MISO Market Roadmap

Project Statuses and Fact Sheets

Updated:

Feb-2019

MISO

MISO's VISION

To be the most reliable, value-creating RTO.

MISO's MISSION

Work collaboratively and transparently with our stakeholders to enable reliable delivery of low-cost energy through efficient, innovative operations and planning.

Market Enhancement Framework

MISO's Market Enhancement Framework includes the Market Vision, Guiding Principles, Focus Areas, and Market Roadmap.

Market Vision

Foster wholesale electric markets that deliver reliable and economically efficient outcomes.

Guiding Principles

Support an economically efficient wholesale market system that minimizes cost to serve load.

Facilitate non-discriminatory market participation regardless of resource type, business model, sector or regional location.

Develop transparent market prices reflective of marginal system cost, and cost allocation reflective of cost-causation and service beneficiaries.

Support Market Participants in making efficient operational and investment decisions.

Maximize alignment of market requirements with reliability requirements of the system.

Focus Areas

Enhance unit commitment and economic dispatch processes.

Maximize economic utilization of existing and planned transmission infrastructure.

Improve efficiency of prices under all operating conditions.

Facilitate efficient transactions across seams with neighboring regions.

Streamline market administrative processes to reduce transaction costs.

Maximize availability of non-confidential and non-competitive market information.

Support efficient development of resources consistent with long-term reliability and/or public policy objectives.

MISO Market Roadmap

MISO Market Roadmap: Key

PROJECT PHASE	INDICATOR	DESCRIPTION
Frame	**F**	Not typically shown on Market Roadmap; Gap Analysis, Develop Management Position, Develop Analysis Strategy
Evaluate	**E**	Research/Gather Information, Proof-of-Concept, Cost-Benefit Analysis, Whitepaper
Concept Design	**C**	Develop and Refine Concept, High Level Business Rules and Software Requirements
Build	**B**	Software Functional Specification, Vendor Software Design, Preparation for Construction, Capital Dollars, Software Development, Hardware Procurement, Business Process
Implement	**I**	Near Pre through near post implementation; Operational Transitional Phase, Implement Production System
Validate	**V**	Analysis of Project Effects, Reporting of Findings

LIST NAME	DESCRIPTION
Current Change Log	A detailed list of changes made to this document.
MISO Market Roadmap Workplan	MISO's scheduled market enhancement projects.
IMM SOM Recommendations	Status of recommendations from the 2014 State of the Market Report for the MISO Electricity Markets.
Unscheduled Projects	Unscheduled projects which have been evaluated through MISO's annual Market Roadmap process.
Change Log History	A detailed list of changes made to this document.

MISO Market Roadmap: Current Change Log

Date	Description
Feb-19	• **Market Roadmap moving to Integrated Roadmap in March**: February will be the final month of posting a pdf to the MSC Meeting Materials. For March onward, the Market Roadmap will merge into the new Integrated Roadmap and roadmap items will be updated on the online Issue Tracking Tool only. • MR 10: Stakeholder workshop completed 1/15/19. Stakeholder feedback due by 2/15/19.

MISO Market Roadmap: Work Plan

Updated: Feb-2019

Fact Sheet ID	Project Name	Market Roadmap Priority	Current Phase	Next Update Entity	Forecasted Implementation Date	2019 1Q	2019 2Q	2019 3Q	2019 4Q	2020 1Q	2020 2Q	2020 3Q	2020 4Q	2021 1Q	2021 2Q	2021 3Q	2021 4Q	2022 1Q	2022 2Q	2022 3Q	2022 4Q	2023 1Q	2023 2Q	2023 3Q	2023 4Q
Potential for Significant Impact to Day-Ahead Real-Time Market Management **LEGACY** System																									
27	**Automatic Generation Control (AGC) Enhancement for Fast-Ramping Resources**	High	Build	MSC	Oct-2019	B	B	B	I	V															
62	**Storage Participation - FERC Order 841 Compliance**	FERC	Build	TBD	Dec-2019	B	B	B	I	V															
42	**Increase the Energy Offer Cap**	FERC	Concept Design	MSC	Oct-2020	C				B	B	B	I	V											
10	**Short-Term Reserves**	High	Concept Design	MSC	Jun-2021	C				B	B	B	B	B	I	V									
25	**Resource Availability and Need** (Likely to breakout multiple enhancements, including #49 and #67)	Medium	Concept Design	RASC	Apr-2021	C	C	C	C	B	B	B	B	I	I	V									
Potential for Significant Impact to Day-Ahead Real-Time Market Management **NEXTGEN (MSE)** System																									
2	**Enhanced Modeling of Combined Cycle Generators**	Medium	On Hold	MSC	Jun-2023										B	B	B	B	B	B	B	I	I	V	
54	**Application of Dynamic and Predictive Ratings**	Low	Not Started	TBD	May-2022							E	E	C	B	B	I	I	I	V					
51	**Enhanced Storage Resource**	Low	Not Started	TBD	Dec-2022						E	E	E	C	C	C	B	B	B	B	I	V			
No Significant Impact to Day-Ahead Real-Time Market Management System																									
30	**Tighten Thresholds for Uninstructed Deviations**	Low	Concept Design	MSC	May-2019	B	I	V																	
61	**Locational Capacity Market Reforms**	Low	Build	RASC	Jun-2019	B	I	V																	
65	**Require the Installed Capacity (ICAP) of Planning Resources be Deliverable**	Low	Evaluate	RASC	Dec-2019	E	C	B	I	V															
31	**Multi-Day Market Forecast**	Low	On Hold	MSC	Oct-2021					C	C	B	B	B	B	I	I			V	V				
39	**Compensation for Restoration Energy**	Low	Evaluate	MSC	Nov-2019	E	C	B	I	V															

FRAME	EVALUATE	CONCEPT DESIGN	BUILD	IMPLEMENT	VALIDATE

IMM State of the Market (SOM) Recommendations

IMM SOM Report Order	IMM SOM Report Category	IMM SOM Report Index	IMM SOM Report Recommendation	Aligned With MISO Market Roadmap Project	MISO Market Roadmap Fact Sheet ID	MISO Market Roadmap Project Name	Current Phase	Next Status Date	Comments
E	Resource Adequacy	2010-14	Introduce a sloped demand curve in the RAC to replace the current vertical demand curve.	No			Inactive	n/a	MISO has decided not to seek rehearing of FERC's order. Following our filing of the CRS proposal, near term resource adequacy circumstances have improved, with passage of legislation in Michigan and Illinois, as well as other factors such as increased ability to import capacity into those states. Furthermore, current circumstances at FERC – including a lack of quorum and uncertainty about timing of appointments – make the rehearing path unclear. MISO has been committed from the beginning of this effort to maintain separation between the mechanisms for traditionally regulated portions of the region and competitive retail areas. The FERC order does not change that commitment. We will continue to work on solutions focused on competitive retail areas that do not implicate the traditionally regulated areas of the MISO region.
D	Improve Dispatch Efficiency and Real-Time Market Operations	2012-16	Re-order MISO's emergency procedures to utilize demand response efficiently.	No			Evaluation		Working with IMM and TOs and coordinating with States to explore practically feasible options.
A	Energy Pricing and Transmission Congestion	2012-2	Implement a five-minute real-time settlement for generation.	Completed	26	Implement 5-Minute Settlement Calculations	Post-Implementation		
B	External Transaction Scheduling and External Congestion	2012-3	Remove external congestion from interface prices to eliminate excess payments and charges to physical transactions.	Completed	44	MISO-PJM Interchange Modeling and Pricing Enhancements	Post-Implementation		Recommendation modified in 2017 SOM Report. MISO is currently deferring work on implementing any solution until full implementation of Market Systems Enhancement.
A	Energy Pricing and Transmission Congestion	2012-5	Introduce a Virtual Spread Product	Parking Lot	5	Introduce a Virtual Spread Product	Frame		Currently on hold in parking lot. Dependent on Market System Enhancement.
D	Improve Dispatch Efficiency and Real-Time Market Operations	2012-12	Improve thresholds for uninstructed deviations.	Yes	30	Tighten Thresholds for Uninstructed Deviation	See Market Roadmap Workplan		
E	Resource Adequacy	2013-4	Improve alignment of the Planning Reserve Auction and the Attachment Y process governing retirement and suspensions.	No			Conceptual Design		Proposed Att. Y changes are being discussed at Planning Advisory Committee. Tariff filing expected in Q1 2018 pending resolution of discussion with stakeholders.

IMM State of the Market (SOM) Recommendations

IMM SOM Report Order	IMM SOM Report Category	IMM SOM Report Index	IMM SOM Report Recommendation	Aligned With MISO Market Roadmap Project	MISO Market Roadmap Fact Sheet ID	MISO Market Roadmap Project Name	Current Phase	Next Status Date	Comments
A	Energy Pricing and Transmission Congestion	2014-2	Introduce a 30-Minute Local Reserve product to reflect VLR requirements.	Yes	10	Short-Term Capacity Pricing and Reliability Requirements	See Market Roadmap Workplan		March 2017: Removed 28 - Pricing for Voltage and Local Reliability (VLR) Commitment as this was merged into 10 - Develop Add'l Short-term Capacity Reserve Requirements
B	External Transaction Scheduling and External Congestion	2014-3	Improve external congestion related to TLRs by developing a JOA with TVA.	No		No Market Roadmap project candidate developed. Please see Comments column for details.	Externally Dependent		Constructive Reliability Coordination efforts continue. JOA talks are beginning. Freeze Date enhancements may mitigate impacts of flow relief requests. July 2016: IMM revised recommendation in the 2016 State-of-the-Market report. May 2016: IDCWG issued IDC change order #395 to address the calculation of unconstrained market flow. MISO has ongoing Reliability Coordinator discussions between MISO and TVA that has led to a better understanding of how each Reliability Coordinator can more efficiently leverage the TLR process to minimize the amount of relief while still maintaining reliability Parallel Flow Visualization will help congestion on market to non-market (i.e. TVA) seams given that Gen-to-Load calculations will more accurately identify the contributing generation to congestion rather than the current approximation used to assess tag impacts.
E	Resource Adequacy	2014-5	Transition to seasonal capacity market procurements.	Yes	25	Address Resource Availability and Need (Formerly Seasonal RAR)	See Market Roadmap Workplan	Q3 2019	MISO to evaluate as part of the Resource Availability and Need (RAN) process.
E	Resource Adequacy	2014-6	Define local resource zones primarily based on transmission constraints and local reliability requirements.	No			Inactive	Q3 2019	Agreed with IMM to evaluate after near-term priorities on Resource Availability & Need. Need to evaluate consistency with state and LSE jurisdiction on resource adequacy.

IMM State of the Market (SOM) Recommendations

IMM SOM Report Order	IMM SOM Report Category	IMM SOM Report Index	IMM SOM Report Recommendation	Aligned With MISO Market Roadmap Project	MISO Market Roadmap Fact Sheet ID	MISO Market Roadmap Project Name	Current Phase	Next Status Date	Comments
A	Energy Pricing and Transmission Congestion	2015-1	Expand eligibility for online units to set prices in ELMP and suspend offline pricing.	Completed	18	Extended Locational Marginal Pricing (ELMP), Phase II	Post-Implementation		Recommendation modified in 2017 SOM Report. Partially addressed under ELMP Phase II implemented on May 1, 2017. Post-implementation assessment is ongoing. MISO continues to recognize value of pricing by offline resources. Further assessment is ongoing through the first half of 2019.
A	Energy Pricing and Transmission Congestion	2015-2	Expand utilization of temperature-adjusted and short-term emergency ratings for transmission facilities	Yes	54	Application of Dynamic and Predictive Ratings	See Market Roadmap Workplan		MISO will provide information on current practices to IMM to ensure understanding of current usage of short-term and temp. adjusted ratings.
C	Guarantee Payment Eligibility Rules and Cost Allocation	2015-3	Model the VLR Requirement in the Day-Ahead Market	Yes	10	Develop Additional Short-term Capacity Reserve Requirements	See Market Roadmap Workplan		
D	Improve Dispatch Efficiency and Real-Time Market Operations	2015-4	Enhanced tools and procedures to respond to address poor dispatch performance.	No			Design		Completed UDS timing change. Setting up process to receive alerts from IMM.
E	Resource Adequacy	2015-5	Implement Firm Capacity Delivery Procedures with PJM.	No			Externally Dependent	Ongoing	MISO worked extensively with IMM, Stakeholders and PJM and made a proposal to implement this recommendation at the May 2016 PJM Joint & Common Market Meeting but has not reached agreement with PJM. As a result, MISO is implementing alternative solutions to address this issue. Received FERC approval on pseudo-tie agreement. IMM has proposed an alternate solution through the FERC process.
E	Resource Adequacy	2015-6	Improve the modeling of transmission constraints in the PRA.	No			Inactive	Q3 2019	Agreed with IMM to evaluate after near-term priorities on Resource Availability & Need. Will identify near term solutions within existing simultaneous feasibility test.
E	Resource Adequacy	2015-7	Improve the physical withholding mitigation measures for the PRA by addressing uneconomic retirements.	No			Inactive	n/a	Filing to address affiliate withholding is pending FERC action. MISO believes permanent loss of interconnection rights is sufficient deterrent to uneconomic retirements, so no further action on this recommendation is anticipated.
E	Resource Adequacy	2015-8	Improve the limit on the transfer constraint between MISO South and Midwest in the PRA.	No			Inactive	n/a	MISO's current methodology was found just and reasonable by FERC. Will continue annual review.

IMM State of the Market (SOM) Recommendations

IMM SOM Report Order	IMM SOM Report Category	IMM SOM Report Index	IMM SOM Report Recommendation	Aligned With MISO Market Roadmap Project	MISO Market Roadmap Fact Sheet ID	MISO Market Roadmap Project Name	Current Phase	Next Status Date	Comments
A	Energy Pricing and Transmission Congestion	2016-1	Improve shortage pricing by adopting an improved contingency reserve demand curve that reflects the expected value of lost load	Parking Lot	60	Improved Contingency Reserve Demand Curve that reflects VOLL	Evaluate		Agree with opportunity and approach. Further analysis is needed for curve design and determination of VOLL (value of lost load).
A	Energy Pricing and Transmission Congestion	2016-2	Improve procedures for M2M (Market-to-Market) Activation and Coordination including identifying, testing and transferring control of M2M Flowgates	No	37	Manage Power Swings Caused by Market-to-Market (M2M) Dispatch	Implement		Existing Market Roadmap project will address transferring control of M2M flowgates with SPP. Further efforts will explore additional options with PJM
A	Energy Pricing and Transmission Congestion	2016-3	Enhanced Transmission and Generation Planned Outage Approval Authority	Parking Lot	53	Impact of Outage Scheduling Practices on Market Funding	Evaluate		Agree with issue. Working to validate potential savings and incentive opportunities for Generation and Transmission Owners.
C	Operating Reserves and Guarantee Payments	2016-4	Establish regional reserve requirements and cost allocation	Yes	10	Short-Term Capacity Pricing and Reliability Requirements	See Market Roadmap Workplan		Identifying underlying drivers and preparing for stakeholder engagement. Exploring other solution approaches to manage north-south transfer
C	Operating Reserves and Guarantee Payments	2016-5	Reform DAMAP and RTORSGP (types of make whole payments) rules to improve performance incentives and reduce gaming opportunities	Parking Lot	58	Reform DAMAP and RTOSGP Rules	Inactive		Agree on opportunity to reform rules. Market Roadmap final prioritization: project moved into Parking Lot.
D	Improve Dispatch Efficiency and Real-Time Market Operations	2016-6	Improve the accuracy of Look Ahead Commitment recommendations	No			Evaluate		MISO will evaluate evidence being provided the IMM. May be addressed under Market System Enhancement.
D	Improve Dispatch Efficiency and Real-Time Market Operations	2016-7	Improve forecasting incentives for wind resources by modifying deviation thresholds and settlement rules	Parking Lot	40	Dispatchable Intermittent Resource Modification	Evaluate		Agree that opportunity exists to improve participant incentive for accurate forecasting. Evaluating solutions implemented at other RTOs
D	Improve Dispatch Efficiency and Real-Time Market Operations	2016-8	Validation of wind suppliers' forecasts and use results to correct dispatch instructions	Parking Lot	40	Dispatchable Intermittent Resource Modification	Evaluate		Agree that forecasts can be improved. Working to improve visibility and alerting tools and process.
E	Resource Adequacy	2016-9	Qualification of planning resources	Yes	25	Resource Availability and Need (RAN)	Evaluate	Q3 2019	Complex issue affecting operational planning of member utilities. Initiated stakeholder review of planned outage occurrence. MISO to evaluate as part of the Resource Availability and Need (RAN) process.

IMM State of the Market (SOM) Recommendations

IMM SOM Report Order	IMM SOM Report Category	IMM SOM Report Index	IMM SOM Report Recommendation	Aligned With MISO Market Roadmap Project	MISO Market Roadmap Fact Sheet ID	MISO Market Roadmap Project Name	Current Phase	Next Status Date	Comments
C	Energy Pricing and Transmission Congestion	2017-1	Improve the market power mitigation rules	No					MISO agrees with the IMMs statement of the issue and agrees with the recommended solution. Enhancing mitigation and sanction provisions in Module D will address evolving market conditions such as negative prices and BCA mitigation. MISO will work with the IMM to develop more detail on specific tariff language changes, stakeholder engagement process, and system impacts to MISO and IMM processes and technology platforms. Target filing by end of Second Quarter 2019.
C	Energy Pricing and Transmission Congestion	2017-2	Remove transmission charges from CTS transactions	Parking Lot	66	Remove transmission charges from CTS transactions	Frame		MISO agrees that CTS is not performing as desired, however, MISO requires further evaluation of the recommended solution. Market Roadmap final prioritization: project moved into Parking Lot.
D	Operating Reserves and Guarantee Payments	2017-3	Improve commitment classifications and implement a process to correct errors	No			Inactive		While MISO agrees with the recommendation, MISO does not currently believe this issue is a higher priority than other work already in the 2019 resource and budget plan and therefor will not receive immediate attention.
E	Dispatch Efficiency and Real-Time Market Operations	2017-4	Improve operator logging tools and processes related to operator decisions and actions	No			Inactive		At this time, this recommendation will be placed in the MSE scope for future prioritization.
E	Dispatch Efficiency and Real-Time Market Operations	2017-5	Evaluate the feasibility of implementing a 15-minute Day-Ahead Market under the Market System Enhancement	Parking Lot	68	Evaluate the feasibility of implementing a 15-minute Day-Ahead Market under the Market System Enhancement	Evaluate		MISO agrees that a more granular Day-Ahead Market would likely deliver some reliability and efficiency benefits. MISO also agrees with the recommended solution to evaluate implementation feasibility for a Day-Ahead market that is configurable to shorter time intervals in the ongoing MSE requirements process. MISO will work to finalize business requirements in partnership with our vendor and consortium partners as part of MSE program.
F	Resource Adequacy	2017-6	Require the ICAP of Planning Resources be Deliverable	Yes	65	Require the ICAP of Planning Resources be Deliverable	Evaluate		Proposed solution addresses issue for majority of resources. Intermittent resources details to be determined.

IMM State of the Market (SOM) Recommendations

IMM SOM Report Order	IMM SOM Report Category	IMM SOM Report Index	IMM SOM Report Recommendation	Aligned With MISO Market Roadmap Project	MISO Market Roadmap Fact Sheet ID	MISO Market Roadmap Project Name	Current Phase	Next Status Date	Comments
F	Resource Adequacy	2017-7	Establish PRA capacity credits for emergency-only resources that better reflect their expected availability and deployment performance	Parking Lot	67	Establish PRA capacity credits for emergency-only resources that better reflect their expected availability and deployment performance	Frame		MISO to evaluate as part of the Resource Availability and Need (RAN) process in 2018-19.

MISO Market Roadmap: Fact Sheet Descriptions

Field	Description
Fact Sheet ID	Identification number for the fact sheet.
Issue ID	ID of any associated issue on MISO's issue tracking tool.
What is it?	A brief description of the project.
Purpose / Issues Addressed	A description of the purpose of the project and the issues the project is intended to address.
Primary Guiding Principle	The primary guiding principle from the Market Vision and Principles framework that the enhancement is related to.
Primary Focus Area	The primary focus area from the Market Vision and Principles framework that the enhancement is related to.
Driver	Source or initiator such as IMM recommendation, FERC, stakeholder issue.
Support	Who supports the initiative (e.g., OMS, owners of pump storage, merchant and non-merchant generators, etc.)
Which markets/sectors does this impact?	DA/RT market clearing, pricing, settlements, Energy and/or AS product.
How many MW are directly affected?	Does it affect all generation or a small subset. Related to the current resource configuration. May not be applicable to some projects / enhancements which are not directly related to the resources.
Implementation cost and other costs	Primarily relates to costs related to consulting from industry experts, proof-of-concept studies, software implementation: Low < $0.5M; $0.5M < Medium < $1M; $1M < High < $2M; Very high > $2M.
Production cost savings	Estimated production cost savings, savings on scarcity value: Low < $1M; $1M < Medium < $5M; $5M < High < $10M; Very high > $10M (annual savings).
Other benefits	Qualitative characterization as applicable - Efficient use of resources, market transparency - transferring uplift cost to market, market participation, improve incentives, settlement to cost causality.
Current Phase	Refers to the state of the analysis in MISO. Phase in Enhancement Lifecycle: Reviewing, Planned, Evaluation, Conceptual Design, Software Design, Construction, Implementation, Post-Implementation.
Complexity/risk	Complexity of solution - simply impacts settlement or affects the market clearing software, consider complexity of concept evaluation versus achieving stakeholder consensus or implementation difficulty.
Relationship to other initiatives	Whether closely related to another initiative, should it be implemented together.
Market Roadmap Priority	Priority given during the annual Market Roadmap process.
Potential fast-track project?	Describes whether the project identified as a potential fast-track project during the annual Market Roadmap process.
Reliability Due Diligence	Describes the effect the project will have on reliability.
Additional Information	Rows contain any additional information for the project including meeting updates, whitepapers, etc.

