

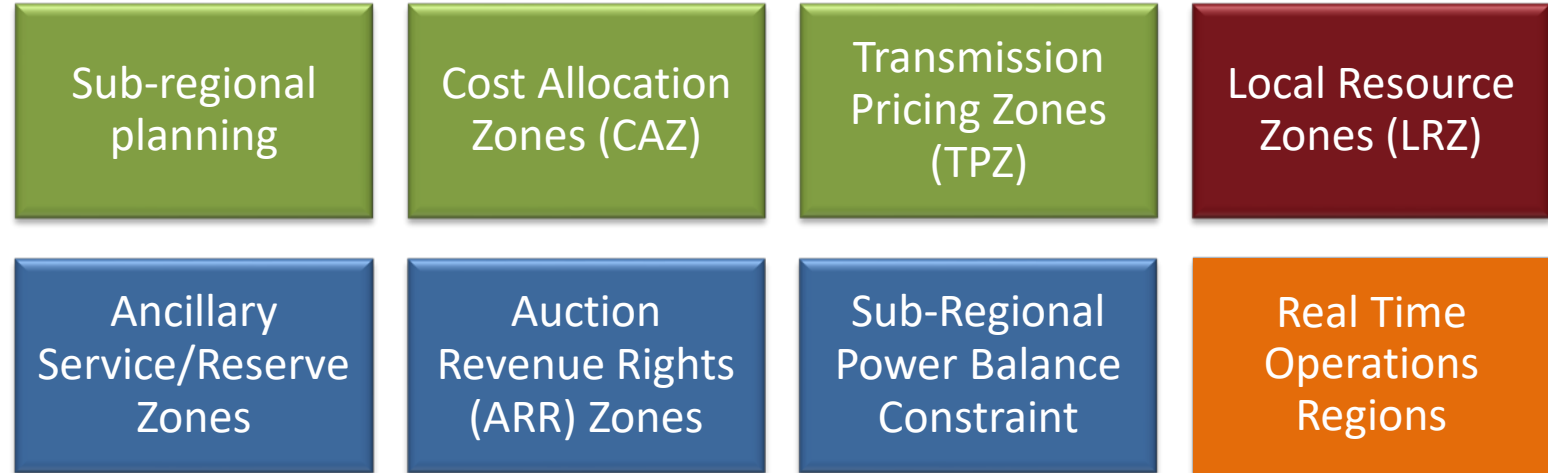


Use of “Zones” and “Regions” at MISO

OMS CAPCom
January 11, 2021



MISO Uses a Variety of Zones for Different Purposes



Planning



Resource Adequacy



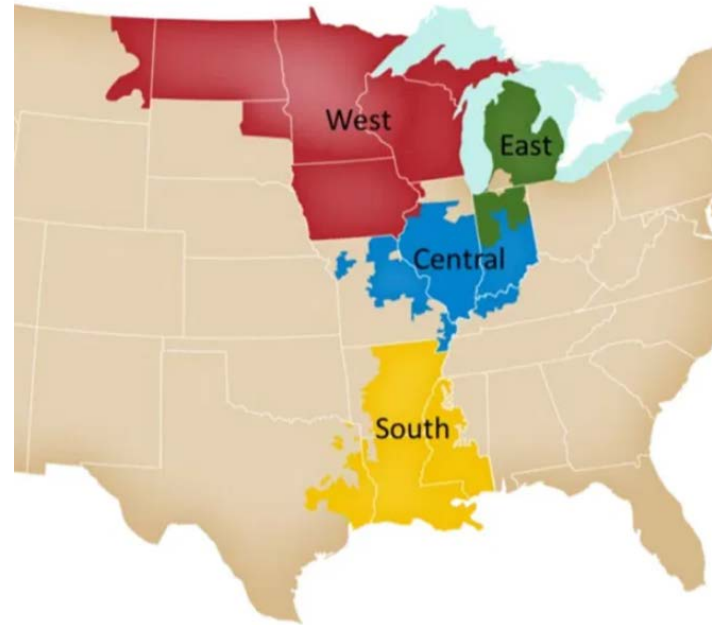
Energy/Ancillary Markets



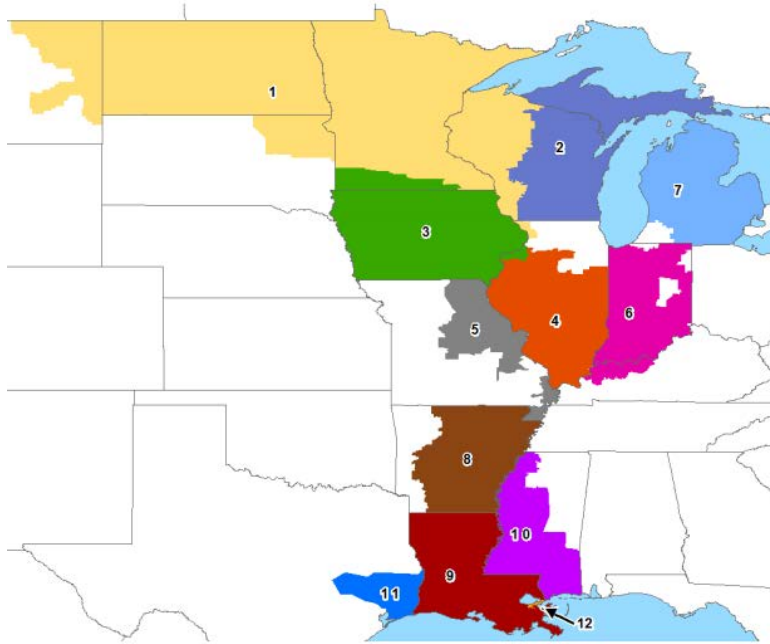
Real Time Operations

Sub-regional Planning

- These zones are used in the MTEP process to review transmission solutions on a more local basis
- Solutions submitted, reviewed, and analyzed by stakeholders

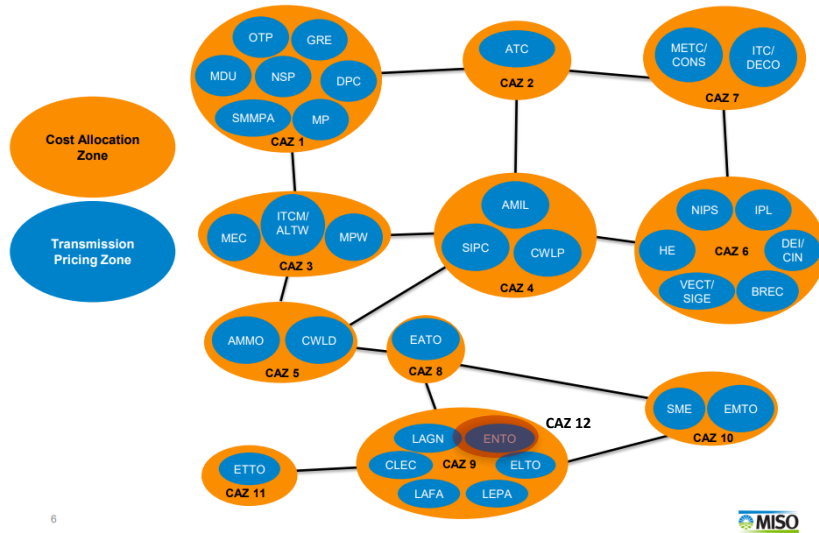


Cost Allocation Zones (CAZ)



- Used to allocate costs of transmission under the Tariff
 - e.g. Adjusted Production Cost benefits

Transmission Pricing Zones



- Used for MEPs
 - Avoided reliability project metric
 - APC metric further allocated to TPZs once total CAZ benefit is determined
 - Settlement savings metric
- Used for local/bottom-up projects as “situs zone”
 - Other projects, BRPs, etc.

Local Resource Zones



- Used for Planning Resource Auction (PRA)
 - Planning Reserve Margin Requirement (PRM) allocated to each zone
 - Local requirement for each zone
- Boundaries set by analyzing state boundaries, electrical connections, relative size, and previous LOLE studies

