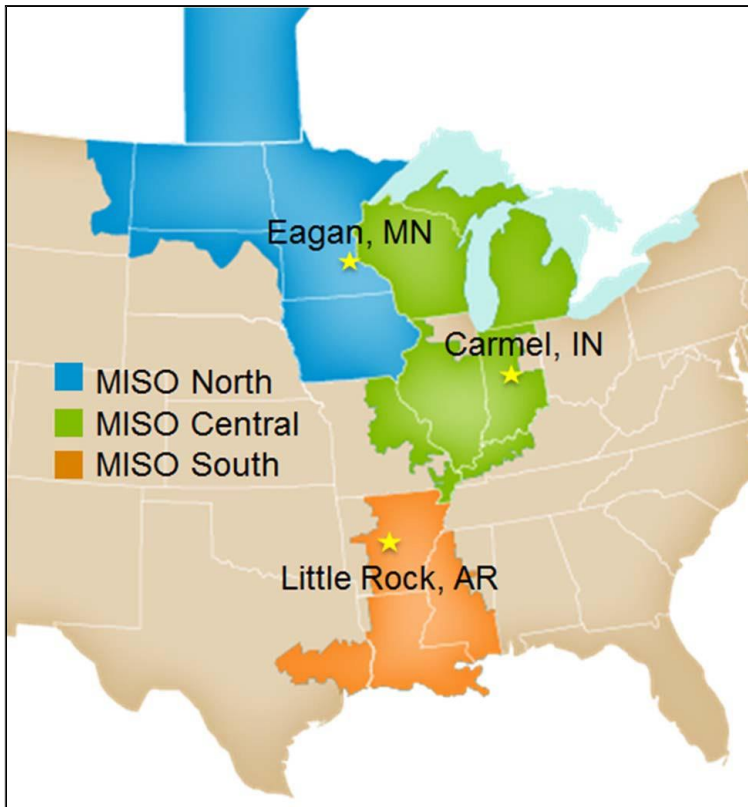




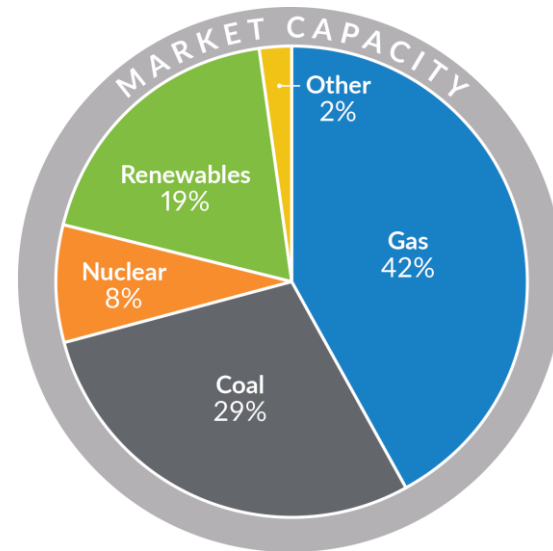
Midcontinent Independent System Operator (MISO)

