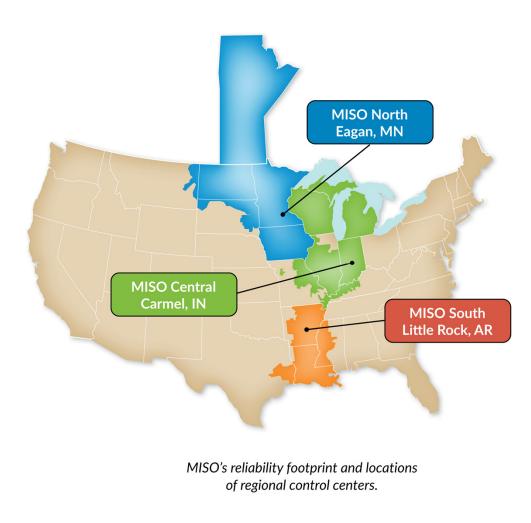
Piecing Together the EE & DER Aggregation Puzzle

MISC

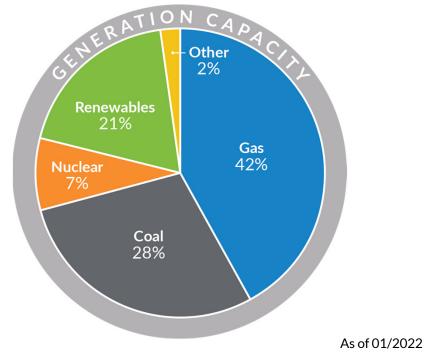
Midwest Energy Solutions Conference February 2, 2022

MISO drives value creation through efficient and reliable markets, operations, planning, and innovation

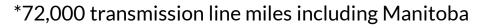


MISO by the numbers

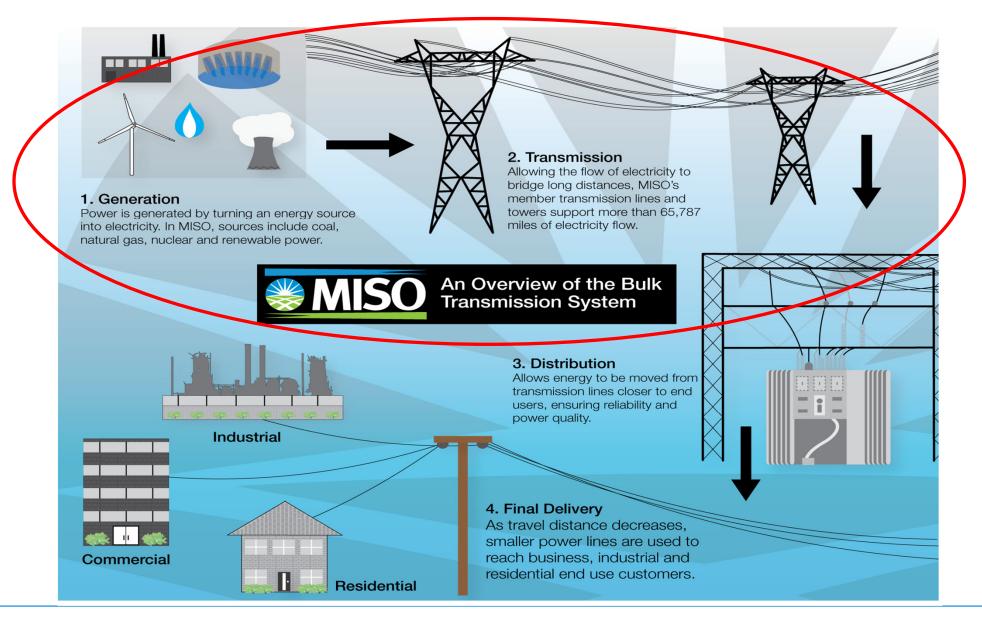
High Voltage Transmission	65,800 miles*
Generation Capacity	184,287 MW
Peak Summer System Demand	127,125 MW
Customers Served	42 Million



MISO



MISO manages flows on the transmission system by directing generator usage





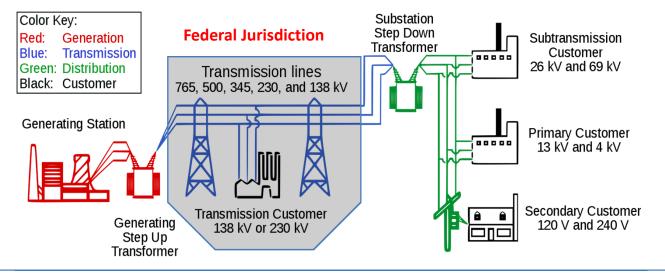
Today's Grid

State and Local Jurisdiction

- Utility operates its Distribution System
- Generation and Transmission Siting
- Retail Rates
- Resource Adequacy
 - Integrated Resource Planning
- Other State Policies
 - Energy Efficiency
 - Portfolio Standards

Federal Jurisdiction

- FERC derives jurisdiction from the Federal Power Act
- Wholesale Electric Rates
- Enforces open access to energy markets
- Regional transmission planning





FERC Order 2222 builds on MISO's work on DER



- FERC Order 2222 encourages the creation of a "coordination framework" to exchange information and control signals between the three levels of the US electric system;
 - the bulk electric system
 - the distribution system
 - the DER/customer level
- Coordination must extend beyond the technical; working with states, transmission and distribution entities, other ISO/RTOs, and regulators is necessary to ensure wholesale market participation works smoothly with distribution system requirements and retail pricing programs
- Order 2222 and the increasing importance of Decentralized assets is one piece of a complicated energy transition landscape





