



**Large Load Working Group (LLWG)
Conference Call & Webex Only**

June 29, 2026

10:00 am to 3:15 pm ET / 9:00 am to 2:15 pm CT

Dial-in and Webex information available at www.misoenergy.org

Minutes

1. Administrative Items (Chris Plante)

a. Call to Order / Roll Call

Meeting called to order at 10:00 am ET.

The Public Meeting Notice and Code of Conduct were issued.

Chair: Chris Plante

Vice Chair: Werner Roth

MISO Liaison: Marc Keyser

Stakeholder Relations: Amanda Jones

Participants:

A. Srivastava, EPE
Consulting
Aaliyah Adkins, Earth
Justice
Aaron Demuth, OTP
Aaron Martin, CMS
Aaron Stemplewicz, Earth
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Abby Schoeller, MGE
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Adam Foltz, ATC
Adam Manty, ATC
Adam Stern, Clearway
Addie Stromberg,
Alan McDonnell, NSEE
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Alex Carpenter, MEC
Alex Kloiber, CIPCO
Allie Koepplinger, MI PSC
Amber Joyce, MDU
Amy Folz, CenterPoint
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Andrew Berg, MRES
Andrew Cameron, CBPU
Andrew Grieve, Jupiter
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Andrew Kienitz, MN Power
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Andy Ford, GDS
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Bob Vosberg, LPSC Staff
Brad Vosters, ATC
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Brendan Endicott, Calibrant
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Bret Haniel, Cooperative
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Brian Daschbach, LS Power
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Brian Hallett, Reliability
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Brian Williams, CWLP
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Britta Benedict, SWPA

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Bryan Garnett, Duke
Bryan Garnett, Appian Way
Bryan Garst, Big Rivers
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Carolyn Wetterlin, Xcel
Carrie Milton, Potomac
Economics
Catherine Franklin, CMS
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Chad Herrick, CIPCO
Charlie Robling, IMEA
Chase Ezell, EPL
Chengyue Guo, ATC
Chris Dall, Second
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Chris Larson,
Chris Norton, AMP
Chris Plante, WEC Energy
Group
Christian Bernardi, HE
Christiana Ivanova, GQS
Christopher Elie, Duke
Christy Langley,
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Clayton W. Robinson, LPSC
Connie Maluwelmeng,
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Conor McKenzie, AEU
Constance Groh, Hallador
Cory Furrier, Duke
Craig VanDevelde, MPPA
Craig Wrisley, Xcel
Cynthia Crane, ITC



Dan Alfred, CMS
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Daniel McGraw, MLP
Danielle Moskop, Ameren
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Dave Lytle, DTE
David Boyd, Aesl Consulting
David Davis, Apex
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David Kempf, GRE
David Mindham, EDPR
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David Ticknor, RES Group
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Derek Sunderman, Savion
Devon Pehrson, Geronimo Power
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Diana Vasquez, Deriva Energy
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Eric Stephens, AMP
Eric Thoms, Invenergy
Erica Miller, Potomac Economics
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Erin Murphy, NextEra
Ethan Chastain, Hoosier Energy
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Forrester Ward, Morning Sky Power
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Gabe Kainz, OTP
Gabe Tabak, Verrus
George Schwager, Atlantica
Ger Celestin, Vistra

