Response to Inquiry from Adam Mckinnie

Concern #1: MISO's Business Practice Manual (BPM) states that Local Balancing Authorities (LBAs) will be notified of ARC demand reduction offers that have been cleared in the Day-Ahead (DA) and Real-Time (RT) markets. However, the BPM currently allows an ARC to aggregate customers of multiple Load Serving Entities (LSE). AmerenUE customers can be aggregated with customers of municipal authorities. This raises the following reliability concerns.

- The LBA cannot determine each LSE's contribution to the reduction cleared in the DA.
- If there is a constrained capacity shortage in RT, the LBA may not be able to determine which LSE is short.

Recommendation: 1) Work with MISO to add a restriction to their BPM that a demand reduction resource CPNode may not include loads from more than one LSE. 2) Institute rules prohibiting an ARC from aggregating AmerenUE customers with customers of municipal authorities.

Research and Further Notes: The PJM tariff states that "All End-Use Customers in an aggregation shall be served by the same electric distribution company or Load Serving Entity where the electric distribution company is the Load Serving Entity for all End-Use Customers in the aggregation." Stated more clearly, all customers in an aggregation must be served by the same EDC. The only exception to this rule is when one LSE is the EDC for more than one service territory. In this case the LSE may aggregate customers from more than one EDC if and only if they are the LSE for those customers. Since AmerenUE is the only EDC and LSE in its service territory, this one rule would alleviate the concern stated above.

Concern #2: The lack of metering requirements raises concerns that impact the ability of an LBA, LSE or Transmission Operator to satisfy their statutory and regulatory obligations. DRR Type I is the class of demand reduction resources that are capable of supplying reductions through physical load reduction. This class of DRR has the following attributes.

- May sell energy or reserves
- If deployed for reserves must provide five-minute interval data within 5 days
- No requirements for selling into energy market
- Note that this does not explicitly require interval metering. Five-minute data could be constructed using profiling or other estimation technique
- Very clearly does not require real-time signals or anything close to it.
- MISO has traditionally distanced itself from metering requirements, especially for retail customers. Perhaps MISO's position is that they do not have jurisdiction over retail customers.

Recommendation: 1) Work with MISO as appropriate to incorporate metering requirements into the MISO BPM. 2) Develop rules, policies and tariffs at the state level as necessary for retail customer metering in order to ensure safe, reliable and efficient operation.

Research and Further Notes: Both PJM and ISO-NE require that every end-use customer in an ARC aggregation must "have metering equipment that provides integrated hourly kWh values". The ARC is responsible to ensure that metering is in place. Further, PJM specifies that "metering equipment shall either meet the electric distribution company requirements for accuracy, or have a maximum error of two percent". Also, the ARC must provide "meter data

for each end use customer in the aggregation." Meter data will be forwarded to the EDC and the LSE upon receipt, and these parties will then have ten business days to provide feedback to PJM. PJM has further metering requirements for the ancillary services markets that are briefly listed below. These requirements apply to end use customers that are represented by ARCs as well as customers that are participating directly in the PJM markets.

- Regulation Market – Resources MW output must be telemetered to the PJM control center in a manner determined to be acceptable by PJM.
- Synchronized (Spinning) Reserve Market – Demand Resources providing Synchronized Reserve are required to provide metering information at no less than a one minute scan surrounding a synchronized reserve event. Metering information for demand resources is not required to be sent to PJM in real time. Daily uploads at the end of the day if an event has occurred are sufficient.
- Supplemental Reserve Market – Demand resources' response controls must be approved by PJM prior to participation in the Supplement Reserve Market including ability to be dispatched by PJM's Unit Dispatch System. Demand resources providing Supplement Reserve are required to provide telemetry that is capable of providing metering information at no less than a one minute scan rate. Metering information of demand resources is not required to be sent to PJM in real time. Daily uploads at the end of the day if an event has occurred are sufficient, as the response evaluation is performed after the fact.

The PJM rules, if adopted by MISO, would substantially address Ameren's concerns about metering requirements as they relate to real-time operations as well as after-the-fact verification and settlement.