MISO's Coordination Framework



FERC Order 2222 recommends, but does not require, establishing a "Coordination Framework" to outline roles and responsibilities

MISO will establish such a framework for O2222. This framework will include:

A series of meetings and communications with RERRAs, TOs, EDCs, and potential DERAs Tariff documentation of roles and operating or market participation agreements, including interoperability and communications

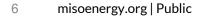
MISO resources to manage questions and inquiries related to O2222

Business Practices Manuals which outline O2222/ DERA participation in MISO markets and may include interoperability and communications (not usually completed as part of the compliance filing)

MISO's scheduled EDC workshops, as well as RERRA meetings, are a part of the "Coordination Framework"

MISO has also pointed to existing processes and tariff language which will be used to model the O2222 requirements

Metering and Settlements (enhancements to these will be determined) Attachment HHH (created for Order 841) as a sample document Registration (upcoming workshop) for aggregators of retail customers, including EDC/ LBA/ RERRA review processes





FERC has called for collaboration across jurisdictions and seams; successful implementation requires developing new frameworks



MISO has the Facilitation Role in Order 2222

Relevant Electric Retail Regulatory Authority/ Public Utility Commission (PUC)	Transmission Owner (TO)	MISO	Local Balancing Authority (LBA)/ Load Serving Entity (LSE)	Electric Distribution Company (EDC)	DER Aggregator
Review/Approve			Operate		
 Define local interconnection requirements Assign any cost allocation/ recovery of upgrades Dispute resolution Review wholesale market participation eligibility for DERA Establish small utility opt-in Supervise applicable integrated resource planning process 	 Understand DER flows at EPNode level Plan reliable trans- mission system Evaluate trans- mission system upgrades Coordinate transmission - distribution interface 	 Enable participation in all markets Model, recognize, and value impacts on transmission system Maintain reliability on transmission system Coordinate with DERA, EDC, TO and RERRA Dispute resolution 	 Manage day-to-day system operations Represent the EDCs in the DEAR enrollment review Review settlement data to ensure it is compatible with meter records 	 Evaluate DER flows and impacts on distribution systems' reliability Coordinate T&D interface Manage DER interconnection Coordinate communication with DERA and RTO Review DEAR enrollment compatibility 	 Register with the ISO, providing required data on DER location, configuration, telemetry, and performance capability Participate in wholesale market based on applicable wholesale and retail rules Coordinate communication with RTO and EDC
misoenergy.org Public Key for Roles: EDC TO DERA DERO DERO MISO RERRA Roles: Electric Distribution Company Owner Owner Aggregator Der Owner Aggregator System Operator Authority					

Limits of the MISO tariff

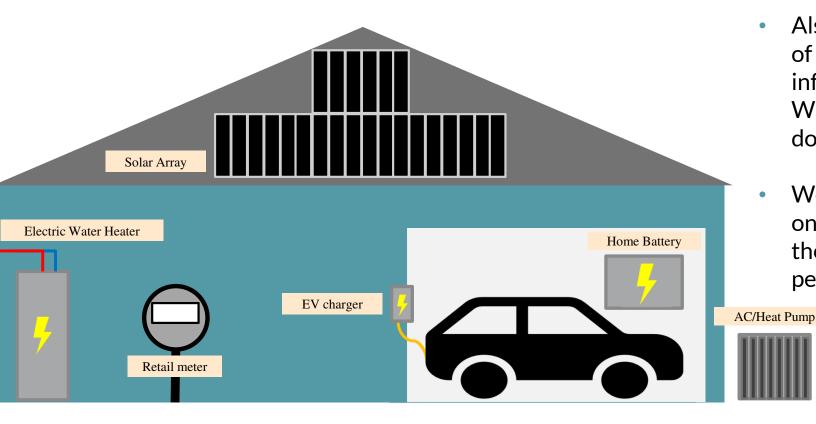


- During the stakeholder process at MISO, and by participating in EPRI working groups as well as following other RTO/ISO's as they develop O2222 responses, the MISO team has identified a number of items which cannot be addressed within the MISO tariff
 - Utilities must define the scale and scope of their technical review for reliability. Disputes may be raised to MISO or FERC, this is not ideal as neither has the technical information to adjudicate such matters.
 - There is the potential to charge for some wholesale market access through something like wholesale distribution service, though this application is not quite the same as what has come before.
 - Metering and submetering of individual devices is relatively immature and the billing systems of utilities are limited in their ability read more granular data in many cases.
 - There are data privacy concerns for individuals who participate in aggregations, as household-level data may be collected and transmitted in an unaggregated fashion.
 - Communication and cybersecurity of home-based devices may also be subject to new data privacy concerns.
 - Retail rates largely do not anticipate wholesale market access. There are hundreds or thousands of rated within the MISO footprint.
 - There is a time horizon disconnect between the MISO wholesale market and distribution operations, both because of day ahead wholesale markets and unexpected distribution level events.
 - MISO's utilities may deploy a number of technologies to manage DER, investments made locally will not all reach the same result. MISO must interface with all potential users.
 - Ongoing operational coordination is needed between TOs, EDCs and DERA. MISO will communicate with current members and the DERA as the Market Participant.



Imagine a house

- Connected home may be enrolled in multiple programs, and both utility programs or 3rd party aggregators may sell different services to retail and wholesale markets
- Understanding how to measure multiple activities behind a single retail meter is important; how can "settlement quality data" be collected/transferred?



- Also raises questions of WHO has the information and WHAT needs to be done?
- We are addressing only wholesale sales, though EDC's perspective is critical





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