# MISO's Resource Adequacy Overview

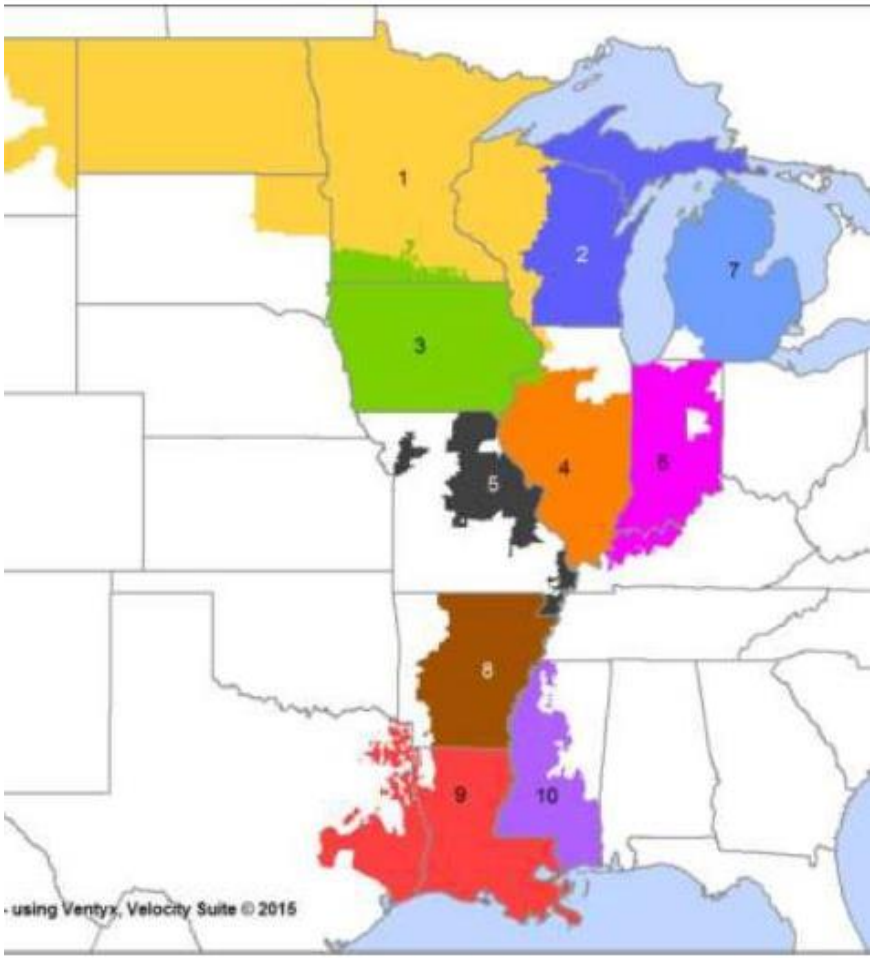
June 8, 2017

# Today's discussion

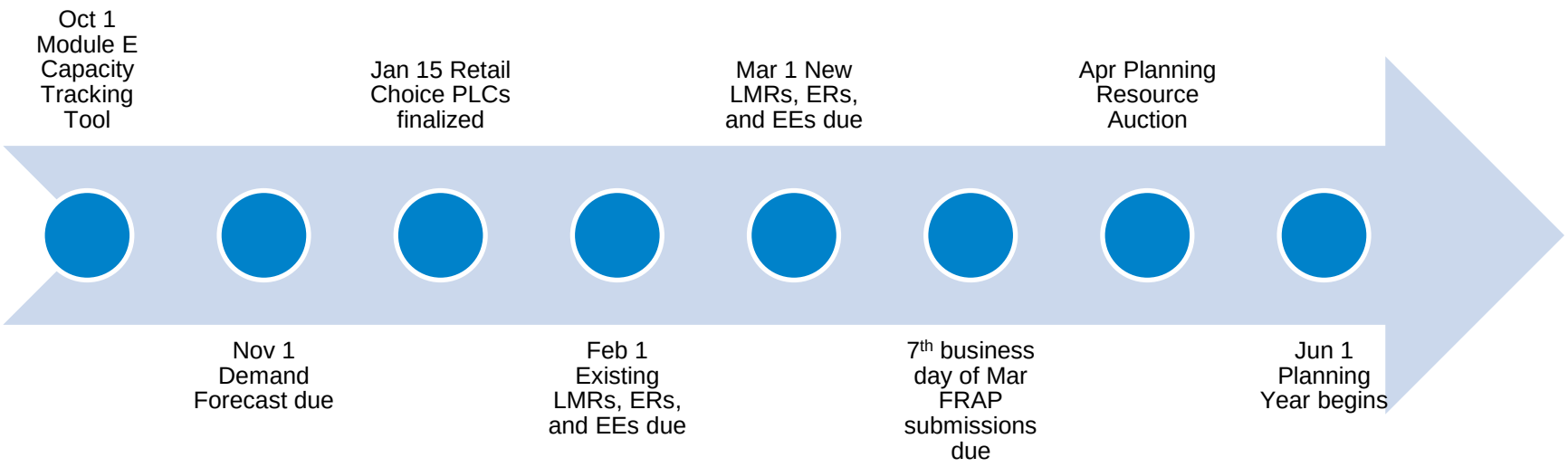
- Overview of MISO's Resource Adequacy Construct
- Load Serving Entities and Electric Distribution Company requirements
- Planning Resources
- Zonal Resource Credits
- Planning Resource Auction
- Locational Reform
- Data for State Reliability Mechanism

# Overview of MISO's Resource Adequacy Construct

- Annual Obligation for Load Serving Entities (LSEs)
  - Planning Year period is from June 1 to May 31
  - Resource Adequacy requirements are determined by the load forecast submitted.
