Accelerating the Interconnection Process with Advanced Software and Automation

ESIG

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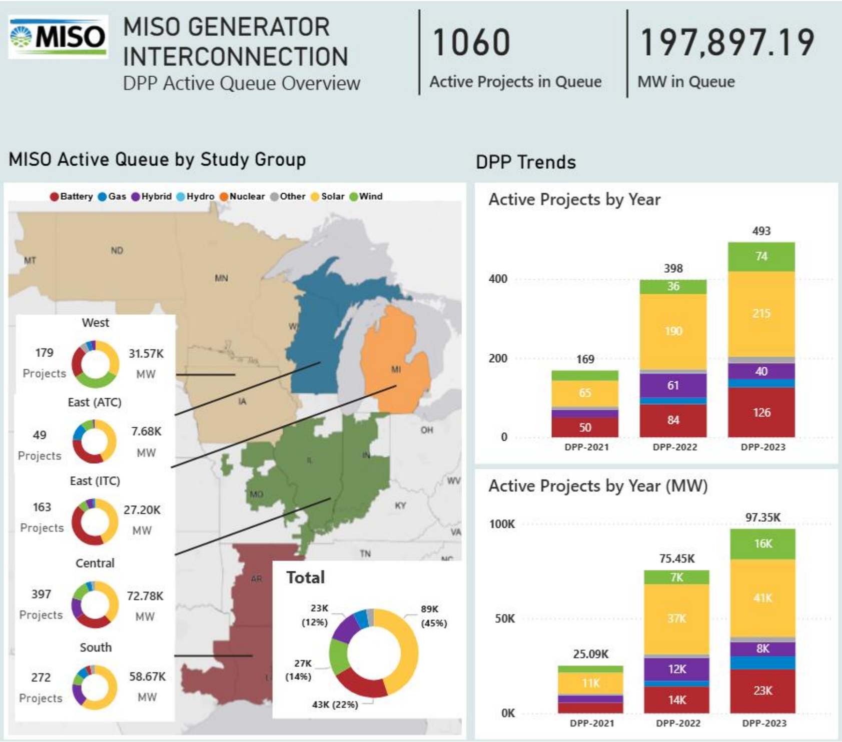
MISO’s large Queue volume and a backlog of applications are contributing to the delay of resource additions