Name:	Enhanced Modeling of Combined Cycle Generators

Fact Sheet ID	2
Issue ID	MR002
What is it?	Model combined cycle (CC) resources as configurable in the DA and RAC SCUC algorithm. The participant would be able to offer 1) configuration transition costs, 2) independent energy, no-load, and reserve offers for each configuration, 3) minimum run time and down times for each configuration, and 4) configuration transition and notification times. The algorithm would commit the best configuration on an hourly basis subject to configuration transition constraints offered by the participant. Once a configuration is committed, the offer parameters for that configuration would be loaded into SCED (DA or RT) for dispatch.
Purpose / Issues Addressed	Market participants must offer CC components as either an aggregate resource or individual resources for an entire day, with a single offer curve. Since a certain dispatch point may have a different cost depending on the configuration, the higher cost is always factored into the offer curve. Transition times and costs between different configurations cannot be modeled effectively, resulting risk premiums added to startup and no-load offers.
Primary Guiding Principle	Support Market Participants in making efficient operational and investment decisions.
Primary Focus Area	Enhance unit commitment and economic dispatch processes.

Origin

Category	Assessment	Comments
Driver	Requested by CC owners	
Support	MSC, IMM	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Energy - Primarily relates to generation commitment in DA and RT	Additional level of detail for combined cycle.
How many MW are directly affected?	19,000 MW	There are 44 CC plants in the MISO footprint, and there are multiple new CC's planned for development. In some cases, there are few projects that coal units are substituted by gas units.

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Very high	Estimate implementation cost > $2M.
Production cost savings	High	Estimate $14M-$34M per year through more efficient commitment of CC configurations.
Other benefits	Low	Market clearing technology may eventually be expanded to other operational constraints for other types of units.

Implementation Considerations

Category	Assessment	Comments
Current Phase	Conceptual System Design Completed by MISO, GE created initial Delta Design Note (DDN).	Software functional design (including Agile story creation) and software construction will begin in 2021. ECC project work requires completion of other nGEM developments first.
Complexity/risk	High	Market clearing software run time performance impact is large and will require efforts to address solution timing.
Relationship to other initiatives	Market System Enhancement (MSE) Project	This project is one that has been included under the MSE umbrella due to its importance.
Market Roadmap Priority	Medium	
Potential fast-track project?	No	Communicated at September 1, 2015 MSC.

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Does no harm	Better modeling may slightly help plan/prepare for operational constraints.

Change Log

Category	Date	Comments
Informational	Jan-2019	Forecasted implementation date changed to Q2 2023. Current Phase details (above) updated.
Informational	Nov-2018	Forecasted implementation date changed to Q2 2022.
Implementation Considerations	Jul-2018	Updated Current Phase Assessment and Comments.
Implementation Considerations	Feb-2018	Relationship to other initiatives - MSE.
Economic Benefits and Costs	Feb-2018	Production cost savings Assessment changed to High.
Implementation Considerations	Jan-2018	The Evaluation phase has been completed, and the development of the product has begun. First stage is Conceptual System Design.
Implementation Considerations	Feb-2017	Updated Market Roadmap Priority to Medium to match Market Roadmap Workplan.

Name:	Enhanced Modeling of Combined Cycle Generators

Informational	Jun-2016	Updated information for the 2016 ranking process.
Informational	Jan-2016	Please see Issue ID above which links to MISO's issue tracking tool.
Fact Sheet Template Updated	Nov-2015	Market Roadmap fact sheet converted to updated template.

Name:	Short-Term Reserves

Fact Sheet ID	10
Issue ID	MR010
What is it?	Short-term capacity, which can provide energy within a relatively short period of time (e.g. 30 minutes), is an important tool for maintaining reliability, providing the ability to manage capacity needs that may not be addressed by Operating Reserves and the Ramp Capability Reserve product. This project explores options, including existing and/or new pricing mechanisms, for ensuring availability of short-term capacity in an efficient manner to address Voltage and Local Reliability (VLR), regional, and system-wide requirements.
Purpose / Issues Addressed	System-Wide: Gas-fired units have historically provided short-term operational flexibility and have been called on for short-term capacity needs. Low natural gas prices (like in the recent past) or increase in the cost of operating resources of other fuel types (e.g. coal due to regulations), may allow operationally flexible gas-fired resources to become more economical and, as such, be committed and dispatched ahead of less-flexible resources. With flexible resources online and generating near maximum capacity and less flexible resources offline and unavailable to respond quickly, the capability to respond to short-term capacity needs may fall below needed levels. Regional: The IMM identified a regional capacity need driven by the Regional Directional Transfer constraint and currently addressed by commitments incurring significant uplifts. The IMM recommends utilizing a short-term reserve product to address this regional capacity need more efficiently. Voltage and Local Reliability: VLR constraints in several load pockets (particularly in the South Region) are managed through commitments that incur significant uplifts (as high as $90 Million in 2014). The IMM recommends pricing the VLR constraints using a short-term reserve product to provide better transparency of the VLR costs and, potentially, incent entry of resources that can address this need in a more economic manner.
Primary Guiding Principle	Develop transparent market prices reflective of marginal system cost and cost allocation reflective of cost-causation and service beneficiaries.
Primary Focus Area	Enhance unit commitment and economic dispatch processes.

Origin

Category	Assessment	Comments
Driver	IMM Recommendation # 2014-2 IMM Recommendation # 2016-4 Stakeholder initiative on Gas-Electric Coordination	
Support	MISO	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Energy and Operating Reserve Market	
How many MW are directly affected?	Uncertain	

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	High	Approximately $1,605,927
Production cost savings	None to Medium	• More cost effective solution to meet reliability standards through a market based solution • Enhanced cost allocation through better cost causation. • Attract investment where need.
Other benefits	Improve price efficiency and reliability	

Implementation Considerations

Category	Assessment	Comments
Current Phase	Conceptual Design	Develop Short Term Reserve product.
Complexity/risk	Medium	A new product, requiring changes to the Market Clearing Engine and the Settlement System may be implemented. Additionally, a new reserve product would contribute to overall capacity requirements, and therefore it is probable that the frequency of scarcity would be higher.
Relationship to other initiatives	Market System Enhancement	
Market Roadmap Priority	High	Communicated at December 14, 2017 MSC.
Potential fast-track project?	No	Communicated at September 1, 2015 MSC.

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	No harm	Solution will enhance reliability.

Change Log

Category	Date	Comments
Informational	Feb-2019	Stakeholder workshop completed 1/15/19. Stakeholder feedback due by 2/15/19.
Informational	Nov-2018	Name changed to "Short-Term Reserves" Forecasted implementation date changed to Q2 2021.
Name	May-2018	Name changed to "Short-Term Capacity Reserves"
Implementation Considerations	May-2018	Current phase changed to Conceptual Design. Relationship to other initiatives changed to Market System
Implementation Considerations	Feb-2018	Provided update of current phase and updated Market Roadmap priority to high.
Add IMM Recommendation (#2016-4) and integrate description of 28, Pricing for Voltage and Local Reliability (VLR) Commitments	Jun-2017	Fact sheet updated to reflect that issues considered under this project now includes the IMM recommendation (#2016-4) to establish regional reserve requirements and cost allocation. The fact sheet was also updated to reflect the issues formerly considered under 28, Pricing for Voltage and Local Reliability (VLR) Commitments.
Includes VLR issues	Nov-2016	28 - VLR was merged into this project, as there is significant overlap in issue addressed and potential solution
Informational	Jun-2016	Updated information for the 2016 ranking process.
Evaluation Started	Jan-2016	Project has moved into the Evaluation phase.
Informational	Jan-2016	Added Issue ID above which links to MISO's issue tracking tool.
Fact Sheet Template Updated	Nov-2015	Market Roadmap fact sheet converted to updated template.

Name:	**Address Resource Availability and Need (RAN)** (Formerly Seasonal RAR)

Fact Sheet ID	25
Issue ID	MR025
Sub Issue ID	RSC007
Sub Issue ID	RSC008
What is it?	Evaluation of issues impacting the availability of resources sufficient to serve load and provide needed reserves at all times.
Purpose / Issues Addressed	Assure the conversion of committed capacity resources into sufficient energy every hour of the Planning Year.
Primary Guiding Principle	Maximize alignment of market requirements with system reliability requirements
Primary Focus Area	Support efficient development of resources consistent with long-term reliability and/or public policy objectives.

Origin

Category	Assessment	Comments
Driver	Efficiency and Reliability	
Support	See 2018 & 19 RSC and 2019 MSC/RASC materials and the RAN issue in the tracking tool	IMM Recommendation # 2014-5

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Energy Markets	
How many MW are directly affected?	~12,000 MW	The standard deviation for load & generation is ~12 GW. RAN aims to understand and, if needed, mitigate misalignment of resource availability & need.

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	High	Approximately $2,000,000
Production cost savings	High	1. Mitigate risk threatening achievement of reliability criterion due to gaps between data reported to our LOLE studies and the operating day 2. Committing resources that are more available to MISO during the Operating Day 3. Enhance efficiency of existing resources 4. MISO administers a resilient construct that will achieve reliability objectives in a diverse set of futures (e.g., high intermittent resource penetration, retention of aging existing assets)
Other benefits	Medium	Improved price signals and accounting of resource adequacy during all seasons.

Implementation Considerations

Category	Assessment	Comments
Current Phase	Conceptual Design	RAN was transferred to the Reliability Subcommitte (RSC) by the Steering Committee in early 2018 where the Evaluation phase was completed. MISO is implementing phase 1 enhancements related to LMRs and Outage Coordination to improve the conversion of capacity into energy by Q2 2019 allowing for time for phase 2 and 3 items to be vetted with stakeholders in 2019. At the end of 2018 the Steering Committee assigned specific Resource Adequacy items to the RASC and other market-oriented items to the MSC for further development. Shorter-term operational items impacting reliability directly remain at the RSC for discussion.
Complexity/risk	High	MISO and stakeholders are now considering changes to market products to provide price signals that incentivize the successful conversion of capacity into energy.
Relationship to other initiatives	High	Needs to account for and inform market changes in addition to regulatory, operational and planning initiatives. Stakeholders have requested coordination with the Renewable Integration Impact Assessment (RIIA) in particular which is now in place.
Market Roadmap Priority	Medium	
Potential fast-track project?	No	Communicated at September 1, 2015 MSC.

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Enhances reliability	Provides transparency into operational adequacy during all seasons

Change Log

Category	Date	Comments

Phase, complexity, relationship	Jan-2019	Updated current phase, increased complexity and relationship to "High" given RAN is proceeding into phase 2 and 3 items which entail significant changes/additions to the current markets
Status and cost	Jun-2018	Updated current phase and reduced expected cost.
Numerous	Feb-2018	DG made updates to project sheet.
Implementation Considerations	Feb-2018	Changed Current Phase to Evaluate to match Market Roadmap Work Plan.
Informational	Feb-2018	Included additional Current Phase comments.
Name	Feb-2017	Updated the name to Resource Availability and Need
Implementation Considerations	Feb-2017	Updated Current Phase to Software Design to match Market Roadmap Work Plan. Updated Market Roadmap Priority to Medium to match Market Roadmap Work Plan.
Schedule	Sep-2016	Filing deferred to 2017 to accommodate additional stakeholder discussion and allow for stakeholder focus on CRS effort.
Schedule	May-2016	Stakeholders requested additional time prior to filing. MISO requested written feedback on areas that require clarity and will follow up with a revised schedule.
Schedule	Mar-2016	Schedule adjusted; change communicated at March 2 RASC Change will allow time for the footprint to prepare for the process change, including adjusting any commercial arrangements. Adjustment also allows certainty from a FERC process perspective, furthering the commercial certainty of the proposal
Informational	Jan-2016	Added Issue ID above which links to MISO's issue tracking tool.
Informational	Dec-2015	Added IMM Recommendation # to Origin
Fact Sheet Template Updated	Nov-2015	Market Roadmap fact sheet converted to updated template.

Name:	Automatic Generation Control (AGC) Enhancement for Fast-Ramping Resources

Fact Sheet ID	27
Issue ID	MR027
What is it?	Enhancement of AGC system to incorporate priority-based deployment of resources for regulation service.
Purpose / Issues Addressed	Implementation of FERC order 755 achieved benefits from performance of existing resources but the market hasn't attracted better performing new resources. MISO identified opportunities to enhance AGC based regulation deployment system that will enable superior regulation service by utilizing fast ramping resources and improve overall efficiency of the market. Increased regulating reserve suppliers can potentially reduce production costs by freeing up traditional resources that are currently providing regulating reserve to provide energy and/or contingency reserves as well as freeing up stranded capacity on those resources due to regulation commitment. Meanwhile, the market can also benefit from better utilization of fast ramping resources and potentially improved reliability.
Primary Guiding Principle	Maximize alignment of market requirements with reliability requirements of the system.
Primary Focus Area	Enhance unit commitment and economic dispatch processes.

Origin

Category	Assessment	Comments
Driver	Storage resource developers	
Support	MSC	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Primarily resources providing regulation	With co-optimization, all participants will be impacted.
How many MW are directly affected?	400MW regulating resources	

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Low	
Production cost savings	Medium	
Other benefits	Potentially reduce emission; improved reliability with better regulation performance	

Implementation Considerations

Category	Assessment	Comments
Current Phase	Build	
Complexity/risk	Mostly on AGC system; risk relatively low	
Relationship to other initiatives	High	Follow up on FERC Order 755
Market Roadmap Priority	High	Communicated at September 1, 2015 MSC.
Potential fast-track project?	No	Communicated at September 1, 2015 MSC.

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Expect to improve reliability	

Change Log

Category	Date	Comments
Informational	Dec-2018	Implementation date updated to October 2019.
Implementation Considerations	Aug-2018	Project approved as fixed bid
Implementation Considerations	Jul-2018	Detailed Design Complete
Implementation Considerations	Feb-2018	Updated Current Phase to Build to match Market Roadmap Work
Implementation Considerations	May-2017	Updated Current Phase to Evaluation.
Implementation Considerations	Feb-2017	Updated Current Phase to Conceptual Design to match Market
Informational	Jun-2016	Updated information for the 2016 ranking process.
Informational	Jan-2016	Added Issue ID above which links to MISO's issue tracking tool.
Fact Sheet Template Updated	Nov-2015	Market Roadmap fact sheet converted to updated template.

Name:	Tighten Thresholds for Uninstructed Deviations

Fact Sheet ID	30
Issue ID	MR030
What is it?	Revise the tariff/BPM rules, thresholds and settlements calculations for resource variance from dispatch instructions.
Purpose / Issues Addressed	A revision to the tariff/BPM rules, thresholds, and calculations will improve suppliers' incentives to follow MISO dispatch instructions and when used to determine eligibility for Price Volatility Make Whole Payments, will help address concerns about unreported derates.
Primary Guiding Principle	Support Market Participants in making efficient operational and investment decisions.
Primary Focus Area	Improve efficiency of prices under all operating conditions.

Origin

Category	Assessment	Comments
Driver	2012 IMM SOM	IMM Recommendation # 2012-12
Support		Has been presented to stakeholders.

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Generation owners	
How many MW are directly affected?		

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Medium	Settlement software changes are complex in this area
Production cost savings		Will improve generator performance and reduce production costs.
Other benefits		Improved incentives to obey operator instructions, which ultimately improves reliability.

Implementation Considerations

Category	Assessment	Comments
Current Phase	Concept Design	IMM provided starting documentation of proposal, MISO has perfomed initial analysis
Complexity/risk	Medium	Settlement calculations
Relationship to other initiatives	Settlements Replacement	IMM related recommendation 2012-12a
Market Roadmap Priority	Low	Communicated at September 1, 2015 MSC.
Potential fast-track project?	No	Communicated at September 1, 2015 MSC.

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	No direct impact	Should improve reliablity by improving generator performance.

Change Log

Category	Date	Comments
Informational	Dec-2018	Implementation date updated to May 2019.
Implementation Considerations	Jul-2018	Edited phase timing to reflect current build and implementation status.
Implementation Considerations	May-2018	Market Roadmap Priiority corrected to "Low". Edited phase timing to reflect current status.
Implementation Considerations	Mar-2018	Edited phase timing to reflect current status.
Implementation Considerations	Feb-2018	Edited phase to reflect product being in Concept Design phase. Expected Implementation now in 3Q of 2018.
Implementation Considerations	May-2017	Edited phase to reflect product being in Software Design phase.
Implementation Considerations	Apr-2017	Edited phase to reflect product being in Conceptual Design phase.
Informational	Jan-2016	Added Issue ID above which links to MISO's issue tracking tool.
Extended Conceptual Design Phase	Dec-2015	Additional analysis and discussion required in conceptual design. The Conceptual Design phase, which was previously forecasted to end in 4Q of 2015, is now expected to end one quarter later in 1Q 2016. Please note that this change extends the project's Forecasted Completion Date by one quarter.
Fact Sheet Template Updated	Nov-2015	Market Roadmap fact sheet converted to updated template.

Name:	Multi-Day Market Forecast

Fact Sheet ID	31
Issue ID	MR031
What is it?	Assessment of current Tariff design surrounding unit commitment, especially Multi-day commitment considerations.
Purpose / Issues Addressed	Improvement in economic cycling of resources and improved commitment in advance of the DA Market. This issue has been more noticeable due to significant penetration of renewable resources (primarily wind) that can change dramatically day-to-day and footprint expansion that allows for more diversity in the selection of resources and regional operational drivers for commitment. Some customers have raised concerns that routine cycling on baseloaded units leads to inefficient unit commitment and increased maintenance & capital costs to run resources in this manner, especially when considered over a greater length of time than next-day. Additionally need to review and improve information made available to MISO customers to better enable business decisions outside of MISO's commitment decisions.
Primary Guiding Principle	Support Market Participants in making efficient operational and investment decisions.
Primary Focus Area	Enhance unit commitment and economic dispatch processes.

Origin

Category	Assessment	Comments
Driver	Stakeholder initiative on Gas-Electric Coordination	
Support	MidAm, Entergy most vocal	Interest raised in the context of the ENGCTF for improved gas supply arrangements

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Most, if not all	Commitment and cycling decisions directly impact production costs
How many MW are directly affected?	Over 40,000 MW	Approximately 10% of the MISO Generation Fleet could realistically benefit from multi-day market information, to improve their commitment decisions.

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	TBD	Depends on scope created during Conceptual System Design. Beyond the initial development work, ongoing staff will be required to perform, validate and publish the Multi-Day Market Forecast
Production cost savings	~$30-45 Million/Year	Presented at December 2017 MSC
Other benefits	Reduced customer risk, less volatile market solutions, improved MISO Operational Awareness, improved natural gas purchases, improved pumped-hydro scheduling	

Implementation Considerations

Category	Assessment	Comments
Current Phase	Not Active	Conceptual System Design to begin in 2020
Complexity/risk	Medium	MISO Process and Procedures will have to be adjusted for TSP, DA, FRAC and IRAC functions.
Relationship to other initiatives	Market System Enhancement (MSE) Project	
Market Roadmap Priority	Medium	
Potential fast-track project?	No	

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Improves Reliability	Increases ability to commit longer lead resources while improving ability to procure fuel in advance of the operating day

Change Log

Category	Date	Comments
Project timeline / Current Phase Comments	Jul-2018	Project timeline updated to show implementation date of Oct-2021, which includes MISO resource and budgetary constraints related to other projects.
Update project description	Jun-2018	Updated cells C6 and C9 above.

Name	Mar-2018	As communicated at the February MSC, the project was renamed from "Introduce Multi-Day Financial Commitments" to "Multi-Day Market Forecast", which better reflects the current effort. After implementation, an assessment will be made regarding Mulit-Day Financial Commitments.
Indicators of Extent of Impact	Feb-2018	MW directly affected: assessment and comments updated.
Implementation Considerations	Feb-2018	Current Phase updated to Not Active to match Market Roadmap. Complexity/risk changed from Low to Medium. Relationship to other intiatives changed to MSE. Market Roadmap Priority changed from High to Medium.
Economic Benefits and Costs	Feb-2018	Implementation costs, production costs savings and other benefits: assessment and comments updated.
Informational	Jun-2016	Updated information for the 2016 ranking process.
Informational	Jan-2016	Added Issue ID above which links to MISO's issue tracking tool.
Fact Sheet Template Updated	Nov-2015	Market Roadmap fact sheet converted to updated template.

Name:	Compensation for Restoration Energy

Fact Sheet ID	39
Issue ID	MR039
What is it?	Create mechanism to settle for energy provided and delivered during a system restoration event.
Purpose / Issues Addressed	During system restoration events, the transmission system in the isolated or blacked out areas must be re-energized and expanded to create a stable island that can eventually be re-synchronized to the interconnection. In such a scenario, the Transmission Operator is responsible for re-energizing their transmission facilities and identifying the generation and load needed to support system operation. While MISO is able to economically commit and dispatch generation in an interconnected system, the generators in the separated area(s) do not obtain unit dispatch instructions from MISO. A compensation and cost allocation methodology needs to exist to make resource owners whole during island events.
Primary Guiding Principle	Support Market Participants in making efficient operational and investment decisions.
Primary Focus Area	Streamline market administrative processes that reduce transaction costs.