  - Multiple methods of achieving and demonstrating resource adequacy, including self-supply, bilateral contracting and market-based acquisition via the Planning Resource Auction.
- Overview of Planning Resource Auction
  - Occurs two months ahead of Planning Year
  - Residual Auction - allows buyers and sellers to balance resource portfolio prior to Planning Year
  - Includes a locational requirement indicating the amount of capacity that must be secured from resources within each zone to meet reliability standards



# Timeline of MISO's Resource Adequacy Construct



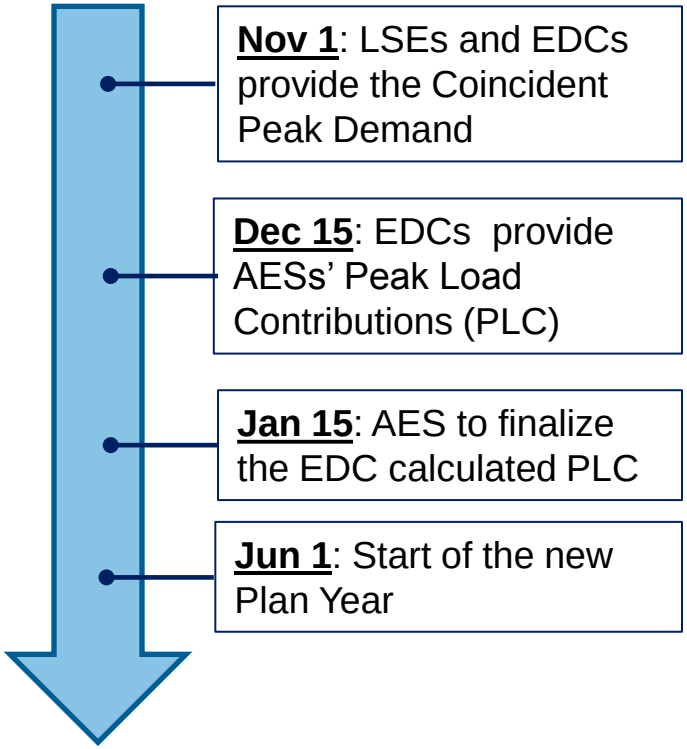



PLC = Peak Load Contribution
LMR = Load Modifying Resources
ER = External Resources
EE = Energy Efficiency Resources
FRAP = Fixed Resource Adequacy Plan