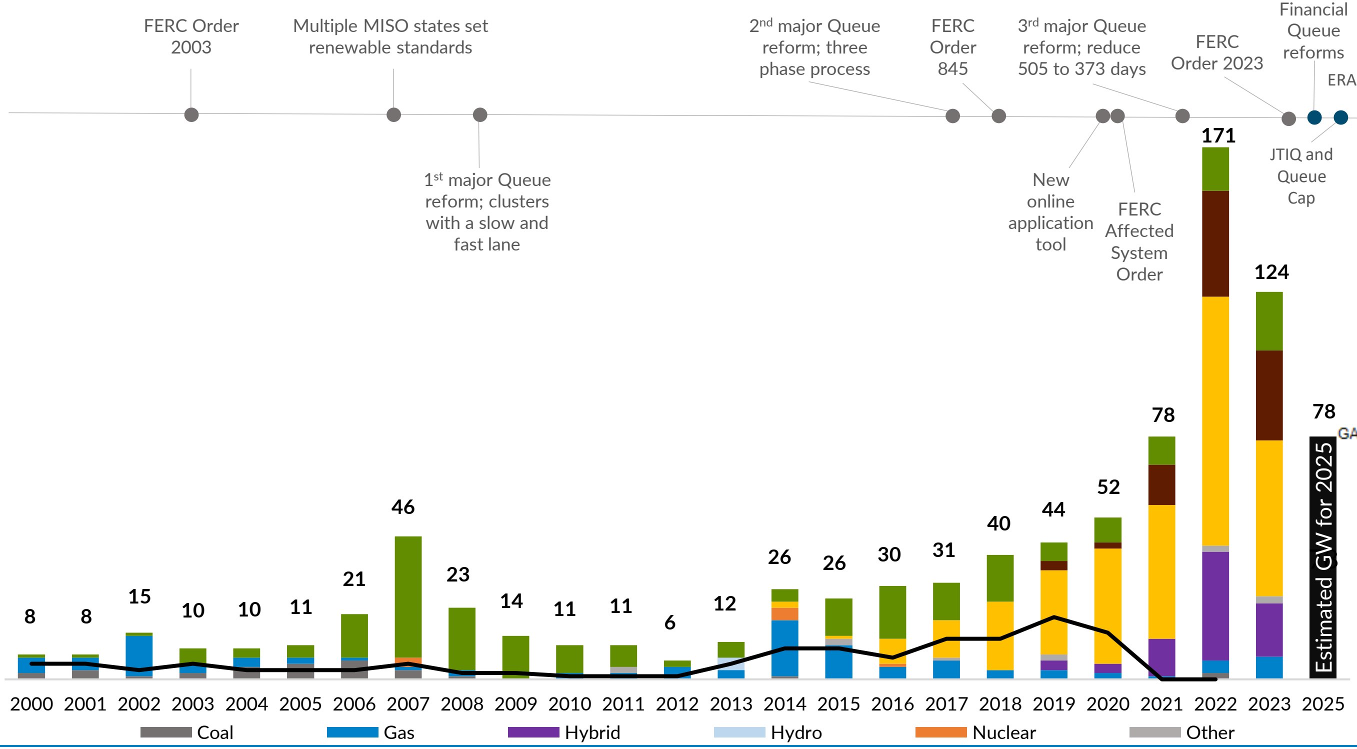


CURRENT QUEUE

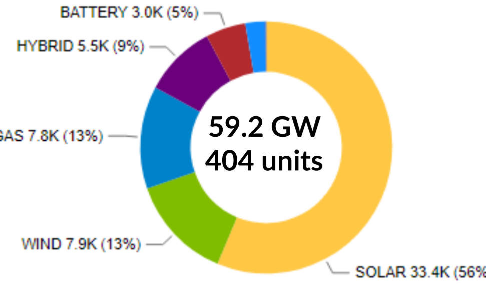
- Tariff time is approximately 1-year
- Cycles are taking 3-4 years
  - Late-stage dropouts in 2019-2021 cycles require restudies and prevent processing of later cycles
- Generator Interconnection Agreements are required now for projects aimed at meeting resource adequacy needs in the next 3-5 years

Queue data as of 10/7/2025

MISO has made several improvements to Queue processes to reflect "first-ready, first-served" principles, but additional reforms are needed to achieve reasonable Queue speed and volume



Projects Out of the Queue with a GIA not Online



As of 10/7/2025

Not all project applications will enter the active queue. Historically, 5% to 30% of projects withdraw during the application review phase, and only about 20% reach GIA . GIA – Generator Interconnection Agreement. ERAS – Expedited Resource Addition Study

MISO has been actively improving the manageability of its Queue to provide a critical path to timely resource approvals, but it may take several years to reduce Queue processing to a one-year timeframe

Improvements are addressing the Queue backlog, improving certainty of projects and addressing resource adequacy needs

2024 Accomplishments	2025 Plans	
	Queue Improvements	Support for Timely Resource Additions
• Implemented FERC-approved reforms • Filed compliance with FERC Order 2023 • Received FERC approval of JTIQ framework	• Implemented FERC approved Queue Cap – applying to current 2025 cycle • Using innovative software for automation of early Queue phases	• Launched Commercial Operation Date tracker tool on website • New in house developed online submission tool • Pursuing an Expedited Resource Addition Study (ERAS) process

MISO's queue process, which should be close to one year, begins with the application review and is followed by definitive planning phases where interconnection project impacts are studied

Queue Phases

Phase 1
(~100 Days)

System Impact Study completed; provides preliminary cost estimates for network upgrades

Phase 2
(~105 Days)

Revised System Impact Study

Interconnection Facilities Studies

Phase 3
(~60 Days)

Final System Impact Study

Network Upgrade Facilities Studies

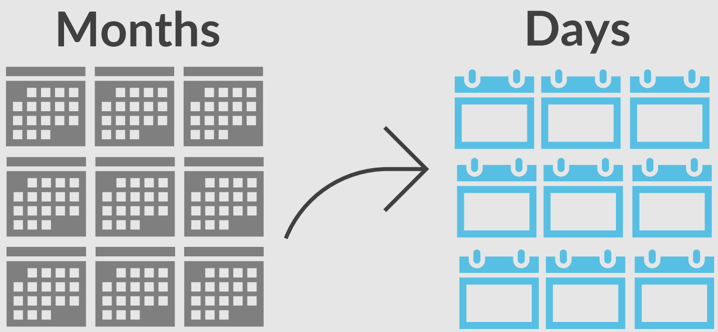
Generator Interconnection Agreement Negotiation
(~108 Days)

Tender, execute and file

As projects progress, higher certainty of interconnection costs is achieved

Automating Interconnection Studies

Benchmarking against the 2021 Phase 1 study yielded accurate results and substantial time savings that were further validated within 2022 Phase 1