Origin

Category	Assessment	Comments
Driver	Requested by RSC	EPPSRWG developed whitepaper.
Support	RSC Endorsement of Whitepaper	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	RT/DA Market, all LSEs and Generation	
How many MW are directly affected?	Potentially entire market depending on scope of restoration event	

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Medium	Tariff solution, minimal settlement\ software development
Production cost savings	Low	Would not impact day-to-day dispatch. Restoration events are rare but widespread.
Other benefits	Without a mechanism to compensate for restoration energy, some gen operators (particularly IPPs) would have little incentive to assist in a restoration event. This could delay system restoration activities.	Since restoration events are very rare, yet very high impact, the process will not come into play often, but will be very important. This is especially true with the integration of the South Region due to the added risk of Hurricane damage causing widespread system damage and blackouts.

Implementation Considerations

Category	Assessment	Comments
Current Phase	Evaluate	Whitepaper developed.
Complexity/risk	Medium/High	Will likely require an After The Fact settlements process outside the normal settlements processes. During a restoration event, Real Time data will likely be unavailable and the MISO State Estimator would be incapacitated. Data may need to be collected over weeks or months to facilitate the final settlement.
Relationship to other initiatives	Low	System Restoration Events are by definition not "Normal Operations". Most of the processes/initiatives in MISO are focused on ongoing operations.
Market Roadmap Priority	Medium	Communicated at September and November 2018 MSC.
Potential fast-track project?	No	Communicated at September 1, 2015 MSC.

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Does No Harm	Comes in to play during restoration, and is a settlement mechanism.

Change Log

Category	Date	Comments
Informational	Jan-2019	Current phase updated to Evaluate.
Informational	Nov-2018	Moved to Active Work Plan.
Informational	Jan-2016	Please see Issue ID above which links to MISO's issue tracking tool.
Fact Sheet Template Updated	Nov-2015	Market Roadmap fact sheet converted to updated template.

Name:	Increase the Energy Offer Cap

Fact Sheet ID	42
Issue ID	MR042
What is it?	Energy markets accept offers to sell energy. These offers are not required to be cost-based, as was required in the early days of energy pools. As a precaution against possible market power, electric power markets have created caps for these energy offers. In 1999, PJM switched from cost-based offers to market-based offers, and introduced the $1,000/MWh energy offer cap. At that time, it was not expected that valid energy offers would ever exceed this limit. Since then, most other ISOs/RTOs, including MISO, have adopted the same $1,000/MWh Energy Offer Cap, most likely for consistency reasons.
Purpose / Issues Addressed	When the Energy Offer Cap was created, MISO's generation fuel mix was dominated by coal and nuclear. These fuel prices were relatively low and stable, so "reasonable" energy offers did not approach the $1,000/MWh level. In recent years, natural gas generators have become a larger portion of the generation fleet. This transition has occurred for a variety technical, economic, and environmental reasons. If natural gas prices surpass the levels seen in early 2014, then hundreds of MWs of generation capacity could have marginal costs that exceed the current energy offer cap. This project will change the current offer cap, as mandated in FERC Order 831.
Primary Guiding Principle	
Primary Focus Area	

Origin

Category	Assessment	Comments
Driver		
Support		

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?		
How many MW are directly affected?		

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs		
Production cost savings		
Other benefits	FERC Compliance	

Implementation Considerations

Category	Assessment	Comments
Current Phase	Concept Design	MISO's compliance filing accepted by FERC on Oct. 1, 2018. Implementation will be Oct. 1, 2020.
Complexity/risk	Medium	System changes will be needed to calculate the effective offers of Fast Start Resources (FSRs) before the ELMP pricing run is executed.
Relationship to other initiatives	No	
Market Roadmap Priority	FERC	
Potential fast-track project?	No	

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence		

Change Log

Category	Date	Comments
Purpose / Issues Addressed	Jan-2018	Updated to indicate MISO is changing the offer cap, per FERC Order 831.
Implementation Considerations	Dec-2018	Current phase updated to Concept Design.
FERC accepts Order 831 Compliance Filing	Oct-2018	FERC accepted MISO's Compliance filing for Order 831, with an implementation date of Oct. 1, 2020.
Updated schedule based on most recent filing to FERC	Aug-2018	MISO's Order 831 compliance filing was rejected in part by FERC on 3/28/18, and MISO re-filed 5/29/18. Awaiting FERC approval.
Implementation Considerations	Feb-2018	Updated Current Phase to Not Active to match Market Roadmap Work Plan. Relationship to other initiatives entered as "No". Market Roadmap Priority entered as "FERC". Potential fast-track project entered as "No".
Informational	Feb-2018	Updated Current Phase comments to reflect rejected FERC filing.
Informational	May-2017	MISO has filed compliance filing for FERC Order 831 (May 8th, 2017). Conceptual Design is largely completed, and Software Design is beginning

Name:	Increase the Energy Offer Cap

Informational	Mar-2017	Current expectation is to implement enhanced offer verification and ORDC redesign by December 2017. This could change based on final solution approach and FERC acceptance of MISO compliance submission.
Implementation Considerations	Feb-2017	Updated Current Phase to Reviewing to match Market Roadmap Work Plan.
Informational	Nov-2016	FERC issued a final rule largely consistent with the NOPR requiring that RTOs allow cost verified bids over $1,000 be eligible to set the market clearing price. Verified cost-based offers over a $2,000 “hard cap” can be made but will not set the market clearing price but rather be paid for costs over $2,000 in uplift. Under MISO’s current processes the verification process would lie with the IMM. In other RTOs this function lies in the RTOS.
Informational	Nov-2016	https://www.ferc.gov/media/news-releases/2016/2016-4/11-17-16-E-2.asp#.WDRv2U3ruJe
Informational	Nov-2016	https://www.ferc.gov/industries/electric/indus-act/rto/E-2-presentation.pdf
Informational	Sep-2016	Filed temporary Tariff waiver for the third winter. Allows verified fuel costs above $1000/MWh to be recovered via RSG.
Informational	Aug-2016	Provided update on Energy Offer Cap at August MSC.
Informational	May-2016	Future presentation to MSC will be made after FERC Energy Offer Cap Rules are finalized.
Informational	Feb-2016	Extended the Evaluation phase by one quarter to account for the FERC NOPR.
Informational	Jan-2016	FERC published a related NOPR on 1/21/2016, Docket No. RM16-5-000.
Fact Sheet Created	Nov-2015	Market Roadmap fact sheet created.

Name:	Enhanced Storage Resource

Fact Sheet ID	51
Issue ID	MR051
What is it?	Create a new resource type, considering broader issues related to storage constraints with the dispatch and commitment model for behind or in-front of the meter, including state-of-charge constraints, settlements, coordination with state policy and tariff language. Incorporate transition considerations for pumped storage resources.
Purpose / Issues Addressed	Specifically focused on how to include storage, given its flexibility to inject or withdraw capacity
Primary Guiding Principle	Facilitate non-discriminatory market participation regardless of resource type, business model, sector or regional location
Primary Focus Area	Enhance unit commitment and economic dispatch processes

Origin

Category	Assessment	Comments
Driver	MISO emergent technology enablement initiative	Industry trends show expectation of growth in storage. FERC final order will require system changes by late 2019.
Support	MSC	Stakeholder interest in storage participation in the market

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Storage resources	With co-optimization, all Energy and Ancillary Service participants will be impacted.
How many MW are directly affected?	Currently < 1000 MW	Expected to grow in near and long-term

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	TBD	Depends on level of complexity for solution
Production cost savings	TBD	Depends on amount of storage participating in the market
Other benefits	Medium	Enables higher penetration of renewables

Implementation Considerations

Category	Assessment	Comments
Current Phase	Evaluate	This project is planned after new storage resource
Complexity/risk	Medium to High	Depends on level of complexity for solution
Relationship to other initiatives	Yes	May utilize transition model in enhanced combined cycle.
Market Roadmap Priority	High	
Potential fast-track project?	No	

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Reliability Enhancement	Can provide emergency capacity, provides flexibility to balance highly intermittent peaks and lows (e.g. wind and solar), reduce wear and tear on other regulating resources

Change Log

Category	Date	Comments
Informational	Nov-2018	Concept Design, Build, Implemt and Validate phases added to work plan timeline.
What is it?	Aug-2018	Added pumped storage transition considerations to the description.
Name	May-2018	Name Changed to "Enhanced Storage Resource"
Implementation Considerations	Mar-2018	Updated Current Phase comments.
Origin	Mar-2018	Updated Driver and Support comments.
Implementation Considerations	Feb-2018	Updated Current Phase to Evaluate to match Market Roadmap Work Plan. Updated Market Roadmap Priority to High to match Market Roadmap Work Plan.
Implementation Considerations	Feb-2017	Updated Current Phase to Reviewing to match Market Roadmap Work Plan. Updated Market Roadmap Priority to Medium to match Market Roadmap Work Plan.
Fact Sheet Created	Jun-2016	New candidate

Name:	Application of Dynamic and Predictive Ratings

Fact Sheet ID	54
Issue ID	MR054
What is it?	Improved utilization of the existing transmission system by facilitating the systematic input of transmission ratings into MISO EMS and market applications based on actual or forecasted conditions
Purpose / Issues Addressed	More granular transmission ratings can increase reliability specifically under conditions where the real-time temperature and wind speed data suggests that predictive or dynamic ratings should be lower than static ratings. When evaluating Open Project proposals for robustness, consideration should be given to the use of monitoring equipment, software, etc. that enable utilizing dynamic or predictive ratings. There are many conditions where the planning criteria that set the limits of the transmission system are not reflective of the conditions experienced in operations. Under most conditions, utilizing dynamic transmission ratings would greatly increase the transmission capability for use in the near-term operations of the Real-Time market. In longer term horizons (applies to both RT and DA markets), predictive limits could be used that are based on anticipated ambient conditions. The economics for additional transmission capacity (e.g., through monitoring equipment installation, etc.) could be improved by co-location of generation specific to intermittent resources in order to smooth variations. MISO has developed an application that provides more options for Transmission Owners to submit facility ratings for use in real-time and future study applications.
Primary Guiding Principle	Support an economically efficient wholesale market system that minimizes cost to serve load
Primary Focus Area	Maximize economic utilization of existing and planned transmission infrastructure

Origin

Category	Assessment	Comments
Driver	Stakeholder driven	Submitted by Chad Koch of WEC Energy Group – We Energies and Wisconsin Public Service Corporation
Support		

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Energy, Ancillary Services, Financial Transmission Rights	Specifically targeted to enhance the transmission congestion management process. With this, MISO should promote the availability of the application and, encourage its use among Transmission Owners and Selected Developers.
How many MW are directly affected?	TBD	

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	~1M $	Expected implentation and operating costs by 2022
Production cost savings	$2 Million per Year	Envision 20-40% of additional TO/TOPs use Dynamic Ratings in MISO process
Other benefits	Enhance Market Effeciency and Maximize existing use of Transmission system	

Implementation Considerations

Category	Assessment	Comments
Current Phase	Not Active	Planned
Complexity/risk	Medium	The suggested focus should be on making the application 'user friendly' with sufficient data controls.
Relationship to other initiatives	Yes	Localized pilot programs
Market Roadmap Priority	Low	
Potential fast-track project?	TBD	

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	This project will improve market effeciency and maximimize existing use of transmission system which in turn help reliable operations and enhance reliability	

Change Log

Category	Date	Comments
Informational	Nov-2018	Forecasted implementation date changed to Q2 2022.
Economic Benefits and Costs	Feb-2018	Added Implementation cost assesment and comments.Added Production cost assessment and comments.Added Other benefits assessment.
Reliability Due Diligence	Feb-2018	Added Reliability Due Diligence assessment.
Implementation Considerations	Feb-2018	Updated Current Phase to Not Active to match Market Roadmap Work Plan.

Name:	Application of Dynamic and Predictive Ratings

Implementation Considerations	Feb-2017	Updated Current Phase to Planned to match Market Roadmap Work Plan. Updated Market Roadmap Priority to Low to match Market Roadmap Work Plan.
Fact Sheet Created	Jun-2016	New candidate

Name:	Locational Capacity Market Reforms

Fact Sheet ID	61
Issue ID	MR061
What is it?	Provide a means to align treatment of internal and external resources in the Planning Resource Auction
Purpose / Issues Addressed	External resources are priced as though they are located where their transmission service crosses into the MISO footprint, and are counted toward meeting the Local Clearing Requirement of a Local Resource Zone when not physically located in that Zone.
Primary Guiding Principle	Support Market Participants in making efficient operational and investment decisions. Address potential reliability concern by ensuring procurement of adequate resources within each Local Resource Zone.
Primary Focus Area	Support efficient development of resources consistent with long-term reliability and/or public policy objectives.

Origin

Category	Assessment	Comments
Driver	Voted into Market Roadmap Initiative List at 6/2/2015 Market Roadmap Workshop	
Support	IMM Recommendation # 2008-11	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Resource Adequacy	
How many MW are directly affected?		

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs		
Production cost savings	No direct production cost savings.	This would not affect dispatch.
Other benefits	Zonal hedging of capacity costs over time, may lead to more efficient investment incentives.	Being able to lock in a hedge against future congestion between Zonal Resource Credits (ZRC) on which the Capacity Import Limits (CIL) is not yet binding would reduce risk associated with future changes in congestion and perhaps provide more efficient investment incentives for resources located in a different ZRC.

Implementation Considerations

Category	Assessment	Comments
Current Phase	Build	Refiled at FERC on August 31st for 2019/2020 implementation
Complexity/risk	Medium	Core concepts already exist in MISO resource adequacy design.
Relationship to other initiatives	High	Resource Availability & Need (MR025)
Market Roadmap Priority	Low	
Potential fast-track project?	Yes	Communicated at September 1, 2015 MSC.

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence		

Change Log

Category	Date	Comments
Informational	Nov-2018	FERC accepted filing without condition.
Current Phase	Sep-2018	Current Phase updated to Build.
Informational	Sep-2018	FERC rejected filing with guidance; proposal refiled with consideration of FERC's guidance August 31st
Schedule	Jun-2018	Deficiency notice received; response scheduled for June 5
Informational	Mar-2018	Updated comments to reflect March 2017 filing
Implementation Considerations	Feb-2018	Updated Current Phase to Concept Design to match Market Roadmap Work Plan. Updated Market Roadmap Priority to Low to match Market Roadmap Work Plan.
Informational	Jun-2017	Updated fact sheet to be more focused on external resource zones in the Planning Resource Auction
Schedule	Feb-2017	Topic discussed at Resource Adequacy Subcommittee. Implementation tentatively scheduled for 2018 and is dependent upon stakeholder feedback. Updated Current Phase to Software Design to match Market Roadmap Work Plan. Changed Market Roadmap Priority to Medium to match Market Roadmap Work Plan.

Name:	Locational Capacity Market Reforms

Project name changed	Nov-2016	Previous name: Introduce Capacity Transfer Rights in the Resource Adequacy Requirements
Schedule	May-2016	Stakeholders requested additional time prior to filing. MISO requested written feedback on areas that require clarity and will follow up with a revised schedule.
Schedule	Mar-2016	Schedule adjusted; change communicated at March 2 RASC Change will allow time for the footprint to prepare for the process change, including adjusting any commercial arrangements. Adjustment also allows certainty from a FERC process perspective, furthering the commercial certainty of the proposal
Informational	Dec-2015	Added IMM Recommendation # to Origin
Fact Sheet Template Updated	Nov-2015	Market Roadmap fact sheet converted to updated template.

Name:	Storage Participation – FERC Order 841 Compliance

Fact Sheet ID	62
Issue ID	MR062
What is it?	Develop an Electric Storage Resource Participation Model in compliance with FERC Order 841.
Purpose / Issues Addressed	FERC Order 841 requires RTOs to establish a participation model for Energy Storage Resources (ESRs). ESRs should be able to provide capacity, energy, ancillary services, and non-market products to extent technically capable. The participation model must recognize characteristics of ESRs in bid parameters or by other means.
Primary Guiding Principle	Facilitate non-discriminatory market participation regardless of resource type, business model, sector or regional location.
Primary Focus Area	Enhance unit commitment and economic dispatch processes.

Origin

Category	Assessment	Comments
Driver	FERC Order 841	Compliance requirement
Support	MSC, RSC, RASC, PAC	Issues have been subdivided to different stakeholder entities

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Storage Resources	Electric Storage Resources participating in the market will be able to set market clearing prices.
How many MW are directly affected?	Uncertain	Minimum resource size is 100 kW.

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	TBD	Depends on complexity of solution
Production cost savings	TBD	Uncertain
Other benefits	TBD	Enables participation of Electric Storage Resources

Implementation Considerations

Category	Assessment	Comments
Current Phase	Build	MISO filed compliance proposal.
Complexity/risk	Medium to High	Depends on complexity of solution
Relationship to other initiatives	Yes	Intersects with Enhanced Storage Resource
Market Roadmap Priority	TBD	Currently being prioritized
Potential fast-track project?	Yes	FERC Requirement

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	TBD	Reliability effects TBD. Should not have negative effect on reliability.

Change Log

Category	Date	Comments
Curent Phase	Jan-2019	Set to build and updated comments
Current Phase	Aug-2018	Set Category to Conceptual Design
Fact Sheet Created	May-2018	Market Roadmap fact sheet created.

Name:	Require the Installed Capacity (ICAP) of Planning Resources be Deliverable

Fact Sheet ID	65
Issue ID	MR065
What is it?	IMM recommends that MISO determine deliverability for all resources based on the entire ICAP of applicable planning resources (whether they are Network Resource Interconnection Service (NRIS) or Energy Resource Interconnection Service (ERIS)). This will ensure consistency with the Loss of Load Expectation (LOLE) studies, which assume that resources will perform up to their ICAP level when they are available. This will also ensure consistency with the performance requirement of the Tariff section 69A.5 (ICAP must-offer requirement). By making this change, ERIS resources would be required to procure firm transmission service in the amount of their ICAP level.
Purpose / Issues Addressed	Reliability is measured using LOLE studies, which assume that resources will perform up to their ICAP level when they are available. By making this change, ERIS resources would be required to procure firm transmission service in the amount of their ICAP level, ensuring adequate capacity to meet system needs. It will treat all capacity resources on a comparable basis, resulting in more accurate prices in the capacity market.
Primary Guiding Principle	Facilitate non-discriminatory market participation regardless of resource type, business model, sector or regional location
Primary Focus Area	Support efficient development of resources consistent with long-term reliability and/or public policy objectives

Origin

Category	Assessment	Comments
Driver	IMM recommendation	
Support	IMM	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Capacity Market	
How many MW are directly affected?	Subset	Exact level of impact to be determined

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Medium	Includes cost of process implementation and resulting TSRs
Production cost savings	To be determined	
Other benefits	Efficient use of resources	

Implementation Considerations

Category	Assessment	Comments
Current Phase	Evaluate	
Complexity/risk	Medium	Impact on individual generators to be determined
Relationship to other initiatives	None	
Market Roadmap Priority	Low	
Potential fast-track project?		

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	To be determined	

Additional Information

Category	Date	Comments
Informational	Nov-2018	Added to Work Plan.
Fact Sheet Created	Jun-2018	Market Roadmap fact sheet created.

MISO Market Roadmap: Parking Lot (& New)

Fact Sheet ID	Project Name	Market Roadmap Priority	Fact Sheet Last Updated
5	Virtual Spread Product	High	Jun-2017
7	Optimize Flow-Control Resource Dispatch	Medium	Jun-2017
8	Look-Ahead Commitment, Phase II	Low	Jun-2017
21	Enhance Economic Selection and Dispatch of Spinning Reserves	Medium	Jun-2017
29	Multi-year FTR Auction	Low	Jun-2017
32	Develop Three-way Market-to-Market Processes (MISO, PJM, SPP)	Low	Jun-2017
33	Incentive for Frequency Response Service	High	Jun-2018
34	Cross-LBA DR/storage participation	Low	Jun-2017
35	Reduce Minimum Megawatt Participation Limit for Demand Response	Low	Jun-2017
36	Aggregate Load to Meet Min Participation Lim	High	Jun-2017
38	Allocate Feasible Auction Revenue Rights	Low	Jun-2017
40	Dispatchable Intermittent Resource Modification	Low	Jun-2017
41	Capacity Transfer Rights in Resource Adequacy Requirements	Low	Jun-2017
49	DR/BTMG/EDR use during Capacity Emergency	High	Jun-2017
50	Behind Meter Storage Aggregation in DRR Type II	Medium	Jun-2017
52	MISO-SPP Coordinated Transaction Scheduling	Medium	Jun-2017
53	Impact of Outage Scheduling Practices on Market Funding	Low	Jun-2017
55	Post Contingent Actions	Low	Jun-2017
57	ASM Product Substitution Visibility	Low	Jun-2017
58	Reform DAMAP and RTOSGP Rules	Medium	Jun-2017
59	Modified INC/DEC	Low	Jun-2017
60	Improved Contingency Reserve Demand Curve that reflects VOLL	Medium	Jun-2017
63	Enhanced Modeling of Generator Operations	Medium	Jun-2018
64	Look Ahead Dispatch	High	Jun-2018
66	Remove transmission charges from Coordinated Transmission Service (CTS) transactions	Medium	Jun-2018
67	Establish PRA capacity credits for emergency-only resources that better reflect their expected availability and deployment performance	Medium	Jun-2018
68	Evaluate the feasibility of implementing a 15-minute Day-Ahead Market under the Market System Enhancement	Medium	Jun-2018
69	Allow Dispatchable Intermittent Resources (DIRs) to Provide Regulation Service	Low	Jun-2018

Parking Lot: Introduce a Virtual Spread Product

Fact Sheet ID	5
Issue ID	MR005
What is it?	Implementation of a new virtual spread product in the Day Ahead market. It involves a virtual sale at a point of injection and a corresponding virtual buy at a point of withdrawal.
Purpose / Issues Addressed	Removes execution risk of transacting with virtual bids and offers. Allows MPs the ability to manage their exposure to RT congestion. Provides enhanced price convergence between the DA and RT markets related to congestion, which the IMM has described as poor in the past. Allows MPs a better means to arbitrage inconsistent congestion patterns between the day-ahead and real-time markets.
Primary Guiding Principle	Develop transparent market prices reflective of marginal system cost, and cost allocation reflective of cost-causation and service beneficiaries.
Primary Focus Area	Improve efficiency of prices under all operating conditions.

