



Reliability Imperative: System Enhancements

Technology Committee
of the Board of Directors

September 4, 2025

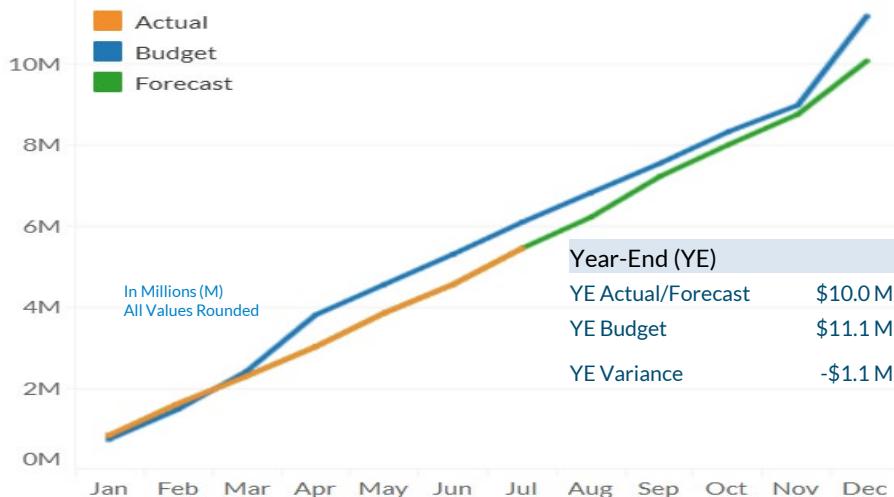
Executive Summary

- As the Market System Enhancement (MSE) program enters its final phase for delivery, MISO is continuing to accelerate the Real-Time Market Clearing Engine
- The MSE program is expecting additional costs and an extended timeline, and MISO is incorporating lessons learned and monitoring risks and unknowns
- Testing is underway for Real-Time Ambient Adjusted Line Ratings (AARs)
- The deployment of the new workflow management platform will help MISO operate with more security, consistency, speed and transparency
- MISO is accelerating its quality assurance strategy

MISO is focused on advancing the Real-Time Market Clearing Engine deliverables, but the complexity is causing delays

#	Key Program Risks	Heat Map Index*	Trend	Mitigation
1	Program cost management	6 Moderate & Likely	↗	Evaluate Scope
2	Performance of key vendors	5 Moderate & Possible	↔	Leadership & Consortium Escalation
3	Acquisition and retention of key talent	5 Minimal & Likely	↔	Evaluating alternatives
4	Events impact operational plan	5 Minimal & Likely	↔	Update as needed
5	Scope complexity	4 Minimal & Possible	↔	Monitor

Year End Cost (Investment Only)



Program 2025 Major Deliverables	Original Timeline (2021)	Revised Timeline (2023)	Latest Reset (Q4 2024)
Begin parallel operations of the Real-Time Market Clearing Engine (RT-MCE) for Reliability Assessment and Commitment (RAC)	Q3 2024	Q1 2025	Complete
Complete parallel operations and enter production with the new Reliability Assessment and Commitment (RAC) engine	Q2 2025	At Risk	Q4 2025
Begin Factory Acceptance Testing (FAT) for the Look Ahead Commitment (LAC) study mode	Q2 2025	At Risk	Q2 2025
Model Manager Phase 3 Data Migration Stage Features completed for planning	Q3 2024	Q1 2025	Q2 2025
Complete Factory Acceptance Testing (FAT) of the integrated planning model for Model Manager	Q3 2025	At Risk	Q4 2025
Complete Site Acceptance Testing (SAT) of the integrated planning model for Model Manager	Q4 2025	At Risk	Q1 2026

In bold: Short-Term Incentive Plan initiative

*Heat map index is the sum of risk likelihood (1-4 scale) and impact (1-4 scale)

The total cost forecast for the Market System Enhancement (MSE) program is increasing, and MISO is managing the scope of the budgetary and schedule complexities