Concern #3: The BPM gives no specifics on real-time communication between MISO, ARC, and the LBA. The LBA must have some idea in real-time about demand reductions that are actually taking place so that resource adequacy can be assured. For example, if the system demand drops 50 MW due to an ARC demand reduction, then the LSE is still responsible for the 50 MW. However, if the drop is due to a weather front, then the LSE_LBA? is not responsible.
Recommendation: Work with MISO to add detailed communication requirements to the BPM for real-time (hour ahead) notifications of demand reductions from the ARC to the LBA.
Research and Further Notes: The PJM BPM states that ARCs "shall provide PJM with Notification no less than 5 minutes prior to beginning a load reduction event and no more than 7 days prior to an event. CSPs may begin a Demand Response intra-hour provided that Notification is given. A Notification may be withdrawn or adjusted downward during the relevant event hour, but not after the event hour. The Notification shall include the start and stop times of the event and the amount of the demand reduction." In PJM Demand Resources are limited to providing 25% of the Spinning Reserve requirement. Also, PJM limits the size of individual customers participating through ARC aggregation. If the aggregation will only provide energy to the market then individual customers are limited to 100 kW in size. If the aggregation is providing ancillary services then individual customers are limited to 500 kW in size. These rules in PJM ensure 1) that ARC resources are not treated any differently than other demand resources from the perspective of resource adequacy, and 2) that the LBA has the information that it needs when it needs it to assure resource adequacy in real time.

Concern #4: The BPM contains no requirement for communication between the ARC and Transmission Operator (TOP). This raises the following concerns about safely operating the transmission system.

- No long-term, seasonal, or daily system studies can be performed to determine the impact of deployment decisions.
- The TOP receives no notice of amounts and locations of curtailed load either DA or in RT.
- The TOP does not receive notice that curtailed load is reconnecting to the system. This creates potential concerns with voltage/reactive power analysis and intra-day system planning of flow and voltage.

Recommendation: Work with MISO to add detailed communication requirements to the BPM for real-time (hour ahead) notifications of demand reductions from the ARC to the TOP. In many cases the TOP is the same entity as the LBA. However, it should be noted that the TOP and the LBA have different concerns.

Research and Further Notes: While the PJM BPM and tariff are not explicit that the notifications described above in Concern #3 are to both the LBA and TOP, it is my reading of those documents that the intention is for that to be the case. Again, in nearly all cases they are the same entity, but Ameren would prefer to see that stated explicitly because the LBA and TOP have different responsibilities. The PJM rules described in Concern #3 would address the real-time notification concerns under the second and third bullet points of Concern #4. Further, the limitation on the size of individual customers within an ARC aggregation diminish concerns expressed in all three bullet items of Concern #4 because it is unlikely that customers of that size would cause local instabilities even if a large number of them were distributed throughout the system.

Background: When an ARC causes customer loads to be curtailed, MISO settlements adds back this load reduction to the LSE's load so that it is returned to the level it would have been without the reduction. This is called reconstitution. The LSE is responsible for (must pay for) the full amount of the reconstituted load. Take the example of a customer with a typical load of 10 MW. If the customer reduces their load to 9 MW, the ARC and the customer receive the benefit of the 1 MW reduction, and the customer's actual load is 9 MW. However, the LSE is still responsible for 10 MW of energy and 10 MW of capacity.

Concern #5: The MISO BPM contains no requirement for MISO or the ARC to provide DA or RT communication regarding demand reduction to the LSE. The LSE is only notified after the fact, and the BPM does not specify how an individual LSE can determine which portion of an ARC reduction is their responsibility when the ARC has aggregated customers of multiple LSE. The LSE is responsible for bringing generation resources to the market to back the full amount of their reconstituted load. Having no DA or RT notification impairs the ability of the LSE to properly forecast their load obligations, potentially understating these obligations.
Recommendation: 1) Work with MISO to add a restriction to their BPM that a demand reduction resource CPNode may not include loads from more than one LSE. 2) Work with MISO

to add detailed communication requirements to the BPM for day-ahead and real-time (hour ahead) notifications of demand reductions from the ARC/MISO to the LSE.
Research and Further Notes: The PJM rule described under Concern #1 above addresses the issue of an ARC aggregating customers from more than one LSE. In the PJM markets, rules are in place regarding notifications that in large part address issues of reliability. However, like in MISO, there are only after-the-fact notifications to the LSE. While not a reliability concern, this does impact the LSE's ability to operate most efficiently.

