

Stakeholder Feedback Template

Large Load Interconnection Reliability Requirements – June 29 LLWG

Purpose: provide feedback to MISO for Large Load Interconnection Reliability Requirements presented during the June 29 Large Load Working Group.

Instructions:

- Add feedback by topic to this workbook
- Email the completed workbook to StakeholderRelations@misoenergy.org

Timeline: submit feedback by Tuesday, July 7th

Links:

- [June 29 LLWG Meeting Materials](#)
 - LL Interconnection Reliability Requirements Presentation
 - Technical Compendium

Submitter: Dr. Rhonda Peters

Email: intertranec@gmail.com

Company: Clean Grid Alliance

Sector: Environmental

Do you wish for this feedback to be posted on the MISO public website? Yes

Tariff Section	Description
Module A/B	NEW DEFINED TERMS, APPLICABILITY, TRANSITION PROVISION, and effective date
Module B	LARGE LOAD INFORMATION REQUIREMENTS: Basic Facility Data
Module B	LARGE LOAD TELEMETRY REQUIREMENTS
Module B	LARGE LOAD RIDE-THROUGH REQUIREMENTS
Module B	LARGE LOAD RAMP REQUIREMENTS

General Feedback for Large Load Interconnection Reliability Requirements (Slides 8,12)

1. Do you have any specific feedback related to the Large Load related definitions in slide 8?

Response: Clean Grid Alliance offers general support for distinguishing between computational loads and more traditional loads, given that computational loads can have significantly different characteristics and are typically connected to the transmission system through inverters at a single point with a large draw of concentrated power. This power draw can fluctuate cyclically from full output to zero output in a matter of milliseconds, which is very different than traditional loads that MISO and its transmission owners are accustomed to managing. Even among computational loads, there are significant differences in that some may not actually experience large fluctuations in power, while others do. MISO may want to consider Tier 1 (higher risk) and Tier 2 (lower risk) subcategories of computational loads.

MISO has proposed 50MW or higher to be the threshold for designation as large load, and that 50% or greater of a large load being comprised of computational-based load, designates it as computational load. We do not immediately have an opinion on this, but note that computational loads interface to the electric grid through inverters, similar to wind, solar and battery storage generation, and therefore share similar electrical interface characteristics, but can experience more extreme and frequent ramping up and down from full output to zero output in the millisecond timeframe, introducing unprecedented variability of large power swings on a time scale that traditional/thermal generation may struggle to match.

2. Do you have any specific feedback related to the TRANSITION PROVISION in slide 12?

Response: Clean Grid Alliance has serious concerns about the transition proposal on slide 12. Computational and large load projects do not benefit from delaying or removing reliability requirements at the front end, only to find operating issues at commissioning or farther out that must be addressed at a much higher cost. Large loads can significantly increase the risk of cascading blackouts due to constant cycling between full (or nearly full) output and zero (or nearly zero) output and also through tripping offline in response to voltage variations and other disturbances nearby. This puts a further strain on transmission system voltage and stability, often causing cascading disturbances that automatically

trigger nearby facilities to also trip offline, particularly if they do not have ride through requirements. MISO has proposed that all large loads coming online up to November 2027 will be allowed to trip offline and ramp up and down freely from a Tariff perspective, indefinitely. This will apply to gigawatts of new computational load that is expected before the cutoff date. MISO is proposing to create the same conditions on its system that were responsible for the Iberian Peninsula blackout of 2025.

To safely and reliably operate the grid, MISO must ensure that generation and load are sufficiently balanced under all circumstances. A rapid fluctuation in either load or generation can lead to voltage increases or drops that trigger automatic protective equipment to rapidly trip facilities offline, creating further imbalances that cannot be compensated for and lead to cascading blackouts in a matter of seconds or less. In some MISO regions, proposed computational loads are extremely large (GW scale for a single computational load) and there are also concentrations of multiple facilities in a single geographic or electrical region that may be behaving similarly and additively contributing to imbalances. It is not in these computational load's, MISO's or any MISO stakeholder's best interest to allow lax voltage ride through or ramp rate requirements (basically none whatsoever until November 2027).

Clean Grid Alliance recommends that point "b" on slide 12 of the presentation be removed completely and point "c" be changed to "b" with 2027 changed to 2026 for the implementation year. While it may cost a little more upfront for these facilities, it's a significant savings in the long run providing protection for the facility itself, and nearby facilities, reducing the cost and consequence for basic of interconnection of large load.

Clean Grid Alliance supported renewable generation developers in MISO through implementation of FERC Order 661A in 2005 and various subsequent reforms that strengthened the standard. We understand the balance needed between implementing an essential reliability standard and protecting late-stage projects. With this in mind and in support of a November 2026 requirement, we proposed that projects on an individual basis up to November 2027 should be able to petition for a variance similar to the recent NERC PRC 29 variance provision. (https://www.nerc.com/globalassets/standards/reliability-standards/prc/2020-02_prc-024-4_prc-029-1_implementation_plan_final.pdf)

LARGE LOAD TELEMETRY REQUIREMENTS (slide 18)

3. Do you have any feedback regarding this requirement(s)?:

Response: Clean Grid Alliance supports MISO's proposed redline edit that requires computational load and generation that is behind the meter to have individual meter and telemetry requirements. This requirement for individual metering and data allows for visibility into events such as when either the load or generator trip off-line, while the other remains, even if just for a fraction of a second, indicating the power that will be flowing on the MISO transmission system as a result. A serious reliability event can easily occur in the millisecond timeframe. Visibility into the status of both the generation and the load allows for appropriate and quick responses to events to maintain the reliability of the bulk electric system.