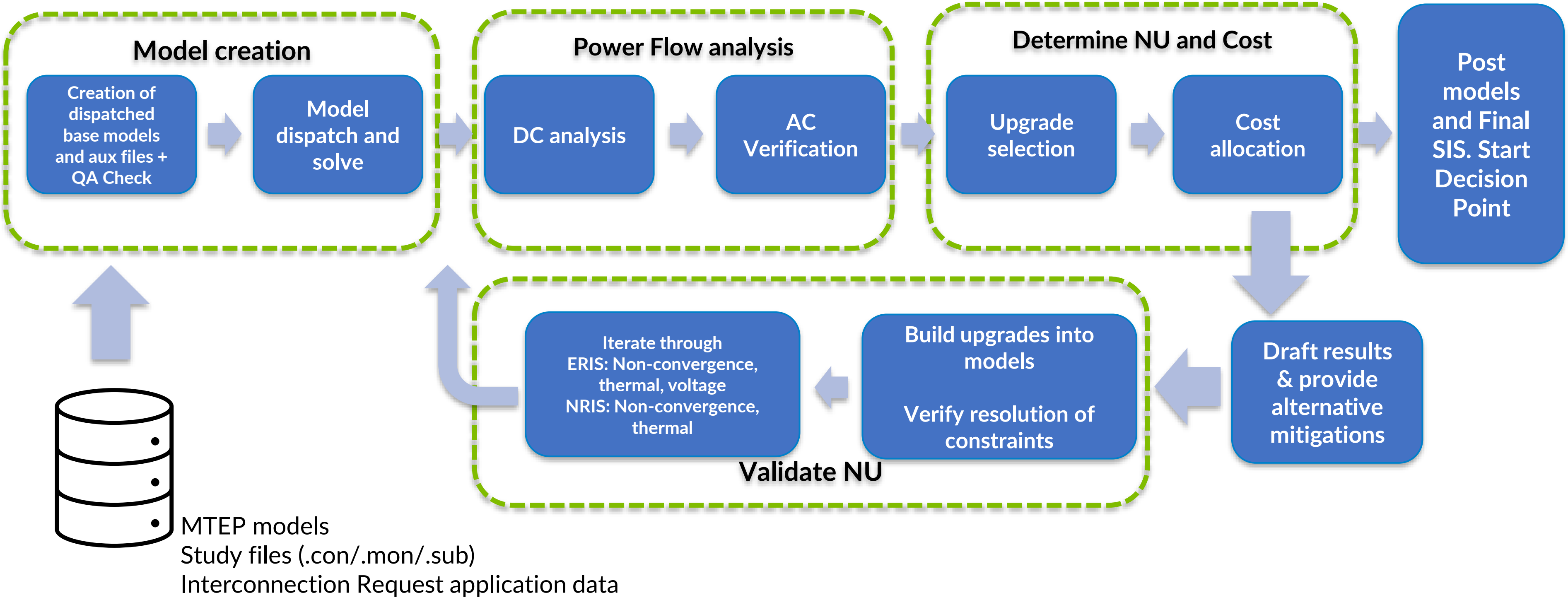


Benchmark analysis proved **SUGAR™ is a reliable tool** for power flow simulation, matching more than 99% of constraints identified by MISO's current software

AUTOMATION OF EARLY PHASE

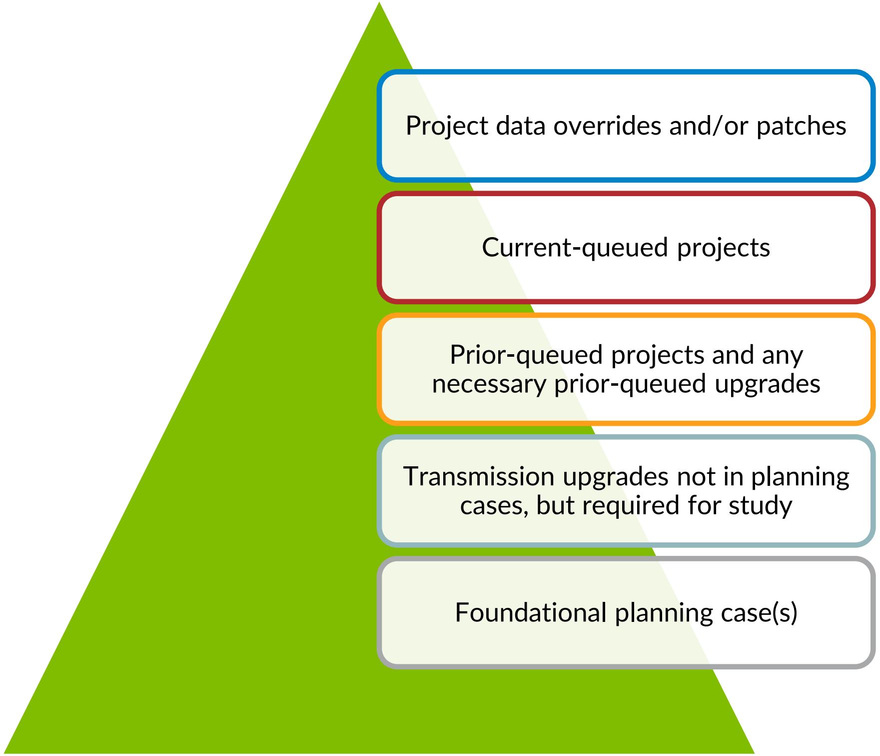
- 2022 Phase 1 was finalized in July, due to use of SUGAR™
- Studies for the 2023 cycle begin in August utilizing new automation
- Improves model build, constraint and mitigation identification
- Provides customers cost estimates more quickly