Michigan House Energy Committee
March 2, 2021

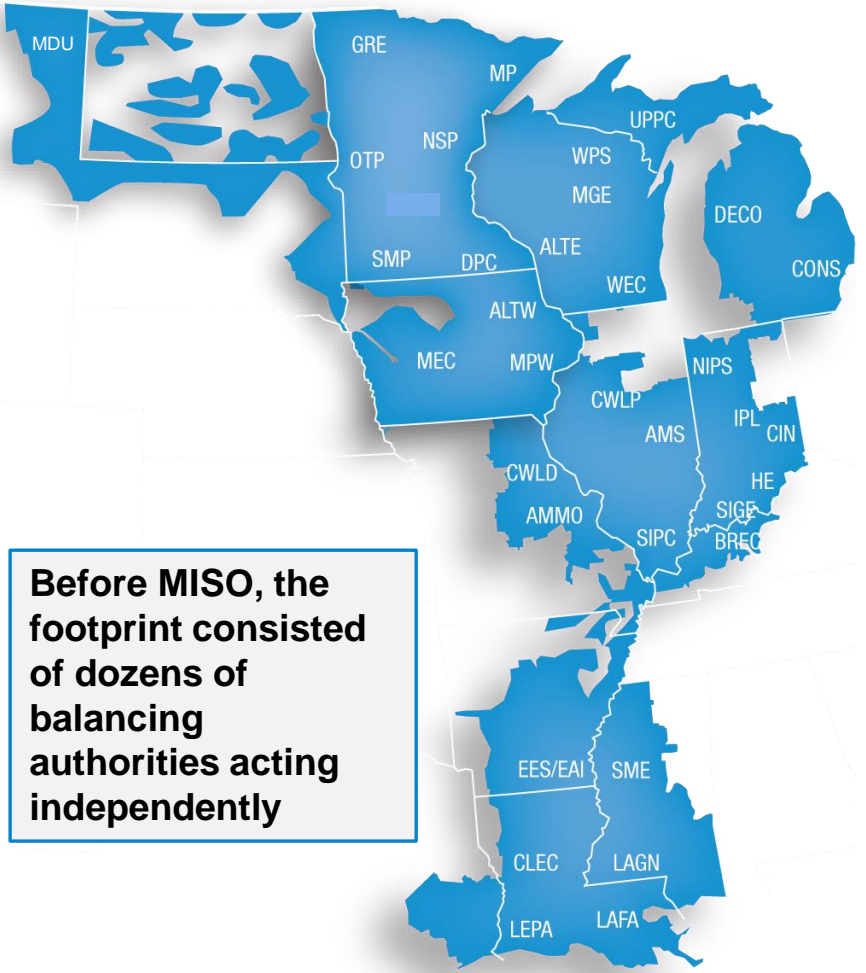
MISO is a voluntary, non-profit member-services organization responsible for providing reliability and system-planning services across its multi-state region.



MISO by-the-numbers	
High Voltage Transmission	65,800 miles
Generation Capacity	174,000 MW
Peak System Demand	127,125 MW
Customers Served	42 million



Regional Transmission Organizations (RTOs) were formed to operate the transmission grid on a regional basis, removing transactional barriers across utility and state boundaries