- The complexity of the Real-Time Market Clearing Engines (RT-MCE) and the challenges associated with quality and schedule have increased costs
- MISO is managing the scope of remaining work and the unknown risks by using lessons learned, taking corrective actions and working closely with the vendor
- MISO's projected forecast to complete the Unit Dispatch System is \$20 million, and the schedule for RT-MCE has extended through 2028

The MSE program is under budget for 2025, and the preliminary estimate for the 2026 budget is approximately \$13 million

2025

Major deliverables are expected to be complete by the end of the year

2026

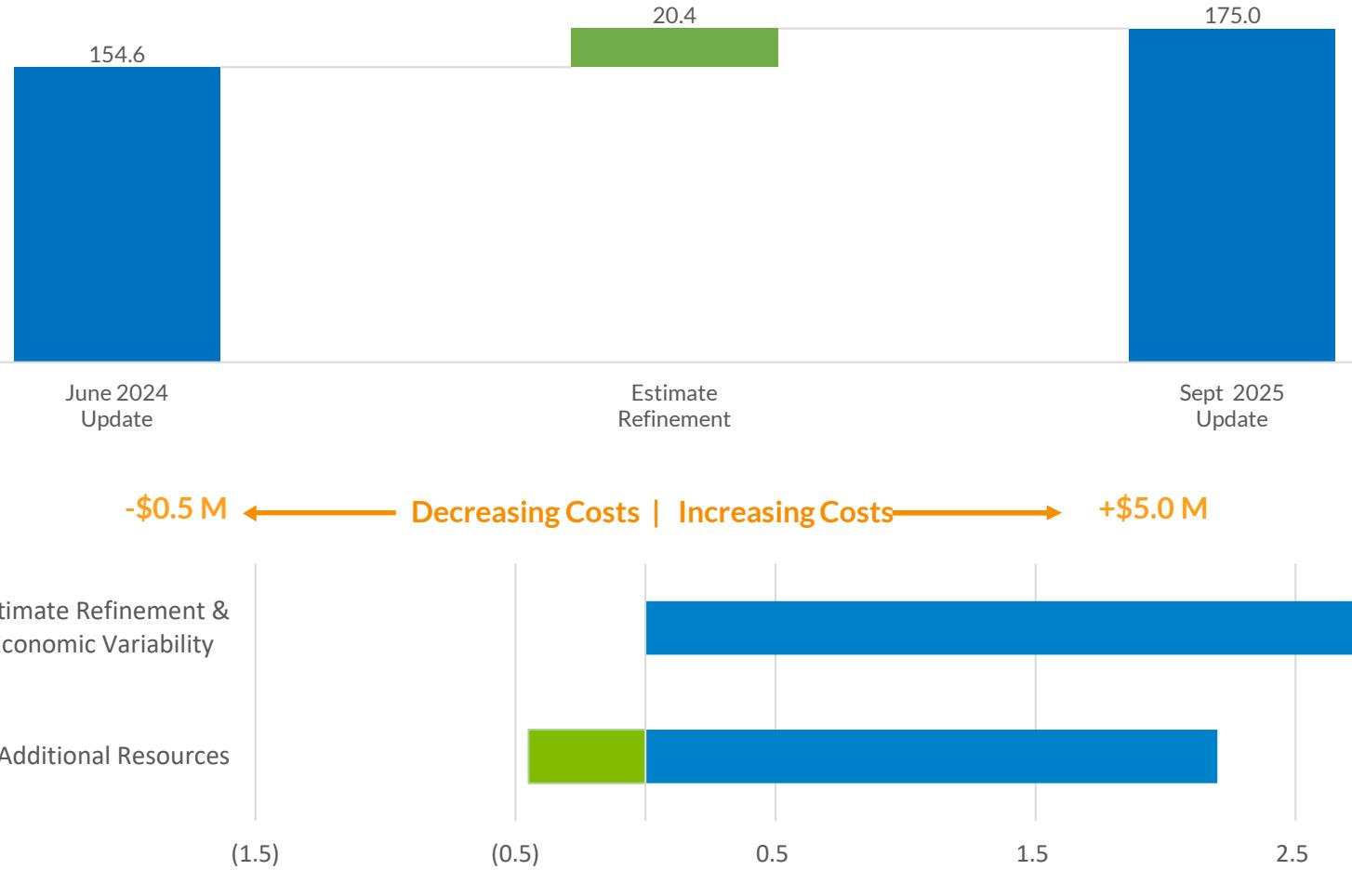
The program's initial forecast of approximately \$13 million will continue to be refined within the overall organizational budget