Origin

Category	Assessment	Comments
Driver	Proposed by financial participants	
Support	IMM recommendation	IMM Recommendation # 2012-5

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Energy market - DA only	
How many MW are directly affected?	< 10 GW	In PJM, similar product clears 50 GW/hour. MISO expects more moderate volumes.

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Medium	In DA SCUC/SCED, virtual spreads would look like a Up-to-TUC physical schedule without a source/sink node restriction. Main implementation costs would be to adapt this model to a virtual product, plus settlement system changes.
Production cost savings	Medium	Will improve the DA Commitment of resources by improving its recognition of real-time congestion patterns. Due to relative complexity of simulating virtual bids, no cost benefit analysis was undertaken.
Other benefits	Medium	1) Would improve the ability of intermittent generation sources to export or import into MISO market. 2) Would improve the ability of financial traders to converge DA/RT congestion prices; as a product that would allow more efficient hedging of real time congestion than pairs of virtual incs and decs.

Implementation Considerations

Category	Assessment	Comments
Current Phase	Planned	Three stakeholder workshops to educate market participants and collect feedback/concerns.
Complexity/risk	Medium	Similar to traditional virtual bids, the virtual spread product has the potential to create both beneficial and harmful wealth transfers.
Relationship to other initiatives	Medium	Project will likely remain on hold until DA SCUC engine performance issues are resolved. MISO cannot implement this proposal if it results in an inability to clear the DA market.
Market Roadmap Priority	Low	
Potential fast-track project?	No	Communicated at September 1, 2015 MSC.

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Does no harm	

Change Log

Category	Date	Comments
Implementation Considerations	Feb-2017	Updated Market Roadmap Priority to Low to match Market Roadmap Work Plan.
Informational	Jun-2016	Updated information for the 2016 ranking process.
Informational	Jan-2016	Added Issue ID above which links to MISO's issue tracking tool.
Informational	Dec-2015	Added IMM Recommendation # to Support
Fact Sheet Template Updated	Nov-2015	Market Roadmap fact sheet converted to updated template.

Parking Lot: Optimize Flow-Control Resource Dispatch

Fact Sheet ID	7
Issue ID	MR007
What is it?	Provide control for classic HVDC, back-to-back HVDC, variable frequency transformer, and series compensation FACTS devices.
Purpose / Issues Addressed	Improve congestion management; model physical characteristics and limitations of FCRs.
Primary Guiding Principle	Support an economically efficient wholesale market system that minimizes cost to serve load.
Primary Focus Area	Maximize economic utilization of existing and planned transmission infrastructure.

Origin

Category	Assessment	Comments
Driver	Initiated by owners of assets that utilize the HVDC facilities	
Support	MSC and Stakeholders	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Both DA and RT markets	
How many MW are directly affected?	Approx. 2 GW	2 HVDC currently within market

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Medium	Between $0.5M and $1M
Production cost savings	Medium	True HVDC dispatch will reduce stranded Ramp capability of cheaper generation. Can bypass congestion on AC system. Reduce congestion and A/S costs.
Other benefits	Medium	Will send better price signals for building HVDC merchant transmission.

Implementation Considerations

Category	Assessment	Comments
Current Phase	Reviewing	
Complexity/risk	Medium	Programming changes by Alstom.
Relationship to other initiatives	None	
Market Roadmap Priority	Low	
Potential fast-track project?	No	Communicated at September 1, 2015 MSC.

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Reliability Enhancement	Controllability of HVDC transmission power flow can improve reliability, utilization and efficiency of Transmission system. HVDC transmission can bypass the congested path and deliver power to load centers.

Change Log

Category	Date	Comments
Implementation Considerations	Feb-2017	Updated Current Phase to Reviewing to match Market Roadmap Work Plan. Updated Market Roadmap Priority to Low to match Market Roadmap Work Plan.
Informational	Jun-2016	Updated information for the 2016 ranking process.
Informational	Mar-2016	Project to be kicked off in April after SMEs review of design documentation. Updated project phase from "Planned" to "Evaluation".
Informational	Jan-2016	Added Issue ID above which links to MISO's issue tracking tool.
Fact Sheet Template Updated	Nov-2015	Market Roadmap fact sheet converted to updated template.

Parking Lot:	Look Ahead Commitment (LAC), Phase II

Fact Sheet ID	8
Issue ID	MR008
What is it?	Add Simultaneous Feasibility Test (SFT) check to LAC, executed as a post-process to discover new constraints and fine-tune the existing constraints.
Purpose / Issues Addressed	LAC analysis is based on list of constraints the operator selects ahead of time using the constraint manager. This list may not capture major transmission constraints or the dispatch changes could contribute to new transmission violations. This can cause reliability issues after the commitments have been issued.
Primary Guiding Principle	Maximize alignment of market requirements with reliability requirements of the system.
Primary Focus Area	Enhance unit commitment and economic dispatch processes.

Origin

Category	Assessment	Comments
Driver	MISO	
Support	MISO	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	RT commitment process for Energy and AS markets	
How many MW are directly affected?	Uncertain	Effects resource selection for transmission constraints.

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	High	Implementation costs are estimated to be close to $2M.
Production cost savings	Low	This process improvement may better inform decisions and lead to slight cost savings through improved commitment.
Other benefits	Low	LAC process efficiency improved by automatically considering new potential transmission constraints along with the existing constraints in the LAC Runs.

Implementation Considerations

Category	Assessment	Comments
Current Phase	***Unscheduled***	Evaluation Completed.
Complexity/risk	Medium	Performance challenge; uncertainty around availability of robust AC power flow application.
Relationship to other initiatives	None	
Market Roadmap Priority	Low	Communicated at September 1, 2015 MSC.
Potential fast-track project?	No	Communicated at September 1, 2015 MSC.

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Reliability enhancement	Reliability and economics are impacted together.

Change Log

Category	Date	Comments
Fact Sheet Template Updated	Nov-2015	Market Roadmap fact sheet converted to updated template.

Parking Lot: Enhance Economic Selection and Dispatch of Spinning Reserves

Fact Sheet ID	21
Issue ID	MR021
What is it?	Eliminate guarantee payments to deployed spinning reserves or consider expected deployment costs during clearing/selection of resources for spinning reserve.
Purpose / Issues Addressed	Compensating spinning reserve suppliers for out-of-market deployment costs when they are called on to produce energy results in an inefficient selection of spinning reserve resources. Eliminating such payments, including RTORSGP and real-time RSG payments, will improve reserve market efficiency by causing expected deployment costs of operating reserves to be reflected in participants' offers.
Primary Guiding Principle	Develop transparent market prices reflective of marginal system cost, and cost allocation reflective of cost-causation and service beneficiaries.
Primary Focus Area	Improve efficiency of prices under all operating conditions.

Origin

Category	Assessment	Comments
Driver	IMM Recommendation # 2010-11	
Support		

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Contingency Reserve (primarily)	
How many MW are directly affected?	2000 MW	

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Low	Procedures and settlements affected.
Production cost savings	Medium	More efficient selection of operating reserves.
Other benefits	Medium	Fairness; perceptions.

Implementation Considerations

Category	Assessment	Comments
Current Phase	Evaluation	Evaluation completed; conceptual design underway.
Complexity/risk	Low	Straightforward changes; impacts relatively minor.
Relationship to other initiatives	Low	
Market Roadmap Priority	Low	Communicated at September 1, 2015 MSC.
Potential fast-track project?	Yes	Communicated at September 1, 2015 MSC.

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Does no harm	

Change Log

Category	Date	Comments
Informational	Jun-2016	Updated information for the 2016 ranking process.
Informational	Jan-2016	Added Issue ID above which links to MISO's issue tracking tool.
Informational	Dec-2015	Added IMM Recommendation # to Origin
Fact Sheet Template Updated	Nov-2015	Market Roadmap fact sheet converted to updated template.

Parking Lot: Multi Year FTR Auction

Fact Sheet ID	29
Issue ID	MR029
What is it?	Addition of an FTR Auction allowing for the trading of FTRs beyond the current planning year.
Purpose / Issues Addressed	This new feature would allow Market Participants to purchase FTRs that span beyond the planning year, allowing for increased certainty on congestion hedging position beyond the current 1 year out framework.
Primary Guiding Principle	Support an economically efficient wholesale market system that minimizes cost to serve load.
Primary Focus Area	Maximize economic utilization of existing and planned transmission infrastructure.

Origin

Category	Assessment	Comments
Driver	Proposed by financial traders	
Support	Market Participants	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	FTR Market only	
How many MW are directly affected?	10 GW	In PJM, about 10% of the transmission capacity is made available for FTR spanning beyond the planning year.

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Medium	Requires enhancements to the Nexant software and hardware to enable the successful administration of additional auctions.
Production cost savings	Low	
Other benefits	Medium	Would improve the hedging confidence of entities with multi year contracts.

Implementation Considerations

Category	Assessment	Comments
Current Phase	***Unscheduled***	FTRWG discussion in Fall of 2015 led to inclusion as a candidate for prioritization in the 2017-2019 Market Roadmap
Complexity/risk	Medium	Product has the potential to create both beneficial and harmful wealth transfers.
Relationship to other initiatives	Medium	MISO cannot implement this proposal if it results in an inability to administer the allocation or auction that are already established.
Market Roadmap Priority	Low	Communicated at September 1, 2015 MSC.
Potential fast-track project?	No	Communicated at September 1, 2015 MSC.

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Does no harm	

Change Log

Category	Date	Comments
Current Phase	Jun-2017	Current Phase Comments were updated
Informational	Jan-2016	Please see Issue ID above which links to MISO's issue tracking tool.

Parking Lot:	Develop Three-way Market-to-Market Processes (MISO, PJM, SPP)

Fact Sheet ID	32
Issue ID	MR032
What is it?	Determine justification and plans to implement three way market to market in 2017.
Purpose / Issues Addressed	MISO currently performs market to market congestion management with either PJM or SPP. Future changes or increases in pseudo tie generators may create the need for three way market to market including both SPP and PJM with MISO. This project could allow all three markets (MISO,PJM,SPP) to provide joint economic dispatch on same constraint.
Primary Guiding Principle	Support an economically efficient wholesale market system that minimizes cost to serve load.
Primary Focus Area	Facilitate efficient transactions across market "seams" with neighboring regions.

Origin

Category	Assessment	Comments
Driver	WAPA integration into SPP and increase in pseudo tie generation will result in flowgates that are responsive to MISO, PJM and SPP control. MISO will need to be able to share in redispatch with its neighbors to ensure that the most economic resources are responding to the market to market constraints.	
Support		

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	RT Energy Market, DA/FTR	Will affect RT/DA operation including the JOA settlement
How many MW are directly affected?	Significant	

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs		Detailed evaluation is needed in order to determine the benefits and costs.
Production cost savings		
Other benefits		

Implementation Considerations

Category	Assessment	Comments
Current Phase	Reviewing	Ongoing discussion among three RTOs (MISO,PJM,SPP)
Complexity/risk	Complex	Alstom Change, Settlement and JOA change
Relationship to other initiatives	Existing M2M with PJM/SPP	
Market Roadmap Priority	Medium	Communicated at September 1, 2015 MSC.
Potential fast-track project?	No	Communicated at September 1, 2015 MSC.

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence		Improving coordination between MISO, PJM and SPP will have a positive impact on reliability.

Change Log

Category	Date	Comments
Current Phase	Apr-2016	Updated current phase to Reviewing, continue to review the need for Three-Way Market-to-Market thru the middle of 2017. Update provided at May 2nd SMWG.
Informational	Mar-2016	Updated completion to be within 2017 rather than by 2017
Conceptual Design Started	Jan-2016	Project has moved into the Conceptual Design phase.
Informational	Jan-2016	Added Issue ID above which links to MISO's issue tracking tool.
Fact Sheet Template Updated	Nov-2015	Market Roadmap fact sheet converted to updated template.

Parking Lot: Incentive for Frequency Response Service

Fact Sheet ID	33
Issue ID	MR033
What is it?	Introduce additional financial incentive for providers of Primary Frequency Response (PFR) service such as synchronous generators with governors enabled or invertor based technology, such as energy storage technology. Frequency response is a measure of an Interconnection's ability to stabilize frequency within a time frame of 1s to 10s immediately following the sudden loss of generation or load. This effort will evaluate the opportunity and benefits of a market based solution such as explicit AS product or a compensation mechanism.
Purpose / Issues Addressed	This enhancement intends to restrict declining frequency response due to change in generation mix in the system. Primary Frequency responds to reduce minimum frequency nadir during trip of large generators and thus reducing the risk of under frequency load shedding and cascading outages. System governor response has been declining steadily. Declining response results in deeper frequency nadirs during system disturbances and increasing the risk of under frequency load sheddings and cascading outages. Introducing a market based product would allow MISO to meet BAL-003 standard requirements reliably and most economically.
Primary Guiding Principle	Maximize alignment of market requirements with reliability requirements of the system.
Primary Focus Area	Support efficient development of resources consistent with long-term reliability and/or public policy objectives.

Origin

Category	Assessment	Comments
Driver	MISO	Once we are at a point where we are close to not meeting BAL-003 standard this product should give us most economical way to meet the standard requirements.
Support	MISO	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	ASM	
How many MW are directly affected?	Unknown	At this point of time, MISO has sufficient Frequency response to meet BAL-003 standard. Declining frequency response over time should give more accurate MW affected.

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Low-Medium costs	Depending on the potential solution if we want include frequency response in co-optimization process costs will be little higher as ALSTOM work will be needed.
Production cost savings	None to Low	
Other benefits	Reliability Benefits and meet BAL-003 standard requirements most economically and avoid any potential penalties if BAL-003 standard not met	

Implementation Considerations

Category	Assessment	Comments
Current Phase	Reviewing	
Complexity/risk	Low to Medium	
Relationship to other initiatives	None	
Market Roadmap Priority	Low	Communicated at September 1, 2015 MSC.
Potential fast-track project?	No	Communicated at September 1, 2015 MSC.

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Will enhance reliability	Primary frequency response is used to stabilize the Interconnection frequency within a time frame of 1s to 10s immediately following the sudden loss of generation or load. Managing frequency is a key activity for reliability.

Change Log

Category	Date	Comments
Modified Issue Created	Jun-2018	Clarification to the description to broaden the scope to include synchronous generation as well as invertor based technology such as energy storage.
Informational	Feb-2016	Extended the Reviewing phase by two quarters.
Fact Sheet Template Updated	Nov-2015	Market Roadmap fact sheet converted to updated template.

Parking Lot:	Cross-LBA DR/storage Participation

Fact Sheet ID	34
Issue ID	MR034
What is it?	Refine business rules and modeling methodology such that demand response and storage resources operating across LBA boundaries can participate in the MISO market as a single asset.
Purpose / Issues Addressed	Certain resources, including storage, cannot currently participate as DR because of the requirement for the associated resources to reside in the same LBA. This leads to utility self-commitment of resources, lack of operator intelligence regarding loads, reduced supply available to MISO, higher prices and other inefficiencies.
Primary Guiding Principle	Facilitate non-discriminatory market participation regardless of resource type, business model, sector or regional location.
Primary Focus Area	Enhance unit commitment and economic dispatch processes.

Origin

Category	Assessment	Comments
Driver	Initiated by demand response participants	Reduce artificial barriers to demand response participation in MISO market and address declining reserve margins
Support	MSC & OMS	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Demand response, storage	With co-optimization, all Energy and Ancillary Service participants will be impacted.
How many MW are directly affected?	Uncertain -- estimated to be greater than 1000 MWs	

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	TBD	
Production cost savings	TBD	
Other benefits	Reliability benefits & improved load forecasting	

Implementation Considerations

Category	Assessment	Comments
Current Phase	Previously unscheduled	Now being reconsidered
Complexity/risk	Medium	Impact to load forecasting must be considered as part of the evaluation.
Relationship to other initiatives	Yes	36 - Aggregate Load to Meet Minimum Participation Limits
Market Roadmap Priority	Previously low	Communicated at September 1, 2015 MSC.
Potential fast-track project?	No	Communicated at September 1, 2015 MSC.

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Will enhance reliability	

Change Log

Category	Date	Comments
Fact Sheet Template Updated	Jun-2016	Added storage impacts
Informational	Jan-2016	Please see Issue ID above which links to MISO's issue tracking tool.
Fact Sheet Template Updated	Nov-2015	Market Roadmap fact sheet converted to updated template.

Parking Lot:	Reduce Minimum Megawatt (MW) Participation Limit for Demand Response

Fact Sheet ID	35
Issue ID	MR035
What is it?	Allowing demand response resources to operate at lower MW limits
Purpose / Issues Addressed	Certain resources cannot currently participate as DR because of varying minimum participation limits. This is problematic because the resources must be price takers. This leads to sub-optimal commitment of resources, stifles potential new demand-response program participation, reduces supply and increases prices, reduces operator transparency to load, and other inefficiencies.
Primary Guiding Principle	Facilitate non-discriminatory market participation regardless of resource type, business model, sector or regional location.
Primary Focus Area	Enhance unit commitment and economic dispatch processes.

Origin

Category	Assessment	Comments
Driver	Reduce artificial barriers to demand response participation in MISO market and address declining reserve margins	
Support	MSC & OMS	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Energy & ancillary services (day ahead & real-time) and capacity markets	
How many MW are directly affected?	Uncertain -- but certainly > 1000 MWs	

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Medium	
Production cost savings	Significant -- TBD	
Other benefits	Reliability benefits & improved load forecasting	

Implementation Considerations

Category	Assessment	Comments
Current Phase	***Unscheduled***	
Complexity/risk	Medium	
Relationship to other initiatives	Uncertain	
Market Roadmap Priority	Medium	Communicated at September 1, 2015 MSC.
Potential fast-track project?	No	Communicated at September 1, 2015 MSC.

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Will enhance reliability	

Change Log

Category	Date	Comments
Informational	Jan-2016	Please see Issue ID above which links to MISO's issue tracking tool.
Fact Sheet Template Updated	Nov-2015	Market Roadmap fact sheet converted to updated template.

Parking Lot: Aggregate Load and/or Storage to Meet Minimum Participation Limit

Fact Sheet ID	36
Issue ID	MR036
What is it?	Refine business rules and modeling methodology such that demand response and storage resources operating across multiple busses can aggregate to meet minimum MW participation limit.
Purpose / Issues Addressed	Certain resources that span buses cannot currently participate as DR or storage because of this requirement. This leads to utility self-commitment of resources, stifles potential new DSM or storage programs participation, reduces supply to MISO and increases prices, inhibits operator intelligence regarding loads, and other inefficiencies.
Primary Guiding Principle	Facilitate non-discriminatory market participation regardless of resource type, business model, sector or regional location.
Primary Focus Area	Enhance unit commitment and economic dispatch processes.

Origin

Category	Assessment	Comments
Driver	Initiated by demand response participants	Reduce artificial barriers to demand response and storage participation in MISO market and address declining reserve margins
Support	MSC and OMS	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Demand response	With co-optimization, all Energy and Ancillary Service participants will be impacted.
How many MW are directly affected?	Uncertain, estimated to be greater than 500 MWs	

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	TBD	Depends on solution implemented
Production cost savings	TBD	Evaluation needed to quantify benefit
Other benefits	Reliability benefits and improved load forecasting	

Implementation Considerations

Category	Assessment	Comments
Current Phase	Reviewing	
Complexity/risk	High	Need to quantify impact to EMS and DART performance
Relationship to other initiatives	Yes	34 - Cross-LBA DR/storage participation
Market Roadmap Priority	High	
Potential fast-track project?	No	Communicated at September 1, 2015 MSC.

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Will enhance reliability	

Change Log

Category	Date	Comments
Name	Jun-2017	Added "and/or Storage" to product name.
Implementation Considerations	Feb-2017	Updated Current Phase to Reviewing to match Market Roadmap Work Plan. Updated Market Roadmap Priority to High to match Market Roadmap Work Plan.
Informational	Jan-2016	Please see Issue ID above which links to MISO's issue tracking tool.
Fact Sheet Template Updated	Nov-2015	Market Roadmap fact sheet converted to updated template.
Fact Sheet Template Updated	Jun-2016	Added storage impacts

Parking Lot: Allocate Additional Feasible Auction Revenue Rights

Fact Sheet ID	38
Issue ID	
What is it?	Enhance ARR Allocation process such that long term firm transmission customers can acquire additional feasible ARRs
Purpose / Issues Addressed	Under the current process, long term firm transmission customers including load serving entities may not receive adequate ARR allocations from Stage 1A and Stage 1B entitlements due to limitation of transfer capability. This enhancement will allow these customers to request additional ARRs that may better align with their current and future arrangements.
Primary Guiding Principle	Support Market Participants in making efficient operational and investment decisions.
Primary Focus Area	Support efficient development of resources consistent with long-term reliability and/or public policy objectives.