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Greg Levesque, ATC
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Hannah McCorry, ICC
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Hilary Gold, Entergy
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Jacob Lampi, CIPCO
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Jake Wroblewski, NIPSCO
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James Peters, ITC
Jamie Watts, Long Law
Janelle Dieleman, MEC
Jared Rasbold, Cooperative Energy
Jared Shaw, Entergy
Jason Cox, EQ Energy Advisors
Jason Mazigian, BEPC
Jason Standing, Xcel
Jason Weiers, OTP
Jay Rasmussen, Duke
Jay Sher, Alliant
Jaymes Christie, Xcel
Jeff Adams, CUB WI
Jeff Biggerstaff, CenterPoint
Jeff Gindling, Duke
Jeff Kelley, NIPSCO
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Jeffrey Phillips, Entergy
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Jennifer Solomon, NextEra
Jennifer Vosburg, Jennifer J. Vosburg, LLC
Jenny Liu, Jupiter Power
Jeremi Wofford, Ameren
Jeremy Bennett, Avangrid
Jeremy Foster, Day Pitney
Jeremy Martin, CenterPoint
Jerry Harness, Entergy
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Matt Waldron, ATC
Matthew Jackson, FERC
Matthew Wofie, OTP
Matthew Wyatt, MPW
Max Reitz, Ameren
Maxx Snell, MDU
Megan Allen, Ameren
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Michael Fischette, LBWL
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Michael Marz, ATC
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Preston Hart, OTP
Rahul Anilkumar, Quanta
Rajesh Gopinath, Oracle
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Rhonda Peters, Inter Tran
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Ruth Pallapati, MN Power
Ryan Lovan, IA IUC
Ryan Lowe, MB HYDRO
Ryan McKeever, Husch
Blackwell
Ryan Snyder, CenterPoint
Rylan Hanson, OTP
Sage Magras, Xcel
Sam Wendt, MEC
Samantha Schall, AES
Sameer Doshi, Earth Justice
Samson Mabry, Entergy
Samuel Lukens, IL OAG
Sara Ostrander, Hoosier
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Sarah Horner, MPC
Sarah Martz, IA IUC
Sarah Murphy, Daymark EA
Sarah Ratinetz, Sol
Sarah Wang, RMI
Sawyer McClure, WPSCI
Scott Bents, Iowa OCA
Scott Jones, IN OUCC
Scott Mallory, ABATE,
CMTC, IBEC, IIEC, LEUG,
NLCG, TIEC
Sebastian Smater, Strom
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Seth Cochran, Vitol

Shane O'Brien, Aypa
Shaun Mohler, SMXB Law
Shawn Welch, Doral
Renewables
Shelby Leisz, AES
Shivam Sharma, Alliant
Silvya Sanders, Ameren
Sindhu Iyer, Engie NA
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Stacie Hebert,
Stephanie Neitzel, ATC
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Steve Lannoye, Rainbow
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Steve Leovy, WPPI
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Susan Rossi, Xcel
Tanya K Kelm, OTP
Tarek Khaja, CenterPoint
Tatiana Gabriichuk, AES
Taylor Carpenter, Calfee
Taylor Costes, IMPA
Taylor Lucke, Duke
Temujin Roach, EDFR
Terri Rivera, Entergy
Terry Volkmann, GLP
Thomas Chamberlain,
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Thomas Roberts, Hoosier
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Tia Elliott, Pelican Power
Tiffany Sterling, DOW
Timothy Beddow, OTP
TJ Cochran, Ameren
Todd Komplin, WPPI
Tom Butz, MN Power
Tom Chamberlain, Entergy
Tom Conlin, RPU
Tom Dostal, MPC
Tom Siegrist,
Travis Stewart, Gabel
Trey Mayeux, Cleco
Tricia DeBleckere, OMS
Tristin Rojeck, DTE
Troy Fortwengler, WVPA
Tuan Truong, Duke
Tyler Bergman, CGA
Tyler Tworek, DTE
Tzu-Yuan Su, DPC
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Venona Greaff, OXY
Vince Vandaveer, Ameren
Wendy Anderson, MN
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Wendy Reed, Wright &
Talisman
Werner Roth, TX PUC

Will Koebel, PSCW
Will Lovelace, MPC
Zach Fjestad, OTP

Zach Starkey, CenterPoint
Zach Wright, WVPA
Zachary Callen, ICC

b. Review Agenda

Agenda accepted as posted.

c. Review Draft Minutes / Action Items

Minutes for the June 10 meeting were accepted as posted. The single action item from the last meeting is closed.

Action Item	Owner	Date	Status
Feedback requests will be opened for Large Load Firm Service Step Up (LLWG-2026-1) – due June 24	MISO	6/10/2026	Closed

d. Review Management Plan

Updates to the management plan were posted in redline. There were no proposed changes.

2. Status Updates ➡ (Chris Plante)

a. Steering Committee (SC)

A written report was provided with meeting materials. There were no questions.

