



# MISO Futures Overview

PJM Independent State Agencies Committee

*May 22, 2023*

# MISO's Reliability Imperative works to define the MISO changes that are necessary to reliably manage the changing resource portfolio

## Market Redefinition

*Develops significant market enhancements and optimizations to ensure continued reliability and value in anticipation of the changing resource mix, more frequent extreme weather events, and increasing electrification.*

## Transmission Evolution

*Assesses the region's future transmission needs and associated cost allocation holistically, including transmission to support utility and state plans for existing and future generation resources.*



## System Enhancements

*Creates flexible, upgradeable, and secure systems that integrate advanced technologies to process increasingly complex information and evolve with the industry.*

## Operations of the Future

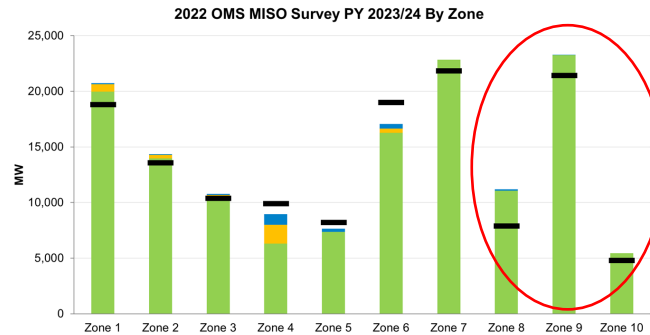
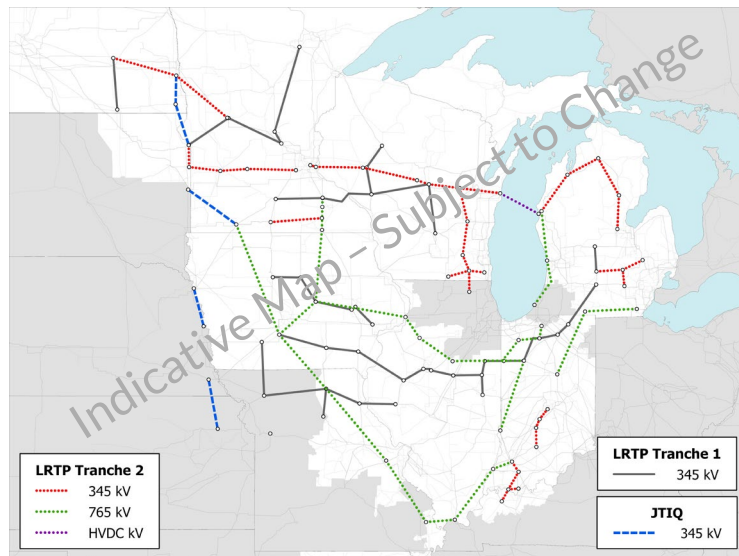
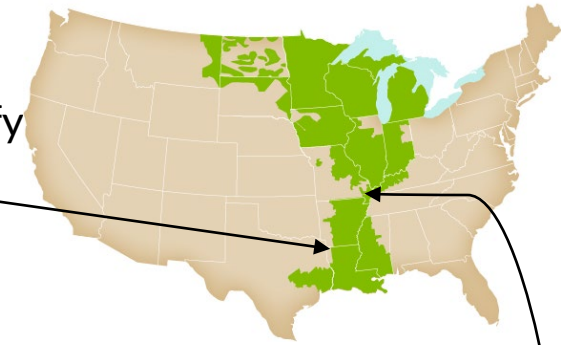
*Focuses on the skills, processes and technologies needed to ensure MISO can effectively manage the grid of the future under increased complexity.*

# The Long Range Transmission Planning effort is increasing the ability to add and transfer carbon-free and flexible resources throughout the system

**Tranche 1**, approved summer of 2022, identified an 18-project, \$10.3 billion portfolio of transmission investment in the North and Central Regions.

**Tranche 2** will address additional needs in these subregions.

**Tranche 3** will identify and address South Region needs...



...and **Tranche 4** will be focused on the North/South interface, which could free up any remaining capacity surplus in the South Region

# MISO's Futures fills the resource gap between what is known & being planned by our members vs. what the system needs

## Develop Futures

It's very difficult to accurately predict the future, so we create multiple planning scenarios to hedge uncertainty and "bookend" a range of economic, political, and technological possibilities over a 20-year planning horizon.

