Housekeeping

• All lines are muted, video is disabled unless you are presenting
  ➢ If you are dialed in via phone: *6 to mute and unmute
  ➢ If you are dialed in through your computer: Click on microphone icon to mute and unmute

• Do not put this call on hold

• Announce name and affiliation when speaking

• We will pause after each topic for questions / discussion

• Raised Hand feature is being monitored for questions

• This session is being recorded
Agenda

1. Welcome – JT Smith
   a. Housekeeping
   b. Agenda Review

2. Lessons Learned
   a. Hurricanes - Trevor Hines
   b. Max Gens - Dan Munson
   c. Load Modifying Resources – Mike Carrion
   d. Changes to Conservative Ops Language since 2020/21 – Dan Munson

3. Seasonal Assessment
   a. Weather / Meteorological Assessment - Adam Simkowski / Brett Edwards
   b. Generation - Eric Rodriguez
   c. Transmission – Ritam Misra

4. Guest Speaker – Carlo Capra, ITC

5. General Drills / Readiness - Anita Hurst

6. Emergency Procedures - Mike Carrion
   a. New data availability / situational awareness (being discussed earlier that day in RSC)

7. Keynote Speaker – Tim Crowley, Executive Vice President, L. E. Peabody & Associates

8. Q&A
Lessons Learned – 2021

• Hurricanes
• Max Gens
• Load Modifying Resources
• Changes to Conservative Ops Language
2021 Hurricane Season Observations and 2022 Focus Areas

• Practice like you Play
  • Ongoing updates and refinements to Hurricane Drills
  • Incorporation and review of past operating decisions
  • Neighboring RC participation

• Communication and Coordination prior to and during Hurricane Landfall
  • Operator to Operator communications
  • Coordination of engineering analysis and what if scenarios
  • Support team alignment and coordination improvements
    ➢ Multiple week recovery and support team rotation
  • Inclusion of Neighboring RCs in coordination calls
Max Gen Declarations have become more common over the last 6 years

Chart indicates the number of days under a max gen alert, warning or event.
MISO 2021 Max Gen Review

Levels utilized

- 9 Capacity Advisories
- 6 Hot Weather Alerts
- 7 Max Gen Alerts
- 1 Max Gen Warning
- 1 Event (Step 2A)
MISO Issued LMR Scheduling Instruction Event on June 10, 2021

- An overview of the June 10 Max Gen Event was provided in the July 2021 MSC
- The LMR Penalty Assessment was provided in the November 2021 RASC
Demand Side Resource Interface (DSRI) Launched in July 2021

IR049 – Update to demand response deployment tools resulted in the creation of the Demand Side Resource Interface (DSRI) to provide MPs a better way to manage Load Modifying Resources
MISO Declared Conservative Operations 29 Days in 2021

Why?

- 13 Days due to Hurricane Ida (only in the South)
- 9 Days due to Hot Weather

Where?

- 3 Days entire MISO Footprint
- 13 Days Only South
- 6 Days Only North and Central
MISO has changed the language in MCS messages for Conservative Operations

**Previous**

All Transmission and Generation Maintenance is suspended in the affected area for the duration of the Conservative Operations period, unless such maintenance will result in improved Bulk Electric System (BES) monitoring, control and security. Such maintenance will be coordinated between MISO and the applicable entity. The return to service of equipment on outage should be coordinated between MISO and the applicable entity. MISO Outage Coordination may permit on a case-by-case basis specific transmission maintenance that does not impact the Bulk Electric System. Transmission Operators (TOPs) and Generation Operators (GOPs) in the affected area, in coordination with the MISO and their Local Balancing Authority (LBA), are to review outage plans to determine whether any maintenance or testing, scheduled or being performed on any monitoring, control, transmission or generating equipment can be deferred or cancelled.

**Current**

TOPs, GOPs and LBAs are to review outage plans to determine any maintenance or testing, scheduled or being performed on any monitoring, control, generation or transmission equipment that can be deferred, revoked or cancelled. **Coordinate with MISO and LBA** for completing any maintenance that may enhance BES reliability, monitoring and control. The return to service of equipment on outage should be coordinated between MISO and the applicable entity.

Conservative System Operations Procedure
Questions?