# Overview of MISO's Resource Adequacy Construct cont.

- By November 1 prior to the upcoming Planning Resource Auction (PRA) Year, MISO calculates the following determinants:
  - Planning Reserve Margin (%)
    - Total resources required to meet load reliably through the year.
    - MISO's Planning Reserve target is 1 day in 10 years.
  - Local Clearing Requirement
    - The minimum amount of resources that must be from the Local Resource Zone (LRZ) in order to meet 1 day in 10 years standard
  - Capacity Import Limit
    - Number of resources that can be imported into the Local Resource Zone
  - Capacity Export Limit
    - Number of resources that can exported from the Local Resource Zone

# Load Serving Entities/Electric Distribution Companies requirements




- LSEs with demand and energy that is not subject to retail choice switching under the Michigan's Electric Choice Program and EDCs that distributes electricity to retail choice customers will provide their MISO Coincident Peak Demands by November 1 via the MECT,
- EDC will calculate the AESs' share (PLC) of the EDC area demand under the Michigan's Electric Choice Program by December 15,
- AES will have until January 15 to review the EDC calculated PLC values and reconcile the difference (if needed) with their EDC,
- See Peak Forecast Methodology Review Whitepaper available at:

https://www.misoenergy.org/Library/Repository/Communication%20Material/Key%20Presentations%20and%20Whitepapers/Peak%20Forecasting%20Methodology%20Review%20Whitepaper.pdf

AES = Alternative Electric Suppliers
EDC = Electric Distribution Company

# Types of Planning Resources

## Capacity Resources

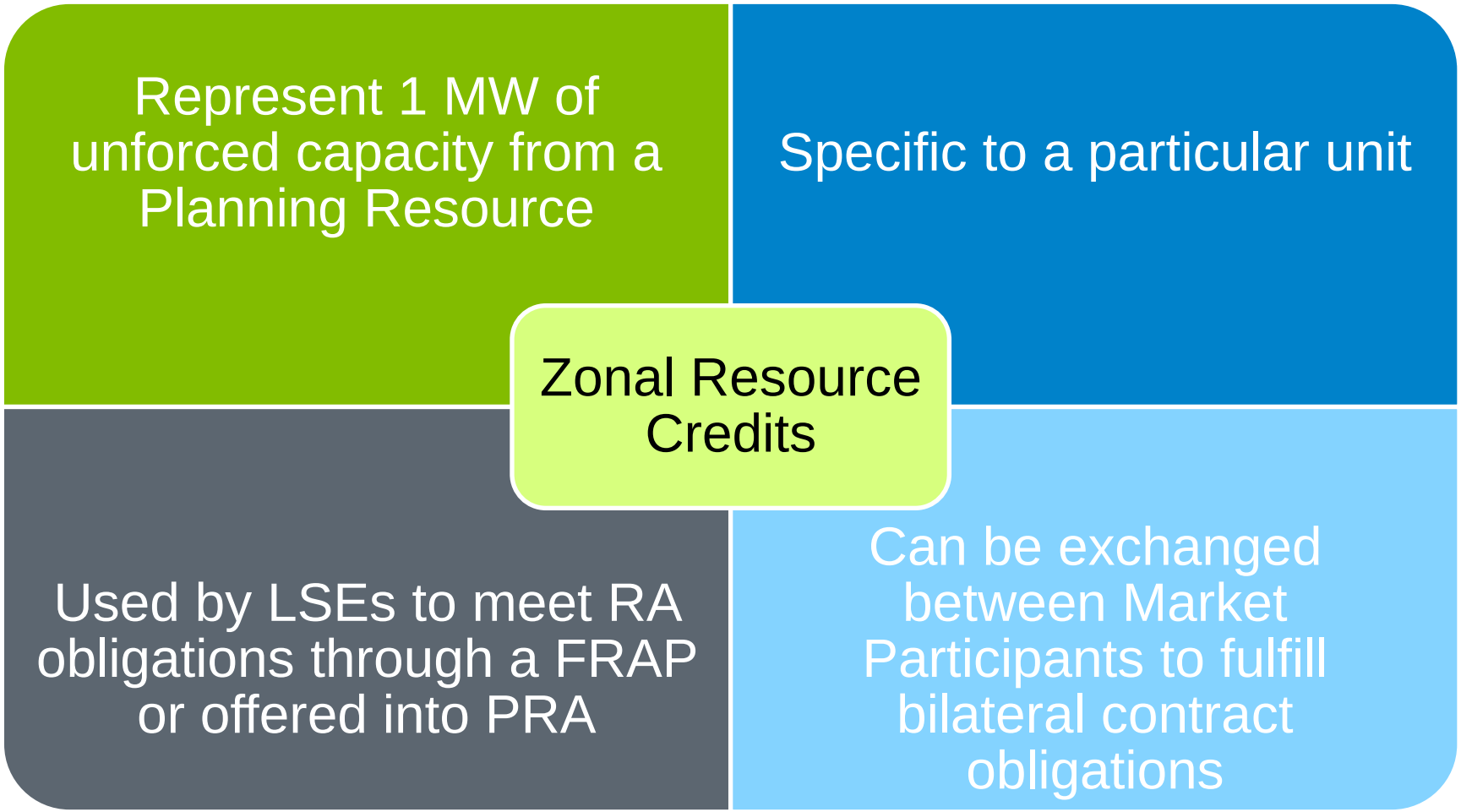
- Non-Intermittent Generation
- Intermittent Generation and Dispatchable Intermittent Resources
- Use Limited Resources
- External Resources
- DRR Type I and II