Full MSE Program

The overall program cost has increased to approximately \$175 million due to the complexity of completing Real-Time Market Clearing Engines

The MSE program's total cost projection continues to increase due to schedule changes, system complexities and inflation impacts

Increase



MISO is applying lessons learned from Day-Ahead Market Clearing Engine to mitigate risks, while monitoring unknowns that contribute to forecast variability

- Initial forecasts are 25-50% low
- Time & material contracts
- Defects found late in testing
- Fix resolution times are highly variable
- Limited requirements governance

ACTIONS

- ✓ Shifted testing earlier in development with clear acceptance criteria
- ✓ Built “production like” environment for vendor to perform higher quality testing
- ✓ Established comprehensive test automation to support regression testing
- ✓ Increased subject matter expertise in testing for Real-Time Market Clearing Engine (RT-MCE)
- ✓ Tightened requirement governance to reduce late-stage surprises
- ✓ Increased executive engagement

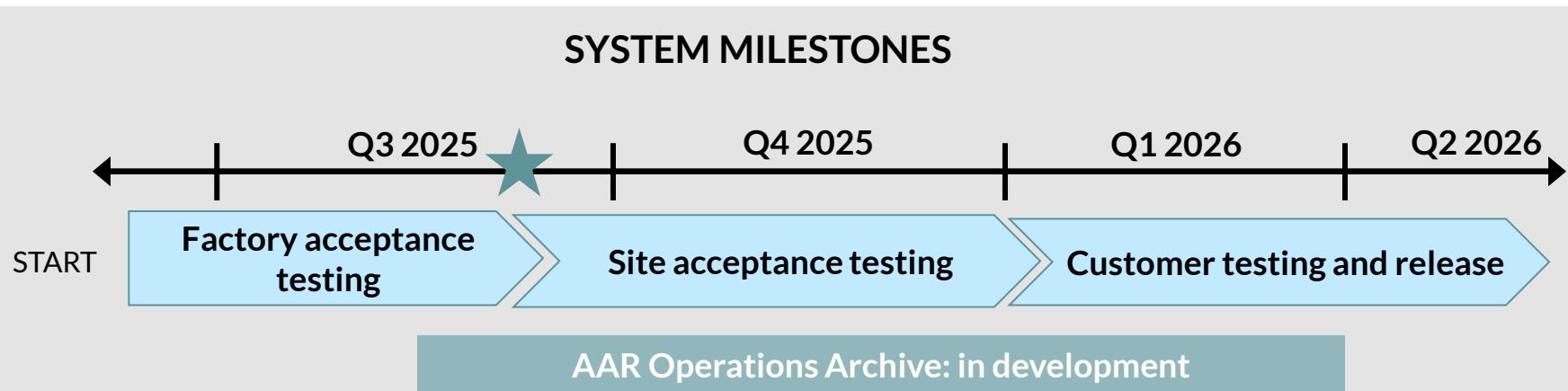
KEY UNKNOWNS

- Final estimate to complete all RT-MCE efforts
- Impact of technical foundations challenges
- Impact of new production-like test environment
- Performance challenges may require hardware refresh
- Extended testing durations that may require staff augmentation



The technology for Real-Time Ambient Adjusted Line Ratings (AARs) is in the testing stages for the remainder of 2025 with production still on track for 2026