Contact Information:
Mike Mattox, Sr. Advisor (mmattox@misoenergy.org)
Trevor Hines, Mgr., South Reliability (thines@misoenergy.org)
Dan Munson, Shift Mgr. (dmunson@misoenergy.org)
Mike Carrion, Shift Mgr. (mcarrion@misoenergy.org)
Seasonal Assessment
Last Summer (2021)

- 6\textsuperscript{th} hottest summer on record nationally.
- Historic drought in the western U.S. (Still on-going).
- Above normal temperatures experienced in MISO North/Central
- Near-normal in MISO South.
What are the vendors saying?

DTN
What are the vendors saying?

Maxar

*We are unable to share Maxar forecast images publicly*

- Above Normal Temperatures in MISO North.
- Normal to Slightly Above Normal temperatures in MISO Central and South.
- Above to Well Above Normal Temperatures across the west-central U.S.
- Summer 2022 forecast to be 9th hottest on record
What are the vendors saying?

NOAA

Seasonal Temperature Outlook

Valid: Jun-Jul-Aug 2022
Issued: March 17, 2022

Source: National Oceanic and Atmospheric Administration (NOAA)
Precipitation Outlook

NOAA

Precipitation Forecast

NOAA forecasts below average precipitation across most of Zones 1 through 5 and Zone 8 while it is expected that the remainder of the footprint will see average precipitation levels.

Source: National Oceanic and Atmospheric Administration (NOAA)
Current Drought Conditions
How are these forecasts made?

The Oceans

Drought Conditions

Climate Change

Recent SST Anomalies

Long Range NWP Models

Seasonal Forecast
Historical Analog (Reference) Years
Historical Analog (Reference) Years

MISO Load and Temperature Summer Months (Jun-Aug) Temps >= 80°F

South Load and Temperature Summer Months (Jun-Aug) Temps >= 80°F
Hurricane Forecast

Vendors Hurricane Forecast

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Major Hurricanes</th>
<th>Hurricanes</th>
<th>Named Storms</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-YR NORMAL</td>
<td>3</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>10-YR NORMAL</td>
<td>3</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>CSU</td>
<td>4</td>
<td>9</td>
<td>19</td>
</tr>
<tr>
<td>MAXAR</td>
<td>4</td>
<td>9</td>
<td>19</td>
</tr>
<tr>
<td>DTN</td>
<td>4</td>
<td>8</td>
<td>21</td>
</tr>
</tbody>
</table>
Adam and Brett’s Opinions

- A warmer than normal summer is expected for MISO’s footprint.

- Drought conditions will be important to watch through the summer. They are currently in MISO South and mainly west of the footprint. Eastward expansion into MISO Central/North increased heat risk.

- Greater risk for heat for MISO’s western neighbors, but chances for pervasive eastern U.S. will be closely monitored as the forecast pattern does not preclude such scenarios.

- Elevated risk for scattered storms across MISO North and Central with forecast pattern set up.

- An active hurricane season is expected. Climatological maximum for storms is in late August to mid-September.
Summary

• Above normal/slightly above normal temperatures in MISO North/Central Region.
• Above normal/slightly above normal temperatures in the South Region.
• Potentially active storm pattern across MISO North/Central.
• An active hurricane season is expected.
Summer 2022
Seasonal Assessment
Generation

Eric Rodriguez
Tim Bachus
Key Takeaways

- Under typical demand and generation outages, MISO is projecting insufficient firm resources to cover summer peak forecasts.
- Emergency resources and non-firm energy imports are projected to be needed to maintain system reliability.
- Seasonal assessment aligns with cleared resources from the most recent Planning Resource Auction.
For every month, emergency resources would be required to meet peak load conditions.
New maximum seasonal peak for cumulative generation outages occurred in June 2020

<table>
<thead>
<tr>
<th></th>
<th>Forced Outages (GW)</th>
<th>Total Outages (GW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average of 15 monthly peaks</td>
<td>14.4</td>
<td>21.2</td>
</tr>
<tr>
<td>Maximum seasonal peak</td>
<td>20.1</td>
<td>30.8</td>
</tr>
</tbody>
</table>

Source: Generating Availability Data System (GADS)
Two deterministic scenarios (typical and worst case) are evaluated to capture potential risk this upcoming Summer

**Generation**

**Probable Capacity**
- Removes an *average* volume of resource outages\(^1\) (forced, planned, and maintenance)

**Low Generation Capacity (Worst Case Outage)**
- Removes a *worst-case* volume of resource outages\(^1\) (forced, planned, and maintenance), typically because of non-normal weather conditions