SUGAR Deployment at MISO



Automating Model Building

- Project data is exported from intake database and layered on top of MTEP
    - Individual project overrides can be supplied on an as-needed basis
    - Voltage schedules can be optionally provided to ensure units regulate their bus (or POI) voltage following local TO practice
- Study files are updated automatically to adjust for model changes (e.g., line taps)
- Built power flow cases are then available for download, or fed directly into analysis



Transparent Network Upgrade Selection

MISO + Pearl Street developed a series of rules to automate the selection and validation of reasonable network upgrades based on sound engineering principles, and documented the process for full transparency

Read More: Automated Network Upgrade Selection Strategy

Network Upgrade Mitigation Strategy for DPP Phase 1

This document outlines the collaborative effort between MISO and Pearl Street Technologies to develop a robust and transparent framework for addressing transmission system overloads and voltage violations, as identified by the SUGAR software in DPP-Phase 1 studies. MISO gathered key mitigation data from several Transmission Owners (TOs), which was used to analyze and propose mitigation strategies for various upgrade types. Additionally, MISO's publicly available cost estimation guide was employed to ensure a transparent, data-driven approach to estimating network upgrade costs.

Transmission Line Overload Mitigation

Based on mitigation data shared by MISO, as well as other sources such as the MISO Cost Estimation Guide, BPM-029, and Phase 1 results from the DPP-2020 and DPP-2021 cluster studies, a comprehensive list of conductors with corresponding impedance data across various voltage levels was developed. Appendix A contains a detailed table for all voltage levels, including 69 kV, 115 kV, 138 kV, 161 kV, 230 kV, 345 kV, 500 kV, and 765 kV lines. This table serves as a reference for selecting appropriate mitigation strategies.

For a more detailed discussion of the initial objectives, challenges, and the analysis of MISO data that informed the proposed line overload mitigation approach, refer to Appendix C.

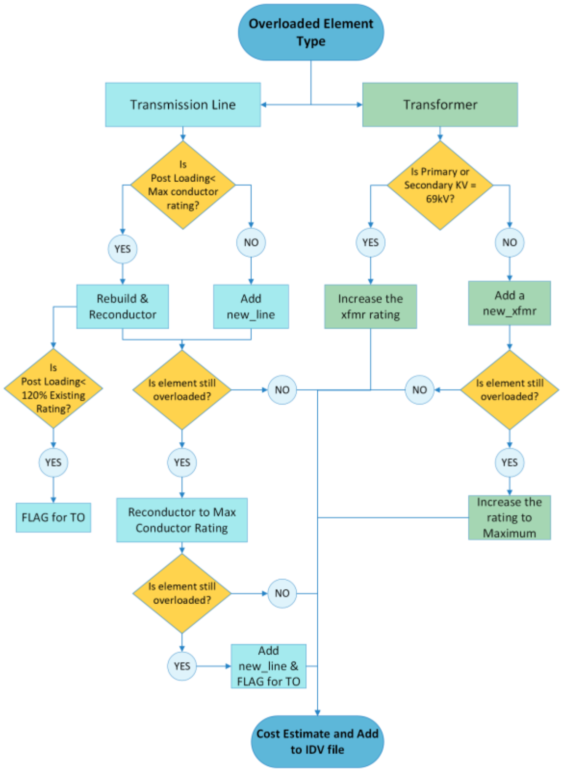
Rules for Automated Mitigation

The following rules, developed with input from TOs, guide the automated mitigation process for line overloads. These rules determine the appropriate conductor type based on post-contingency flow and ensure that the upgrades remain within the maximum allowable capacities for various voltage levels. Additionally, the rules account for terminal equipment limitations, which require verification from TOs, ensuring an efficient and cost-effective approach for mitigating transmission system issues.

For each voltage level, **maximum allowable capacity thresholds** are established based on input from TOs, terminal equipment limitations, and the current branch ratings in the MTEP models:

- The maximum allowable upgrade for 230 kV and below is 3000 A.

DRAFT



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Questions?