MISO Transmission Update

UP Energy Summit
June 14, 2019
Today’s discussion

• Brief Overview of MISO
• What’s changed since last year?
  • Generation Projects in the Upper Peninsula
  • ATC Straits Projects
• Long-term renewable studies
  • Renewable Integration Impact Assessment
• FERC orders and upcoming filings
  • Generator Interconnection Reforms
  • Energy Storage as a Transmission Asset
MISO is an independent, non-profit organization in 15 U.S. States and one Canadian province

MISO by-the-numbers

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<table>
<thead>
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<tbody>
<tr>
<td>High Voltage Transmission</td>
<td>65,853 miles</td>
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<tr>
<td>Installed Generation</td>
<td>177,388 MW</td>
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<tr>
<td>Installed Generation</td>
<td>1,594 Units</td>
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<tr>
<td>Peak System Demand</td>
<td>127,125 MW</td>
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Mission

Work collaboratively and transparently with our stakeholders to enable reliable delivery of low-cost energy through efficient, innovative operations and planning.
MISO manages flows on the transmission system by directing generator usage.

1. Generation
Power is generated by turning an energy source into electricity. In MISO, sources include coal, natural gas, nuclear and renewable power.

2. Transmission
Allowing the flow of electricity to bridge long distances, MISO’s member transmission lines and towers support more than 65,787 miles of electricity flow.

3. Distribution
Allows energy to be moved from transmission lines closer to end users, ensuring reliability and power quality.

4. Final Delivery
As travel distance decreases, smaller power lines are used to reach business, industrial and residential end use customers.
Generation projects currently in the queue

- **Project Name: J1244**
  - Summer Capacity: 38.4 MW
  - Fuel Type: Wind
  - In-service: 09/15/2021
  - Status: Not Started

- **Project Name: J1252**
  - Summer Capacity: 20 MW
  - Fuel Type: Battery Storage
  - In-service: 10/30/2022
  - Status: Not Started

- **Project Name: J1251**
  - Summer Capacity: 100 MW
  - Fuel Type: Solar
  - In-service: 10/30/2022
  - Status: Not Started

- **Project Name: J849**
  - Summer Capacity: 125 MW
  - Fuel Type: Solar
  - In-service: 4/1/2020
  - Status: GIA in progress

- **Project Name: J1183**
  - Summer Capacity: 1.35 MW
  - Fuel Type: Solar
  - In-service: 1/31/2019
  - Status: Not Started

- **Project Name: J1370**
  - Summer Capacity: 50 MW
  - Fuel Type: Gas
  - In-service: 3/1/2021
  - Status: Not Started

- **Project Name: J1264**
  - Summer Capacity: 20 MW
  - Fuel Type: Gas
  - In-service: 9/1/2021
  - Status: Not Started

- **Project Name: J928**
  - Summer Capacity: 79.99 MW
  - Fuel Type: Wind
  - In-service: 8/15/2019
  - Status: GIA in progress
ATC’s Straits project in MTEP18 was approved by MISO’s Board of Directors last December

- Mackinac – McGulpin 138kV Straits Cable Replacement project is replacing one damaged and one operating fluid dielectric 138 KV insulated submarine circuits with two solid dielectric insulated 138 kV submarine circuits.
  - $105 million
  - in-service date is 2021
Renewable Integration Impact Assessment (RIIA) seeks to find inflection points of renewable integration complexity.

**Focus Areas**

- **Resource Adequacy**
  - Having the sufficient capacity of resources to reliably serve peak demand

- **Energy Adequacy**
  - Ability to provide energy in all operating hours throughout the year

- **Operating Reliability**
  - Ability to withstand unanticipated component losses or disturbances

**Illustrative example**

RIIA seeks to identify inflection points are where integration complexity significantly increases.

RIIA begins by modeling the current system.
RIIA assumes a logical distribution for location and type of increasing levels of renewable generation across MISO.
FERC orders and upcoming filings

- FERC rejected MISO site control and milestone proposal on 3/9/2019 (ER19-637-000 and ER19-637-001)
- FERC approved MISO’s Generator Replacement filing on 4/9/2019 (ER19-1065)
- FERC made compliance filing on May 20, 2019 on Surplus Interconnection (Net Zero)
- The electric storage as a transmission asset filing is anticipated in September/October
Questions?

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