neosho - Delaware 345 kV line plus Riverton - tap 345 kV line add new 345/161 kV transformer at Riverton	6	0.86
I-20	Lacygne - Morgan 345 kV line	6	0.63
I-24	Lacygne - Blackberry 345 kV line plus 345/161 kV transformer and Blackberry - Asbury 161 kV line	6	0.85
I-28	James River - Brookline 345 kV line plus 345/161 kV transformer	7	0.69
Staff Sol 3	Morgan 345/161 kV Transformer plus Morgan - Brookline 161 kV uprate	7	2.41

Table 8.2-3: Projects that passed screening

Benefit-to-Cost Analysis

MISO used a 20-year net present value calculation of benefits and costs to calculate an indicative B/C ratio for the proposed transmission solutions that passed the preliminary screening analysis[5]. Benefits were calculated by the change in APC with and without the proposed Interregional Project that passed the screening process. The APC was adjusted to account for purchases and sales. The APC benefit metric was calculated for the simulated years 2020, 2025 and 2030. Benefits for intermediary years were calculated using interpolation and years beyond 2030 used extrapolation. The period covered by the benefit and cost calculation was 20 years starting with the project's in-service year[6]. The annual costs were estimated using each RTO's own respective ATRR/ARRs[7] based on whether the project was located in MISO or SPP. The present value calculation assumed an 8 percent discount rate.

For the 2016 CSP study, four projects passed the Interregional Project criteria defined in the JOA.

[5] There is not a B/C ratio requirement in the CSP study.
[6] Initially MISO and SPP have made the assumption that the in-service date for all projects is 2021.
[7] ATRR/ARR: Annual Transmission Revenue Requirement/Annual Revenue Requirement

- Loop One Split Rock - Lawrence 115kV Ckt into Sioux Falls
- Crosstown - Blue Valley 161 kV line
- Lacygne - Blackberry 345 kV line plus 345/161 kV transformer and Blackberry - Asbury 161 kV line
- James River - Brookline 345 kV line plus 345/161 kV transformer

Loop One Split Rock - Lawrence 115 kV Ckt into Sioux Falls

The proposed Interregional Project, Loop One Split Rock to Lawrence 115 kV Ckt into Sioux Falls, is a proposed new transmission project located near Sioux Falls, S.D. (Figure 8.2-2). This project has an estimated in-service date of 2021.