**Load**

**Probable Load Forecast**
- Base 50/50 forecast\(^2\), provided by Market Participants

**High Load Forecast**
- Higher 90/10 forecast\(^3\)

---

1. Based on 5-year historical outage information provided by Resource Owners
2. 50% chance of the actual load being lower and 50% chance of the actual load being higher
3. 90% chance of the actual load being lower and 10% chance of the actual load being higher
Emergency resources and non-firm energy imports will be needed to maintain system reliability.
The need for emergency procedures will be impacted by the availability of non-firm resources.
Summer 2022
Seasonal Assessment
Transmission

Ritam Misra
Purpose:
• Evaluate expected conditions across the MISO footprint
• Inform MISO RT-Operations of potential limitations & issues on the system for the upcoming Summer Peak Season
• Coordinate with other entities

Study Focus:
• Steady State Analysis
• RDT Flowgate Impact Analysis
• Load Pocket Studies
• East to West Transfer Study
Base Case:
- 2022 Summer Peak
- Submitted in MOD by the first week of 2022 with an effective date of 12/17/2021 or earlier
- Generator Retirements approved on or before December 1, 2021 are offline
- Transmission and Generator Outages are modeled if they are greater than or equal to two months between the months of June through August
- TO’s can recommend outages outside the time period if deemed necessary

MOD Projects:
- MTEP Appendix A – Planned
- MTEP Appendix B – Target MTEP A
- All the generation interconnection projects applied

Generation Assumptions:
- Wind Gen. Dispatch based on Capacity Credit Level – Around 16%
- Gen. Dispatch = Security Constrained Economic Dispatch (SCED)
- MISO South Load Pocket Op Guides honored

<table>
<thead>
<tr>
<th>CSA Model</th>
<th>2021 Summer</th>
<th>2022 Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load (MW)</td>
<td>140,512</td>
<td>138,248</td>
</tr>
<tr>
<td>Generation (MW)</td>
<td>136,853</td>
<td>142,450</td>
</tr>
</tbody>
</table>
The transmission system performance is within expectations for this upcoming summer

<table>
<thead>
<tr>
<th>Steady-State AC Contingency Analysis</th>
<th>Regional Directional Transfer (RDT Studies)</th>
<th>Load Pocket Studies</th>
</tr>
</thead>
</table>
| • Evaluate the effects of simple and complex contingencies on the MISO footprint and Tier-1 areas | • Evaluate the impact of RDT on MISO’s neighboring entities  
• Some RDT flowgates are already in MISO processes  
• 7 additional RDT flowgates not previously in MISO’s processes found. | • Evaluate import capability for four MISO load pockets in the South: Amite South, DSG, WOTAB, and Western load pockets  
• Import capabilities for the load pockets determined. |

<table>
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<tr>
<th>Regional Directional Transfer (RDT Studies)</th>
<th>Load Pocket Studies</th>
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<table>
<thead>
<tr>
<th>East to West Interface Study</th>
<th>Opguide Study</th>
</tr>
</thead>
</table>
| • Evaluating the impact in MISO areas during a transfer of 12000 MW from East to West across MISO.  
• Constraints binding at lower transfer levels presented to ops. | • Evaluating a few selected scenarios for standing opguides covering all MISO regions.  
• Some of it would be done to see if the validity of opguide would still hold or not. |
Steady State AC Contingency Analysis – Contingencies Evaluated

**Category P1 > 100 kV**

- P1.1 – fault generator (>50 MW)
- P1.2 – fault transmission circuit
- P1.3 – fault transformer
- P1.4 – shunt device
- P1.5 – block single dc pole

**Gas-Electric Contingencies**

No major constraints that do not have mitigations for this summer

P1 Contingency Files are submitted by Stakeholders
RDT Flowgate Impact Studies

- Study the impact of Regional Directional Transfer (RDT) on MISO’s neighboring entities
- Identify 3rd party flowgates affected by transfers between MISO North and South Regions
- Collaborate with neighboring entities to improve their seasonal modeling in our seasonal models
Import Limits Study for MISO Load Pockets

- Simulate peak load conditions for **four** MISO load pockets as shown below:
  - Amite South
  - DSG (Downstream of Gypsy)
  - WOTAB
  - Western load pocket

- Perform transfer studies into these load pockets.

- Identify import limits for the load pockets
East to West Interface Study

• Source – PJM, SERC (without AECI)
• Sink – SPP, AECI, MH
• Transfer across MISO using gen-gen source/sink
• Flows measured at all tie points and lines bypassing MISO.
• Driven by 2021 Winter event recommendations
Questions?