Origin

Category	Assessment	Comments
Driver	MISO and stakeholder issue	
Support		

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	FTR Market only	
How many MW are directly affected?	20 GW	

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Medium	Requires enhancements to the Nexant software and hardware to enable the successful administration of any additional allocation stages
Production cost savings	Low	
Other benefits	Medium	Would improve the congestion hedging of long term firm transmission customers

Implementation Considerations

Category	Assessment	Comments
Current Phase	Evaluation	MISO will kick off the discussion of this topic in 2018
Complexity/risk	Medium	
Relationship to other initiatives	Medium	MISO cannot implement this proposal if it results in an inability to administer the allocation or auction that are already established
Market Roadmap Priority	Medium	Communicated at September 1, 2015 MSC.
Potential fast-track project?	No	Communicated at September 1, 2015 MSC.

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Does No Harm	

Change Log

Category	Date	Comments
Evaluation Started	Jan-2016	Project has moved into the Evaluation phase.
Fact Sheet Template Updated	Nov-2015	Market Roadmap fact sheet converted to updated template.

Parking Lot: Dispatchable Intermittent Resource (DIR) Modification

Fact Sheet ID	40
Issue ID	
What is it?	Modify business and settlements rules to improve incentives and enable more efficient participation of DIRs in MISO's economic dispatch process. • Perform analysis to determine appropriate alarming, notification, and replacement procedures, including any necessary tariff provisions to implement accuracy and performance standards, to validate market participant Forecast Maximum Dispatch submittals. • Enhance persistence forecasting to better reflect ramping capability of DIRs. • Consider a modified excess energy threshold for wind resources that would allow these resources more latitude to exceeds its dispatch level (i.e., its forecasted output) when it will not cause congestion. • Modify the Excessive Energy settlement to help balance the Excessive and Deficient energy settlements that wind resources face associated with forecast errors.
Purpose / Issues Addressed	MISO's Tariff requires Market Participant's Offers reflect the known physical capabilities and characteristics of Generation Resources, including Forecast Maximum Limits for Dispatchable Intermittent Resources (DIRs). Other than ensuring that forecasts are timely, MISO's Tariff does not require validation of the accuracy of wind suppliers' forecast used to develop dispatch instructions for DIRs. In 2016, certain supplier wind Forecast Maximum Limits were consistently biased and many that were consistently more than 10 percent over-forecasted and were utilized to develop dispatch instructions. Because the MISO dispatch uses these forecasts as the dispatch maximum, the lack of accuracy or performance provisions makes the MISO energy dispatch subject to chronic shortfalls related to the over-forecasting. Additionally, over-forecasting can lead to inaccurate assumed system flows that result in inefficient congestion management. All real-time wind forecasts are either completely reliant on "persistence" based forecasting or heavily dependent on "persistence" based forecasting. "Persistence" forecasting is a forecast of what is currently being produced. This yields to wind appearing to not follow dispatches when the wind is either ramping up or down due to the inability to properly forecast wind ramps in real-time. DIR wind resources in MISO have a strong incentive to over-forecast their output in real-time. Under the current rules for all MISO Resources, Excessive energy is paid the lower of LMP or the Resource offer. For most conventional resources this is a reasonable outcome and provides reasonable incentives. For wind resources, however, their offers often reflect a Production Tax Credit payment opportunity cost so their offer prices are often in the range of negative $30/MWh. Hence, the Excessive Energy settlement for wind resources is far more punitive than the Deficient Energy settlement rules.
Primary Guiding Principle	Support an economically efficient wholesale market system that minimizes cost to serve load.
Primary Focus Area	Enhance unit commitment and economic dispatch processes.

Origin

Category	Assessment	Comments
Driver	Voted into Market Roadmap Initiative List at 6/2/2015 Market Roadmap Workshop IMM Recommendation #2016-7 IMM Recommendation #2016-8	Potential software and/or procedure change for real-time market.
Support		

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Real-Time Energy Markets	
How many MW are directly affected?	All real-time dispatch MWs	Dispatch of units with fast ramping capability would likely be affected the most.

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs		
Production cost savings		
Other benefits		

Implementation Considerations

Category	Assessment	Comments
Current Phase	***Unscheduled***	
Complexity/risk		
Relationship to other initiatives		
Market Roadmap Priority	Low	Communicated at September 1, 2015 MSC.
Potential fast-track project?	No	Communicated at September 1, 2015 MSC.

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence		

Parking Lot:	Dispatchable Intermittent Resource (DIR) Modification

Change Log

Category	Date	Comments
Scope Revised	Jun-2017	Included new 2016 IMM recommendations
Fact Sheet Template Updated	Nov-2015	Market Roadmap fact sheet converted to updated template.

Parking Lot: Capacity Transfer Rights in the Planning Resource Auction

Fact Sheet ID	41
Issue ID	
What is it?	Provide a means to hedge zonal congestion in the PRA.
Purpose / Issues Addressed	Resources may be in a zone different from the load that paid for that resource. There is currently no means to hedge zonal price differences.
Primary Guiding Principle	Support Market Participants in making efficient operational and investment decisions.
Primary Focus Area	Support efficient development of resources consistent with long-term reliability and/or public policy objectives.

Origin

Category	Assessment	Comments
Driver	Separated from Locational - External Zones at 6/9/2017 Market Roadmap Workshop	
Support		

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Resource Adequacy	
How many MW are directly affected?		

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs		
Production cost savings	Indirect production cost savings.	If participants are able to locate generation in more cost-effective locations with ability to hedge potential price separation, there could be production cost savings.
Other benefits	Zonal hedging of capacity costs over time, may lead to more efficient investment incentives.	Being able to lock in a hedge against future congestion between Local Resource Zones (LRZs) would reduce risk associated with future changes in congestion and perhaps provide more efficient investment incentives for resources located in a different LRZ.

Implementation Considerations

Category	Assessment	Comments
Current Phase	Conceptual Design	
Complexity/risk	Medium	Core concept of hedges already exists in MISO resource adequacy design.
Relationship to other initiatives	To be sequenced with other Resource Adequacy roadmap items	
Market Roadmap Priority	Medium	Communicated at September 1, 2015 MSC.
Potential fast-track project?	No	

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	No Harm	Financial hedging instrument

Change Log

Category	Date	Comments
Informational	Jun-2017	Updated fact sheet
Schedule	May-2016	Stakeholders requested additional time prior to filing. MISO requested written feedback on areas that require clarity and will follow up with a revised schedule.
Schedule	Mar-2016	Schedule adjusted; change communicated at March 2 RASC Change will allow time for the footprint to prepare for the process change, including adjusting any commercial arrangements. Adjustment also allows certainty from a FERC process perspective, furthering the commercial certainty of the proposal
Informational	Dec-2015	Added IMM Recommendation # to Origin

Parking Lot:	Demand Response/BTMG/EDR deployment during Capacity Emergency

Fact Sheet ID	49
Issue ID	
What is it?	Enhance existing market applications to incorporate administration of LMR and EDR resources in registration through settlement processes.
Purpose / Issues Addressed	The current tools and processes for registration, clearing and deployment of demand response resources pose administrative challenges for MISO and stakeholders. MISO utilizes Demand Response during it's emergency procedures. Demand Response Owners have an obligation to inform MISO of availability and MW quantity. Greater dependency on demand response in the future drives the need to improve the process.
Primary Guiding Principle	Facilitate non-discriminatory market participation regardless of resource type, business model, sector or regional location
Primary Focus Area	Streamline market administrative processes to reduce transaction costs

Origin

Category	Assessment	Comments
Driver	MISO process efficiency improvement initiative	MISO would like to pursue efficiency improvements to streamline the process for MISO and external operators in anticipation of Demand Response seeing more frequent deployments in the future. MISO is also interested to investigate refreshing of the application(s).
Support	Demand Response Owners	MISO stakeholders with Demand Response want the MCS tool to be more automated. Stakeholders have requested MISO to improve the movement of relevant information form the various tools utilized by the Demand Response Owners.

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Demand response	With co-optimization, all Energy and Ancillary Service participants will be impacted.
How many MW are directly affected?	~9,000 MW	

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Medium	
Production cost savings	TBD	LMRs and EDRs would be integrated into the standard processes. Improving the external user experience and workflow might help mitigate progressing further into emergency procedures.
Other benefits		MISO needs to improve the process and tools utilized to deploy Demand Response. MISO anticipates refreshing the application will result in a reduction of internal maintenance.

Implementation Considerations

Category	Assessment	Comments
Current Phase	Planned	
Complexity/risk	High	This is a broad effort that will require coordination throughout MISO and stakeholders.
Relationship to other initiatives	Yes	One of the impacted tools will also be modified for seasonal and locational resource adequacy requirements.
Market Roadmap Priority	Medium	
Potential fast-track project?	TBD	This project will need some time spent on developing requirements with the stakeholder community.

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Reliability Enhancement	A single platform utilized to deploy LMRs and EDRs reduces the risk of errors during deployment which might help mitigate progressing further into emergency procedures.

Additional Information

Category	Date	Comments
Implementation Considerations	Feb-2017	Updated Current Phase to Planned to match Market Roadmap Work Plan. Updated Market Roadmap Priority to Medium to match Market Roadmap Work Plan.
Fact Sheet Created	Jun-2016	Initial creation

Parking Lot: Behind Meter Storage Aggregation Under DRR Type II

Fact Sheet ID	50
Issue ID	
What is it?	Improve existing DRR Type II modeling methodology and business rules to include behind-the-meter storage resources. The settlement rules and settlement system also needs to be reviewed and modified to accommodate DRR-type II with storage.
Purpose / Issues Addressed	There is an opportunity for participants to aggregate behind-the-meter storage resources and participate as DRR Type II resource in MISO markets. Current DRR-Type II model allows behind-the-meter generators and dispatchable load to participate in MISO capacity, energy and ancillary service markets. The baseline methodology needs to be reviewed to enable storage resources under the same construct.
Primary Guiding Principle	Facilitate non-discriminatory market participation regardless of resource type, business model, sector or regional location
Primary Focus Area	Enhance unit commitment and economic dispatch processes

Origin

Category	Assessment	Comments
Driver	MISO emergent technology enablement initiative	Industry trends show expectation of growth in storage
Support	MSC	Stakeholder interest in storage participation in the market

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Storage resources	With co-optimization, all Energy and Ancillary Service participants will be impacted.
How many MW are directly affected?	Currently < 500 MW	Expected to grow in near and long-term

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Low	Incremental changes to the system
Production cost savings	TBD	Depends on amount of storage participating in the market
Other benefits	Medium	Enables higher penetration of storage

Implementation Considerations

Category	Assessment	Comments
Current Phase	Reviewing	
Complexity/risk	Low	Mostly tariff changes and settlements related
Relationship to other initiatives	None	
Market Roadmap Priority	High	
Potential fast-track project?	Potentially	Could depend on new settlements platform

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Reliability Enhancement	Enhancements contingent on level of participation

Change Log

Category	Date	Comments
Update length of Evaluation Phase in roadmap	Jun-2017	This project is scheduled to be in the Evaluation Phase for all of 2018.
Implementation Considerations	Feb-2017	Updated Current Phase to Reviewing to match Market Roadmap Work Plan. Updated Market Roadmap Priority to High to match Market Roadmap Work Plan.
Fact Sheet Created	Jun-2016	New candidate

Parking Lot: MISO-SPP Coordinated Transaction Scheduling (CTS)

Fact Sheet ID	52
Issue ID	
What is it?	CTS will be an additional real-time market product for participants to schedule energy interchange transactions across the MISO-SPP Interface. It will allow participants to submit a spread bid at the interface to simultaneously buy from one market and sell into the other. The cleared CTS offers will be settled and entered into the real-time dispatch individually by each RTO according to the current process.
Purpose / Issues Addressed	Energy interchange across the MISO-SPP interface is currently determined based on participant submitted price-insensitive transaction schedules which are often economically inefficient. Scheduling timelines limit participants' ability to arbitrage price differences. CTS will provide the ability for the RTOs to schedule economically efficient transactions while also assisting reliability and adding scheduling flexibility.
Primary Guiding Principle	Support an economically efficient wholesale market system that minimizes cost to serve load.
Primary Focus Area	Facilitate efficient transactions across market "seams" with neighboring regions.

Origin

Category	Assessment	Comments
Driver	SPP stakeholders	
Support	MISO and SPP	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Energy, Ancillary Services	
How many MW are directly affected?	~ 1500 MW	

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Medium	
Production cost savings	TBD	
Other benefits		

Implementation Considerations

Category	Assessment	Comments
Current Phase	New	Reviewing
Complexity/risk	Medium	
Relationship to other initiatives	Yes	MISO-PJM CTS is similar
Market Roadmap Priority	New	
Potential fast-track project?	TBD	

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Reliability Enhancement	Mitigate operations risk in generation commitment process by improving predictability of next scheduled interchange

Additional Information

Category	Date	Comments
Fact Sheet Created	Jun-2016	New candidate

Parking Lot: Impact of Outage Scheduling Practices on Market Funding

Fact Sheet ID	53
Issue ID	
What is it?	Process and Tariff changes for MISO to be able to analyze the impact of outages on market funding and then utilize results of that analysis to help facilitate efficient scheduling of these outages by the transmission operators.
Purpose / Issues Addressed	The IMM expressed a concern in the State of the Market Report, specifically described in recommendation 2014-1, that outages have impacts on market funding, and incentives for transmission operators to schedule outages more efficiently should be evaluated and considered.
Primary Guiding Principle	Develop transparent market prices reflective of marginal system cost, and cost allocation reflective of cost-causation and service
Primary Focus Area	Maximize economic utilization of existing and planned transmission infrastructure

Origin

Category	Assessment	Comments
Driver	IMM Recommendation # 2014-1	Outages contribute to the underfunding of Financial Transmission Rights and high Excess Congestion Fund charges.
Support		

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Energy, Financial Transmission Rights	This has the potential to impact Market funding levels, both FTR funding and excess congestion fund
How many MW are directly affected?	Several 1000 MW of FTR	Includes all FTRs settled in Day Ahead market

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Medium	This would require investment in analysis tools for the Outage Coordination group to analyze the economic impact of outages, and would also likely require additional Engineering resources within the group. Roughly $100,000 for the required tool development and one additional full time Engineering position.
Production cost savings	TBD	Difficult to quantify, but a single outage can generate hundreds of thousands or even millions of dollars worth of congestion costs in some situations. Potential cost savings are related to reduced congestion charges and reduced reliability commitments of units.
Other benefits		

Implementation Considerations

Category	Assessment	Comments
Current Phase	New	MISO has had high level process and policy discussions with Reliability and Market stakeholder groups in the past. Outage Coordination has looked at required steps for implementation, but did not pursue because it lacked broad support.
Complexity/risk	Medium	Forecasting economic impact is highly complex. Financial data related to the energy market has the potential to change daily which can affect the forecasted results. There is a risk that significant time and effort put into this analysis would not have the desired impact if there are other significant drivers of underfunding and congestion.
Relationship to other initiatives	No	
Market Roadmap Priority	New	
Potential fast-track project?	TBD	

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Low	Taking Economic impact into consideration for outage scheduling could impact timing of maintenance and repair work. Outages that are delayed for economic reasons could lead to an increase in urgent or forced outages, and Transmission Owners and Operators would need to ensure that they are still completing all maintenance required by NERC and the regional reliability organizations.

Additional Information

Category	Date	Comments
Fact Sheet Created	Jun-2016	

Parking Lot: Post Contingent Actions

Fact Sheet ID	55
Issue ID	
What is it?	Provision additional post-contingent actions such as Adaptive Ratings, Optimal Transmission Switching and Remedial Action Systems into MISO's congestion management processes
Purpose / Issues Addressed	Use of adaptive transmission ratings enables the ability to determine post-contingent dispatch of generators to greatly reduce congestion and increase utilization of transmission assets. Roughly 85% of all congestion in MISO is due to post-contingent, thermal limits. Recognizing post-contingent capabilities could maintain system reliability, increase transfer capability of flowgates, and reduce overall production cost. Use of optimal transmission switching, under specific conditions e.g., moving the system from an N-4 to an N-3 can reduce congestion while maintaining reliability.
Primary Guiding Principle	Support an economically efficient wholesale market system that minimizes cost to serve load
Primary Focus Area	Maximize economic utilization of existing and planned transmission infrastructure

Origin

Category	Assessment	Comments
Driver	Stakeholder driven	Submitted by Chad Koch of WEC Energy Group – We Energies and Wisconsin Public Service Corporation
Support		

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Energy, Ancillary Services, Financial Transmission Rights	
How many MW are directly affected?	TBD	TBD for MISO. For other ISOs/RTOs, some studies shows significant benefit. For instance: http://www.pjm.com/markets-and-operations/etools/oasis/system-information/switching-solutions.aspx

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	TBD	TBD. This would require exhaustive study to analyze impact of post contingency transmission switching throughout MISO footprint. At present, Operations considers few post contingency transmission switching action in North MISO footprint to mitigate congestion caused by wind. Few studies, conducted in other ISOs have shown promising results, http://www.pjm.com/markets-and-operations/etools/oasis/system-information/switching-solutions.aspx
Production cost savings	TBD	TBD. Considered to be significant. Automation of post-contingent actions could also allow for more pre-contingent flows on existing facilities which will reduce total production cost.
Other benefits		Studies in other ISOs have shown significant flexibility in Operations. Transmission switching can even be used to mitigate congestion in non-contingency events. Increased ability of low cost generation to serve load; and, ability to efficiently and effectively utilize online generation and fast start generation to alleviate congestion.

Implementation Considerations

Category	Assessment	Comments
Current Phase	New	Reviewing
Complexity/risk	TBD	Actions must meet TPL-001-4 requirements. "Extended time" transmission switching can cause under funding in FTR market.
Relationship to other initiatives	None	
Market Roadmap Priority	New	
Potential fast-track project?	TBD	

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Few	Imposes some risks. Stability concerns of transmission switching needs to be analyzed.

Additional Information

Category	Date	Comments
Fact Sheet Created	Jun-2016	New candidate

Parking Lot:	ASM Product Substitution Visibility

Fact Sheet ID	57
Issue ID	
What is it?	Get visibility when a higher quality ASM product is substituted for a lower quality product (i.e., when a resource appears to be awarded Reg, but is substituted to received Spin MCP payment) in both DA and RT market. Have the DA ASM product substitution (including the MW and the product substituted) listed in the Day-Ahead Awards that are published each afternoon and RT ASM product substitution in the Real-Time Dispatch that are published right after the dispatch interval is committed in the Portal.
Purpose / Issues Addressed	Visibility on when ASM products are substituted gives MPs more confidence and transparency in offer strategies. Waiting several days for settlement data is an inefficient method to confirm products awarded and dispatched for, as well as associated compensation.
Primary Guiding Principle	Develop transparent market prices reflective of marginal system cost, and cost allocation reflective of cost-causation and service beneficiaries.
Primary Focus Area	Maximize availability of non-confidential and non-competitive market information.

Origin

Category	Assessment	Comments
Driver	Stakeholder	Submitted by Mike Zaccardi of The Energy Authority
Support	TBD	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	TBD	
How many MW are directly affected?	TBD	

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	TBD	
Production cost savings	TBD	
Other benefits	TBD	

Implementation Considerations

Category	Assessment	Comments
Current Phase	Reviewing	
Complexity/risk	Low	
Relationship to other initiatives	Low	
Market Roadmap Priority	TBD	
Potential fast-track project?	Yes	This is a minor process change

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	TBD	

Additional Information

Category	Date	Comments
Fact Sheet Created	Jun-2017	New candidate

Parking Lot:	Reform DAMAP and RTOSGP Rules

Fact Sheet ID	58
Issue ID	
What is it?	Reform DAMAP and RTORSGP rules to improve performance incentives, and reduce gaming opportunities and unjustified costs.
Purpose / Issues Addressed	IMM evaluation of DAMAP and RTORSGP reveals that significant amounts were paid to resources that were not performing well. These price volatility make-whole payments are intended to ensure that resource have incentives to be flexible and are not harmed financially from following MISO's dispatch instructions. Under the current formulas, however, some resources receive payments because they are running at an uneconomic dispatch level because they are not following MISO's dispatch instructions. The IMM believes suppliers should be accountable for poor generator performance and these payments were not intended to hold suppliers harmless for poor performance. Because poor performance can increase such payments, the current rules may enable manipulative strategies involving coordinating offer prices and deliberate poor performance. The IMM has referred such conduct to the Commission's Office of Enforcement. The only current means to address these concerns under the current rules are through eligibility criteria that cause a supplier to become ineligible if it exceeds MISO's Excessive and Deficient energy thresholds. Even with the improvements in these thresholds that the IMM has recommended, these eligibility rules will not effectively address the performance and manipulation concerns. Therefore, the IMM recommends that MISO incorporate a performance metric in the calculation of these make-whole payments that would reduce the payment by the amount that corresponds to resources' dispatch deviations.
Primary Guiding Principle	Support an economically efficient wholesale market system that minimizes cost to serve load.
Primary Focus Area	Enhance unit commitment and economic dispatch processes.