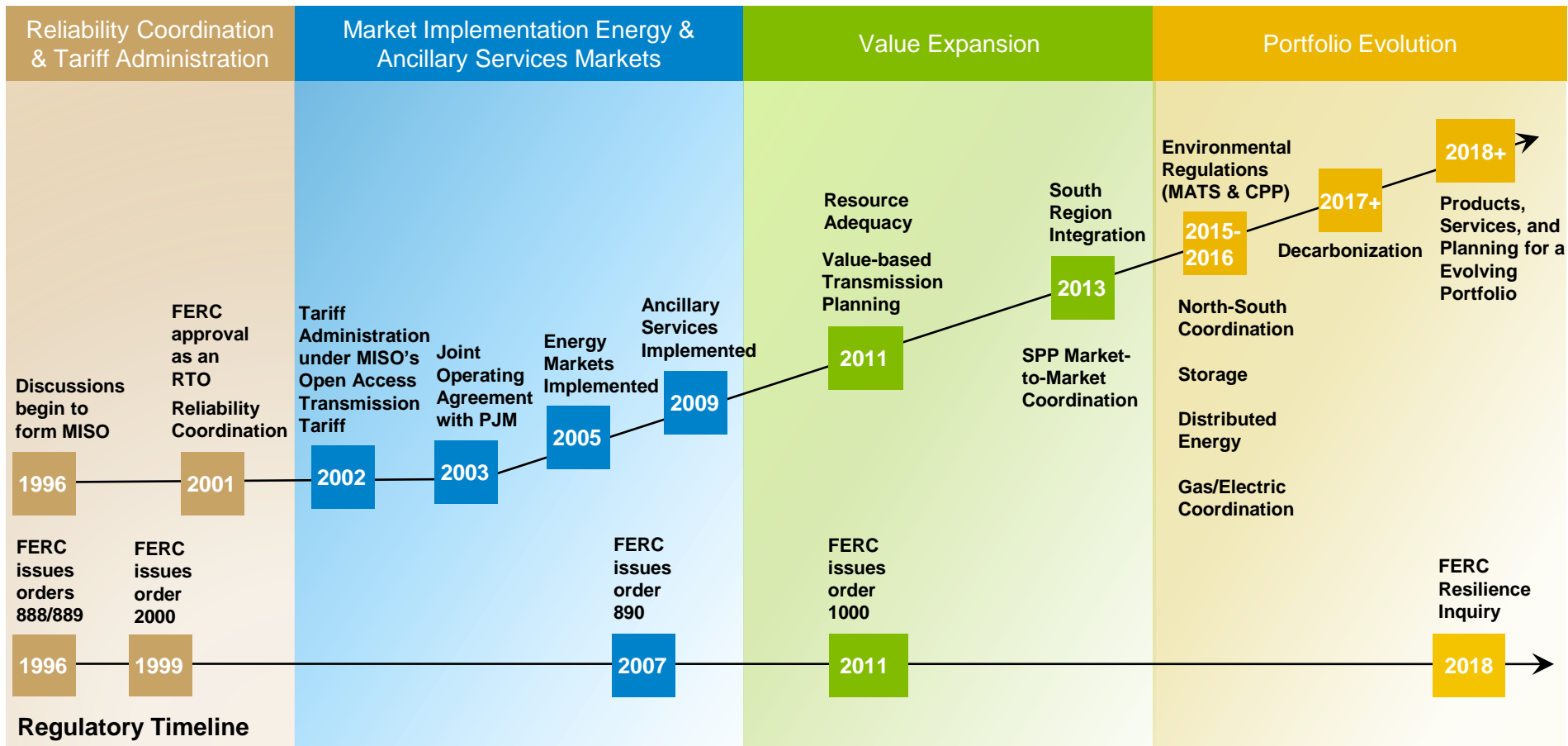


Before MISO, the footprint consisted of dozens of balancing authorities acting independently