Reserve Zones



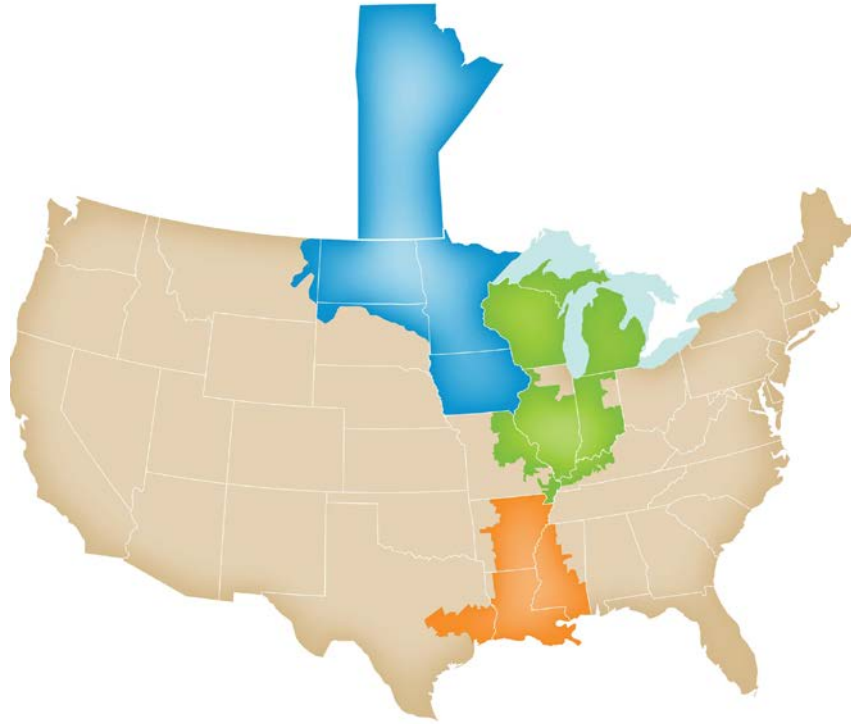
- Zones set based on MISO analysis of transmission system to ensure enough reserves procured in various regions
- Recent changes reflect ability to procure reserve across N-S interface

Sub-regional Power Balance Constraint (N-S)



- Midwest & South sub-regions are used for purposes of allocating SPP Settlement costs
- Within the sub-regions costs are allocated to each LRZ based on identified benefits

Real Time Operations Reliability Regions



- Regions utilized to split up Reliability Coordination responsibilities among regional operators
- North Region operated out of Eagan, MN
- Central Region operated out of Carmel, IN
- South Region operated out of Little Rock, AK



MISO Transmission Planning Update

OMS Cost Allocation Principles
Committee (CAPCom) Meeting -
January 25, 2021

Purpose & Key Takeaways



Purpose:

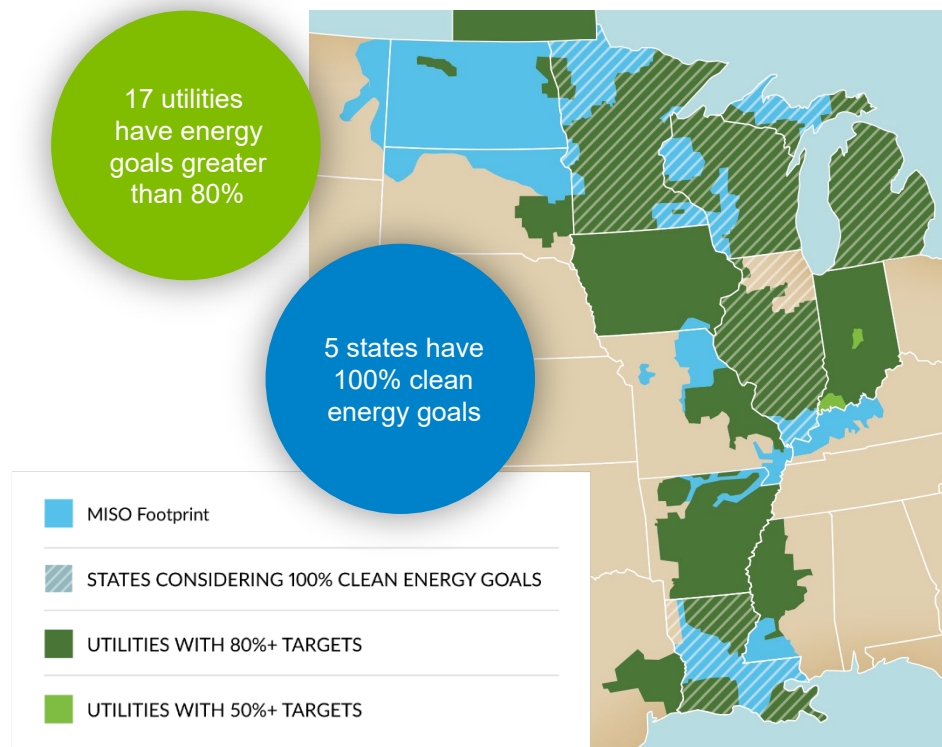
Provide brief overview on MISO 2021 Transmission Planning and review of Long-Range Transmission Planning (LRTP)

Key Takeaways:

- Long-Range Transmission Planning (LRTP) base model building is underway
- Preliminary results should be available in the next few months
- Future 1 is the right place to start, without using Long-Range Transmission Planning (LRTP) inefficient planning will occur; the resource shift contemplated by MISO stakeholders goals will be difficult to achieve