Origin

Category	Assessment	Comments
Driver	IMM recommendation	Submitted by Jason Fogarty of Potomac Economics; IMM Recommendation 2016_5
Support	TBD	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	TBD	By improving generators' incentives, it will improve their performance and overall market performance as described in the issue description above.
How many MW are directly affected?	TBD	

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	TBD	
Production cost savings	TBD	
Other benefits	TBD	

Implementation Considerations

Category	Assessment	Comments
Current Phase	Reviewing	
Complexity/risk	TBD	
Relationship to other initiatives	TBD	The IMM believes this item could be implemented independently from other initiatives though it is somewhat dependent on the current Roadmap item Tighten Thresholds for Uninstructed Deviations.
Market Roadmap Priority	TBD	The current PVMWP eligibility rules are resulting in significant unjustified payments, may be subject to gaming, and are not providing adequate incentives to follow set points and provide bid flexibility.
Potential fast-track project?	TBD	

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	TBD	

Additional Information

Category	Date	Comments
Fact Sheet Created	Jun-2017	New candidate

Parking Lot: Modified INC/DEC

Fact Sheet ID	59
Issue ID	
What is it?	This proposal creates a new product which will be only the congestion and losses portion of LMP, minus the energy component. This is a congestion product which does not require a matched source and sink point to clear, but is one source or sink compared to a reference bus. It removes the energy risk of the traditional inc/dec.
Purpose / Issues Addressed	This product will allow for greater convergence between the day-ahead and real-time markets, allowing market participants to take positions on congestion and losses at a given source or sink. It will improve price formation, reduce energy imbalances, lower day-ahead uplift, improve unit commitment and dispatch, and increase convergence and liquidity.
Primary Guiding Principle	Support an economically efficient wholesale market system that minimizes cost to serve load.
Primary Focus Area	Improve efficiency of prices under all operating conditions.

Origin

Category	Assessment	Comments
Driver	Stakeholder	Submitted by Ruta Skucas of Financial Marketers Coalition
Support	TBD	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Day-Ahead & Real-Time	As noted above, this product will improve price formation, reduce energy imbalances, lower day-ahead uplift, improve unit commitment and dispatch, and increase convergence and liquidity
How many MW are directly affected?	TBD	

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	TBD	
Production cost savings	TBD	
Other benefits	TBD	

Implementation Considerations

Category	Assessment	Comments
Current Phase	Reviewing	
Complexity/risk	TBD	
Relationship to other initiatives	TBD	
Market Roadmap Priority	TBD	Given the significant delays in implementing the Virtual Spread Bid, this product should be given immediate attention.
Potential fast-track project?	TBD	

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	TBD	

Additional Information

Category	Date	Comments
Fact Sheet Created	Jun-2017	New candidate

Parking Lot: Improved Contingency Reserve Demand Curve that reflects VOLL

Fact Sheet ID	60
Issue ID	
What is it?	Improve shortage pricing by adopting an improved contingency reserve demand curve that reflects the expected value of lost load.
Purpose / Issues Addressed	Recommend that MISO reform its operating reserve demand curve. Because it is the primary determinant of the shortage pricing in MISO's energy markets, establishing an ORDC that reflects reliability is essential. MISO's current ORDC does not reflect reliability value, overstating the reliability risks for small shortages and understating them for deep shortages. Additionally, PJM's recent changes will price shortages as high as $6000/MWh (sum of the shortage pricing and capacity performance settlement), which will lead to inefficient imports and exports when both markets are tight. An optimal or "economic" ORDC would reflect the "expected value of lost load", equal to: probability of losing load * net value of lost load (VOLL). The economic ORDC has substantial advantages. The shortage pricing under the economic ORDC will track the escalating risk of losing load. In the range where most shortages occur, the economic ORDC is sometimes higher and sometimes lower than the current curve so it should not substantially increase consumer costs for these shortages.
Primary Guiding Principle	Maximize alignment of market requirements with reliability requirements of the system.
Primary Focus Area	Improve efficiency of prices under all operating conditions.

Origin

Category	Assessment	Comments
Driver	IMM recommendation	Submitted by David Patton of Potomac Economics; IMM Recommendation 2016_1
Support	TBD	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Day-Ahead	It will improve the Markets' price formation, improve performance incentives for generators, and improve incentives to schedule efficiently in the day-ahead market.
How many MW are directly affected?	TBD	

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	TBD	
Production cost savings	TBD	
Other benefits	TBD	Revenues during shortage conditions is one of the primary economic signals to facilitate investment and retirement decisions.

Implementation Considerations

Category	Assessment	Comments
Current Phase	Reviewing	
Complexity/risk	TBD	
Relationship to other initiatives	TBD	We believe this item can be undertaken independent of other actions.
Market Roadmap Priority	TBD	The risks from the current ORDC are ongoing so current action is recommended.
Potential fast-track project?	TBD	

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	TBD	Understating ORDC value during shortages, in particular relative to neighboring regions will impact reliability.

Additional Information

Category	Date	Comments
Fact Sheet Created	Jun-2017	New candidate

Parking Lot:	Enhanced Modeling of Generator Operations

Fact Sheet ID	63
Issue ID	
What is it?	MISO is working on Market Roadmap Item 002 – Enhanced Modeling of Combined Cycle Generators, and is moving into the conceptual design phase of the project. The goal of this project is to develop modeling of combined cycle units in the both the DA and RT SCUC/SCED algorithms that will allow market participants with these types of units to submit offer data on different unit/equipment configurations, distinct component operating characteristics, and transition constraints and notification times. Given this offer data, the enhanced SCUC/SCED algorithms would commit and dispatch the most economic unit configuration on an hourly basis. We believe this same approach could be expanded to include equipment operating characteristics and transition constraints of other types of generation resources (e.g., transition constraints due to starting and stopping of coal mills, boiler feedpumps, etc.).
Purpose / Issues Addressed	MISO has stated that enhanced combined cycle modeling will improve market efficiency and allows the market to access greater flexibility of these generators. These same concepts would also apply to enhanced modeling of other generators with equipment transition constraints. It would also address the concerns that some generators have with committing or decommitting equipment to follow MISO setpoint, and should decrease potential generator dragging effects on the system. MISO also states that enhanced combined cycle modeling will reduce overall production costs, and estimates an annual benefit between $14 million and $34 million. While the annual benefit may not be as dramatic as estimated for enhanced combined cycle modeling, expansion of the enhanced modeling to other generators should also help lower production costs for the footprint.
Primary Guiding Principle	Facilitate non-discriminatory market participation regardless of resource type, business model, sector or regional location
Primary Focus Area	Enhance unit commitment and economic dispatch processes

Origin

Category	Assessment	Comments
Driver		
Support	Market Participants	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?		
How many MW are directly affected?		

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs		
Production cost savings		
Other benefits		

Implementation Considerations

Category	Assessment	Comments
Current Phase	Frame	New candidate submitted by stakeholders
Complexity/risk		
Relationship to other initiatives		
Market Roadmap Priority	Medium	
Potential fast-track project?		

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence		

Additional Information

Category	Date	Comments
Fact Sheet Created	Jun-2018	Market Roadmap fact sheet created.

Parking Lot: Look Ahead Dispatch

Fact Sheet ID	64
Issue ID	
What is it?	Only publishing the next 5-min dispatch instructions can lead to inefficiencies with generators who need to bring on or off equipment to meet this dispatch. Some type of look ahead dispatch would enable proactive measures by generator owners to meet future dispatch instructions timely. Examples of this could include bringing on/off coal mills, boiler feed pumps, etc.
Purpose / Issues Addressed	This should decrease the dragging effects on the system by enabling generator owners to more proactively commit/decommit equipment in an effort to more closely follow the MISO setpoint. This should lower production costs for the footprint on the system by enabling generator owners to more proactively commit/decommit equipment in an effort to more closely follow the MISO setpoint.
Primary Guiding Principle	Facilitate non-discriminatory market participation regardless of resource type, business model, sector or regional location
Primary Focus Area	Enhance unit commitment and economic dispatch processes

Origin

Category	Assessment	Comments
Driver	Post-LAC stage 2 Implementation	
Support	Market Participants	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Real Time to 3 hours ahead	
How many MW are directly affected?	System-wide (All Dispatchable Gen)	

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Costs and functionality dependent on legacy vs. MSE implementation. Other required settlement changes will impact implementation costs and timeline.	https://www.ece.cmu.edu/~electriconf/2012/slides/Section%20D1-A2/3.%20Le%20Xie.%20Texas%20A&M.%20Model-Predictive%20Scheduling%20for%20ERCOT..pdf
Production cost savings	$47000 A day	
Other benefits	Resiliency, Time-coupled dispatch and resource plan	

Implementation Considerations

Category	Assessment	Comments
Current Phase	Stage 2 of LAC has not been completed. Would need to upgrade LAC & RTUDS prior to LAD	
Complexity/risk	Very Complex	
Relationship to other initiatives	LAC, UDS, MSE, ODC	
Market Roadmap Priority	High	
Potential fast-track project?		

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	LAC stage 2 would result in AC Powerflow for all 3 hours, not just prompt 15-minute interval. Improve unit performance, unit awarness.	https://ieeexplore.ieee.org/document/7452435/

Additional Information

Category	Date	Comments
Fact Sheet Created	Jun-2018	Market Roadmap fact sheet created.

Parking Lot:	Remove transmission charges from Coordinated Transmission Service (CTS) transactions

Fact Sheet ID	66
Issue ID	
What is it?	IMM recommends that MISO eliminate all charges to CTS transactions and eliminate the requirement that participants reserve transmission for CTS transactions. CTS with PJM can provide substantial economic benefits by adjusting the scheduled interchange based on forecasted energy prices in the two RTO areas, giving the RTOs the ability to dynamically schedule the interface and lower the costs of serving load in both regions. MISO applies transmission charges to these transactions when they are offered (not just when they are scheduled). These charges discourage CTS offers and, therefore, undermine the potential for substantial savings.
Purpose / Issues Addressed	Efficient Interchange with PJM can provide a source of system supply during tight operating conditions. CTS with PJM can provide substantial economic benefits by adjusting the scheduled interchange based on forecasted energy prices in the two RTO areas, giving the RTOs the ability to dynamically schedule the interface and lower the costs of serving load in both regions. MISO applies transmission charges to these transactions when they are offered (not just when they are scheduled). These charges have virtually eliminated all CTS offers and, therefore, have prevented the CTS from delivering any of the potential savings .
Primary Guiding Principle	Support an economically efficient wholesale market system that minimizes cost to serve load
Primary Focus Area	Facilitate efficient transactions across seams with neighboring regions

Origin

Category	Assessment	Comments
Driver	IMM Recommendation	
Support	IMM	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Real Time Energy	
How many MW are directly affected?	Real Time Interchange with PJM	

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Low	
Production cost savings	Unknown	Unknown at this time
Other benefits	Lower costs to serve load	

Implementation Considerations

Category	Assessment	Comments
Current Phase	Frame	
Complexity/risk	Low complexity	
Relationship to other initiatives	CTS (implemented)	Transmission Owner Cost Recovery
Market Roadmap Priority	Medium	
Potential fast-track project?		

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Not Assessed	

Additional Information

Category	Date	Comments
Fact Sheet Created	Jun-2018	Market Roadmap fact sheet created.

Parking Lot:	Establish PRA capacity credits for emergency-only resources that better reflect their expected availability and deployment performance

Fact Sheet ID	67
Issue ID	
What is it?	We recommend that LMRs and emergency-only resources receive PRA capacity credit if they are expected to be reasonably available in an emergency. This means their time to deployment (notification plus start-up time/shut-down time) should be less than a benchmark to be determined by MISO (e.g., one or two hours). Establishing such a benchmark should be based on MISO historic experience regarding how long in advance of its capacity shortages MISO has typically declared a Maximum Generation Event to enable access to the emergency resources. As a secondary associated issue, we also recommend that MISO develop a reasonable methodology for quantifying the capacity credit for emergency-only resources in the PRA. Such a methodology should consider factors that reduce the expected availability of the resource, including the resources' seasonal availability, variation in available curtailment quantity, and historical performance. The objective of these changes should be to qualify the LMRs at levels that would accurately reflect their expected availability during emergency conditions. This is comparable in principle with MISO's UCAP methodology for its generators.
Purpose / Issues Addressed	Accurate values reflecting expected availability will allow MISO to procure capacity in a manner that will satisfy its planning needs allow it to achieve its LOLE objective.
Primary Guiding Principle	Maximize alignment of market requirements with reliability requirements of the system
Primary Focus Area	Support efficient development of resources consistent with long-term reliability and/or public policy objectives

Origin

Category	Assessment	Comments
Driver	IMM Recommendation	
Support	IMM	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Capacity Market	More accurate capacity credits that reflect expected resource availability during emergencies will allow the capacity market prices to better reflect that actually supply needed to satisfy MISO's planning requirements.
How many MW are directly affected?	Subset of generation	Approximately 11.7 GW of LMRs offered in last PRA

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Medium	
Production cost savings	To be determined	
Other benefits	Efficient use of resources	

Implementation Considerations

Category	Assessment	Comments
Current Phase	Frame	
Complexity/risk	High	
Relationship to other initiatives	Related	Associated with Fact Sheet 25 - Address Resource Availability and Need
Market Roadmap Priority	Medium	
Potential fast-track project?		

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	To be determined	

Additional Information

Category	Date	Comments
Informational	Dec-2018	Project will be considered as part of RAN (MR25).
Fact Sheet Created	Jun-2018	Market Roadmap fact sheet created.

Parking Lot:	Evaluate the feasibility of implementing a 15-minute Day-Ahead Market under the Market System Enhancement

Fact Sheet ID	68
Issue ID	
What is it?	IMM recommends that MISO evaluate the feasibility of solving the day-ahead market with 15-minute scheduling intervals. As initially designed, due to technological limitations, the day-ahead market software did not permit market solutions on a basis as frequent as the real-time dispatch solutions. The granularity mis-match creates significant operational drawbacks. By producing hourly schedules based on 60-minutes of ramp capability and hourly load forecasts, the day-ahead schedules cannot track the expected changes in real-time system needs, particularly during ramping periods. It also regularly results in generator schedule changes from hour to hour that are not feasible, which results in substantial make-whole payments. More granular day-ahead market schedules would lower these uplift costs and better prepare the system to respond to the real-time needs.
Purpose / Issues Addressed	The current system results in generator schedule changes from hour to hour that are often not be feasible, which results in substantial make-whole payments. More granular day-ahead market schedules would lower these uplift costs and better prepare the system to respond to the real-time needs.
Primary Guiding Principle	Support an economically efficient wholesale market system that minimizes cost to serve load
Primary Focus Area	Enhance unit commitment and economic dispatch processes

Origin

Category	Assessment	Comments
Driver		
Support	IMM	Concept has merit although evaluation should include cost/benefit increment of sub-hourly granularity (e.g. 30 minutes vs 15 minutes vs 5 minutes, etc.). Improved balancing and consideration for sub-hotly ramp issues. Additionally, may improve production costs by more precisely committing resources closer to the time that they are needed. May reduce price suppression at top of hour due to large group of resources starting at the same time.

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Day-Ahead	Day-ahead commitment does not foresee the ramp needs in real-time and can cause ramp constraints.
How many MW are directly affected?		This is limited to resource commitments in time periods where large changes in demand / supply occur. Additionally, limited to resources that provide flexibility for marginal use within the hour. MWs??

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	High	
Production cost savings	Low-Medium	
Other benefits	Possible reduction in make whole payments	

Implementation Considerations

Category	Assessment	Comments
Current Phase	Evaluation	
Complexity/risk	High	Somewhat complex to complex depending on solution. Dependency on next gen technology given added complexity and computational needs.
Relationship to other initiatives	NA	
Market Roadmap Priority	Medium	Low until additional analysis can better undersatnd cost/benefit
Potential fast-track project?	No	Too complex and technology dependent

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence		Improves balancing performance

Additional Information

Category	Date	Comments
Fact Sheet Created	Jun-2018	Market Roadmap fact sheet created.

Parking Lot:	Allow Dispatchable Intermittent Resources (DIRs) to Provide Regulation Service

Fact Sheet ID	69
Issue ID	
What is it?	Dispatchable Intermittent Resources (DIRs) have the capability of providing regulation down service but the MISO tariff currently precludes these resources from providing regulation service. DIRs should also be allowed to provide regulation up service when coming out of a curtailment. Similar to FERC's Order 841 which required ISOs/RTOs to revise their Tariffs to enable storage energy resources to provide all of the market services they are capable of providing, MISO's Tariff should not restrict DIRs from providing regulation service. In fact, for maximum efficiency and elimination of duplicate efforts, the development and implementation of this project should be completed in coordination with FERC Order 841 compliance to create a more flexible participation model to enable all resource types to participate in MISO to their fullest extent.
Purpose / Issues Addressed	Enabling DIRs to provide regulation service would provide MISO more flexibility for market solutions. DIRs can provide regulation down service (and regulation up services after a curtailment) instead of commiting or dispatching higher-priced resources to provide regulation. DIRs are expected to increase significantly in the future and this revision would position MISO to incorporate more capabilities of DIRs as more thermal resources retire.
Primary Guiding Principle	Support an economically efficient wholesale market system that minimizes cost to serve load
Primary Focus Area	Enhance unit commitment and economic dispatch processes

Origin

Category	Assessment	Comments
Driver		
Support	Market Participants	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	All	Generation owners will be directly impacted. Load serving entities may also see impacts.
How many MW are directly affected?	17,000	Approximately 17,000 MW of DIR are registered in the MISO market.

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs		
Production cost savings		
Other benefits		

Implementation Considerations

Category	Assessment	Comments
Current Phase	Frame	New candidate submitted by stakeholders
Complexity/risk		Need to understand technical capability to adjust output on a 4 second basis.
Relationship to other initiatives		Fast Ramp AGC
Market Roadmap Priority	Low	
Potential fast-track project?		

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence		Often, Dispatchable Intermittent Resources are dispatched below their forecast due to transmission congestion. Considertion will need to be given to methods to avoid clearing and deploying regulation that would exacerbate a transmission constraint.

Additional Information

Category	Date	Comments
Fact Sheet Created	Jun-2018	Market Roadmap fact sheet created.

MISO Market Roadmap: Completed Projects

Fact Sheet ID	Project Name	Market Roadmap Priority	Fact Sheet Last Updated
15	Expand Day-Ahead Market-to-Market Coordination Processes with PJM		
45	Address the need for efficient prices under emergency conditions.		
48	Implementation 2Q 2016.		
47	Removed from Roadmap, as this is administrative, not a market enhancement		
28	Removed from Roadmap, as this was merged into 10 - Develop Add'l Short-term Capacity Reserve Requirements		
56	Removed from Roadmap, as MISO did not file for rehearing at FERC on the product was put on permanent hold	High	Feb-2017
46	Day-Ahead Reliability Assessment Commitment (DA-RAC) Software Performance Enhancement		
18	Extended Locational Marginal Pricing (ELMP), Phase II		
44	MISO-PJM Interchange Modeling and Pricing Enhancements		
43	MISO-PJM Coordinated Transaction Scheduling		
37	Manage Power Swings Caused by Market-to-Market (M2M) Dispatch		
26	Implement 5-minute Settlement Calculations		

Name:	Expand Day-Ahead Market-to-Market Coordination Processes with PJM

Fact Sheet ID	15
Issue ID	
What is it?	The proposal is to (1) establish a robust data exchange between PJM and MISO (currently underway), and (2) to perform a joint DA optimization to efficiently allocate FFE between PJM and MISO.
Purpose / Issues Addressed	Under the PJM-MISO JOA, Firm Flow Entitlements (FFE) represent each RTO's share of capacity of Reciprocal Coordinated Flowgates (RCFs). Either RTO has the option to request additional FFE in both DA and RT and compensate the responding RTO based on its shadow price; however neither RTO has ever done so in the DA due to scheduling conflicts, lack of coordination, and technical challenges. FFEs are thus modeled as a firm limit on the net market flows that an RTO can have on each RCF. PJM has consistently been over its FFE on a large number of RCFs in real time. If additional FFEs were requested by PJM in the DA market, MISO could more efficiently commit (or decommit) resources to manage the increased flows on the affected RCFs. This would reduce RT congestion costs and the divergence between DA and RT markets.
Primary Guiding Principle	
Primary Focus Area	Facilitate efficient transactions across seams with neighboring regions.

Origin

Category	Assessment	Comments
Driver	IMM Recommendation # 2011-10	
Support	Market participants with assets near the seam	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Day-Ahead Market	Potentially it may affect many DA market participants through a significant change unit commitment and resulting market prices.
How many MW are directly affected?	Several 100 MW depending on the applicable flowgates	FFEs vary widely by flowgate; from a few MW to thousands of MW. Thousands of MW could be indirectly affected through economic opportunities provided by improved transmission coordination. Based on M2M settlement data between PJM and MISO, 480 GWh, 361 GWh, and 268 GWh were settled in real time for flows exceeding FFE in 2012, 2013, and 2014 (through end of March), respectively.

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Medium	Expected implementation cost less than $0.5M including DA market clearing and M2M settlement process
Production cost savings	High	Has not been quantified yet. It would require a comparison of production costs between (1) using JOA fixed FFEs; vs. (2) actual FFE sharing in RT. Potential indicator of benefits: In 2012, MISO received $50.7 million from PJM through the M2M settlement process when PJM exceeded its FFE in real time.
Other benefits	Low	None identified

Implementation Considerations

Category	Assessment	Comments
Current Phase	Implemented	Conceptual design completed in 2014. Implementation completed in February 2016.
Complexity/risk	Medium-High	High complexity; medium-high risk because it requires cooperation with external partners.
Relationship to other initiatives	None	
Market Roadmap Priority		2014 Market Roadmap
Potential fast-track project?		

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Does no harm	

Change Log

Category	Date	Comments
Informational	Feb-2016	Updated the Current Phase to show that the project is completed.
Informational	Jan-2016	Added Issue ID above which links to MISO's issue tracking tool.
Informational	Dec-2015	Added IMM Recommendation # to Origin
JCM Update	11/18/2015	20151118 MISO PJM JCM Item 03 Day Ahead M2M Update
Fact Sheet Template Updated	Nov-2015	Market Roadmap fact sheet converted to updated template.