Concern #6: The current MISO registration process does not provide for ARC resources to be incorporated in DA, seasonal, long range planning. Unless these resources are incorporated into planning, the benefits of these resources are reduced, and new generation will continue to be built as if the ARC resources didn't exist.
Recommendation: Work with MISO to develop procedures to incorporate ARC resources into the various MISO planning processes. In BPM, require similar notification to the TOP of capability and availability for ARCs, similar to that which exists in NERC standards for generation.
Research and Further Notes: I was not able to find any specifics as to how PJM treats ARC Resources in the planning process. Certainly, under the current rules, incorporating ARC resources into the planning process is less important for PJM than for MISO. In PJM, ARC customers are limited in size. Therefore, large customers participate directly in the market. This approach results in a practical limit on the number of MWs that ARCs can bring to the market. Under the current MISO rules there are no limits to either the number or size of customers that may be included in an ARC aggregation. The primary issue that Ameren is highlighting with this concern is cost. Not including ARC resources in the generation planning process could result in a non-optimal solution.

Concern #7: The LSE will not be notified of an actual curtailment until 7 days after the fact. This raises the following real-time trading and procurement issues.

- The LSE is left guessing if a load reduction is "real." The LSE monitors their load in real time and will observe a reduction in actual load, but will not know if this is due to ARC deployment or other normal customer activity
- If the reduction puts the LSE below what was cleared in the DA market, the LSE may believe it is now long and seek to hedge prices for the balance of the day.
- If the reduction reduces the amount that the LSE is above what was cleared in the DA market, the LSE may not recognize that it is in fact short and fail to hedge prices for the balance of the day.
- As the LSE has no means of knowing if the load reduction is due to ARC deployment, they must choose between acting as if the load reduction is real and potentially having the load reconstituted and acting as if the load reduction is due to ARC activity and potentially not having the load reconstituted. Both strategies expose the LSE to real-time price risks.
- Any negative cost impact arising from such inefficiencies will be passed through to all other customers.

Recommendation: Work with MISO to add detailed communication requirements to the BPM for day-ahead and real-time (hour ahead) notifications of demand reductions from the ARC/MISO to the LSE.

Research and Further Notes: Like in MISO, PJM only provides after-the-fact notification to the LSE. This is more of a cost issue than a reliability issue which is perhaps why neither the PJM nor the MISO rules contain the recommended provisions. As described under Concern #3, ARCs must provide real-time notification to PJM of load reductions. Certainly, the addition of a rule that PJM forward this information to the LSE seems practical. MISO currently doesn't have a requirement for any type of notification.

Concern #8: Several of the MISO settlement requirements are problematic when retail customers are involved.

- The LSE may not challenge the use of a default baseline method by the ARC, even if they possess information that may indicate a more accurate option exists.
- Notice of curtailments of their loads provided 7 days after the fact, but the LSE is only provided with 10 days to verify data self-reported by the ARC
    - Customer meters may not have been read prior to the 10 day deadline
    - LSE not permitted to object to the use of default profiles by ARCs
- Virtually (perhaps in-fact) impossible to shadow settle

Recommendation: 1) Work with MISO to incorporate sensible metering and notification requirements into the BPM to enable the LSE to verify settlement data. 2) Work with stakeholders to develop rules, policies and tariffs for the registration of ARC resources, metering requirements for ARC customers and settlement verification including addressing the following issues.

- Daily-read hourly-interval meters needed for timely LSE verification
- Rules that the LSE verification is based on
- What happens if reconstituted load is nonsensical (actual + load reduction is greater than all-time high)?
- When can profiled data be used and when is interval data required?

Research and Further Notes: Under the current MISO rules, there are situations in which an LSE would not be able to verify settlement with MISO. This is not the case in PJM because of the rule described under Concern #1. Further, as described previously PJM requires all customers, even those that are part of an ARC aggregation, that are providing demand response resources to have "have metering equipment that provides integrated hourly kWh values." The ARC is allowed 60 days to submit meter data for energy market settlement instead of the 7 days that is allowed by MISO. This allows enough time for the ARC and the LSE to acquire the actual meter data for each customer. Finally, the use of profiled data is not allowed by PJM.

PJM's requirement to use hourly interval data reduces Ameren's concern about verification in two ways. First, it is straightforward to determine if an individual customer actually performed during an event because the meter data is detailed enough to resolve the customer's load. Second, the establishment of the CBL is more straightforward because it is based on metered values and not calculated values.

Concern #9: Protections for Participating Customers
Research and Further Notes: The PJM contains a customer authorization form that end-use customers must sign in order for the ARC to obtain the electric usage history for a customer. This provision addresses one of the concerns that Ameren stated regarding ARCs serving residential and small commercial customers.