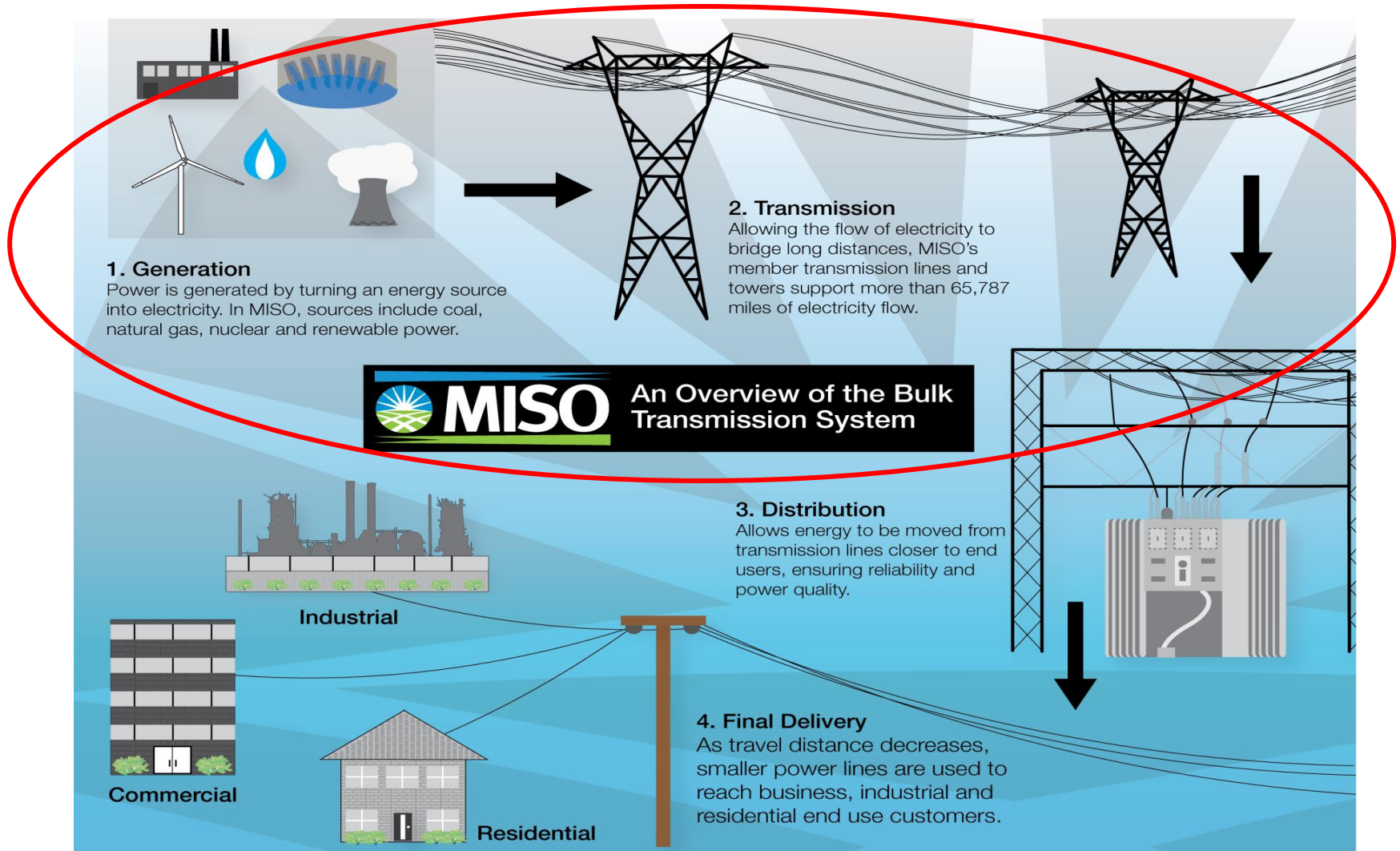
With MISO, the footprint is operated as one large network and one balancing authority (with 37 local balancing areas)

MISO Timeline and Value Creation



	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Value Proposition (\$M) ¹	\$789	\$761	\$2,429	\$2,169	\$2,043	\$2,680	\$2,585	\$2,958	\$3,324	\$3,543	\$3,585	3,504 ¹
Reserve Margin (%)		25.9	23.8	27.4	28.1	18.6	18.0	18.2	18.8	19.1	19.3	20.8
Wind Installed (MW) ²	5,467	8,161	10,219	11,809	12,539	13,521	14,552	16,531	17,224	19,218	22,601	25,975

MISO manages flows on the transmission system by directing generator usage



What does MISO do?

Efficient Wholesale Market Management & Operations to Ensure Reliability

- Conduct day-ahead and real-time energy and operating reserves markets
- Manage least cost economic dispatch of generation units
- Monitor and schedule energy transfers on the high voltage transmission system



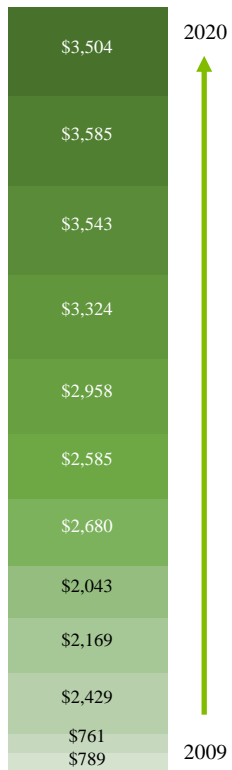
Comprehensive Regional Transmission Planning

- Long-range transmission planning
- New generator interconnection and retirement
- Transmission studies, e.g., Renewable Integration Impact Assessment (RIIA)