Next meeting: July 7

3. MISO Posted Items ➡ (Marc Keyser)

n/a

4. Liaison Report (Marc Keyser)

A high-level overview of key topics was shared, including:

- Status update on MISO's three-part large load framework including filing timeframe and upcoming topics
- Notification of special Steering Committee meeting on July 7 to consider whether to consolidate all large load issues under the LLWG. Interested parties were encouraged to join.
- Announcements and Workshops
 - Capacity Emergency Alert Changes effective June 1, 2026
 - Market Reports Retirement effective September 30, 2026
 - Customer Experience Annual Survey open July 7 – 28, 2026
 - September 22: Annual ARR Registration Workshop
 - July 17: Locational Marginal Emissions Workshop
 - July 29: MISO Initiatives to Support the Reliability Imperative Workshop
 - MISO AI Summarization Pilot Program
 - New Website Feature: My MISO Calendar

5. Legal Review of Show Cause Order (Chris Supino)

In response to the June 18 Order to Show Cause issued by FERC, directing improvements to the MISO Tariff to better accommodate large loads, MISO provided initial review to the LLWG. The Order recognized MISO's ongoing efforts but required additional filings, including an informational report, detailing these initiatives. MISO's current approaches are considered directionally consistent with the Order, but further evaluation is underway to determine if additional changes are necessary to meet the Order's requirements and filing timelines.



The Show Cause Order outlines several directives, including enhancements to interconnection processes for co-located and electrically proximate generation and load, transmission service studies with consideration of Grid Enhancing Technologies, and increased transparency and accountability for load interconnection costs. MISO is required to submit an informational report addressing resource adequacy related issues by July 18, 2026*, with further compliance filings due in August, unless an abeyance is requested. The Order encourages MISO to continue stakeholder-driven large load initiatives and signals openness to creative solutions.

(*Note: July 18, 2026 was stated during the meeting; July 20, 2026 is the correct date.)

MISO's current proposals, such as the ZGIA (Zero Generation Interconnection Agreement), address many Commission concerns by offering a customized interconnection service, an accelerated study process, and agreements that memorialize necessary configurations and commitments. The proposal reflects extensive stakeholder engagement and process refinements. MISO is evaluating whether enhancements are needed to fully respond to the Order and to align with planned filing schedules.

The Order defines "Large Load" as a new commercial or industrial customer with a peak load of 50 MW or greater, interconnecting at voltages above 69 kV, and not part of a co-location arrangement. It seeks a rolling application process, readiness requirements, and robust data submission from eligible customers. MISO's current proposal includes operational requirements, voltage and ride-through standards, and an expedited project review process. Differences remain between MISO's approach and the Order's directives, particularly regarding readiness milestones, whether co-location should be an element of the definition of Large Load, and remote disconnection capabilities.

Transparency and accountability requirements also need to be established, including escalating milestones and payments to deter speculative requests, pro forma agreements for security and cost commitments, and visible tariff requirements for network upgrade costs. MISO is actively evaluating compliance approaches with Transmission Owners and stakeholders, acknowledging that revisions to application processes and development of new agreements will require careful planning and may take longer than several months. Next steps include submitting the required informational report, requesting an abeyance, and communicating the schedule for addressing the Order's matters to stakeholders once developed.

Throughout discussion, stakeholders asked clarifying questions about filing strategy and opportunities to discuss with stakeholders. Stakeholders requested advance drafts or outlines of our filing plan. MISO subject matter experts provided commentary on the progression and potential timelines for their various efforts and issues, including non-firm transmission service (July LLWG). Some thoughts were expressed on potential interconnection principles for large load resources as well as MISO's proposed transition plan. In closing, MISO reiterated that the Show Cause Order called for speed in enabling large loads. MISO committed to providing updates on the filing process to the LLWG as it progresses.

Upon questioning from stakeholders, MISO stated they would respond with a resource adequacy informational report to show how MISO initiatives allow LSEs to fulfill resource adequacy for large loads. MISO hopes to share an outline of the informational report with OMS and stakeholders prior to the July 20 deadline.

6. Market Participation and Registration of Co-Located Load and Generation (Marc Keyser)

Consideration of Zero-Injection GIA (PAC-2024-4B)

MISO returned with further discussion of the Zero-Injection Generation Interconnection Agreement (ZGIA) proposal, which has been developed over the past six months with significant stakeholder input. Stakeholder feedback was sought on remaining concerns and to address responses to the recent FERC Show Cause Order. MISO acknowledged broad support for the ZGIA framework, while noting that



some members have specific outstanding issues. Stakeholder feedback is being actively sought to refine the proposal and ensure alignment with regulatory expectations.

MISO proposes to file its ZGIA approach as previously described, with one modification based on stakeholder feedback and FERC guidance. Notably, ZGIAs associated with large loads will be required to register as market resources, ensuring accurate reporting and settlement of market volumes for both load and generation. Accurate reporting of market energy production and consumption volumes will appropriately assign ancillary charges such as regulating reserve to the large load on a gross basis. MISO also plans to clarify in its response that loads associated with ZGIAs will be classified as firm Network Integrated Transmission Service (NITS) loads and must pay for transmission services on a gross basis.