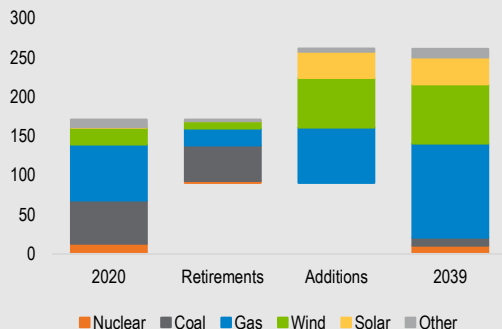
Narrow & less useful

Broad & more useful



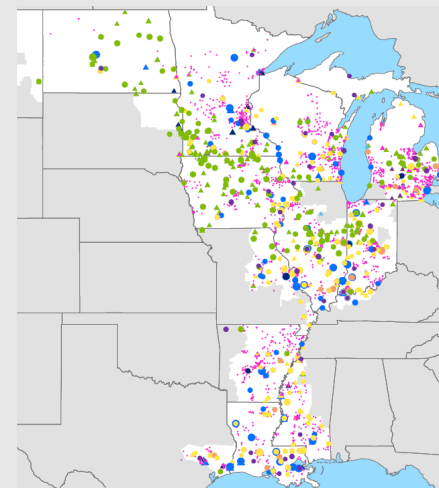
## Resource Expansion

Apply Futures assumptions, incorporate members' plans (e.g. resource additions, retirements, & environmental goals), & perform resource expansion to economically determine type, magnitude, & timing of new resources.



## Siting

Determine location to place each new resource in the transmission system.

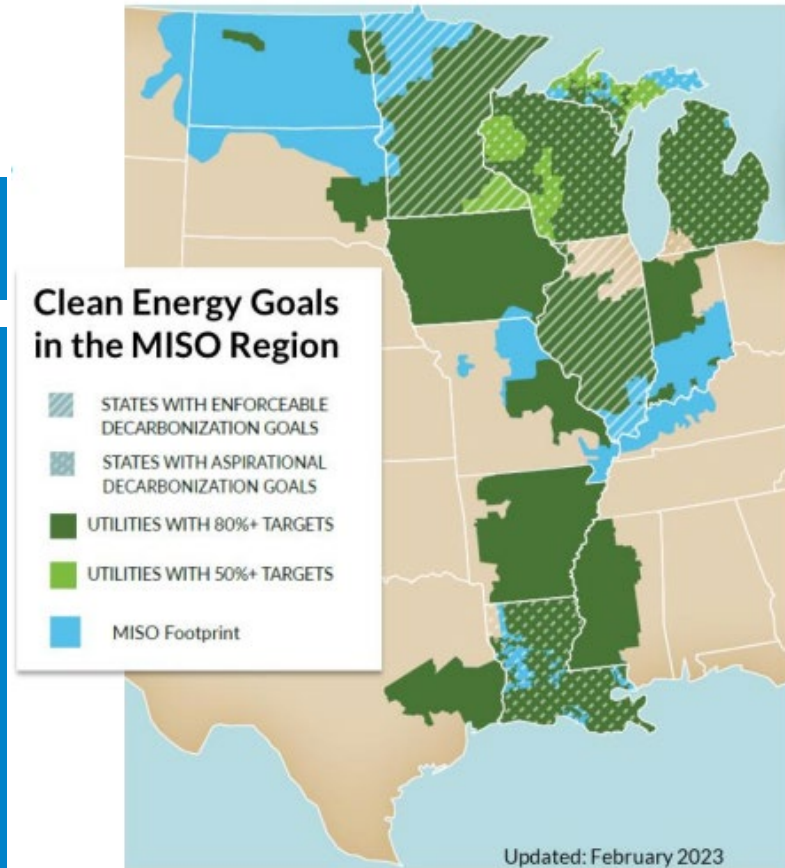


## MISO is not a resource planner

- However, MISO is required to perform long-term planning analysis which require sufficient resources through out the study period
- Typically the amount of resources needed exceed what is currently known or publicly being planned by members
- The MISO Futures Process is a tool to help fill the resource gap.