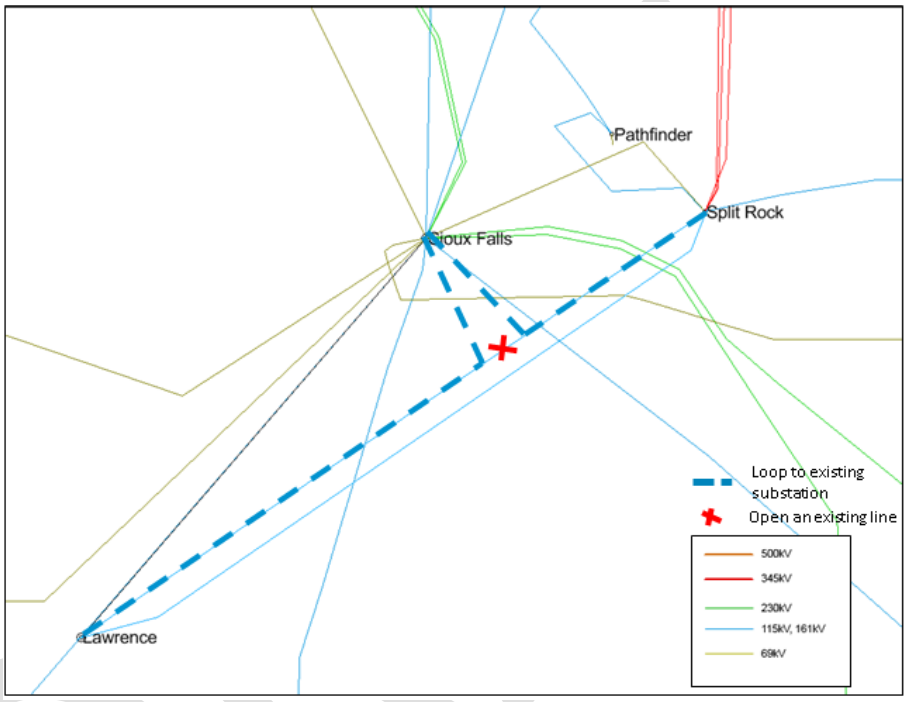

Figure 8.2-2: Loop One Split Rock - Lawrence 115 kV Ckt into Sioux Falls

This project was proposed to relieve congestion on the Lawrence to Sioux Falls 115 kV flowgate. MISO and SPP's analyses show the project completely relieves the congestion on this flowgate and provides benefit to both parties.

MISO estimated a scoping level cost estimate of approximately $6.15 million for this project, which has been reviewed by SPP[8]. Assuming the in-service date of 2021, the $6.15 million cost results in a 20-year present value cost of $7.51 million[9]. MISO and SPP's 20-year present value benefit analysis shows that MISO and SPP are estimated to collectively receive $27.83 million[10] in APC benefit over the first 20 years of the project's life, resulting in a B/C ratio of 3.71. Of the $27.83 million of APC benefit, SPP is estimated to receive $5.15 million with MISO receiving $22.68 million. Since the proportion of cost paid by MISO

[8] 2016 dollars
[9] The 20-year present value cost and benefit numbers here are calculated using SPP's 18.16 percent NPCC, factoring in depreciation, and discounting at 8 percent. The numbers calculated used MISO's Gross-Plant Weighted annual charge rate and 8 percent discount rate are similar to SPP's.

and SPP is based on the proportion of benefits, both MISO and SPP's B/C ratio is 3.71. Based on these numbers, both MISO and SPP supported the recommendation of this project into the regional review process.

Crosstown - Blue Valley 161 kV line

The proposed Interregional Project, Crosstown – Blue Valley 161 kV, is a proposed new transmission project near Kansas City, Mo. (Figure 8.2-3). This project has an estimated in-service date of 2021.

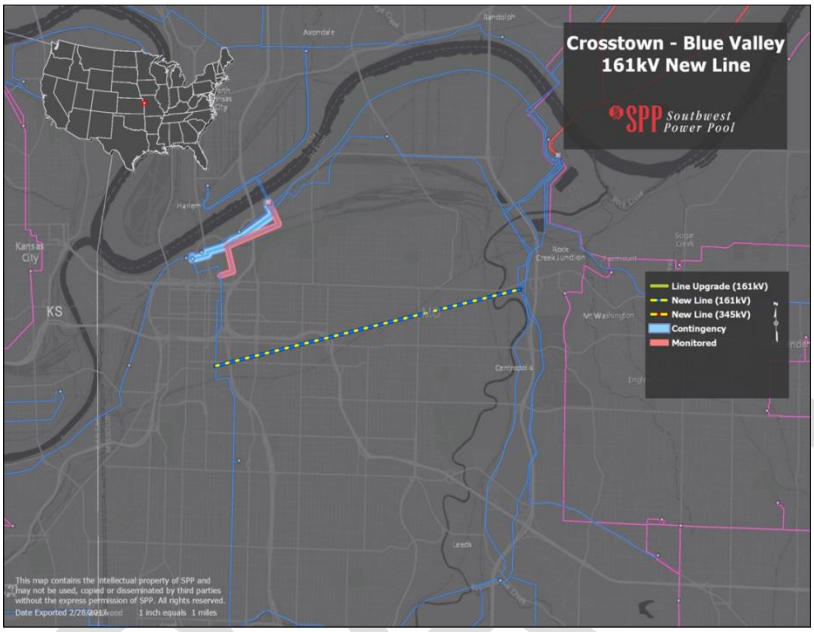

Figure 8.2-3: Crosstown - Blue Valley 161 kV line

This project was proposed to relieve congestion on the Northeast to Charlotte 161 kV flowgate. MISO and SPP's analyses show that relieving the congestion on this flowgate provides benefit to both parties. This proposed project is expected to relieve all of the congestion on the Northeast to Charlotte 161 kV flowgate.