- The four key AAR workstreams are progressing, and MISO is closely collaborating with the vendor to finish testing
- MISO is working with the vendor to resolve defects identified in Factory Acceptance Testing
- Site Acceptance Testing, as an integrated system, is on track to begin in Q3, with the goal to complete the performance metric in 2025



MISO's new service management platform is transforming service delivery and asset management to drive reliability, enhance decision-making and benefit stakeholders and members

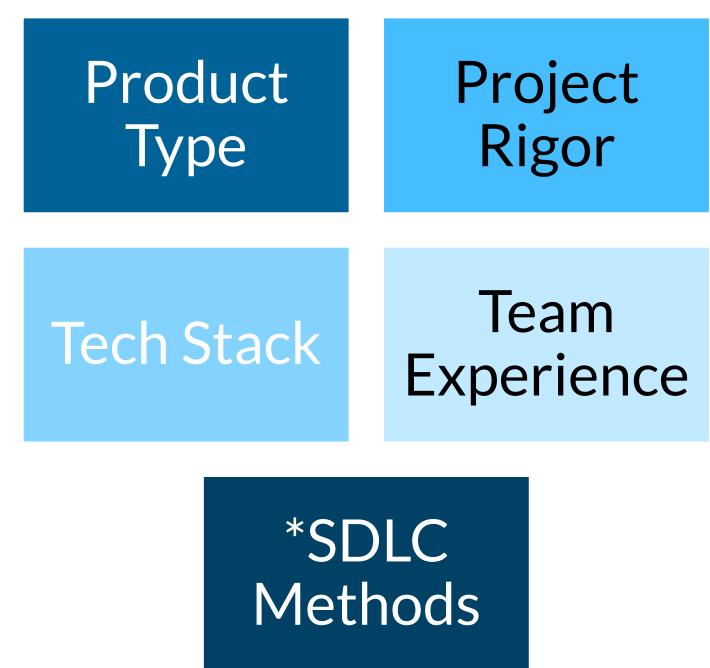
- ***First release went live in June:*** discovery, configuration management database, core integrations and knowledge management
- ***Second release scheduled for iterative releases through 2025 and Q1 2026:*** Service portal, IT service and asset management functionality and workplace service delivery for Facilities
- Stakeholders and members will benefit from the enhanced service transparency



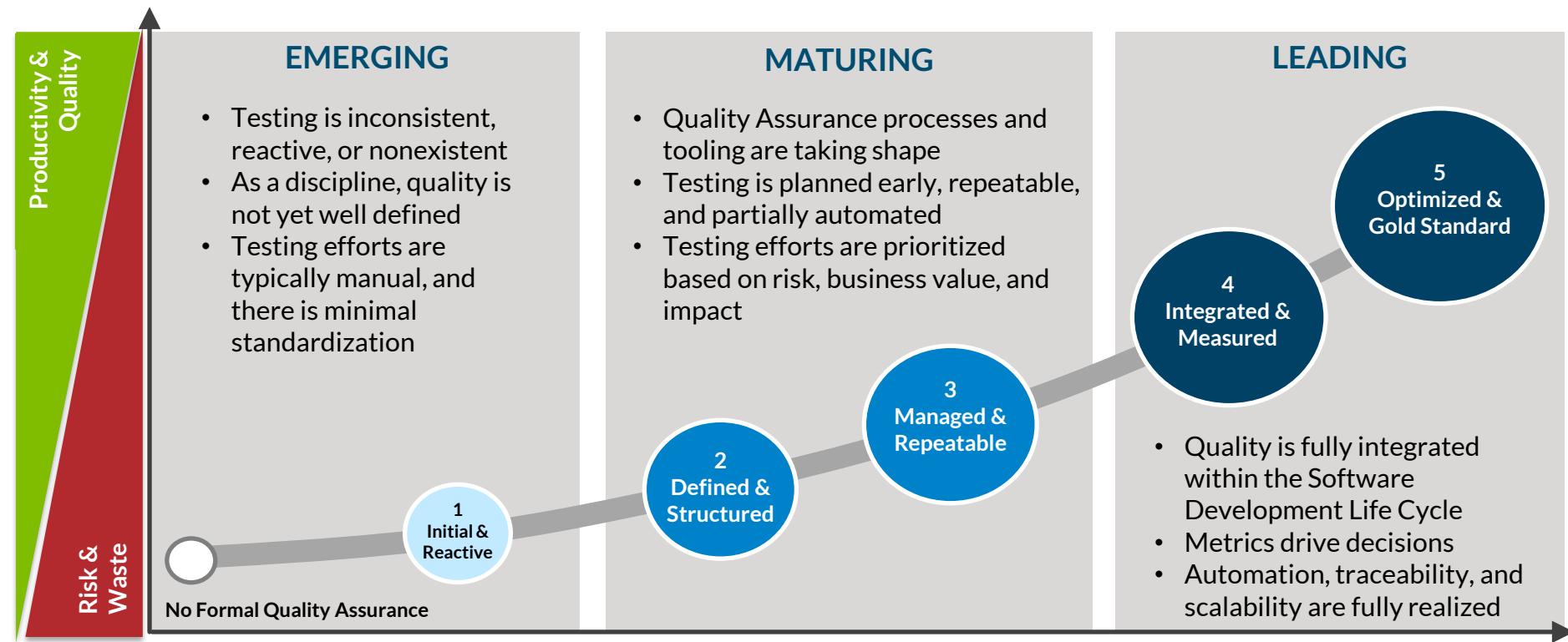
MISO is currently accelerating its capabilities to enhance its quality assurance strategy to ensure consistent, scalable and auditable testing across all products