LARGE LOAD RIDE-THROUGH REQUIREMENTS (slide 23)

4. Do you have any feedback regarding this requirement(s)?:

Response: Clean Grid Alliance does not support removing the earlier proposed and more conservative requirement. MISO has not adequately provided justification or cause for its removal.

Computational loads can create new challenges in frequency and voltage stability due to size and standard operational behavior that the MISO system as it exists today did not envision, nor was it constructed to handle. If mitigation of the impacts created by computational loads is not addressed by the computational loads themselves at the time of interconnection, it inevitably shifts cost and consequences to native load.

Please also refer to our earlier comments on ride-through in question 2 above.

LARGE LOAD RAMP REQUIREMENTS (slide 14)

5. Do you have any feedback regarding this requirement(s)?:

Response: Clean Grid Alliance has concerns about the broad language proposed to allow offset to ramping on page 14th and the lack of any clear Tariff-defined metrics (bookends) for large load developers to take into design consideration early in the process. Under the graphic on Slide 14, MISO notes the millisecond range that ramping of computational load can occur in (AGC – automatic generation control which is typically milliseconds). Only equipment that similarly meets the same millisecond timeframe of load variations and demands should be allowed for mitigation or offset. Further, this section should clearly provide specific ramp rate maximum and minimum values for the benefit of all stakeholders, especially computational loads seeking to interconnect. Some information

can be included in the MISO business practice manual, while the bookends of the calculations should be prescribed in the MISO Tariff.

It is also essential that MISO address oscillatory behavior in the Tariff filing, including specific metrics and bookends. We support a 10MW variation over a sliding 5 second metric that has been proposed by other stakeholders and similarly refer MISO to Southern Company's documented method for compliance testing. This standardization not only protects the grid from disturbances that can lead to cascading blackouts but it allows for large load/computational load customers to understand and incorporate costs and requirements upfront, rather than after fact, when the facility may be failing tests needed to synchronize with the grid and mitigation solutions are far more challenging and costly.

6. Other general feedback:

Response: It is no small undertaking to reliably connect computational loads, that by nature can fluctuate heavily and rapidly, creating oscillations and voltage swings that can easily lead to cascading blackouts in a matter of seconds or less.

MISO may benefit from considering a power smoothing interconnection requirement to protect the existing synchronous generator fleet from shaft torque pulsations. AI computational loads in ERCOT have faced significant cost overruns to prevent shaft torque pulsations. It's much more efficient and painless for computational load projects to have well defined requirements upfront than to work after construction to mitigate issues that are found upon commissioning and much more costly to address at that point.

Grid stability and oscillation metrics/specifications should also be included in computational load interconnection requirements.

MISO should be aware that a four-second reserve requirement is still extremely slow compared to what will likely be needed in practice. MISO may not have the AI computational load experience to understand that four seconds is likely not sufficient. We encourage MISO to investigate this.

MISO has also not yet defined a process whereby the combined impacts of multiple large loads/computational loads can individually be assigned their pro-rata costs on shared upgrades. Currently those shared upgrades are socialized to the transmission load zones which ultimately results in native load customers subsidizing large load/computational load interconnection. This can easily be addressed through added Tariff language on reliability requirements that address individual costs through DFAX calculations, similar to how generators are cost assigned their pro rata allocation of Shared Network Upgrades.

ESIG (Energy Systems Integration Group) just recently published several reports on large load behavior and reliability impacts, as well as mitigation approaches and strategies to address the impacts. While the CGA comments here were largely written prior to the reports becoming available, the reports appear to be fully aligned and provide a deeper dive into the requests and comments provided here. Clean Grid Alliance encourages MISO to comprehensively review these reports alongside the comments here, and accordingly make adjustments, prior to filing:

<https://www.esig.energy/reports-briefs/large-loads-behaviors-capabilities/>

<https://www.esig.energy/reports-briefs/large-loads-reliability-impacts/>

And finally, it is worth noting that computational and large load centers have access to solutions that optimize power for their own facilities and minimize power quality problems and impacts to nearby facilities and customers. Several computational load stakeholders have already mentioned this optimization approach in previous MISO large load meetings and Clean Grid Alliance has referenced it in earlier large load comments. These customers particularly, but all large load customers generally appreciate having clear metrics and standards upfront to eliminate surprise requirements that can lead to unplanned cost overruns if they come up later in the process.

Sincerely,

Rhonda R. Peters, Ph.D.

Technical Consultant to Clean Grid Alliance