SPP estimated an engineering and construction (E&C) cost estimate of approximately $8.06 million[11] with an assumed in-service date of 2021. The $8.06 million E&C cost results in a 20-year present value of $9.84 million[12]. MISO and SPP's 20-year benefit analysis shows that over the first 20 years of the project's life, MISO and SPP are estimated to receive $35.21 million in APC benefit resulting in a 20-year B/C ratio of 3.58. Of the $35.21 million of APC benefit, SPP is estimated to receive approximately $23 million with MISO receiving approximately $12 million. The proportion of cost paid by MISO and SPP is based on the proportion of benefits both MISO and SPP's B/C ratio is 3.58.

SPP prefers the regional solution, Northeast – Charlotte 2 Ohm series reactor, approved in the 2017 ITP10 to address this need. MISO's preliminary regional evaluation indicates that the Crosstown to Blue Valley 161 kV line would likely not pass MISO's regional review.

[11] 2016 dollars
[12] The 20-year present value cost and benefit numbers are calculated using SPP's 18.16 percent NPCC, factoring in depreciation, and discounting at 8 percent.

Lacygne - Blackberry 345 kV line plus 345/161 kV transformer and Blackberry - Asbury 161 kV line

The proposed Interregional Project, Lacygne – Blackberry 345 kV line plus 345/161 kV transformer and Blackberry – Asbury 161 kV, is a new transmission project in Missouri. This project has an expected in-service date of 2021.

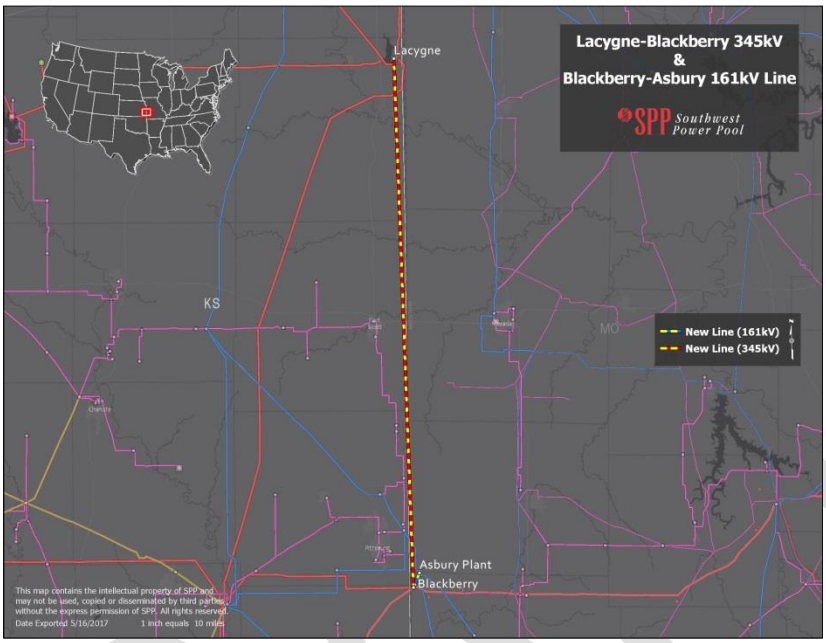

Figure 4: Lacygne - Blackberry 345 kV line plus 345/161 kV transformer and Blackberry - Asbury 161 kV line

This project was proposed to relieve congestion on the Neosho - Riverton 161 kV flowgate. MISO and SPP's analyses show that relieving the congestion on this flowgate provides benefit to both MISO and SPP. This project was calculated to relieve 69% of the congestion on the Neosho - Riverton 161 kV flowgate.