L RTP: part of the MISO Reliability Imperative that enables stakeholder driven resource transition underway

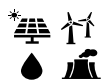
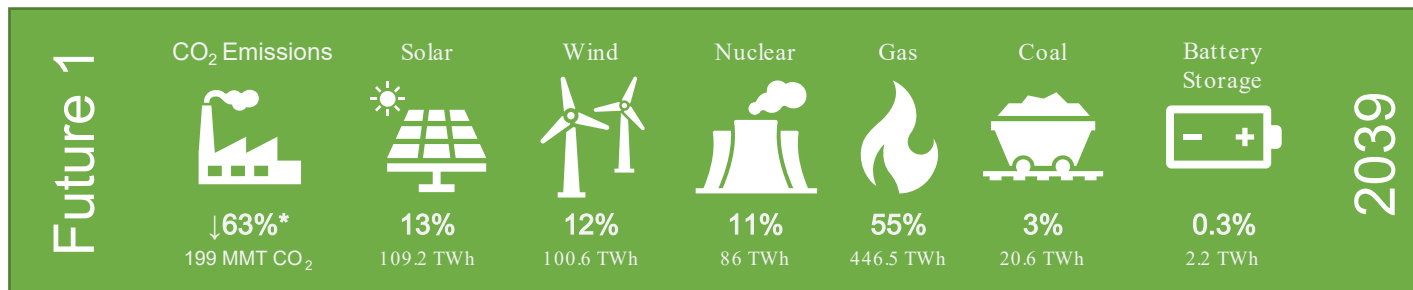
- Provide roadmap to efficiently and effectively achieve the MISO Futures and as applicable and appropriate develop the business case for L RTP project inclusion in MTEP Appendix A
- Allow goals and policies in the Futures to be achieved, they may be unachievable without some L RTP roadmap transmission projects
- Provide for the continued resource evolution of retirements and additions of renewable resources



The resource transition is happening now... wind by the Numbers

- On November 1, MISO set a new instantaneous wind peak of 18.5 GW.
 - Beating the previous peak from April 9 by 300 MW.
- On November 15, MISO set a new instantaneous wind peak of 18.9 GW.
 - At that time wind made up one-third of the total load for the hour.
- Then, December 23, MISO set a new instantaneous wind peak of 20.2 GW
 - Serving 26.8% of MISO's load.
- With an additional 4,500 MW expected to come online in the next 12 months, it is increasingly important to see how the system is currently handling production of renewable resources and prepare for future growth.

Future 1 substantially meets MISO members' plans



Carbon-free energy: ~42%



Carbon-based energy: ~58%

85% of utility CO₂ plans and 100% of utility announced additions/retirements were included in Future 1

Stakeholder plans outstripped original MISO assumptions:
Future 1 original assumption of 40% decarbonized,
reached 63%* due to plans & retirements

F1 Stats		
Gross Load		Low-Base EV Growth
Total Growth		94,275 GWh
Energy		0.63% CAGR
Demand		0.75% CAGR
Electrification Growth & Technologies	Growth	2% of Total Growth; 14,147 GWh
	Technologies	PEVs
Carbon Reduction*		40%
Min. Wind & Solar Penetration		25% with no minimum enforced
Utility Announced Plans		85% Goals Met, 100% IRPs met
Retirement Age-Based Criteria	CC	50 years
	Coal, CT	46 years
	Oil	45 years
	Nuclear	Retire if Publicly Announced
	Wind & Solar	25 years
Retirements	Coal	44.83 GW
	Gas	18.68 GW
	Oil	2 GW
	Nuclear	2.36 GW
	Wind	9.52 GW
	Solar	0.02 GW
	Other	0.04 GW
Additions	CC	37.13 GW
	CT	14.09 GW
	CC+CCS	0 GW
	Wind	18.51 GW
	Solar	33.95 GW
	Hybrid	12 GW
	DGPV	3.47 GW
	EE/DR	8.76 GW
	Hydro	0.08 GW
	Battery	0.6 GW

