



# FERC Technical Conference

Docket Nos. ER12-678-000 &  
ER12-679-000

May 15, 2012

**Session 1: 9:00 AM – 11:00 AM**

# **Voltage and Local Reliability (VLR) Commitments**

# **Question 8: Discuss Transmission Reliability Issues and the resulting increase in RSG Costs**

- **Issues occur frequently in 3 areas**
  - ***Marquette, Michigan area***
    - Issue emerged in December 2009 following resource retirements
    - Resources committed for 319 of 366 days between 4/1/2011 – 3/31/2012
    - 5 Resources owned by one Market Participant effectively address this issue
  - ***Escanaba, Michigan area***
    - Issue emerged in December 2009 following Resource modeling changes
    - Resources committed for 274 of 366 days between 4/1/2011 – 3/31/2012
    - 3 Resources owned by one Market Participant effectively address this issue
    - Transmission System upgrades in December 2011 have significantly reduced VLR commitments in this area
  - ***The “Michigan Thumb Loop”***
    - Issue existed in 2009
    - VLR issue is dependent on forced or planned outages on the Transmission System

## **Question 9: How are Voltage Constraints modeled in the SCUC and SCED?**

- MISO establishes thermal proxies, or flowgates, that are used to represent voltage stability issues caused by regional transfers in the Network Model
  - The proxies work well to maintain reliable and efficient operations in the market for regional issues
  - Do not work well for local voltage issues
    - Typically mitigated by the manual commitment of a limited set of resources located in the local vicinity of the issue, resulting in the voltage constraint being completely cleared
    - With the voltage constraint cleared, resources committed do not receive an economic signal via the LMP as the constraint is not bound in the market

## **Question 9: How are Voltage Constraints modeled in the SCUC and SCED?**

- MISO models known voltage constraints in the Network Models used to operate the Markets
- Voltage stability issues are represented in the Day Ahead Market's commitment and dispatch algorithms as predefined thermal proxies
- Local voltage issues are controlled using a thermal proxy if one can be identified

## ***Question 9: How are Voltage Constraints modeled in the SCUC and SCED?***

- MISO also uses a Voltage and Stability Analysis Tool to conduct Real-Time P-V (Power versus Voltage) Analysis
- Assessments are conducted to identify any expected voltage issues or possible IROL conditions as part of:
  - Seasonal winter and summer assessments,
  - Week-Ahead Security Planning
  - Day-Ahead Security Planning for early morning off-peak load and peak load conditions

## **Question 9: How are Voltage Constraints modeled in the SCUC and SCED?**

- MISO conducts Real-Time Voltage Assessments
- In Real-Time, MISO Reliability Coordinators monitor:
  - Voltages through SCADA voltage alarms and/or state estimator voltage results. Voltages compared to Transmission Operator defined voltage limits
  - Circuit flows and bus voltages
  - Predefined constraint boundary flows
  - Load levels

## **Question 9: How are Voltage Constraints modeled in the SCUC and SCED?**

- In addition, MISO Reliability Coordinators monitor Real Time Contingency Analysis (RTCA).
- RTCA utilizes data from the State Estimator and performs alternating current (AC) contingency analysis.
- RTCA determines both real and reactive power flow and bus voltages violations.
- Reliability Coordinators monitor and take corrective action to prevent potential post-contingency voltage violations as determined by RTCA.

***Question 10:* Explain how and when VLR units are committed in the operating cycle.**

- For the top three issues noted in MISO's May 10 response, the associated VLR Commitments typically occur following the posting of the Day-Ahead Market results during the Forward RAC process per the requirements of the provided Operating Guides.
- Other voltage issues with established Operating Guides will be similarly committed in the Forward RAC process.