SPP estimated an E&C cost of approximately $153.65 million[13] with an assumed in-service date of 2021. The $153.65 million E&C cost results in a 20-year present value of $187.75 million[14]. MISO and SPP's 20-year benefit analysis shows that over the first 20 years of the project's life, MISO and SPP are estimated to receive $193.83 million[15] in APC benefit resulting in a 20-year B/C ratio of 1.03. Of the $193.83 million of APC benefit, SPP is estimated to receive approximately $184 million with MISO receiving approximately $10 million. The proportion of cost paid by MISO and SPP is based on the proportion of benefits both MISO and SPP's B/C ratio is 1.03.

SPP and MISO agreed this project was marginally passing several of the JOA criteria for Interregional Projects. The B/C ratio of 1.03 would have likely fallen below the desired 1.0 B/C ratio with any cost increase to the project. The project also only attributes 5 percent of the estimated APC benefit to the MISO region. SPP and MISO agreed to not recommend this project to the regional review. Additionally,

[13] 2016 dollars
[14] The 20-year present value cost number is calculated using SPP's 18.16 percent NPCC, factoring in depreciation, and discounting at 8 percent.
[15] The 20-year present value benefit number is calculated using a discount rate of 8 percent.

SPP prefers the regional solution, Upgrade Butler – Altoona and Neosho – Riverton Terminals, approved in the 2017 ITP10 to address this need. Additionally, Lacygne – Blackberry 345 kV line plus 345/161 kV transformer was evaluated in the 2017 ITP10 and did not pass the screening process.

James River - Brookline 345 kV line plus 345/161 kV transformer

The proposed Interregional Project, James River - Brookline 345 kV line plus 345/161 kV transformer, is a new 11-mile transmission project in Missouri (Figure 8.2-5). This project has an expected in-service date of 2021.

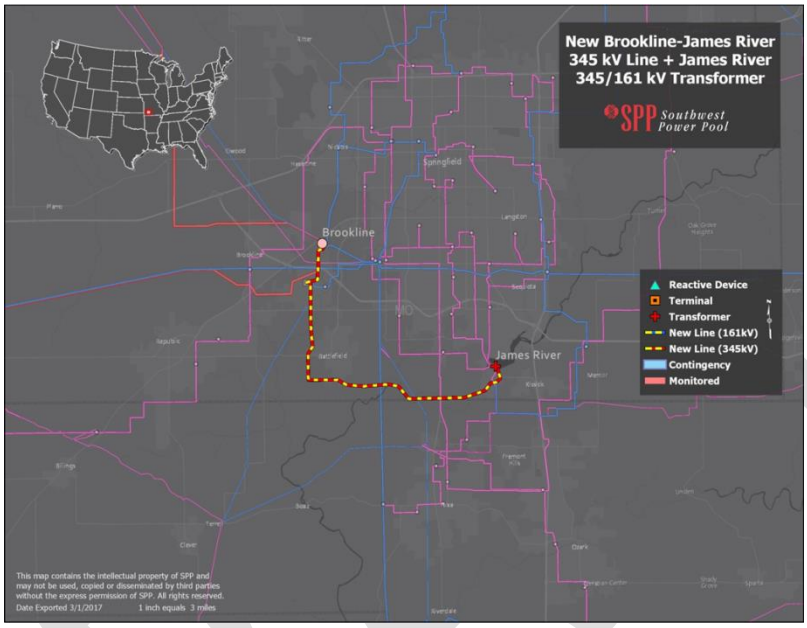

Figure 8.2-5: James River - Brookline 345 kV line plus 345/161 kV transformer

This project was proposed to relieve congestion on the Brookline 345/161 kV transformer. MISO and SPP's analyses show that relieving the congestion on this transformer provides benefit to both MISO and SPP. This project was calculated to completely mitigate the congestion on the Brookline 345/161 kV transformer.