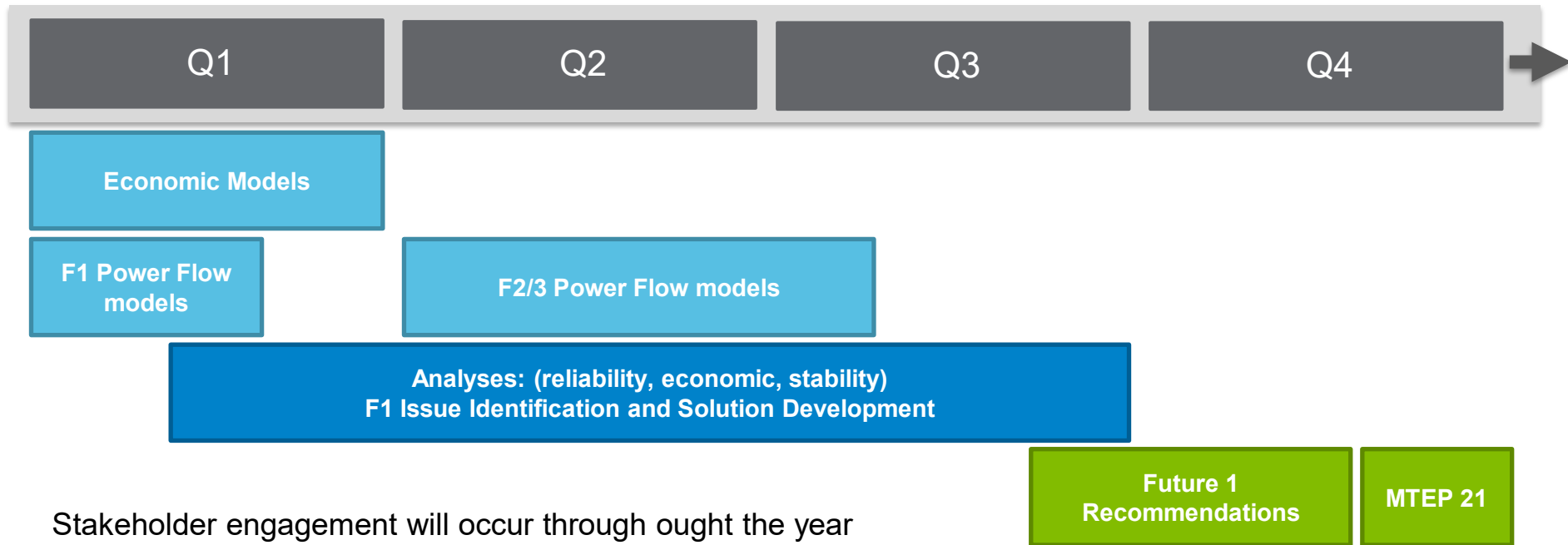
Project types and associated cost allocation methods under the tariff consider drivers and benefits

- Project categories are generally defined by the criteria and benefits that support them (Regional Expansion Criteria and Benefits) – each with aligned allocation mechanism
 - Multi Value Projects address multiple drivers including Policy, and consider the multiple recognized multiple benefits of transmission beyond adjusted production cost (APC). , MVP also have a region-wide portfolio requirement with corresponding region-wide load ratio share cost allocation.
 - Market Efficiency Projects have a more limited set of benefit metrics: APC, avoided reliability and settlement payment benefits. Costs are allocated on a targeted basis based on relative benefits to Cost Allocation Zones (similar to Local Resource Zones).
 - Baseline Reliability Projects are driven by short run needs in meet NERC reliability criteria with only committed resources serving localized needs. Costs are therefore allocated to local transmission Pricing Zones (TPZ).
 - Generator Interconnection Projects are reliability driven and support integration of generation in the queue with interconnection customers allocated all costs, except GIPs 345kV and above that have a 10% postage stamp.

The values of LRTP identified transmission may not be fully captured in existing applicable project types / mechanisms

- Initially, Future 1 transmission Issues and solutions will be evaluated for ability to enable reliable system performance, and economically using the current tariff criteria
 - MEP benefit metrics and allocation methods
 - MISO believes MVP benefits should be considered – but MVP allocation methods are not appropriate to the current footprint
- LRTP identified projects are expected to offer further benefits to the system beyond those captured in MEP evaluation, such as those outlined in MVP benefits from reliably and efficiently enabling the Future 1 resource portfolio evolution
- OMS and RECB considerations will assist with benefit metrics and measurement, and applicable project cost allocation

2021 High Level Timeline



LRTP Update

January

- Building 14 power flow models – (plan to complete in February
 - Seven are 10 years out and seven are 20 years out of the same sensitivities
- Building economic models of the three futures (Plan to complete in March)

February

- Begin evaluation with power flow models

March

- Begin evaluation with economic models on all three Futures

LRTP 2021 in Summary

- LRTP will provide a transmission roadmap to enable the reliable, effective, and efficient achievement of the MISO stakeholders goals and support the related resource evolution
- Initial focus is Future 1 that is based on state and utility announced plans
- Full LRTP will incorporate issues identified under all three Futures