## Load Modifying Resources

- Behind-The-Meter-Generation
- Demand Resources

## Energy Efficiency Resources

# Zonal Resource Credits






FRAP = Fixed Resource Adequacy Plan

# Self-scheduling ZRCs

- Resources are offered in at $0/MW-day in the Planning Resource Auction
- No Limit on how much of the self-scheduled resources must be from within the LRZ
- All self-scheduled resources will be cleared and priced where they are physically located
- Resource Adequacy BPM Section 5.5.3

# ZRCs in Fixed Resource Adequacy Plan

- LSEs that choose to use a FRAP to meet their Resource Adequacy Requirements must designate a sufficient volume of resources located in the same LRZ as the LSE's PRMR to meet the LCR requirement.
- The amount of resources that must be sourced from within the LRZ to satisfy the LSE's LCR share is equal to the load ratio share of the LSE's PRMR multiplied by the total LCR for its LRZ.
- ZRCs used in FRAP are excluded from the auction clearing process
- Resource Adequacy BPM Section 5.3

# Planning Resource Auction

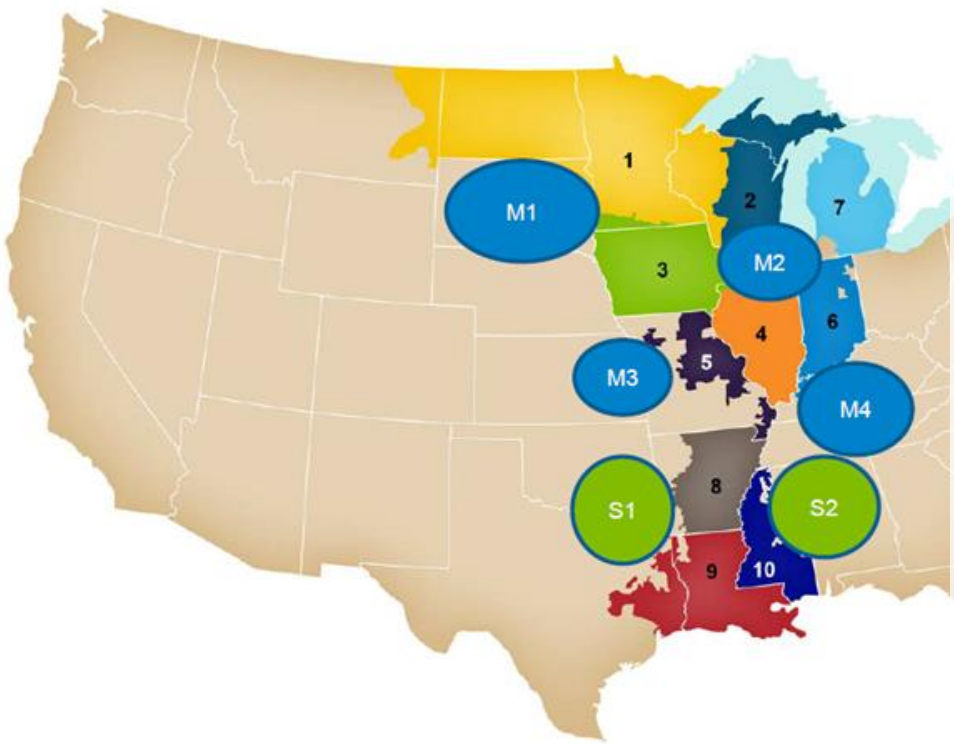
- Resources are able to offer in at $0/MW-day up to Cost of New Entry (CONE) subject to Market Monitoring Review
- CONE is calculated for each Local Resource Zone
  - Zone 7 CONE value was 259.81 $/MW-day for last auction
- Load does not bid in the auction
- Auction clears resources based on lowest price
- Auction process will determine the minimum amount of ZRCs must be purchased from within the zone based on the zonal Capacity Import Limit, Local Clearing Requirement, and offer information
- Sum of FRAP and ZRCs purchased from within the zone must be greater than equal to the zonal LCR
- Only LSEs and AESs can purchase capacity in the PRA

# Planning Resource Auction cont.

- MISO currently conducts the PRA only for the prompt year, therefore utility will not be able to calculate the AES charges for future Planning Years.
- On June 1st, each AES in the EDC area will be charged at the Auction Clearing Price for their Peak Load Contribution (share of the EDC Planning Reserve Margin Requirement) based on the daily load switching.

# Locational reform proposes two changes to PRA. First, model the external resource where located…

## Current External Resource Zone (ERZ) Proposal




- External resources will be located in ERZs, eliminating a reliability risk and allowing the PRA to capture the impact of any transfers
- Each ERZ will be priced based on its ability to support system resource needs
- LOLE study parameters will be aligned with PRA treatment of external resources
- In the last auction, external resources were not used to meet resource adequacy obligations for Zone 7



PRA = Planning Resource Auction
LOLE = Loss of Load Expectation

# …and second, provide hedging mechanism to manage resulting price separation risk for historical arrangements

**Carve Outs**

**Pre-MISO arrangements which opted out of the energy market (GFA Option B, Carve Outs*)**

500 MW

**First Stage**

**Pre-locational capacity market arrangements**

<4600 MW

**Second Stage**

**Existing resources with contracts to load impacted by the zonal boundary changes (up to 7 year transition)**

<2800 MW

*Option B provides refunds to resources scheduled in Day Ahead; Carve Out resources are exempted from most markets