The ZGIA solution is tailored to the MISO footprint and achieves the balance sought by FERC's 206 Order. The proposal considers points of interconnection on the same voltage side of the same substation as electrically equivalent and includes requirements to prevent injections beyond transient tolerance windows. Transmission Owner Local Planning Criteria may restrict certain points of interconnection if special protection schemes are disallowed. MISO clarified that time limits for ZGIAs are not required, given the limited electrical distance eligible for consideration and the need to maintain historic relationships.

Stakeholders are requested to provide feedback on the ZGIA Proposal Framework (PAC-2024-4B) by July 15, 2026, using the Feedback Tool on the MISO website. MISO will review and incorporate feedback into its filing, currently scheduled for the end of July 2026.

7. Interconnection Reliability Requirements (LLWG-2026-3) (Beibei Li)

The LLWG reviewed updates to the Large Load Interconnection Reliability Requirements proposal. MISO is targeting an end-of-July Tariff filing to establish clear, enforceable requirements that protect system reliability. The revised Tariff language, posted with the meeting materials, aligns with the recent FERC Show Cause Order, emerging NERC guidance, and broader industry practices. Stakeholder feedback has significantly influenced the revisions, particularly regarding applicability, transition provisions, and requirement-specific language. A well-defined transition plan is critical to managing active projects and preventing unnecessary retroactive obligations.

The FERC Show Cause Order provides a definition for large loads, specifying criteria such as new commercial or industrial customers located at a single site, with a peak load of 50 MW or greater, interconnecting at voltages above 69 kV, and not part of a co-location arrangement. The Order also highlights the need for ongoing operational requirements, including monitoring, telemetry, equipment, and controls to ensure sufficient visibility and reliability. MISO's revised framework addresses these concerns by requiring transmission customers to provide hourly forecasts, telemetry data, and enabling remote disconnect capabilities, ramp rate, ride-through, and protection systems.

The updated Tariff language introduces refined definitions for computational load, large load customer, large load equipment, and points of withdrawal. Reliability requirements are tailored based on the specific characteristics of large loads, with computational loads subject to advanced modeling, ramp, phasor measurement, and ride-through requirements. All large loads must comply with basic facility data, modeling, telemetry, and forecasting requirements. Transition provisions ensure that in-flight large loads are given a defined path and reasonable timeframe to meet reliability requirements, with exemptions and exceptions based on service commencement dates and upgrade thresholds.

Key technical requirements include ramp rate limits, visibility through real-time telemetry and phasor measurement units, short-term forecasting, and voltage and frequency ride-through performance criteria. Large load customers must provide detailed facility information, electrical models, and real-time telemetry to the Transmission Provider. Compliance with these requirements is essential for maintaining



system reliability, and failure to provide requested information may result in operational limitations or disconnection from the transmission system.

Stakeholders were requested to provide feedback on the proposed Tariff updates by July 7, 2026, using the Feedback Tool on the MISO website. The next steps include a final review of Tariff language at the July 16, 2026, LLWG meeting, with the Tariff filing targeted for the end of July.

Throughout the presentation, stakeholders asked clarifying questions about the updates and corresponding Tariff language. Stakeholders were encouraged to follow up with written feedback. MISO was encouraged to think about including a couple of examples in the final language.

8. Large Load Operational Reliability Requirements

a. Large Load Telemetry and PMU Requirements (LLWG-2026-4C) (Sandeep Yeleti)

MISO reviewed proposed requirements for real-time telemetry and phasor measurement units (PMUs) for large loads across the MISO footprint. The primary objective is to enhance situational awareness and system reliability by mandating real-time SCADA telemetry from large loads and associated generation resources at the same Point of Interconnection (POI). This telemetry, delivered via ICCP, must include MW, MVAR, voltage, breaker status, and other relevant measurements, with standards defined in RTO-SPEC-006 and BPM-031.

For generation resources exceeding 20 MVA behind the same POI as large loads, individual SCADA telemetry is required and cannot be netted with load. Generation participating in the MISO market must also provide control mode telemetry and identify the ICCP provider for dispatch instructions. These requirements are intended to support real-time monitoring, optimal market dispatch, and compliance with reliability standards.