SPP estimated an E&C cost of approximately $25 million[16] with an assumed in-service date of 2021. The $25 million E&C cost results in a 20-year present value of $30.54 million[17]. MISO and SPP's 20-year benefit analysis shows that over the first 20 years of the project's life, MISO and SPP are estimated to receive $62.49 million[18] in APC benefit resulting in a 20-year B/C ratio of 2.05. Of the $62.49 million of APC benefit SPP is estimated to receive approximately $50 million with MISO receiving $12.5 million. Since the proportion of cost paid by MISO and SPP is based on the proportion of benefits both MISO and SPP's B/C ratio is 2.05.

[16] 2016 dollars
[17] The 20-year present value cost number is calculated using SPP's 18.16 percent NPCC, factoring in depreciation, and discounting at 8 percent.
[18] The 20-year present value benefit number is calculated using a discount rate of 8 percent.

SPP prefers the regional solution, Morgan Transformer Project, approved in the 2017 ITP10 and SPP-AECI JCSP to address this need, and MISO's preliminary regional evaluation indicates that the James River - Brookline 345 kV line plus 345/161 kV transformer would likely not pass MISO's regional review.

Reliability Assessment

As stated in the 2016 CSP scope, MISO and SPP staff reviewed proposed and approved reliability projects from their respective regional planning processes. No regional projects of one Regional Transmission Operator were identified as replacing the need for a project in the other's respective regional planning process. Additionally, the review did not indicate any regional projects that could potentially be replaced by a more efficient or cost effective Interregional Project. MISO and SPP have committed to continue to review regional reliability plans as they are approved out of each respective regional planning process.

Conclusions

Economic

Based on the results of the economic assessment as well as preliminary regional evaluation results, MISO and SPP identified one proposed project for consideration as an Interregional Project:

- I-18: Loop One Split Rock to Lawrence 115 kV circuit into Sioux Falls

This project demonstrates benefit to both MISO and SPP as well as APC benefits that exceed the costs of the project over the initial 20 years of the project life.

No-harm Test on Economic Projects

Interregional Projects identified to address congestion were evaluated to ensure they do not create reliability issues. The evaluation could have resulted in the modification of the Interregional Project or identification of additional interregional facilities that are needed to mitigate the projected reliability issue.

SPP utilized the its most recent and updated powerflow models to test the Loop One Split Rock to Lawrence 115 kV Ckt into Sioux Falls for adverse reliability impacts. SPP 2017 ITP near-term supplemental models as well as the 2017 ITP near-term final reliability assessment models, which included the 2017 ITP near-term approved projects, were used for the analysis. All 15 combinations of seasons and model years were tested, and no reliability violations were caused by the addition of the project.

MISO reviewed MTEP16 for any harmful impact of project I-18. Steady-state reliability analysis was performed to check for overloads and voltages within bandwidths. MISO performed steady state analysis on the Loop One Split Rock to Lawrence 115 kV circuit into Sioux Falls. Five models were used to analyze pre- and post-project system conditions to compare impacts. MISO simulate contingencies from the area provided by Transmission Planners and new contingencies representing the project. Results were analyzed for new inabilities for the transmission system to reliably meet violations and large impacts to existing issues.

Reliability no-harm testing of project I-18 found one adverse impact of the project to the MISO or SPP[19] system for the studied conditions: an overload of the line between Lawrence to Sioux Falls due to a P6 event involving the loss of Sioux Falls – Lawrence and Split Rock – Lawrence line No. 2. Though this

[19] Due to the construction of MTEP models and timing of ERAG model construction, facilities in the SPP footprint have a one-year delay of representation in these models. For a more accurate test of no-harm, SPP analysis and results should be considered.

overload was shown in analysis, it is expected that a generator interconnection project will resolve loading issues by the end of 2017.