# To assist with Michigan's SRM process, MISO will be able to provide the following data

| | YEAR 1 | YEAR 2 | YEAR 3 | YEAR 4 | YEAR 5 | YEAR 10 | Data origin |
|---|---|---|---|---|---|---|---|
| INSTALLED CAPACITY (ICAP) | YES | YES | YES | YES | YES | YES | OMS survey |
| UNFORCED CAPACITY (UCAP) | YES | YES | YES | YES | YES | YES | OMS survey |
| LOCAL RESOURCE ZONE PEAK | YES | YES | YES | YES | YES | YES | use historical % from previous LOLE |
| COINCIDENT PEAK DEMAND | YES | YES | YES | YES | YES | YES | use historical % from previous LOLE |
| CAPACITY EXPORT LIMIT (CEL) | YES | NO | NO | YES | NO | NO | Previous Year's LOLE |
| CAPACITY IMPORT LIMIT (CIL)* | YES | NO | NO | YES | NO | NO | Previous Year's LOLE |
| PLANNING RESERVE MARGIN REQUIREMENT (PRMR) | YES | NO | NO | YES | NO | YES | Previous Year's LOLE |
| LOCAL CLEARING REQUIREMENT (LCR) | YES | NO | NO | YES | NO | YES | Previous Year's LOLE |
| LOCAL RELIABILITY REQUIREMENT (LRR) | YES | NO | NO | YES | NO | YES | use historical % from previous LOLE |

YES - MISO will provide info
NO - MISO will not have info (extrapolation needed)

***CIL VALUE FOR MICHIGAN BASED ON VOLTAGE LIMIT AND IS RELATIVELY STATIC UNTIL GENERATION RETIREMENTS.**



OMS = Organization of MISO States
LOLE = Loss of Load Expectation

# Appendix

# Glossary

- External Resources
  - Capacity resources located outside of MISO footprint committed to the MISO capacity market. Currently, External Resources are able to count towards the Local Clearing Requirement of the Local Resource Zone where their transmission service crosses the MISO boundary.
  - An MP that owns External Resources or contracts for an External Resource via a power purchase agreement (PPA) will register its External Resources.
  - Resource Adequacy BPM Section 4.2.5
- Pseudo-tied Resources
  - Internal Pseudo-tied resources: MISO planning resources located in the Local Balancing Area (LBA) that is different from the LBA represented in the MISO Commercial Model. All internal Pseudo-tied resources will be modeled based on the LBA they are physically located in.
  - External Pseudo-tied resource: MISO planning resources that are serving the entity outside of MISO or external resources modeled in the MISO's commercial model to serve the Demand in the MISO footprint. External Pseudo-tied resources serving the MISO footprint are modeled based on the sink zone of the LBA represented in the MISO Commercial Model

# Glossary cont.

- Network Resource Interconnection Service (NRIS)
  - Generation Resources that are deliverable to Load within the MISO footprint as determined by System Impact Studies conducted by MISO
- Energy Resource Interconnection Service (ERIS)
  - Generation resources that did not pass the deliverability test may procure Firm transmission service to meet the deliverability requirements to participate in the PRA

# Helpful links

- Resource Adequacy BPM 011
  - https://www.misoenergy.org/Library/BusinessPracticesManuals/Pages/BusinessPracticesManuals.aspx

- 2017 LOLE Study
  - https://www.misoenergy.org/Library/Repository/Study/LOLE/2017%20LOLE%20Study%20Report.pdf