Contact Information:
Adam Simkowski, Sr. Analyst, Day Ahead (asimkowski@misoenergy.org)
Brett Edwards, Sr. Analyst, Meteorology (bedwards@misoenergy.org)
Eric Rodriguez, Engineer, Resource Adequacy (erodriguez@misoenergy.org)
Ritam Misra, Engineer, Operations Planning (rmisra@misoenergy.org)
Overview

ITC Background
Summer Outlook
Summer Assessments
Outreach
Impact & Risk Management
WHO IS ITC

- Established in 2003
- 5 Subsidiaries in 8 States
- Member of 4 RTOs: MISO, SPP, PJM, NYISO
- About 670 Stations & Substations with ITC Assets
- About 16,000 Circuit Miles
- 90,000 Square Mile Service Territory
- System Peak Load of About 26,000 MW
- A Fortis Company
SUMMER OUTLOOK

- System Modifications - transmission upgrades & load interconnections since last summer & expected over the upcoming summer
- Load Trends & Weather Outlook
- Change in Generation Mix
- Lessons learned from last summer
SUMMER ASSESSMENT

- Independent system assessments for our Midwest and Michigan footprints
- System normal & N-1 contingency analysis
- Multiple scenarios
  - Daily models
    - Expected significant outages (including those submitted to CROW for MISO FTR studies)
  - System basis & generator dispatch
    - Larger unit outages
    - High/low wind in Midwest
    - Ludington pumping in Michigan
SUMMER ASSESSMENT - RESULTS

- Participate in any regional studies (MISO, SPP, PJM)
- Highlight any areas of concern including potential thermal or voltage constraints
- Develop operating guides to support the Operations Control Room (OCR)
- Review any standing operating guides
- Coordinate with the Planning team to highlight areas of concern
SUMMER ASSESSMENT - OUTREACH

- Coordinate development of operating guides with impacted entities (MISO, neighbor TO’s, LDC’s) as necessary
- Meet with LDC’s to review results and coordinate as necessary
- Present to operators during cycle training
- Ops Planner in OCR during normal business hours (T, W, Th) & on-call 24/7
IMPACT & RISK MANAGEMENT

Implemented to replace summer moratorium

Four Key Components:
1. Identify possible unintended outcomes
2. Manage risk of unintended outcomes
3. Identify impact of realizing unintended outcomes
4. Manage potential impact

Safe & Reliable
IMPACT & RISK MANAGEMENT - EXAMPLE

Relay Work at Generator Station

Possible Unintended Outcome

Unintentionally tripping other breakers in the station

Risk Management

Peer Review
Isolating Work Area

System Impact

Loss of generation

Manage Potential Impact
Perform work when generator is off-line or at lower load levels
Questions?

Contact Information:
Carlo Capra (ccapra@ltctransco.com)
General Drills / Training
Summer 2022
Summer brings many challenges that must be closely monitored

- Abnormal Weather
- Limited transfer capability
- Severe Weather Patterns
- Forced Outages
- Seasonal Maintenance
- Transmission Congestion
- Abnormal Temperatures
- Higher than average load
MISO provides opportunities to drill on emergency process with members to **ensure** readiness in all operating situations

<table>
<thead>
<tr>
<th>MONDAY</th>
<th>TUESDAY</th>
<th>WEDNESDAY</th>
<th>THURSDAY</th>
<th>FRIDAY</th>
</tr>
</thead>
</table>
|        | **LMR DRILLs:**  
  - 2\textsuperscript{nd} Tuesday of each month @ 10:00 EST  
  - MPs only  
  **LMM Drill:**  
  - 2\textsuperscript{nd} Tuesday of each month @ 10:00 EST  
  - LBAs only | **Backup Dispatch DRILL:**  
  - Last Wednesday of each month @ 13:00 EST  
  **Firm Load Shed Drill:**  
  - 1\textsuperscript{st} Wednesday of each month @ 13:00 EST  
  - LBAs only | **EDR Drill:**  
  - 2\textsuperscript{nd} Thursday of each month @ 10:00 EST |

**Power Restoration Drills:** Two Drills held each Fall  
**Market Capacity Emergency Drills:** 6 Drills during Spring Operator Training in April and May
2022 Market Capacity Emergency Drills will be held on May 11 & May 18

**Target Audience:** MISO Members *(See Your Company Drill Coordinator for participation eligibility)*

**Registration:** Registration through the MISO Learning Center

**Platform:** WebEx from 9:00 – 12:00 (EPT)

**Questions:** Please contact  MISO-TechTraining@misoenergy.org
2022 Hurricane Readiness Drills Completed on April 12 & 26
Questions?