## **Question 10: Explain how and when VLR units are committed in the operating cycle.**

- Multi-Day Forward Reliability Assessment Commitment (FRAC)
  - Direct Current or DC solution studies ensure generation needs are met for capacity as well as thermal and voltage constraints
  - Thermal proxies are used to represent voltage stability interfaces
  - Constraints and voltage stability limits are based on Outage Coordination studies:
    - Identify voltage issues for local areas through AC analysis and provide generation requirements to mitigate the issue to FRAC
    - Transmission Operators are involved in identifying voltage issues and steps needed to correct the issue; documented in Operating Guides
    - Generation commitments are made in this process if the generation startup times are longer than 24 hours
    - Generation commitments address Capacity needs, Voltage stability interface limits and thermal limits, and Local voltage support issues

## **Question 10: Explain how and when VLR units are committed in the operating cycle.**

- Day-Ahead (DA) Market
  - Uses simultaneously co-optimized Security Constrained Unit Commitment (SCUC) and Security Constrained Economic Dispatch (SCED) algorithms to clear and dispatch Energy and Operating Reserves based on predefined constraints
  - May also detect additional thermal constraints through Simultaneous Feasibility Test (SFT).
  - The DA Market Algorithms use a Direct Current or DC solution
  - Voltage stability issues are represented in DA as predefined thermal proxies
  - Local voltage issues are controlled using a thermal proxy if one can be identified
    - Voltage stability and local voltage constraints are determined by Outage Coordination and Next-Day Security Analysis studies
  - DA commits necessary generation to meet the load bid into the market and identified constraints from an economic perspective
  - Generation re-dispatch and additional unit commitments will occur for a pre-defined thermal proxy for a local voltage issue.

## **Question 10: Explain how and when VLR units are committed in the operating cycle.**

- Forward Reliability Assessment Commitment (FRAC)
  - Following the clearing of the DA Market, MISO performs another FRAC study using a Direct Current or DC solution
  - Based on forecasted load and scheduled interchange transactions, MISO commits additional generation to meet capacity needs and relieve transmission constraints
  - FRAC committed generation for voltage constraints are determined by:
    - SCUC determining a least commitment cost means to mitigate voltage stability issues represented as thermal proxies
    - Manual commitment by operator to address a reliability need as specified in operating guides to mitigate local issues.

## ***Question 10:* Explain how and when VLR units are committed in the operating cycle.**

- Intra-Day Reliability Assessment Commitment (IRAC)
  - Periodically throughout the operating day, additional IRAC studies are performed to ensure enough generation is online to meet capacity, voltage stability constraints and thermal constraints needs
  - IRAC studies will address changes in the system since the FRAC study
- Look-Ahead Commitment (LAC)
  - Commencing April 1, 2012, MISO implemented the Look-Ahead Commitment tool
  - LAC primarily addresses the economic commitment of near-term capacity needs
  - LAC does not have the capability to identify commitments for Voltage and Local Reliability needs

## **Question 10: Explain how and when VLR units are committed in the operating cycle.**

- Real Time Operations
  - Reliability Coordinators monitor the system for any voltage constraints or reactive power needs and take preventive and corrective control actions. General control options include:
    - Working with TOP to take zero cost actions by modifying static reactive devices (caps, reactors, LTCs, etc.) and generator reactive power output. Goal is to maximize the use of static devices to free up dynamic reserves on generators.
    - Re-dispatch generation using a thermal proxy in Real Time SCED algorithm and/or implementation of Manual Re-dispatch.
    - Adjusting real power output of generators to reduce regional transfers and reduce real power imports in load pockets.
    - Commit generation to provide dynamic reactive support, and real power support to reduce real power imports.
    - Utilize emergency procedures up to and including the use of demand response resources and load reductions to correct voltage issues.

## ***Question 10a:* Explain when/how VLR requirements are determined.**

- VLR Commitment requirements are primarily determined by the forward studies MISO conducts as described in the prior slides
- Requirements are then specified in Operating Guides, or as noted in prior slides, when system topology conditions are identified through one of the tools or processes described above for system study or real time monitoring or real time analysis.

## **Question 10b: On what basis are VLR commitments made? MW, Capacity, Other**

- Requirements depend on specific issues and are documented in applicable Operating Guides
- When Voltage or Local Reliability issues are identified through Outage Coordination studies, Next-Day Security Analysis studies, or during real time operations, a solution is determined to mitigate the issue in an economical and efficient manner. The mitigation requirements will depend on the type of constraint identified. The mitigation solution can include a specific MW amount from one or more units, a reactive power requirement from one or more units, or a combination of both.