# Resource Adequacy Timeline

| Month | Day | Process | Date | Responsible Entity | NOTE | Tariff |
|---|---|---|---|---|---|---|
| September | 1st | Annual Cost of New Entry for LRZs | 9/1/2016 | MISO | | 69A.8(a)(3) |
| September | 1st | MISO Coincident Peak Load from previous summer and LRZ coincident factors | 9/1/2016 | MISO | | 69A.1.1.(c) |
| October | 1st Bus. day | MISO opens the new Planning Year in the MECT | 10/3/2016 | MISO | | |
| October | 1st Bus. day | Transmission losses by Local Balancing Authority are posted by MISO | 10/3/2016 | MISO | | 69A.1.1(b) |
| October | 31st | Generation Verification Test Capacity due | 10/31/2016 | Resource Owner | Resource Owners submit operational data or real power test for Sep. 1, 2015 - Aug. 31, 2016 | 69A.3.1.a(1) (d) |
| October | 31st | Intermittent Historical Output Data due (run of river hydro, solar, biomass) | 10/31/2016 | Resource Owner | Resource Owners submit operational data for HE 15,16,17 for each day in months of June, July, and Aug. | 69A.3.1.a(1) (d) |
| October | 31st | Submission of GADs data for Q3 2016 | 10/31/2016 | Resource Owner | Resource Owners must also ensure at least 36 months of data is provided | 69A.3.1.a(1) (d) |
| November | 1st | Evidence for new Zonal Deliverability Charge hedges due | 11/1/2016 | LSE | | 69A.7.7(b) |
| November | 1st | Coincident Peak Demand forecast by LSE/EDC , the 24 monthly and 16 seasonal peak demand and energy forecast values by LSE due | 11/1/2016 | LSE, EDC | No action needed by Retail Choice LSEs | 69A.1.1(a) |
| November | 1st | Loss of Load Expectation study results published by MISO (Publish PRM, LRZ Definitions, CIL and CEL, LRR) | 11/1/2016 | MISO | | 68A.2<br>68A.4<br>68A.5 |
| December | 1st | Unforced Capacity values are published by MISO | 12/1/2016 | MISO | Resources that do not meet the Oct. 31 milestones will not have UCAP calculated at this date | |
| December | 15th | Peak Load Contribution submissions by EDC due (EDC will send the details of the PLCs to both the respective LSEs and the MISO for their review) | 12/15/2016 | EDCS in Retail Choice | The EDC provided PLC data will be the default value for the LSEs' Retail Choice Coincident Peak. | 69A.1.1( e) |
| January | 15th | Catch up date for Resource Owners to submit GADs, GVTC, or Historical Output data | 1/15/2017 | Resource Owner | Catch up date for Resource Owners who missed Oct. 31 milestone | |
| January | 15th | LSEs confirm the Retail Choice PLC in the MECT | 1/15/2017 | LSEs in Retail Choice | LSEs should have all PLC questions resolved at this milestone. If an LSE wants to change the PLC data, please discuss it with EDC because only the EDC can update the PLC values in MECT. | 69A.1.1.1 |