- Today, MISO leverages various testing types, levels and approaches across the organization, and testing strategy is influenced by five factors
- Current testing quality varies by application
- Different types of testing are done for in-house development than for vendor/commercial off-the-shelf development

INFLUENCING FACTORS



MISO is on a maturation journey to improve quality assurance across the enterprise, including test planning, environments, data and automation



To mature our quality assurance (QA) program, MISO will invest in people, processes and technologies

People

- New talent
- Consultant/advisor
- Strategic partner/industry experts
- Upskilling quality assurance engineers
- Quality-first culture

Process

- Independent verification & validation
- Change management policy
- Vendor quality assurance oversight
- In-house quality assurance metrics
- Centralized quality assurance standards

Technologies

- AI-powered testing software
 - Application Programmable Interface
 - User Interface testing
- End-to-end test automation
- Environment and data maturity
- CI/CD* Pipeline integration

*CI/CD = Continuous Integration/Continuous Delivery

APPENDIX

The Market System Enhancement program transforms MISO's market technology into a more flexible, secure system that allows for faster adoption of new technologies



Extend the life of the current system



Design a flexible, scalable, adaptable system



Upgrade, build and launch a new market system

- ✓ Initiated Program
- ✓ Set business objectives
- ✓ Explored Vendor Alternatives
- ✓ Enhanced Training Simulator
- ✓ Completed Legacy MMS & EMS Life Extensions
- ✓ Integrated Architecture
- ✓ Launched private cloud computing platform
- ✓ Launched data analytics governance

- ✓ Launched Reliability Assessment and Commitment
- ✓ Delivered Look Ahead Commitment

- Deliver Unit Dispatch System

2017 - 2020

2021 - 2024

2025

2026

2027

2028

- ✓ Launched Market User Interface
- ✓ Completed Model Manager phases 1 & 2
- ✓ Launched Short-Term Reserve Market Product
- ✓ Energy Management System in parallel operations
- ✓ Launched Electric Storage Resources
- ✓ Retired Legacy Energy Management System
- ✓ Delivered Reliability Assessment and Commitment
- ✓ Launched New Day-Ahead Market

- Build Unit Dispatch System
- Launch Look Ahead Commitment
- Complete Model Manager (phase 3)

- Launch Unit Dispatch System

Platform ready for future products and continued architectural upgrades

EMS = Energy Management System; MMS = Market Management System