Name:	Extended Locational Marginal Pricing, Phase II

Fact Sheet ID	18
Issue ID	MR018
What is it?	Further enhancement of ELMP to incorporate broader benefits that have been validated in Phase I. Consideration of a wider array of online peaking resources should capture more effective online pricing effects to provide better cost recovery and dispatch following incentives. Further investigation of offline pricing effects related to transmission violations would more accurately reflect the cost of actions taken to resolve the violations.
Purpose / Issues Addressed	Phase I of ELMP is a simplified version and an intended conservative implementation of convex hull pricing. While the design objectives of convex hull pricing is validated in practice during Phase I, the overall price effects have been very small at most locations. Only roughly 1% of the online peaking resources are qualified as fast start resources to set prices under ELMP Phase I. The ineligibility of other online peaking resources and their commitment costs to participate in pricing remains a contributor of RSG.
Primary Guiding Principle	Develop transparent market prices reflective of marginal system cost, and cost allocation reflective of cost-causation and service beneficiaries.
Primary Focus Area	Improve efficiency of prices under all operating conditions.

Origin

Category	Assessment	Comments
Driver	IMM; MISO proposal	
Support	IMM, Market Subcommittee	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Ex-post LMP in both DA and RT	
How many MW are directly affected?	All Generation and Load	Impacts settlement prices only.

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Low	Initial assessment shows modest implementation effort.
Production cost savings	Medium	No change in commitment or dispatch.
Other benefits	Medium	Better price signal which can help improve overall market efficiency and fairness.

Implementation Considerations

Category	Assessment	Comments
Current Phase	Post-Implementation	
Complexity/risk	Medium	Relatively complex initiative; uncertainty around availability of full ELMP solution algorithm.
Relationship to other initiatives	High	Operating Reserve Demand Curve; Transmission Constraint Demand Curve; Five-minute Settlement
Market Roadmap Priority	High	Communicated at September 1, 2015 MSC.
Potential fast-track project?	Yes	Communicated at September 1, 2015 MSC.

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Does no harm	

Change Log

Category	Date	Comments
Current Phase	Jun-2017	Updated Current Phase to Post-Implementation.
Current Phase	May-2017	Updated Current Phase to Implementation.
Current Phase	Feb-2017	Updated Current Phase to Construction to match Market Roadmap Workplan.
Informational	Feb-2016	Updated the following sections: What is it?, Purpose / Issues Addressed, Implementation cost and other costs, and Relationship to other initiatives.
Informational	Jan-2016	Added Issue ID above which links to MISO's issue tracking tool.
Fact Sheet Template Updated	Nov-2015	Market Roadmap fact sheet converted to updated template.

Name:	Implement 5-Minute Settlement Calculations

Fact Sheet ID	26
Issue ID	MR026
What is it?	Implementation of a five-minute real-time settlement for generation schedules and interchange transactions.
Purpose / Issues Addressed	MISO clears the real-time market in five-minute intervals and sets physical schedules on a fifteen-minute basis. However, the associated real-time settlements are currently performed on an hourly basis. This can create inconsistencies between dispatch signals and the hourly prices. These inconsistencies can incentivize generators to not follow dispatch signals, or to simply be inflexible.
Primary Guiding Principle	Develop transparent market prices reflective of marginal system cost, and cost allocation reflective of cost-causation and service beneficiaries.
Primary Focus Area	Improve efficiency of prices under all operating conditions.

Origin

Category	Assessment	Comments
Driver	Enhance efficiency per IMM recommendation, FERC NOPR	Related FERC NOPR: Docket No. RM15-24-000: "The Federal Energy Regulatory Commission (Commission) is proposing to revise its regulations to require that each regional transmission organization (RTO) and independent system operator (ISO) settle energy transactions in its real-time markets at the same time interval it dispatches energy and settle operating reserves transactions in its real-time markets at the same time interval it prices operating reserves."
Support	IMM recommendation	IMM Recommendation # 2012-2

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Real-time Energy Market	External schedules are settled at a five-minute basis per compliance with FERC Order 764 - Integration of Variable Energy Resources.
How many MW are directly affected?	Real-time generation and schedules	A majority of the real-time settlement charges will be impacted with this change.

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	High	Formulation changes are minimal, however the scope of changes is significant, impact to participant shadow settlements system.
Production cost savings	Medium	Improve the incentives for generators to follow dispatch instructions and provide more flexibility. Allow participants to schedule imports and exports more efficiently.
Other benefits	Medium	Lowers reliance on PVMWP. Improves settlements for resources relative to performance and flexibility provided.

Implementation Considerations

Category	Assessment	Comments
Current Phase	Implement	Development and testing complete. Code migrated to Production. Implementation on target for July 1, 2018. Implementation complete.
Complexity/risk	Low	The testing and validation required is high, this will be a single large implementation.
Relationship to other initiatives	High	Compliance with FERC Order 764 will address the external scheduling component of this recommendation. Other market initiatives with settlements impact will need to be accounted in project planning.
Market Roadmap Priority	High	Communicated at September 1, 2015 MSC.
Potential fast-track project?	No	Communicated at September 1, 2015 MSC.

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Does no harm	

Change Log

Category	Date	Comments
Informational	Oct-2018	Updated Current phase to Validation
Informational	Aug-2018	Updated Current Phase to Implement
Informational	Jul-2018	Updated Current Phase comments.
Informational	Feb-2018	Added Current Phase comments.
Implementation Considerations	Feb-2018	Updated Current Phase to Build to match Market Roadmap Work
Implementation Considerations	Feb-2017	Updated Current Phase to Construction to match Market Roadmap Work Plan.
Informational	May-2016	Added related FERC NOPR information.

Informational	Jan-2016	Added Issue ID above which links to MISO's issue tracking tool.
Informational	Dec-2015	Added IMM Recommendation # to Support
Fact Sheet Template Updated	Nov-2015	Market Roadmap fact sheet converted to updated template.

Name:	Manage Power Swings Caused by Market-to-Market (M2M) Dispatch

Fact Sheet ID	37
Issue ID	MR037
What is it?	Resolution for power flow and price swings observed in Real Time M2M coordination.
Purpose / Issues Addressed	Both power flow and price swings have been observed in Real Time M2M coordination, under certain operating conditions. This has caused negative impacts on real time reliability, price convergence, and M2M settlements. On a select group of M2M flowgates, when the Non-Monitoring RTO has significant impacts and/or faster moving units than the Monitoring RTO, the Monitoring RTO does not have capability to absorb the changes in flows caused by the Non-Monitoring RTO, resulting power and/or price swings have occurred on the M2M flowgate. The power/price swing is not due to changes in system conditions but due to the timing delay needed for M2M coordination (dispatch and communications) and the Monitoring RTO does not have sufficient control of total flows, this results in continuous M2M binding and unbinding.
Primary Guiding Principle	Support an economically efficient wholesale market system that minimizes cost to serve load.
Primary Focus Area	Facilitate efficient transactions across market "seams" with neighboring regions.

Origin

Category	Assessment	Comments
Driver	MISO,PJM,SPP and MISO IMM	Real Time M2M mechanism. Potential software and/or procedure change for real time M2M coordination. Power swings attributed to M2M events have caused negative impacts on real time reliability as well as on LMPs for market settlement.
Support	MISO,PJM,SPP and MISO IMM	IMM is also aware of the power swing issue and suggested improvement.

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Real Time Energy Market	
How many MW are directly affected?	Uncertain	Theoretically all MISO market units could be impacted by the power swings, but mainly units with fast ramp rates will be affected.

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Low	Software and Procedure change. Alstom cost should be less than $0.5M.
Production cost savings	Medium	The change is not targeting market efficiency improvement. There could be some cost savings by eliminating power swings but it's difficult to estimate. Also, the power swings have forced RTOs to bind conservatively in M2M and resulted in uneconomic operations.
Other benefits	1) Reliability 2) M2M settlement	1) The power swings have caused concern in real time, especially potential risk on constraint associated with voltage stability at an SPP nuclear station. 2) Large price divergence due to the power swings has caused significant M2M settlements between RTOs.

Implementation Considerations

Category	Assessment	Comments
Current Phase	Construction	Completed Software Design phase and project has been moved to construction phase.
Complexity/risk	Medium	Alstom change and JOA Tariff filling.
Relationship to other initiatives	None	Involves input for UDS dispatch but would be implemented independently with other initiative.
Market Roadmap Priority	Medium	Communicated at September 1, 2015 MSC.
Potential fast-track project?	Yes	Communicated at September 1, 2015 MSC.

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Reliability enhancement	Eliminating power swings can enhance reliability of bulk electric system.

Change Log

Category	Date	Comments
Current Phase	Jan-2017	Project is in Construction phase. Implementation is forecasted for 4Q of 2017.
Current Phase	Apr-2016	Project continues to be in conceptual design. Implementation is forecasted for 2Q of 2017, update provided at May 2nd SMWG.
Implementation Considerations	Mar-2016	Added complexity/risk of JOA tariff filling.

Name:	Manage Power Swings Caused by Market-to-Market (M2M) Dispatch

Conceptual Design Started	Jan-2016	Project has moved into the Conceptual Design phase.
Fact Sheet Template Updated	Nov-2015	Market Roadmap fact sheet converted to updated template.

Name:	MISO-PJM Coordinated Transaction Scheduling (CTS)

Fact Sheet ID	43
Issue ID	MR043
What is it?	Coordinated Transaction Scheduling (CTS) is an optional real-time energy scheduling product designed to improve economic efficiency while also assisting reliability and adding scheduling flexibility. CTS will be an additional real-time market product for participants to schedule energy interchange transactions across the MISO-PJM Interface. It will allow participants to submit a spread bid at the interface to simultaneously buy from one market and sell into the other. The cleared CTS offers will be settled and entered into the real-time dispatch individually by each RTO according to the current process.
Purpose / Issues Addressed	
Primary Guiding Principle	Support an economically efficient wholesale market system that minimizes cost to serve load.
Primary Focus Area	Facilitate efficient transactions across market "seams" with neighboring regions.

Origin

Category	Assessment	Comments
Driver		
Support		

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?		
How many MW are directly affected?		

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs		
Production cost savings		
Other benefits		

Implementation Considerations

Category	Assessment	Comments
Current Phase	Construction	
Complexity/risk		
Relationship to other initiatives		
Market Roadmap Priority	High	
Potential fast-track project?		

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence		

Additional Information

Category	Date	Comments
Implementation Considerations	Feb-2017	Updated Market Roadmap Priority to High to match Market Roadmap Workplan.
Fact Sheet Created	Mar-2016	

Name:	MISO-PJM Interchange Modeling and Pricing Enhancements

Fact Sheet ID	44
Issue ID	MR044
What is it?	MISO and PJM evaluate options to resolve the pricing flaw identified by MISO IMM for the MISO and PJM interchange transactions.
Purpose / Issues Addressed	1.The cause of the interface pricing issue is driven by the modeling overlap by the two RTOs This modeling overlap causes two main issues: a) Duplicative counting of congestion leading to price inaccuracy on M2M constraints; b) Revenue inadequacy leading to uplift in RT market. 2.There are potential unintended consequences: a) Price volatility on M2M constraints will create uncertainties for Market participants to schedule efficient transactions; b) Price efficiency on M2M and Non-M2M constraints
Primary Guiding Principle	Align interface pricing methodology between MISO and PJM that provides accurate incentives to transactions between the seams
Primary Focus Area	Improve price efficiency between seams partners

Origin

Category	Assessment	Comments
Driver	IMM 2013 State-of-the-Market recommendation 2012- 3	
Support	MISO, PJM and Stakeholders	

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	FTR, Day-Ahead and Real-time markets	
How many MW are directly affected?	The pricing inefficiency impacts all transactions bewtween MISO and PJM	

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Medium / High	Market software enhancements depend on the solution selection.
Production cost savings	Medium	MISO estimated $2M joint market impact compare status quo with benchmark for 2015.
Other benefits		

Implementation Considerations

Category	Assessment	Comments
Current Phase	Implementation	
Complexity/risk	Medium-High	High complexity; medium-high risk because it requires cooperation with IMM and PJM.
Relationship to other initiatives	None	
Market Roadmap Priority	High	
Potential fast-track project?		

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Does no harm	

Additional Information

Category	Date	Comments
Implementation Considerations	May-2017	Changed phase to Implementation.
Fact Sheet Created	Mar-2016	

Name:	Emergency Energy and Demand Response Pricing

Fact Sheet ID	45
Issue ID	MR045
What is it?	Address the need for efficient prices under emergency conditions.
Purpose / Issues Addressed	MISO is facing tightening supply margins as capacity retires due to EPA rules and market conditions. Seldom-used emergency only resources may have to be deployed. Prices can be depressed under the current design. Some emergency resources, such as Load Modifying Resource (LMR), have fixed schedules and cannot participate in price-setting. ELMP allows Emergency Demand Response to set prices, but needs to be expanded to price more emergency resources. Price can still be depressed if an offer price for the emergency resource is not available or cheaper than the economic resource dispatched prior to invoking emergency. MISO is enhancing its emergency pricing construct to address the need for efficient prices under emergency conditions.
Primary Guiding Principle	Develop transparent market prices reflective of marginal system cost, and cost allocation reflective of cost-causation and service beneficiaries.
Primary Focus Area	Improve efficiency of prices under all operating conditions.

Origin

Category	Assessment	Comments
Driver		
Support		

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?		
How many MW are directly affected?		

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs		
Production cost savings		
Other benefits		

Implementation Considerations

Category	Assessment	Comments
Current Phase	Implemented	
Complexity/risk		
Relationship to other initiatives		
Market Roadmap Priority		
Potential fast-track project?		

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence		

Additional Information

Category	Date	Comments
Fact Sheet Created	Mar-2016	

Name:	Day-Ahead Reliability Assessment Commitment (DA-RAC) Software Performance Enhancement

Fact Sheet ID	46
Issue ID	
What is it?	Peformance improvement of the software used to execute the Day-Ahead market
Purpose / Issues Addressed	MISO has a limited time frame in which to execute, analyze, and approve the results of the Day-Ahead Market. That time frame was further reduced to 3-hours in November, 2016 in alignment with FERC Order 809. This effort will look at ways for improving the performance of the software executing the Day-Ahead case in order to (1) ensure MISO can continue to maintain the high level of on-time result posting under the new 3-hour deadline; and (2) create performance bandwidth so that future market enhancement projects can be implemented
Primary Guiding Principle	Maximize alignment of market requirements with reliability requirements of the system
Primary Focus Area	Enhance unit commitment and economic dispatch processes

Origin

Category	Assessment	Comments
Driver	FERC Order 809 reducing the Day Ahead clearing windot to 3-hours Create performance bandwidth to tackle future market enhancements	
Support		

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Day-Ahead	
How many MW are directly affected?		

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Low	
Production cost savings	N/A	
Other benefits	FERC Order 809 Compliance	

Implementation Considerations

Category	Assessment	Comments
Current Phase	Post-Implementation	
Complexity/risk		
Relationship to other initiatives		
Market Roadmap Priority	High	
Potential fast-track project?		

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence		

Change Log

Category	Date	Comments
Current Phase	Jun-2017	Updated Current Phase to Post-Implementation.
Current Phase	May-2017	Changed phase to Implementation.
Implementation Considerations	Feb-2017	Changed Implementation planned date from 1Q 2017 to 2Q 2017. Updated Market Roadmap Priority to High to match Market Roadmap Workplan.
Fact Sheet Created	Mar-2016	

Name:	Ramp Capability Product Development

Fact Sheet ID	48
Issue ID	
What is it?	This project will increase the robustness of system operations by better positioning the resources for potential load variation and uncertainty for the intervals beyond current dispatch horizon. New up ramp capability (URC) and down ramp capability (DRC) products. Reserve ramp constrained capacity for uncertainties in net load and reduce occurrences of market price spikes associated with scarcity event. Produce clear market-based incentives for resources to contribute to the load following capability Ramp capability model. Market-wide ramp capability requirements. Calculate ramp capability prices and provide market-based incentive signals.
Purpose / Issues Addressed	During short-term scarcity events, deviations from expected net load or high rates of change beyond the visibility of the dispatch horizon can leave the dispatchable resources with sufficient capacity but without ramp capability to respond.
Primary Guiding Principle	Maximize alignment of market requirements with reliability requirements of the system.
Primary Focus Area	Enhance unit commitment and economic dispatch processes.

Origin

Category	Assessment	Comments
Driver		
Support		

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?		
How many MW are directly affected?		

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs		
Production cost savings		
Other benefits		

Implementation Considerations

Category	Assessment	Comments
Current Phase	Implemented	Implementation 2Q 2016.
Complexity/risk		
Relationship to other initiatives		
Market Roadmap Priority		
Potential fast-track project?		

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence		

Additional Information

Category	Date	Comments
Fact Sheet Created	Mar-2016	

Name:	Pricing for Voltage and Local Reliability (VLR) Commitments

Fact Sheet ID	28
Issue ID	
What is it?	Proposed enhancement on SCED to properly price VLR commitment.
Purpose / Issues Addressed	With south integration, MISO needs to commit for Voltage and Local Reliability (VLR) for several load pockets in the south region. VLR constraints are currently considered in the commitment (SCUC) but not in the economic dispatch (SCED). Hence, those VLR commitments are compensated via RSG uplift payments. The expected RSG is ranges from $90 to $20m/y and significantly impacts market efficiency.
Primary Guiding Principle	Develop transparent market prices reflective of marginal system cost, and cost allocation reflective of cost-causation and service beneficiaries.
Primary Focus Area	Improve efficiency of prices under all operating conditions.

Origin

Category	Assessment	Comments
Driver	MISO, stakeholders	Est. $90M/yr in uplift for MISO South load pockets. Objective is to send appropriate price signals for reserves in these areas (in turn, decrease uplift).
Support	IMM	IMM Recommendation # 2014-2

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Generators and loads in the load pockets	
How many MW are directly affected?	6000~9000MW	

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	Low to Medium	
Production cost savings	Low to Medium	May enhance the modeling of SCUC/SCED to improve commitment results.
Other benefits	Improve the efficiency of price	Reduce uplift payments/Provide proper price signals/value for generation providing reliability benefit.

Implementation Considerations

Category	Assessment	Comments
Current Phase	Evaluation	On-going gap analysis of existing software (e.g. the possibility of using zonal reserve requirement or reserve procurement enhancement constraints).
Complexity/risk	Market clearing engine and potentially settlement	
Relationship to other initiatives		
Market Roadmap Priority	High	Communicated at September 1, 2015 MSC.
Potential fast-track project?	No	Communicated at September 1, 2015 MSC.

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Provide efficient price signal and help improve reliability in the long run	

Change Log

Category	Date	Comments
Informational	Jun-2016	Updated information for the 2016 ranking process.
Evaluation Started	Jan-2016	Project has moved into the Evaluation phase.
Informational	Jan-2016	Added Issue ID above which links to MISO's issue tracking tool.
Informational	Dec-2015	Added IMM Recommendation # to Support
Fact Sheet Template Updated	Nov-2015	Market Roadmap fact sheet converted to updated template.
Merged into 10 - Short Term Reserves	Nov-2016	Similarities between problems, solution needs to be in sync

Name:	Online Tool for Change of Registration Information

Fact Sheet ID	47
Issue ID	
What is it?	
Purpose / Issues Addressed	
Primary Guiding Principle	
Primary Focus Area	

Origin

Category	Assessment	Comments
Driver		
Support		

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?		
How many MW are directly affected?		

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs		
Production cost savings		
Other benefits		

Implementation Considerations

Category	Assessment	Comments
Current Phase	Construction	
Complexity/risk		
Relationship to other initiatives		
Market Roadmap Priority		
Potential fast-track project?		

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence		

Additional Information

Category	Date	Comments
Fact Sheet Created	Mar-2016	
Removed from Market Roadmap	Nov-2016	This is an administrative project, not a market enhancement

Name:	Competitive Retail Solution

Fact Sheet ID	56
Issue ID	
What is it?	A set of mechanisms that assures resource adequacy for areas of the footprint that are subject to competitive retail access while respecting jurisdictional processes. Mechanisms include the Forward Resource Auction, Forward Fixed Resource Adequacy Plan, and the Prevailing State Compensation Mechanism.
Purpose / Issues Addressed	Current resource adequacy requirements will not assure resource adequacy for competitive retail areas in the future.
Primary Guiding Principle	1) reliability; 2) respect for jurisdictional processes; 3) efficiency, and 4) continued promotion of regional benefits
Primary Focus Area	Support efficient development of resources consistent with long-term reliability and/or public policy objectives.

Origin

Category	Assessment	Comments
Driver	Efficiency and Reliability	
Support	Issue Statement on Facilitating Resource Adequacy in the MISO Region	https://www.misoenergy.org/Library/Repository/Meeting%20Material/Stakeholder/SAWG/2015/20150305/20150305%20SAWG%20Item%2002%20Resource%20Adequacy%20Issues%20Statement.pdf

Indicators of Extent of Impact

Category	Assessment	Comments
Which markets/sectors does this impact?	Capacity Market	
How many MW are directly affected?	~11,000MW	Demand subject to competitive retail access.

Economic Benefits and Costs

Category	Assessment	Comments
Implementation cost and other costs	High	Requires new market product.
Production cost savings	None	
Other benefits	Medium	Meeting future resource adequacy needs for demand subject to competitive retail access ensures the region remains resource adequate.