# Resource Adequacy Timeline cont.

| Month | Day | Process | Date | Responsible Entity | NOTE | Tariff |
|---|---|---|---|---|---|---|
| February | 1st | Existing Load Modifying Resource/Energy Efficiency/ External Resource registrations due for prompt Planning Year | 2/1/2017 | LMR Owner | | |
| February | 1st | Loss of Load Expectation study begins for next Planning Year | 2/1/2017 | MISO | | |
| February | 1st | Resource Owners Confirm UCAP posted in the MECT | 2/1/2017 | Resource Owner | Excludes UCAP values for LMR and External Resource registrations | |
| February | 14th | Submit data for facility ZRC reference levels to IMM due 45 days prior to the close of the PRA | 2/14/2017 | Gen. Owner | | |
| February | 15th | LSEs submit request to revise Coincident Peak Demand forecast originally submitted on Nov. 1 | 2/15/2017 | LSE | MISO will review and approve/deny request | |
| February | 15th | Catch up date for MISO to post Unforced Capacity Values | 2/15/2017 | MISO | Catch up date for Resource Owners who missed Oct. 31 milestone | |
| February | 15th | GVTC Deferral Notification to MISO is due | 2/15/2017 | Resource Owner | | 69A.7.9(a) |
| February | 15th | New Load Modifying Resource / Energy Efficiency Resource / External Resource registrations to be considered for inclusion in FRAP must be submitted for approval. | 2/15/2017 | LSE | | 69A.9(a) |
| February | 26th | UCAP updated from deferred GVTC | 2/26/2017 | MISO | | |
| February | 26th | Preliminary PRA data is released by MISO | 2/26/2017 | MISO | | |
| March | 1st | Generator Verification Test Capacity/Generator Availability Data for new resources or resources with increased capacity prompt Planning Year | 3/1/2017 | Gen. Owner | | 69A.3.1.a(d) |
| March | 1st | New Load Modifying Resource/Energy Efficiency Resource/ External Registrations due for prompt Planning Year | 3/1/2017 | LMR Owner | | 69A.9(a) |
| March | 1st | MISO posts the SREC and SRIC for each SRRZ | 3/1/2017 | MISO | | 68A.3.1 |
| March | 1st | MISO to complete its Coincident Peak Demand forecast review process | 3/1/2017 | MISO | | 69A.1.1( c) |
| March | 1st | Zonal Deliverability Charge hedge information posted by MISO | 3/1/2017 | MISO | | |
| March | 1st | Satisfy credit requirement for UCAP issued from deferred GVTC | 3/1/2017 | Resource Owner | | 69A.7.9(b) |
| March | 1st | Resource Owners Confirm UCAP posted in the MECT - Catch up Resources only | 3/1/2017 | Resource Owner | | |