MISO's Vision: Be the most reliable, value-creating RTO

Since 2009, MISO has estimated over \$30 billion in membership benefits

Cumulative Benefits
(\$ millions)
\$30,372



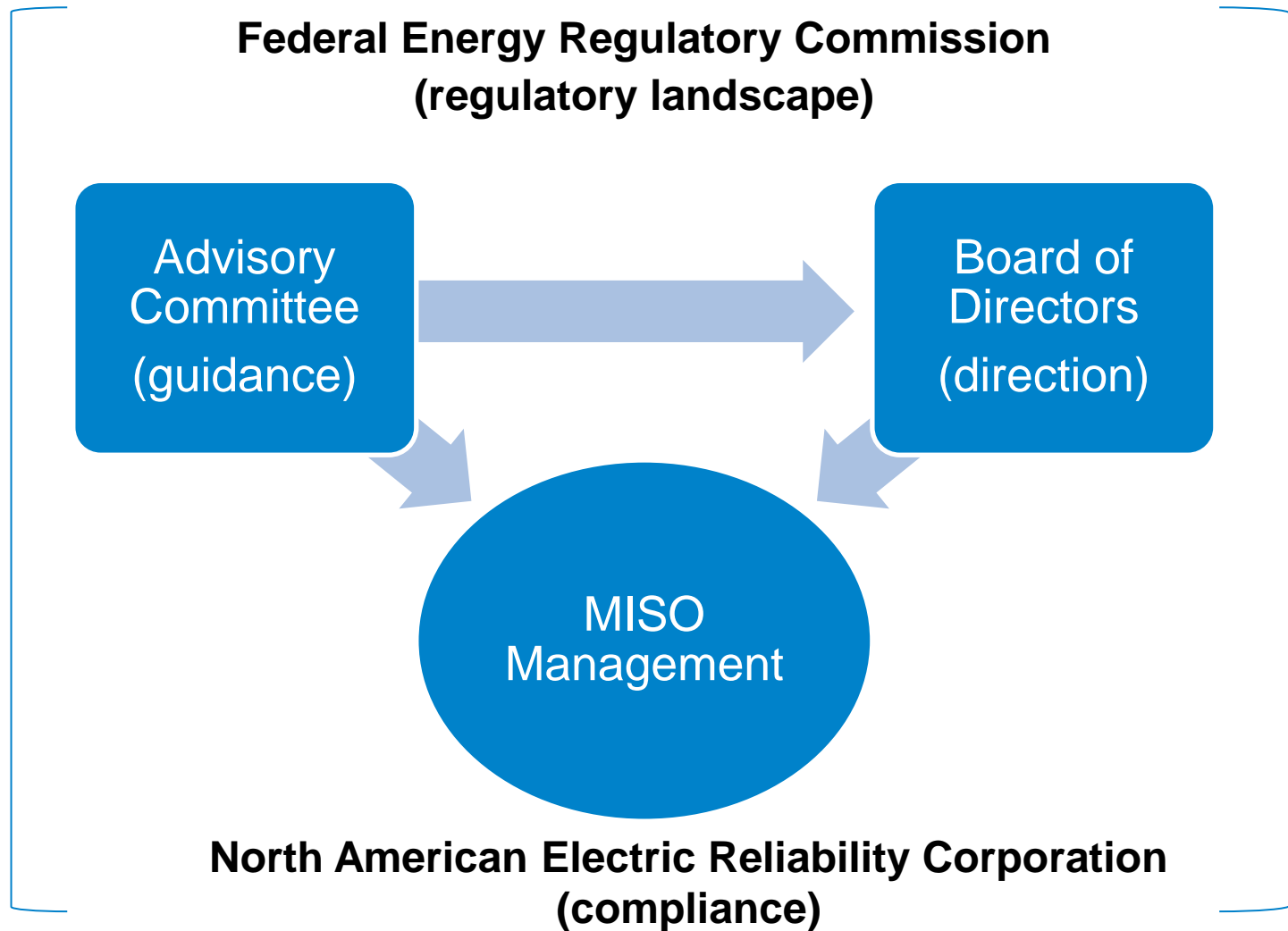
QUANTITATIVE BENEFITS

MISO provides approximately **\$3.5 billion in annual benefits** to members

2020 Benefit by Value Driver (\$ millions)



MISO Governance



MISO members participate across the electricity value chain



**MISO
'Sectors':**

**# of MISO
members:**

Independent Power Producers	Competitive Transmission Developers	Transmission Owners	Power Marketers/ Brokers	Muni/Coop/ Transmission Dependent	Eligible End-User Customers
29	30	51	36	31	9