## ***Question 10c:* Do MISO and the IMM coordinate their VLR determination?**

- Unit commitment, including determining and specifying those Resources committed for Voltage and Local Reliability, is a Transmission Provider, i.e. MISO, responsibility. Therefore, the IMM does not determine or specify unit commitments or their reasons

## **Question 11a: Explain the statement below; what info indicates a VLR Commitment is required?**

“VLR Commitments may be issued at various points in the sequence of administering the [Reliability Assessment Commitment (RAC)] process, depending on the when the needed requirements are known.” *MISO Answer, Docket No. ER12-678-000, at 7.* Explain this statement, and describe what information MISO is relying on to indicate that VLRs are required.

a. As part of the RAC process, explain each of the roles for the following tools in determining the needs for resources committed for VLR: Forward Reliability Assessment Commitment, Intra-day Reliability Assessment Commitment, and Look Ahead Commitment.”

- Please see the slides that address the answer to Question 10

## ***Question 11b: Are VLR commitments several days before the operating day part of the RAC?***

- MISO does not issue commitments for multiple days in either its Day Ahead Market or any RAC process. MISO accepts offers for Minimum Run Times of up to 24 hours, which can result in individual commitments extending into the next operating day, but typically never beyond that.
- As noted in response to 10.a above, VLR Commitments have been historically made primarily in Forward RAC following the Day-Ahead Market posting

## **Question 12: Describe the VLR designation process; when Market Participants (MPs) are informed**

- VLR Commitments are designated at the time of commitment for the duration of the Transmission Provider Commitment period
- Under normal circumstances, MISO would not modify or change a unit's VLR designation after issuing a commitment
  - Final designation is required 54 days following the operating date and could change based on post-operations reviews or disputes
- MPs are not informed of the commitment reason or commitment type at the time of commitment as part of the notification process
- MISO does not inform Generation Operators that they have been committed to address voltage or local reliability issues
- MISO does not intend to inform Generation Operators that they have been committed for VLR under the proposed changes

## **Question 13a: Does WEPCO's exclusion of SCUC commitments depict how VLR's are committed?**

- MISO disagrees with WEPCO's statement and its requirement is inconsistent with the proposed definition of a Voltage and Local Reliability Commitment
- Imposing such limitations in the proposal would be unnecessarily restrictive on administering the DA Market and RAC processes
- The DA Market and RAC process do not have the ability to determine after the fact which VLR Commitments would have cleared in either process based on economics
- If market conditions exist where the VLR Committed Resources would have cleared economically in the DA Market, RSG Costs associated with such Resources should be minimized since production costs are offset by market revenues provided by LMP

## **Question 13b: Can economic commitments in SCUC and SCED be VLR Commitments?**

- MISO clarifies that the SCED does not produce commitments
- Economic commitments recommended by and resulting from the SCUC as part of any RAC process would not be classified as VLR Commitments, unless the commitments were made in order “to manage congestion on facilities below voltage levels of 100 kV”
- Commitments issued via the automated Day-Ahead Market SCUC process would not be classified as VLR Commitments, as this SCUC process does not differentiate between economic commitments for capacity to meet bid load versus commitments to manage transmission constraints
- Market results, including the data provided in MISO’s May 10, 2012 response ahead of this technical conference shows that even out-of-merit commitments associated with low voltage facilities less than 100 kV make up a relatively small percentage of the overall VLR RSG costs

## ***Question 13c:* Can VLR units be declassified and become economic-only units?**

- Commitments are classified as VLR, not the unit themselves
- Generation resources would receive VLR commitments for the duration of individual Transmission Provider commitment periods
- Prior or subsequent commitments may be classified based on Market Participant offers, including Must Run
- Absent Operator error causing an incorrect categorization or Market Participant dispute, VLR units would not be reclassified as another commitment reason