Contact Information:
Anita Hurst, Mgr., Technical Development & Training
(ahurst@misoenergy.org)
Emergency Procedures
• Conservative System Operations Procedure SO-P-NOP-00-449
• MISO Market Capacity Emergency Procedure SO-P-EOP-00-002
MISO prepares for extreme conditions in advance. In Real-Time, unplanned outages and other unknowns may require additional actions.

Review load obligations against available resources and system conditions.

Long-Lead Generation Commitments

Generation Outages Rescheduled

Restored all Possible Transmission Outages

Take Actions to ensure reliability and avoid Load Shed

Curtail Schedules

Reconfiguration Options

Emergency Generation

Load Management

Operating Reserves

Emergency Purchases

Shortage

Ops Planning

Cons Ops / Alerts

Warning / Event
<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capacity Advisory</strong></td>
<td>• Advance notice of forecasted capacity shortage, requests stakeholders update offer data</td>
</tr>
<tr>
<td><strong>Alert</strong></td>
<td>• Define boundaries/suspend maintenance, set Emergency Pricing Tier 0 Offer Floor</td>
</tr>
<tr>
<td><strong>Warning</strong></td>
<td>• Schedule in External Resources, Curtail export transactions, Reconfiguration, and set Emergency Pricing Tier 1 Offer Floor</td>
</tr>
<tr>
<td><strong>Step 1</strong></td>
<td>• Commit Emergency Resources, Declare NERC EEA 1, Activate Emergency Limits</td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td>• Declare NERC EEA 2, Implement LMRs, LMMs Stage 1, Commit EDR Resources, Emergency Energy Purchases, Public Appeals, and set Emergency Pricing Tier 2 Offer Floor</td>
</tr>
<tr>
<td><strong>Step 3</strong></td>
<td>• Utilize Operating Reserves, and LMMs Stage 2</td>
</tr>
<tr>
<td><strong>Step 4</strong></td>
<td>• Reserve Call and Emergency Reserve Purchases</td>
</tr>
<tr>
<td><strong>Step 5</strong></td>
<td>• Declare NERC EEA 3, Firm Load Shed, and set LMPs and MCPs to the VOLL</td>
</tr>
<tr>
<td><strong>Termination</strong></td>
<td>• Max Gen and, possibly, Capacity Advisory Termination</td>
</tr>
</tbody>
</table>
Real-Time Market and Operations Display is available via the MISO website and Mobile App.
Multiday Operating Margin Forecast Report (MOM) is available daily on the MISO Public Website.

This report provides a MISO system-wide week ahead look into committed and uncommitted resources, projected loads, and reserve to better forecast near future energy needs.
The MOM now provides a 7-day Wind Hourly Forecast. It also provides forecast uncertainties, and outage projections and recent history allow users to better plan for upcoming resource allocations.
Keynote Speaker
Tim Crowley
Executive Vice President
L.E. Peabody & Associates
I. Coal Transportation Background

II. Summer 2022 Outlook For Rail Transportation

III. Future Rail Industry Trends
I. Coal Transportation Background
Rail Transportation - Coal and Energy

• In 2020, U.S. railroads moved 3.0 million carloads of coal, with each rail car carrying enough coal to power 19 homes for a year.

• According to Energy Information Administration ("EIA") data, 67% of U.S. coal shipments in 2020 were delivered to their final destinations by rail (water 13%; truck 10%; and conveyor belts 10%).

• 79% of MISO coal shipments were delivered by rail.
52 MISO coal generating plants received a total of over 99 million tons of coal via rail in 2021.
II. Summer 2022 Outlook For Rail Transportation
In the last 12 months coal traffic for energy use increased due to spikes in spot price increases of natural gas.

The long term outlook for coal remains negative, rebound will be short.

In September 2021, the EIA estimated utility coal stockpiles were the lowest since March 1978.

EIA estimated that it will take most of 2022, or longer, before mines and railroads are able to restore inventories to a level comfortable to utilities.