The Balancing Act

- Day-to-day MISO reliably and efficiently balances the needs of customers with available supply through centralized, competitive energy markets
- Long-term reliability (resource adequacy) is assured through mandatory reserve margin requirements (planning reserve margin)
 - Load Serving Entities must meet their load forecast plus their planning reserve margin – this can be done through:
 - Owned resources
 - Controlled resources
 - Planning Resource Auction



MISO markets play a critical role in reliability and cost-effectiveness

Resource Adequacy

- Prompt year capacity auction to ensure adequate capacity

Annual Auction

Financial Transmission Rights Market

- Auction of transmission congestion hedges

Monthly/Seasonal/Annual

Day-Ahead Energy & Ancillary Services Market

- Next day, hourly, financially binding commitment of energy and operating reserves (ancillary services)
- Commit resources to meet demand at least cost per resource offers and load bids from 410 participants at 2,440 price nodes

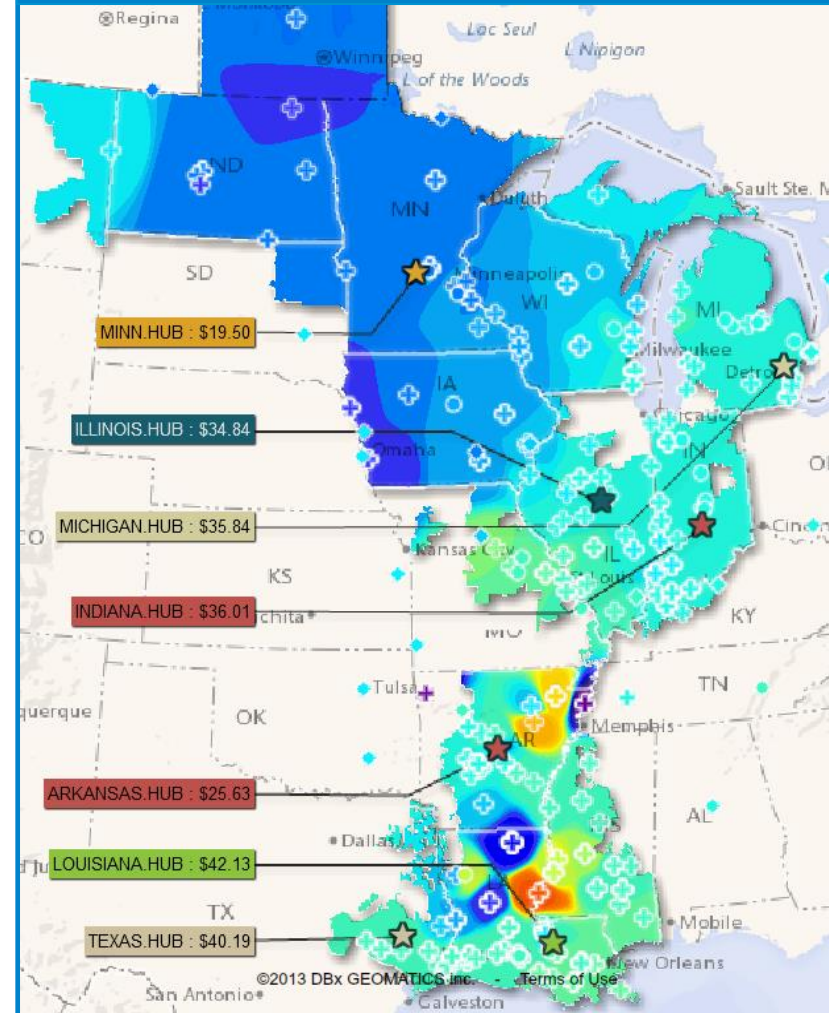
Daily commitment by 1:30pm with 4pm rerun