## **Question 13d: Could MISO include local reliability issues in SCUC and SCED?**

- MISO does incorporate local reliability issues in the SCUC and SCED. However, due to the local nature of the issues, the SCUC and SCED are generally ineffective at addressing the issues through commitment and dispatch
  - Therefore, resources must be committed for VLR outside of these processes
  - In both cases, however, the supplier has the same degree of market power

**Session 2: 11:30 AM – 1:30 AM**

# **Cost Allocation**

## **Question 14: Please explain the statement below.**

“MISO states that “it does not anticipate any significant instances of pseudo-tied load modeling throughout the footprint that would exacerbate or result in cost shifts.” *MISO Answer in Docket No. ER12-678-000 at 9.*”

- Factors that impact a Market Participant’s decision and ability to pseudo-tie load into a different LBA
  - Require real-time metering and telemetry
  - LBA must approve the modeling change
  - Pseudo-tie could impact congestion hedges causing a misalignment load modeling and auction revenue rights zones
  - Moving the modeled location of the elemental nodes via a pseudo-tie would have no impact on the Constraint Contribution Factor used in any VLR commercial significance study, limiting a Market Participant’s ability to avoid VLR Cost Allocation

## **Question 15: Could VLR cost allocation mirror the Constraint Management Charge?**

- Using AC Power Flows to optimize reactive power dispatch is technically infeasible given its dependence on complex, intensive, non-linear programming
- VLR Commitment and allocation are modeled as thermal proxies in the current Constraint Management Charge (CMC)
- Allocating VLR Commitment costs to CMC deviations is inconsistent with cost causation
  - It is the transmission issues and existence of Load, not the existence of deviations that cause the need for VLR Commitments
  - The current allocation shifts approximately 75% of the VLR costs to market-wide Day-Ahead Schedule Deviations

## **Question 16: Any objection to LBAs participating in studies that result in cost allocation?**

- MISO has no objections, subject to restricted access to any confidential data
- Based on feedback from stakeholders, specific provisions were added to the definition of Commercially Significant Voltage and Local Reliability Issue that allow LBAs to request that a VLR Issue be studied for Commercial Significance based on feedback from stakeholder discussions

## **Question 17: MISO's criteria for a broader allocation beyond the LBA area.**

- MISO will apply the following logic in the Voltage and Local Reliability LBA Share Study:
  - **Build the Interfaces:** MISO RT Operations builds the interfaces to support the Commercially Significant VLR Issues.
  - **Determine the Load CP Nodes:** Determine the load CP Nodes impacted by each Commercially Significant VLR Issue based on the identified Elemental Pricing Nodes.
  - **Calculate the LBA Shares:** Calculate the LBA Shares for each Commercially Significant VLR Issue based on the Hourly Real-Time Metered Billable Volume.

## **Question 18: MISO's criteria for determining if a VLR issue is commercially significant.**

- MISO will apply to following logic in the Commercially Significant VLR Issue Study:
  - **Collect VLR Commitments:** Collect all VLR Commitments made within the study time period.
  - **Determine the Occurrence Frequency and Monetary Impact per VLR Issue:** Determine the numbers of days Resources were committed for the VLR Issue and the amount of Revenue Sufficiency Guarantee (RSG) Make Whole Payment (MWP) for the VLR Issue.
  - **Identify the Commercially Significant VLR Issues:** Using the criteria based on frequency and monetary impact.
  - **Adding Commercial Significance:** Use the outcome of the Commercially Significant criteria to designate a given VLR Issue as Commercially Significant.

## ***Question 18: MISO's criteria for determining if a VLR issue is commercially significant.***

- The following criteria will be used to determine Commercially Significant VLR Issues:
  - The number of days for which a VLR Issue has a Resource committed to relieve the VLR Issue exceeds 90 days in a year or 15 days in 2 out of 4 quarters of the year; or
  - The sum of DA and RT RSG MWP's paid to Resources to committed for a VLR Issue exceeds \$800,000 in a year or \$200,000 in 2 out of 4 quarters of the year.