# Currently, MISO has three Futures that incorporate & bookend uncertainty with members' plans

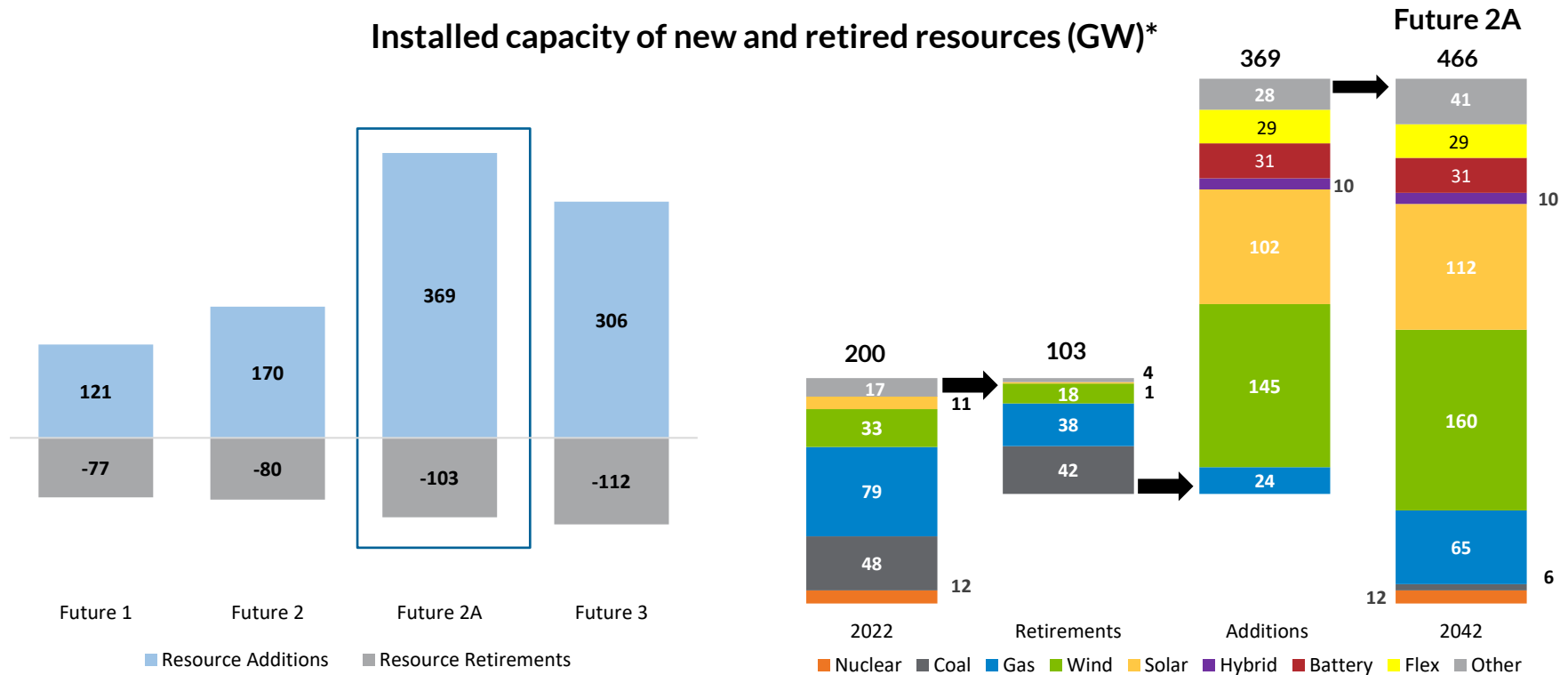
Future 1	Future 2	Future 3
<ul style="list-style-type: none"> <li>The footprint develops in line with 100% of utility IRPs and 85% of utility announcements, state mandates, goals, or preferences.</li> <li>Emissions decline as an outcome of utility plans.</li> <li>Load growth consistent with current trends.</li> </ul>	<ul style="list-style-type: none"> <li>Companies/states meet their goals, mandates and announcements.</li> <li>Changing federal and state policies support footprint-wide carbon emissions reduction of 60% by 2040.</li> <li>Energy increases 30% footprint-wide by 2040 driven by electrification</li> </ul>	<ul style="list-style-type: none"> <li>Changing federal and state policies support footprint-wide carbon emissions reduction of 80% by 2040.</li> <li>Increased electrification drives a footprint-wide 50% increase in energy by 2040.</li> </ul>