# Resource Adequacy Timeline cont.

| Month | Day | Process | Date | Responsible Entity | NOTE | Tariff |
|---|---|---|---|---|---|---|
| March | 7th Bus. day | Fixed Resource Adequacy Plan due by LSE | 3/9/2017 | LSE | | 69A.9(a) |
| March | 15th | Fixed Resource Adequacy Plan review completed by MISO (The LSE will have until the PRA offer window opens to remedy any deficiencies in their FRAP.). | 3/15/2017 | MISO(LSE) | | 69A.9(a) |
| March | 17th | Updated Preliminary PRA data is released by MISO | 3/17/2017 | MISO | Reflects updated information from LSEs, Resource Owners, and PJM auction | |
| March | 25th | Provide facility specific reference levels 5 days prior to the close of the PRA offer window | 3/25/2017 | IMM | | |
| March | - 3 Bus. Day | Planning Resource Auction offer window is opened | 3/29/2017 | MISO | | 69A.7.1(a) |
| March | Last Bus. Day | Planning Resource Auction offer window is closed | 3/31/2017 | MISO | | 69A.7.1(a) |
| April | 1st 10 Bus. Days | Iterations of auction runs with the adjusted CILs and CELs may be required to ensure that a network loading is not violated. Additionally, MISO will work with the IMM to evaluate potential withholding . | 4/3/2017 | MISO/IMM* | *The reference levels are used to determine financial withholding. The mitigation of financial withholding can be expected to reduce the auction clearing price. | 69A.7 |
| April | 10th Bus. day | Planning Resource Auction results posted | 4/14/2017 | MISO | | 69A.7 |
| April | 11th Bus. Day | Assess the Capacity Deficiency Charge | 4/17/2017 | MISO | | 69A.10(a) |
| April | 16th Bus. Day | MISO sends out the Capacity Deficiency Charge | 4/24/2017 | MISO | 5 business days (or as soon as practical) after assessment | |
| April (start of Bus. Day count) | 16th Bus. days + 7 Bus Days | Capacity Deficiency Charge payment due | 5/1/2017 | MISO | Payment made within 7 business days of receipt. | |
| April (start of Bus. Day count) | 16th Bus. days + 7 Bus Days + 2 Bus. Days | Capacity Deficiency Charge payments made to MPs | 5/3/2017 | MISO | Actual payment date may vary depending on above payment receipt date. | |
| May | One month after PRA | Publish details of the ZRC offers submitted in the PRA without revealing the names of the Market Participants | 5/15/2017 | MISO | | 69A.7.4 |
| May | 25th | MISO publishes cleared LMRs to the MCS | 5/25/2017 | MISO | Must Offer performance requirements in the MCS | |
| May | Last Bus. Day | GVTC results for Deferral is due | 5/31/2017 | LSE | | 69A.7.9(a) (2) |
| June | 1st | New Planning Year starts | 6/1/2017 | All | | 69A.7 |
| June | 1st | Daily settlements for the new planning year starts | 6/1/2017 | All | | |

# For Additional Questions:

John Harmon
Manager, Resource Adequacy
jharmon@misoenergy.org