MISO emphasized the necessity of high-frequency monitoring devices, such as PMUs, particularly for computational loads. PMU-capable equipment must be installed at each point of withdrawal before service commencement, with data streamed in IEEE C37.118 format to the Transmission Provider. PMU data will be used for oscillation detection, wide area monitoring, event analysis, and dynamic model validation, aligning with industry consensus and NERC recommendations.

Additional configuration details include preferred use of phasor data concentrators (PDCs) for consolidating streams, adherence to existing retention requirements, and integration of PMU requirements into Business Practice Manuals (BPMs). Transmission Operators are responsible for providing disturbance monitoring and event recording data to meet NERC reliability obligations.

Feedback was requested on these requirements by July 13, 2026.

b. Large Load Operational Forecasting Requirements (LLWG-2026-4A) (Hemant Patil)

MISO reviewed its proposal for operational forecast requirements for large loads interconnecting across the footprint. The main objective is to ensure reliable management of load variability by requiring large load customers to submit short-term forecasts at the Commercial Pricing (CP) node level. These forecasts are intended to supplement MISO's weather and calendar-driven forecasting, which cannot fully capture the volatility introduced by large loads. The proposal aligns with industry direction, including NERC guidance and practices already implemented by SPP.

Forecast submissions are required on both hourly and 5-minute cadences, with the hourly forecast covering the next 168 hours and updated every hour, and the 5-minute forecast covering the next 6 hours and updated every five minutes. These submissions feed directly into MISO's reliability commitment and real-time dispatch processes, ensuring that operational decisions are informed by



the most current load projections. The responsibility for submission lies with the large load customer or the tariff customer requesting transmission service for a large load.

MISO will monitor the performance of submitted forecasts, focusing on submission timeliness and forecast accuracy. Both hourly and 5-minute forecasts will be evaluated against actual telemetered load, and mechanisms to incentivize accurate submissions are under consideration. Options range from monitoring and escalation to settlement-based approaches, with industry examples such as SPP's strategic initiative to improve forecast accuracy serving as reference.

Next steps include finalizing requirements based on LLWG feedback, developing an incentive mechanism for submission accuracy, and aligning operations to integrate submitted forecasts with MISO's scheduling processes. The submission process will be documented in the Business Practice Manual (BPM), with software build and implementation to follow.

Stakeholder feedback on the requirements is requested by July 13, 2026.

9. Large Load Reserve Product Enhancements (LWLG-2026-2) (Chen-HaoTsai)

An informational presentation was given to the LLWG on MISO's Dynamic Reserve process and preparedness for large load integration. MISO has established and periodically updates methodologies for quantifying net uncertainty and deriving seasonal reserve requirements, including Regulation Reserve, Ramp Capability Product, and Short-Term Reserve. These methodologies are designed to capture changes in net uncertainty patterns and reflect them in reserve requirements, ensuring the system remains robust as large loads are integrated.

The Dynamic Reserve methodology incorporates net load error and tie error as key uncertainty components, with reserve requirements calculated across various timeframes and regions. Historical data is used to derive base reserve requirements, while recent months inform scaling factors to reflect trends in growing uncertainty. A central issue discussed was the potential impact of non-conforming large load behaviors on load forecast accuracy, and subsequent impact to reserve product net load error and tie error. Non-conforming loads, which deviate from standard patterns due to industrial processes or unregistered energy storage resources, can introduce volatility and unpredictability into the grid.

MISO's analysis to date, based on correlation analysis, has not identified a clear relationship between existing non-conforming load profiles and reserve product uncertainties, suggesting that current penetration level of non-conforming loads have limited impact on the system.

Most comments from previous feedback supported MISO's approach to evaluate and update existing reserve product uncertainty and variability requirements before introducing new reserve products. MISO will continue to engage stakeholders through the LLWG to monitor uncertainty patterns and determine if revisions to reserve requirement methodologies are warranted as large load integration progresses.

10. New Business

No new business.

11. Review Action Items (Amanda Jones)

Action Item	Owner	Date	Status
Feedback requests will be opened for - ZGIA Proposal Framework (PAC-2024-4B) – due July 15 - Interconnection Reliability Requirements (LLWG-2026-3) – due July 7	MISO	6/29/2026	Closed



• Large Load telemetry and PMU requirements (LLWG-2026-4C) – due July 13 • Large Load Operational Forecast Requirements (LLWG-2026-4A) – due July 13			
Update and repost liaison report	MISO	6/29/2026	Closed

12. Adjournment

Meeting adjourned at 3:06 pm ET.

Next Meeting: July 16, 2026