Interregional Cost Allocation

As outlined in the JOA, MISO and SPP have agreed to use the APC benefit metric to allocate the costs to each planning region of proposed Interregional Projects addressing primarily economic congestion.

If the recommended Interregional Project is approved by both the MISO Board of Directors and SPP Board of Directors as an Interregional Project, the costs will be allocated between MISO and SPP (Table 8.2-8).

Project	E&C Project Cost M$	MISO Cost %	SPP Cost %
Loop One Split Rock - Lawrence 115 kV Ckt into Sioux Falls	$6.15	81.48%	18.52%

Table 8.2-8: Interregional cost allocation for potential MISO-SPP interregional project

IPSAC and Joint Planning Committee Recommendation

As described in Section 9.3.3.5.1 of the JOA, a draft report detailing the work efforts completed as part of the CSP, including any proposed Interregional Projects, was provided to the IPSAC on May 25, 2017. The IPSAC had the opportunity to provide a recommendation to the JPC on the proposed Interregional Project. Taking into consideration the recommendation from the IPSAC and the combination of MISO and SPP stakeholders' votes, the JPC voted to recommend the Loop One Split Rock to Lawrence interregional project and associated interregional cost allocation, provided in this report, to both the MISO and SPP regional review processes for review and approval.

IPSAC Recommendation

The IPSAC net conference on April 24, 2017 resulted in feedback in support of the proposed Interregional Project. Multiple stakeholders expressed support for the project and there was no voiced opposition.

In addition to the IPSAC input provided during the April 24, 2017, IPSAC net conference, the MISO stakeholders' share of the IPSAC vote was conducted on April 27, 2017, at the MISO Planning Advisory Committee special meeting. The MISO portion of the IPSAC is represented by the sector representatives of the MISO Planning Advisory Committee. MISO stakeholders voted in favor of recommending the proposed Interregional Project to both the MISO and SPP regional review processes with no opposition.

The SPP stakeholders from the IPSAC conducted their vote on whether or not to move the Interregional Project to the respective regional review processes at the May 3, 2017, Seams Steering Committee meeting. The SPP stakeholders on the IPSAC include the members of the SPP Seams Steering Committee and a representative from each non-Seems Steering Committee member SPP Transmission Owner, which is interconnected with MISO's transmission system. The SPP stakeholders voted unanimously to direct the SPP portion of the JPC to vote in favor of recommending the proposed Interregional Project to both the MISO and SPP regional review processes.

Joint Planning Committee Recommendation

The MISO and SPP representatives of the JPC met on May 15, 2017, to formally vote on the proposed Interregional Projects to be recommended for review in both the MISO and SPP regional processes. Taking into consideration the recommendation of the IPSAC, the JPC voted in favor of recommending the proposed Interregional Project for review in both the MISO and SPP regional processes.

Regional Review Process

Southwest Power Pool

Project Review Process

Review Results

Midcontinent Independent System Operator

Project Review Process

8.3 MISO/ERCOT Study

A collaborative effort between MISO and the Electric Reliability Council of Texas (ERCOT) is in progress with the purpose of understanding each system's transmission issues along the seam and exploring potential unique opportunities created by joint planning.

Currently, the detailed scope of the collaborative effort is in the development stage. The study resulting from this effort will primarily be an economic evaluation, aimed at identifying solutions that can benefit both the MISO and ERCOT systems. The study will investigate various issues and identify solutions that can efficiently address them. The issues include but not limited to:

- Congestions
- Real-time operational issues
- Load pockets in both systems
- Public policy impact

Through 2017, MISO and ERCOT successfully established data exchange and communication protocols, which laid a foundation for further collaboration. MISO and ERCOT planning teams have met in person to better understand each other's planning process. A joint model is in development and testing.