Class I’s will not make additional long-term investments in coal assets – to avoid stranded costs.
Current Regulatory Actions that may impact Coal Rail Transportation

• STB Docket No. EP 770 - URGENT ISSUES IN FREIGHT RAIL SERVICE

• STB Docket No. FD 36500 – CP-KCS Merger
STB Docket No. EP 770 - URGENT ISSUES IN FREIGHT RAIL SERVICE

- The STB held a public hearing on April 26 and 27, 2022.
- The Board directed executive-level officials from BNSF, CSX, NS, and UP to appear.
- The Board invited CN, KCS and CP to also appear.
- Optional written comments were due April 22, 2022.
In opening the docket, the Board cited:

- Concerns from stakeholders about inconsistent and unreliable service, specifically:
  - Tight car supply
  - Unfilled car orders
  - Delays
  - Increased Dwell Time
“Current rail service indicates rail customers are not being adequately served, and NGFA feels forced to ask STB to step in. In the short run, NGFA asks STB to request plans from these rail carriers to bring rail service up to an acceptable level and to request weekly rail service updates. In the long run, NGFA requests for STB to have rail carriers provide annual service assurance plans to help reduce the probability of future widespread rail service disruptions.”

- National Grain and Feed Association (NGFA) letter to STB
“As NGFA correctly asserts, the scourge of Precision Scheduled Railroading (PSR) looms large in the disruptions its members are currently facing, as well as in the degraded service the freight rail network is providing broadly.”

- Greg Regan, President of the Transportation Trades Department (TTD), American Federation of Labor and Congress of Industrial Organizations (AFL-CIO)
“Over the last 6 years, the Class I’s collectively have reduced their work force by 29% – that is about 45,000 employees cut from the payrolls. In my view, all of this has directly contributed to where we are today – rail users experiencing serious deteriorations in rail service because, on too many parts of their networks, the railroads simply do not have a sufficient number of employees.”

- STB Board Chairman Martin Oberman
STB Docket No. EP 770 - URGENT ISSUES IN FREIGHT RAIL SERVICE

- Summary of Comments from April 26-27

- Expectation for Summer 2022
Ⅲ. Future Rail Industry Trends
STB Docket No. FD 36500 – CP-KCS Merger

- In October 2021, CP and KCS filed an application seeking Board approval for their merger.
- If approved, it will be the first major railroad merger in more than 25 years.
- Initial comments on the CP-KCS application were filed at the end of February, 2022.
- Final briefs currently due in July, 2022.
STB Docket No. FD 36500 – CP-KCS Merger

- Commenters (other RRs, shippers) state that the application is riddled with errors, omissions, inconsistencies, and plainly unreasonable assumptions.
- BN, UP, CSX, NS state STB should not approve without conditions.
- Commenters have suggested that the CP-KCS traffic plans could cause congestion and delays, particularly in the Chicago area and in Texas.
Previous Class I Merger implementations have not gone smoothly

• UP/SP - 1996
• BN/ATSF - 1995
• As of 2000, railroad industry and the shipping public had not fully recovered from the service disruptions associated with the prior mergers.
• Led to the STB issuing a 15-month moratorium on the filing of any major railroad merger proposals.
The MISO footprint and the CP/KCS rail network overlap.

Cascading service issues would be problematic for MISO.
• CP-KCS Merger will not impact 2022 Summer coal transportation, but if approved, will likely impact 2023 Summer coal transportation.

• What will impact the summer of 2022 and possibly beyond?

  - natural gas prices + demand for coal + coal inventories + Railroads shifting assets away from coal transportation
Other potential impacts on coal transportation, short and long term:

- STB Actions – Reciprocal Switching, service requirements, etc.
- Precision Scheduled Railroading (PSR)
- Wall Street
- Other mergers
- Inflation
Summer Readiness Workshop – Rail Transportation Industry Outlook
April 28, 2022

TIMOTHY D. CROWLEY
EXECUTIVE VICE PRESIDENT

L. E. PEABODY & ASSOCIATES, INC.
ECONOMIC CONSULTANTS
Questions?

Contact Information:
Tim Crowley (tim@lepeabody.com)
Thank you for joining us!
Appendix - Generation
Definitions

- **Projected Available Capacity**: Installed Capacity of Planning Resource Auction cleared non-intermittent resources (net of average monthly historical generation outages), with intermittent resources at typical monthly availability, firm imports, and excludes load modifying resources and operating reserves.

- **Stranded South Region Capacity**: Generation in the South region of the MISO footprint in excess of regional load obligations that is constrained by contractual limitations on firm transmission rights shared with neighbors, resulting in a transmission bottleneck that causes the generation to be undeliverable to the North/Central region of the footprint.