



# FERC Hybrid Resources Technical Conference

*Panel 2: Interconnection*

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# Executive Summary



- MISO is seeing increasing Interconnection Requests for hybrid resources and significant stakeholder interest in prioritization of hybrid integration issues.
- Interconnection Request updates considering hybrid resources (MISO Tariff updates) was approved by FERC in April 2019.
- Hybrid resource study practices for interconnection studies (MISO Business Practice Manual-015) are in place by working with stakeholders. The challenge was not study technics itself, but rather reaching consensus of dispatch policies.
- MISO is open to making improvements to the interconnection study practices as necessary after gaining more experience.

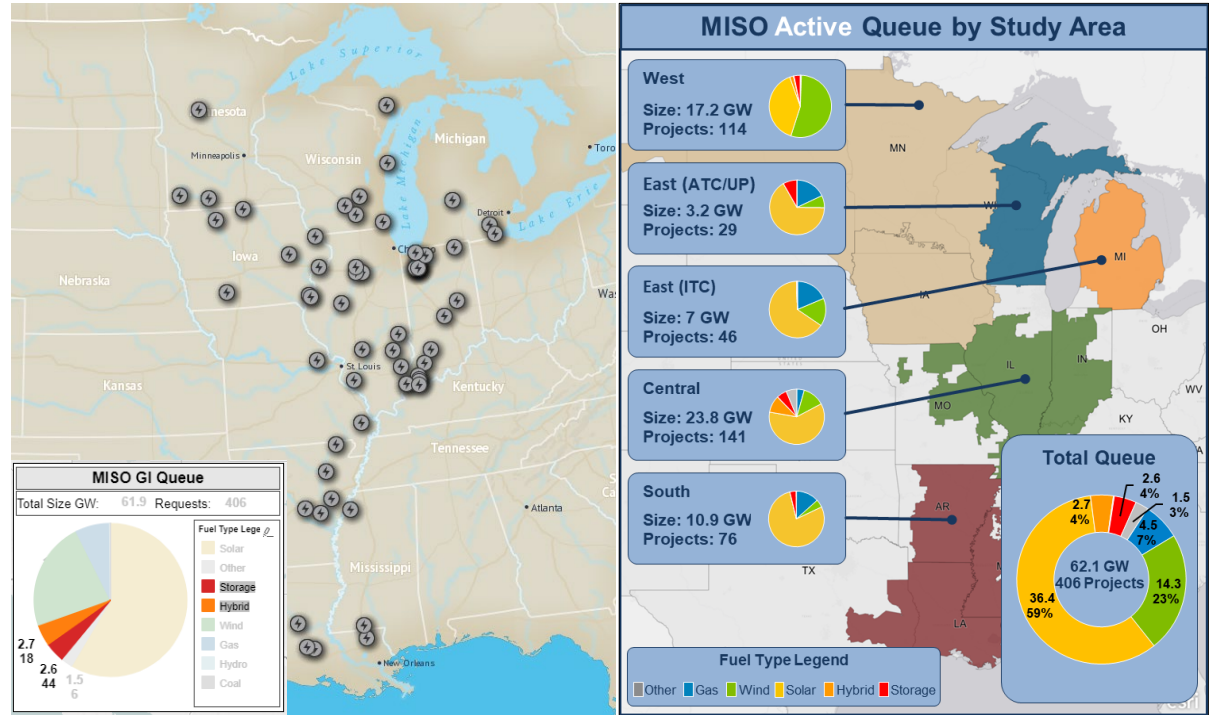
# Agenda



- Queue Overview
- Hybrid Resource Efforts – Interconnection
  - ✓ MISO Tariff Updates
  - ✓ MISO Business Practice Manual-015 Updates
  - ✓ Other Related Efforts
  - ✓ Summary and Future Efforts

# MISO Generator Interconnection: Overview\*

- 18 projects (2.7 GW) in the queue as “hybrid” resource type
- 44 projects (2.6 GW) in the queue as “storage” resource type – some of these storage projects are addition to existing resources/requests



[Link to MISO Interactive Queue Map](#)

\*The numbers/figures do not include the 2020 cycle projects that recently entered MISO queue. Over 350 applications totaling more than 50 GW comprising all fuel types were submitted to the 2020 queue cycle.

# Completed Hybrid Resource Effort (MISO Tariff Updates)

- FERC approved MISO's hybrid filing in April 2019
  - Interconnection Customer (IC) can submit single Interconnection Request for a proposed hybrid resource
  - Added a section specifically for storage project (standalone or as part of hybrid resource) to specify whether or not storage project will withdraw energy from Transmission System ("charging")
  - IC can also submit two separate Interconnection Requests for a hybrid resource if that better suits their business plans

# Completed Hybrid Resource Effort (MISO Business Practice Manual-015)

- Developed study practices for hybrid resources in Generator Interconnection process after 10 months' stakeholder discussions in 2019
  - Documented in MISO Business Practice Manual – 015 ([BPM-015](#): Section 6.1.1.1.2 & Appendix E)
  - Dispatch assumptions of hybrid resource in steady state, stability, and short circuit studies with examples are included
  - Scenarios such as a new hybrid resource with storage or addition of storage to an existing generator (now becoming a hybrid) are also covered

# Other Efforts Closely Linked with Hybrid Resource

- **FERC Order 845's directive relating to service below capacity**
  - As part of this, requirement to have control equipment to ensure generator output does not exceed interconnection service level was added to GIP and GIA
  - This requirement can be applied to hybrid resource especially if service requested for hybrid resource is below capacity
- **Surplus Interconnection Study as part of FERC Order 845**
  - Dispatch assumptions developed for hybrid resources can be largely utilized for Surplus Interconnection Study
  - Documented the study practices in MISO Business Practice Manual – 015 after discussions with stakeholders.

# Summary and Future Hybrid Resource Efforts

- Interconnection Request considering hybrid resources are in place
- Study practices for hybrid resources in Generator Interconnection studies are documented in Business Practice Manual – 015
- The challenge was not study technics, but rather reaching consensus of dispatch policies.
- Make improvements to study practices as necessary after gaining more experience in studying hybrid resources