- 21 utilities have energy goals greater than 80%
- 3 states have 100% clean energy goals
- 2 states with 100% clean energy laws

# MISO is currently refreshing the MISO Futures and the updated Future 2 (F2A) expansion & retirements approach or surpass levels seen in the original Future 3

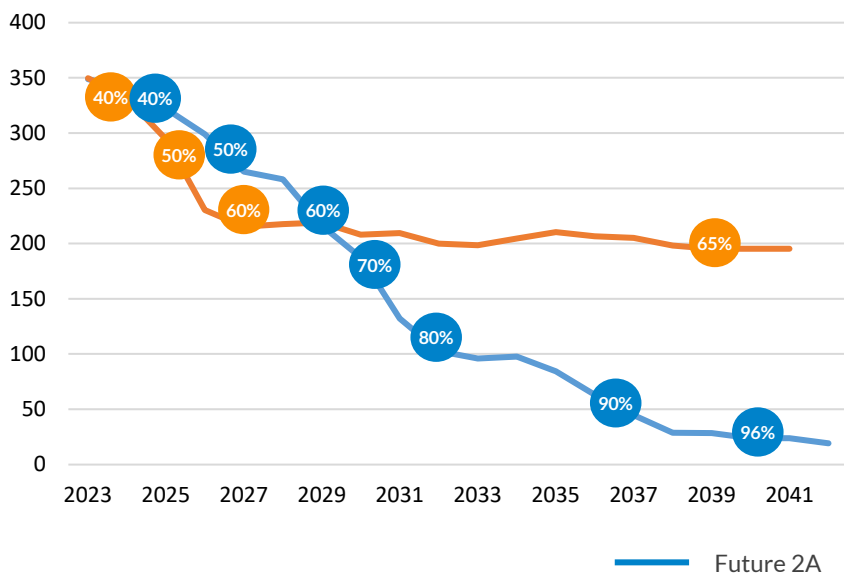
Installed capacity of new and retired resources (GW)\*



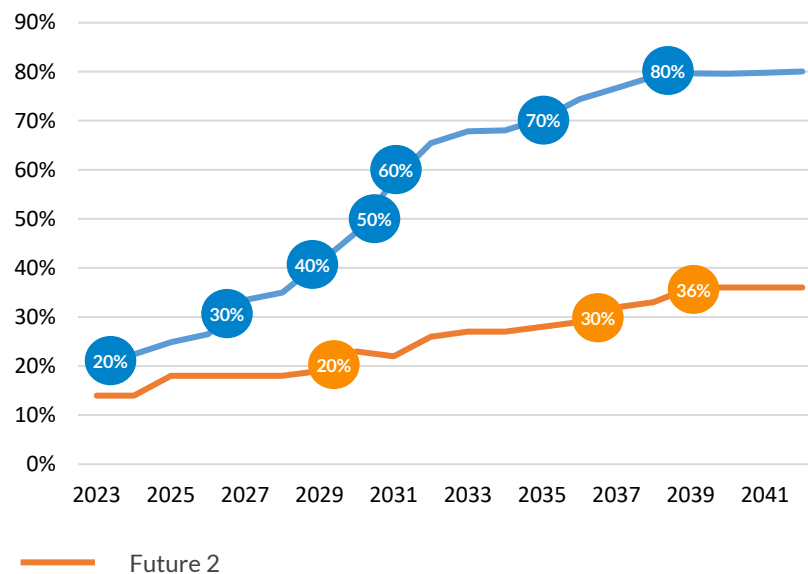
\* Data as of April 26, 2023. Futures do not account for all operational-level reliability needs and attributes that may require different levels of dispatchable resources. Resource additions may be subject to adjustment based on new accreditation rules. "Other" includes biomass, geothermal, hydro, oil, pumped hydro storage, demand response, non-pv distributed generation, and energy efficiency.

# MISO's refreshed Future 2 (F2A) reflects significant fleet transition which is decarbonizing faster and deeper along with reaching a wind and solar penetration level of 30% ~10 years earlier than in Future 2

**Future 2A vs. Future 2  
Carbon Emissions**  
(million short tons)



**Future 2A vs. Future 2  
Wind and Solar Energy Generation**



\* Data as of March 7, 2023. Futures do not account for all operational-level reliability needs and attributes that may require different levels of dispatchable resources. Resource additions may be subject to adjustment based on new accreditation rules.