Implementation Considerations

Category	Assessment	Comments
Current Phase	Software Design	Continuing detailed design to support software development.
Complexity/risk	Medium	Significant complexity in addressing the unique resource adequacy needs of areas subject to competitive retail access. Significant complexity poses risk to timely implementation.
Relationship to other initiatives	Medium	Tightly integrated into existing Resource Adequacy Requirements and the potential changes to them (e.g., locational and seasonal capacity market reforms)
Market Roadmap Priority	High	
Potential fast-track project?		

Reliability Due Diligence

Category	Assessment	Comments
Reliability Due Diligence	Enhances Reliability	A set of mechnisms that assures resource adequacy for areas of the footprint that are subject to competitive retail access while respecting jurisdictional processes.

Additional Information

Category	Date	Comments
Implementation Considerations	Feb-2017	Updated Market Roadmap Priority to High to match Market Roadmap Workplan.
Added to Market Roadmap	11/1/2016	Fact sheet created.

MISO Market Roadmap: Change Log History

Date	Description
Jan-19	• MR02: Updated current phase. Forecasted implementation date changed to Q2 2023. • MR25: Updated current phase, increased complexity and relationship to "High". • MR39: Updated current phase. • MR42: Purpose / Issues Addressed edited. Changed implementation date. • MR62: Current phase set to Build and comments updated.
Dec-18	• MR30: Implementation Date updated to May 2019. • MR27: Implementation Date updated to Oct 2019. • MR39 moved to Active Work plan from Parking Lot. • MR42: Current Phase updated to Concept Design. • IMM Recommencations - Comments updated. • Updated all fact sheet links to link to correct Issue Tracking Tool page on MISO website.
Nov-18	**Work Plan** • Priorities have changed • Some schedules have been delayed • The Work Plan will now be shown by DART impact grouping **Fact Sheets** • MR 61 - Informational: FERC accepted filing without condition • MR 42 - Updates to Current Phase comments and Complexity/risk comments
Oct-18	**Updated Work Plan** • MR 27: Timeline "Build" (Construction) phase adjusted to continue through March 2019
Sep-18	**Updated Fact Sheets** • MR61: Informational - FERC rejected filing with guidance; proposal refiled with consideration of FERC's guidance August 31st, Current Phase - updated to Build. **Updated Work Plan** • MR10: Concept Design phase extended through Q4 2018
Aug-18	**Updated Fact Sheets** • MR 26: Current Phase updated to Implement • MR51: Added pumped storage transition considerations to the description. • MR 62: Set Category to Conceptual Design • MR 42: Updated schedule based on most recent filing to FERC **Updated Work Plan** • MR 42: Updated schedule based on most recent filing to FERC
Jul-2018	**Updated Fact Sheets** • MR#2 - Updated Current Phase Assessment and Comments. • MR#26 - Updated Current Phase Comments • MR#31 - Updated Current Phase Comments **Updated Work Plan** • MR#2 - Project timeline updated. • MR#30 - Edited phase timing to reflect current build and implementation status • MR#31 - Project timeline updated to show implementation date of Oct-2021, which includes MISO resource and budgetary constraints related to other projects. • Added 2017 IMM Recommendations
Jun-2018	**Modified: 1 Modified Candidate in Parking Lot** MR33 - Incentive for Frequency Response Service **New: 7 New Candidates added to Parking Lot** MR63 - Enhanced Modeling of Generator Operations MR64 - Look Ahead Dispatch
May-2018	MR#10 Current phase changed to Conceptual Design.Relationship to other initiatives changed to Market System Enhancement. Name changed to "Short-Term Capacity Reserves". MR#30 Market Roadmap Priority corrected to "Low". MR#51 Name changed to "Enhanced Storage Resource" MR#62 Added "Storage Participation - FERC Order 841 Compliance" to workplan and created new fact sheet.

MISO Market Roadmap: Change Log History

Date	Description
Apr-2018	MR#61 Updated comments to reflect March 2017 filing
Mar-2018	WORK PLAN MR30 - Changed Market Roadmap Priority to "Medium" to match current Fact Sheet. MR31 - Project Name changed to "Multi-Day Market Forecast" FACT SHEETS MR30 - Edited phase timing to reflect current status. MR51 - Updated Current Phase comments. Updated Driver and Support comments. MR31 - Project Name changed to "Multi-Day Market Forecast"
Feb-2018	WORK PLAN • Updated Current Phase of MR#30 to Concept Design. • Updated Current Phase of MR#42 to Not Active. • Updated Work Plan Timeline for MR#54 - start of Evaluation phase moved from Q1 2019 to Q4 2019.
Jan-2018	Moved the following enhancements that were implemented in 2017 to the Completed Section: • MR#46: Day-Ahead Reliability Assessment Commitment Software Performance Enhancement • MR#18: Extended Locational Marginal Pricing, Phase II • MR#44: MISO-PJM Interchange Modeling and Pricing Enhancements • MR#43: MISO-PJM Coordinated Transaction Scheduling • MR#37: Manage Power Swings Caused by Market-to-Market (M2M) Dispatch *** MR#42- Increase the Energy Offer Cap: Revised expected implementation date to November 2018
Dec-2017	MR#42- Increase the Energy Offer Cap: Recent compliance filing was rejected by FERC due to need to clarify some of the language. MISO is filing in December 2017 for additional clarification from FERC to better understand what is needed. MISO plans to then submit a compliance filing in January 2018 following the fairly straightforward direction from the commission. There is no expectation for practical changes that would impact stakeholders.
Nov-2017	• Updated active work plan to reflect 2017 prioritization survey results • Updated what is in the parking lot based on prioritization and resource constraints related to Market System Enhancement • Updated schedules to most candidates based on 2018 budget and resource plans
Aug-2017	Deleted IMM Recommendation "2010-11: Improve expected deployment costs when selecting units to provide spinning reserves", since the IMM believes the issue no longer exists and did not include in 2016 SOM report Deleted IMM Recommendation "2014-1: Modify the allocation of FTR shortfalls in order to fully fund MISO's FTRs.", since the IMM believes the issue no longer exists and did not include in 2016 SOM report Deleted IMM Recommendation "2012-9: Allow the definition of a “dynamic NCA” that is utilized when network conditions create substantial market power.", since it was completed and removed from 2016 SOM report Added an additional quarter of planning for MR#49 Demand Response/BTMG/EDR deployment during Capacity Emergency Revised work plan for MR#10 Short-Term Capacity Pricing and Reliability Requirements
Jul-2017	Allow 1 more quarter for testing of Multi-Day Financial Commitment software (MR 31). Final implementation to occur Q1 2020. Also added post-implementation evaluation to schedule.

MISO Market Roadmap: Change Log History

Date	Description
Jun-2017	18 - Extended Locational Marginal Pricing (ELMP), Phase II: Updated current phase from "Implementation" to "Post-Implementation." Also updated next update date to December 2017 at MSC. 36 - Aggregate Load and/or Storage to Meet Minimum Participation Limit: Added "and/or Storage" to product name to reflect current product name. 46 - Day-Ahead Reliability Assessment Commitment Software Performance Enhancement: Updated current phase from "Implementation" to "Post-Implementation." Completed fact sheet. 10 - Short-Term Capacity and Reliability Reserve Pricing: Fact sheet updated to reflect that issues considered under this project now includes the IMM recommendation (#2016-4) to establish regional reserve requirements and cost allocation. The fact sheet was also updated to reflect the issues formerly considered under 28, Pricing for Voltage and Local Reliability (VLR) Commitments. Changed name to: Short-Term Capacity Pricing and Reliability Requirements. 40 - Dispatchable Intermittent Resource (DIR) Modification: Updated to fact sheet to incorporate two related IMM recommendations (this is in the Parking Lot) 41 - Locational Capacity Market Reforms: Updated fact sheet to be more focused on external resource zones in the Planning Resource Auction and changed fact sheet to new ID#61. Brought back earlier version of fact sheet 41 - Capacity Transfer Rights in Resource Adequacy Requirements and placed in Parking Lot section. Parking Lot: Minor language changes to update fact sheets in the Parking Lot New: Four new candidates added to the Parking Lot section - 57 - ASM Product Substitution Visibility; 58 - Reform DAMAP and RTOSGP Rules; 59 - Modified INC/DEC; 60 - Improved Contingency Reserve Demand Curve that reflects VOLL
May-2017	18 - Extended Locational Marginal Pricing (ELMP), Phase II: Updated product to implementation phase with an implementation date of 5/1/17. 27 - Automatic Generation Control (AGC) Enhancement for Fast-Ramping Resources: Updated product to evaluation phase. 30 - Tighten Thresholds for Uninstructed Deviation: Updated product to software design phase with an implementation date TBD. 42 - Evaluating the Energy Offer Cap and Value of Lost Load: Updated product to software design phase. Also updated Next Update Date to 4Q 2017 at MSC. 43 - MISO-PJM Coordinated Transaction Scheduling (CTS): Updated Next Update Date to 3Q 2017 at MSC. 44 - MISO-PJM Interchange Modeling and Pricing Enhancements: Updated product to implementation phase. Also updated Next Update Date to May 2017 at JCM. 46 - Day-Ahead Reliability Assessment Commitment Software Performance Enhancement: Updated product to implementation phase.
Apr-2017	30 - Tighten Thresholds for Uninstructed Deviation: Updated project schedule to reflect current expectations. Also updated to show next discussion in 2Q 2017 at MSC. Finally, project is in s conceptual design phase with an implementation date TBD. 37 - Manage Power Swings Caused by Market-to-Market (M2M) Dispatch: Updated Market Roadmap next SMWG update date to July 2017. Project is in construction phase. 42 - Evaluating the Energy Offer Cap and Value of Lost Load: Updated project schedule based on current expectations. Also updated to show next discussion in April 2017 at MSC. Finally, project is now in conceptual design phase.
Mar-2017	25 - Updated name to "Resource Availability and Need" to reflect the new understanding of issues (i.e., focus on resource availability and need throughout the entire year, transcending seasons). Reflected next stakeholder discussion is in the 2nd half of 2017 at the RASC. Provided the discussion will focus on issues/problem statement, the work plan was updated to reflect a Planning Year 2020/21 implementation based roughly off a the CRS workload. 26 - Implement 5-Minute Settlement Calculations: The next stakeholder discussion is pending for 3Q 2017 at MSC.

MISO Market Roadmap: Change Log History

Date	Description
	30 - Tighten Thresholds for Uninstructed Deviation: The next stakeholder discussion is pending for 1Q 2017 at MSC. 33 - Incentive for Frequency Response Service: Product removed from Market Roadmap Workplan and entered into Unscheduled Projects list. 41 - Locational Capacity Market Reforms: Project plan updated to reflect implementation in Q1 2018 instead Q1 2019. Also, the next stakeholder discussion is pending for March 2017 at RASC. 46 - Day-Ahead Reliability Assessment Commitment Software Performance Enhancement: Forecasted implementation date updated to Arpil 2017 from March 2017. Also, the next stakeholder discussion is pending for 3Q 2017 at MSC. 56 - Competitive Retail Solutions: Product removed from Market Roadmap Workplan and entered into Completed Projects list as MISO did not file for rehearing at FERC and the product is on permanent hold.
Feb-2017	37 - Manage Power Swings Caused by Market-to-Market (M2M) Dispatch fact sheet updated to represent current phase as Construction phase. Also the next stakeholder discussion is pending for April of 2017.
Jan-2017	30 - Tighten Thresholds for Uninstructed Deviation: Project plan updated to reflect implementation in Q3 2017 instead Q2 2017. 37 - Manage Power Swings Caused by Market-to-Market (M2M) Dispatch fact sheet updated to represent current phase as software design. Also the next stakeholder discusison is pending for March of 2017.
Nov-2016	2 - Enhanced Modeling of Combined Cycle Generators - additional milestones are included in plan 5 - Introduce a Virtual Spread Product - was postponed 7 - Optimize Flow-Control Resource Dispatch - was postponed 10 - Develop Additional Short-term Capacity Reserve Requirements - was postponed 25 - Address Seasonal Resource Adequacy Requirements - was postponed and assigned a Medium priority ranking (formerly High) to reflect 56 - CRS having a higher priority 27 - Automatic Generation Control (AGC) Enhancement for Fast-Ramping Resources - schedule was updated to show milestones through implementation 28 - Pricing for Voltage and Local Reliability (VLR) Commitments - was merged into project 10 - Develop Additional Short-term Capacity Reserve Requirements, because there is significant overlap in issue and potential solution 31 -Introduce Multi-Day Financial Commitments - was postponed 36 - Aggregate Load to Meet Minimum Participation Limits - was added to the work plan 38 - Allocate Additional Feasible Auction Revenue Rights - was postponed 41 - Introduce Capacity Transfer Rights in the Resource Adequacy Requirements - was postoned, assigned a Medium priority (formerly High) ranking to reflect 56 - CRS having a higher priority, and 41 was renamed to: Locational Capacity Market Reforms, to be less prescriptive 42 - Evaluating the Energy Offer Cap and Value of Lost Load - FERC issued a final rule largely consistent with the NOPR 47 - Online Tool for Change of Registration Information, was removed from the Market Roadmap - because it is an administrative project, not a market enhancement 49 - Demand Response/BTG/EDR deployment during Capacity Emergency was added to the work plan 50 - Behind Meter Storage Aggregation Under DRR Type II - was added to the work plan 51 - New Storage Resource - was added to the work plan

MISO Market Roadmap: Change Log History

Date	Description
	54 - Application of Dynamic and Predictive Ratings - was added to the work plan
	56 - Competitive Retail Solution - was created to show transparency around milestones
Oct-2016	The workplan (Next Update Date) for Allocate Additional Feasible Auction Revenue Rights has been updated to reflect the current progress and forecast for this project.
Sep-2016	Removed item 32 (Develop Three-way Market-to-Market Processes (MISO, PJM, SPP)) from 'Market Roadmap' workplan and moved it to the 'Unscheduled Project' list.
Aug-2016	Market Roadmap project 37 - Manage Power Swings Caused by Market-to-Market (M2M) Dispatch stakeholder update to the SMWG is delayed until October of 2016 due to delay in discussions with SPP. Market Roadmap project 43 - MISO-PJM Coordinated Transaction Scheduling (CTS): delayed implementation due to PJM change of schedule. Parallel Operations and testing will take place in Q3 of 2017 with go-live of 10/3/17. Market Roadmap project 26 - Implement 5-Minute Settlement Calculations: started construction earlier to fit in DART modifications prior to Implement 5-Minute Settlement Calculations's start of construction. Market Roadmap project 27 - Automatic Generation Control (AGC) Enhancement for Fast-Ramping Resources: added Software Design in 2016 and Construction in 2017.
Jul-2016	The workplan for Allocate Additional Feasible Auction Revenue Rights has been updated to reflect the current progress and forecast for this project. The Conceptual Design phase has been extended one quarter for the following projects: Address Seasonal Resource Adequacy Requirements and Introduce Capacity Transfer Rights in the Resource Adequacy Requirements.

MISO Market Roadmap: Change Log History

Date	Description
Jun-2016	Extended Locational Marginal Pricing (ELMP), Phase II: Changed forecasted implementation date from March to June per May MSC discussion. Tighten Thresholds for Uninstructed Deviation extended to 2Q 2017 from 4Q 2016 - this was communicated at the June MSC. Updated Current Phase of Emergency Energy and Demand Response Pricing to Implementation.
May-2016	Ramp Capability Product Development has been implemented! For the Evaluating the Energy Offer Cap and Value of Lost Load project: future presentation to MSC will be made after FERC Energy Offer Cap Rules are finalized. Update to status and comments in IMM Recommendation 2014-3. Updated Next Update Date and Entity for: Emergency Energy and Demand Response Pricing, Tighten Thresholds for Uninstructed Deviation, Day-Ahead Reliability Assessment Commitment (DA-RAC) Software Performance Enhancement, Extended Locational Marginal Pricing (ELMP), Phase II, Manage Power Swings Caused by Market-to-Market (M2M) Dispatch, Address Seasonal Resource Adequacy Requirements, Introduce Capacity Transfer Rights in the Resource Adequacy Requirements, Implement 5-Minute Settlement Calculations, Introduce Multi-Day Financial Commitments, Enhance Economic Selection and Dispatch of Spinning Reserves, Develop Three-way Market-to-Market Processes (MISO, PJM, SPP), Evaluating the Energy Offer Cap and Value of Lost Load, and MISO-PJM Interchange Modeling and Pricing Enhancements.
Apr-2016	Workplan has changed for Manage Power Swings Caused by Market-to-Market (M2M) Dispatch and Develop Three-way Market-to-Market Processes (MISO, PJM, SPP). These projects were scheduled to be implemented in December of 2016 and March of 2017 respectively. Manage Power Swings Caused by Market-to-Market (M2M) Dispatch is now forecasted to be implemented in June 2017. Develop Three-way Market-to-Market Processes (MISO, PJM, SPP) is moved to the reviewing phase, we will continue to review the need thru the middle of 2017. Please see the associated fact sheets for details. Workplan has changed for Extended Locational Marginal Pricing (ELMP), Phase II. This project was scheduled to be implemented in March of 2018 and is now forecasted to be completed one year earlier in March 2017.
Mar-2016	Workplan has changed for Address Seasonal Resource Adequacy Requirements and Introduce Capacity Transfer Rights in the Resource Adequacy Requirements. These projects were scheduled to be implemented in March 2017 - they are now scheduled to be implemented in March 2018. Please see the associated fact sheets for details. Forecasted Completion Date has changed for Ramp Capability Product Development. This project was scheduled to be completed by April 2016 but is now scheduled for May 2016, pending FERC approval. As of April 2016, the following projects have progressed in phase. Please review the Market Roadmap Workplan for details: MISO-PJM Coordinated Transaction Scheduling (CTS), Emergency Energy and Demand Response Pricing. Fact sheet 44 created for MISO-PJM Interchange Modeling and Pricing Enhancements. Placeholder fact sheets created for: Fact sheet 43 for MISO-PJM Coordinated Transaction Scheduling (CTS). Fact sheet 45 for Emergency Energy and Demand Response Pricing. Fact sheet 46 for Day-Ahead Reliability Assessment Commitment (DA-RAC) Software Performance Enhancement. Fact sheet 47 for Online Tool for Change of Registration Information. Fact sheet 48 for Ramp Capability Product Development.
Mar-2016	Workplan updated for item 32: Develop Three-way Market-to-Market Processes (MISO, PJM, SPP) the Conceptual Design phase will continue into 2Q 2016 rather than Software Design.

MISO Market Roadmap: Change Log History

Date	Description
Feb-2016	The Expand Day-Ahead Market-to-Market Coordination Processes with PJM project has been completed. The MISO Market Roadmap Workplan and Fact Sheet #15 have been updated accordingly. The workplan for MISO-PJM Interchange Modeling and Pricing Enhancements has changed. This project, which was previously scheduled for Implementation in the second quarter of 2016, is now planned to be in the Conceptual Design phase through the second quarter of 2016. As MISO and PJM communicated during the February 18th JCM, the Real-time joint analysis shows that the collaborative approach has merit to improve the current interface pricing issue. However, MISO and PJM are performing additional analysis to ensure no adverse impact is expected for the forward markets (i.e. DA and FTR). The additional analysis won't be finalized in time for the 2016 FTR allocation process, so both MISO and PJM have agreed to remain status quo for 2016. The workplan for this project will be planned beyond the Conceptual Design phase once more information is known. In the MISO Market Roadmap Workplan, the *Next Update Date* & *Next Update Entity* columns were updated for the following projects: Introduce Capacity Transfer Rights in the Resource Adequacy Requirements (changed from February 2016 to March 2016), Address Seasonal Resource Adequacy Requirements (changed from February 2016 to March 2016), and MISO-PJM Interchange Modeling and Pricing Enhancements (changed from February 2016 to March 2016). In the MISO Market Roadmap Workplan, please review the *Fact Sheet Last Updated* column for "Feb-2016." You can find more details of the changes in the associated fact sheets.
Jan-2016	In the MISO Market Roadmap: Workplan, updates were made to the Next Update Date and Next Update Entity columns: Next Update Date/Entity added to three projects: 1) Expand Day-Ahead Market-to-Market Coordination Processes with PJM: February 2016 @ JCM 2) Address Seasonal Resource Adequacy Requirements: February 2016 @ SAWG 3) Introduce Capacity Transfer Rights in the Resource Adequacy Requirements: February 2016 @ SAWG Next Update Date changed for four projects: 1) Emergency Energy and Demand Response Pricing: was April 2016, now March 2016 2) Introduce Multi-Day Financial Commitments: was April 2016, now May 2016 3) Develop Additional Short-term Capacity Reserve Requirements: was March 2016, now April 2016 4) Pricing for Voltage and Local Reliability (VLR) Commitments: was March 2016, now April 2016
Jan-2016	Two changes were made to add clarification: 1) Changed nomenclature of "Report Card" to "Fact Sheet" 2) The "Additional Information" section in each fact sheet is now called "Change Log"
Dec-2015	Extended the "Day-Ahead Reliability Assessment Commitment (DA-RAC) Software Performance Enhancement" project to 1Q 2017 (previously communicated with a 2Q 2016 completion date) to account for additional work needed. Added IMM Recommendations list. Updates were made in several fact sheets. For a list of fact sheets to review, please see the MISO Market Roadmap: Workplan page where the "Fact Sheet Last Updated" column is Dec-2015. In each associated fact sheet, see the Additional Information section for a description of the change. Thank you. Added project phase descriptions to the Market Roadmap Key. Added "2015 Market Roadmap Priority" column to Market Roadmap and Unscheduled Projects.