Real-Time Energy & Ancillary Services Market

- Dispatch 6,300 units to meet system demand, secure operating reserves and manage congestion

Setpoints issued every 4 seconds; dispatch target every 5 minutes

MISO Real-time Energy Markets



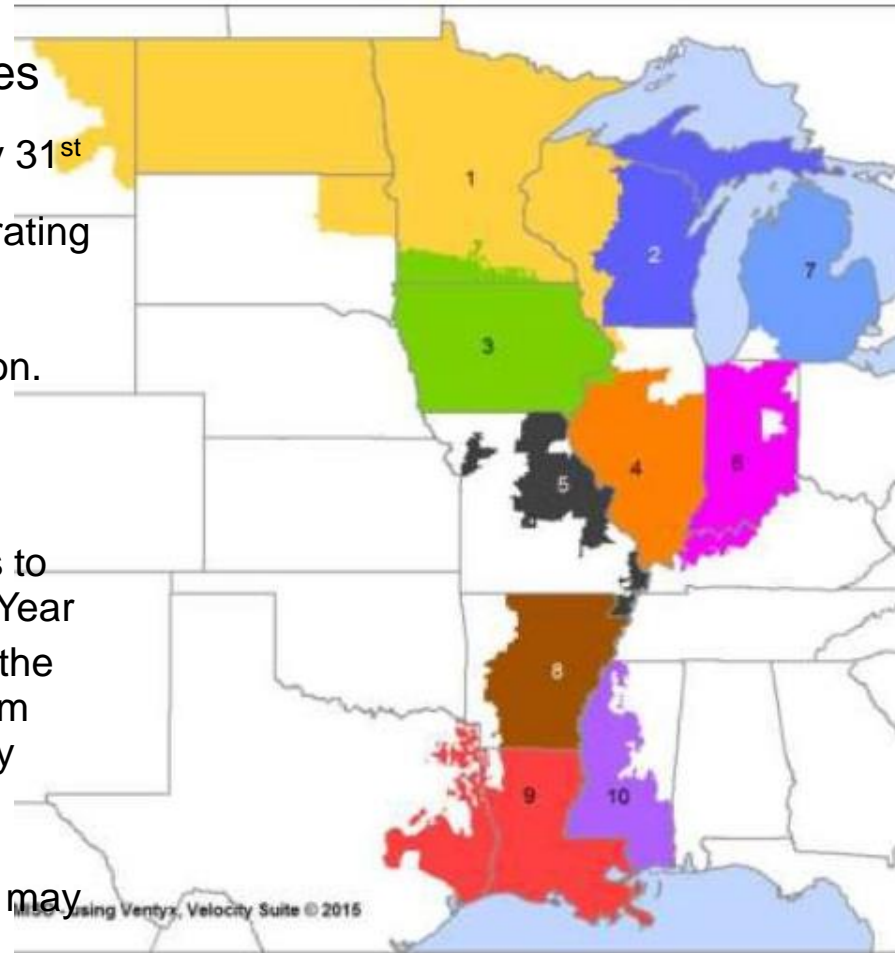
MISO's Resource Adequacy Construct

- Annual Obligation for Load Serving Entities

- Planning Year period is from June 1st to May 31st
- 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
- If there are insufficient resources to meet demand in the auction, Resource Adequacy may not be achieved.



The MISO Transmission Expansion Plan (“MTEP”) provides a comprehensive approach to plan for grid needs.

Regional Planning

Long-term regional planning based on future scenarios

Resource Planning

Evaluate long-term interconnection queue requests; identify upgrades to integrate into base expansion model



Policy Assessment

Analyze policy change; determine transmission required to support policies

Local Planning

Validate plan needs identified by Transmission Owners; seek efficiencies in planning; evaluate system against reliability standards

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