

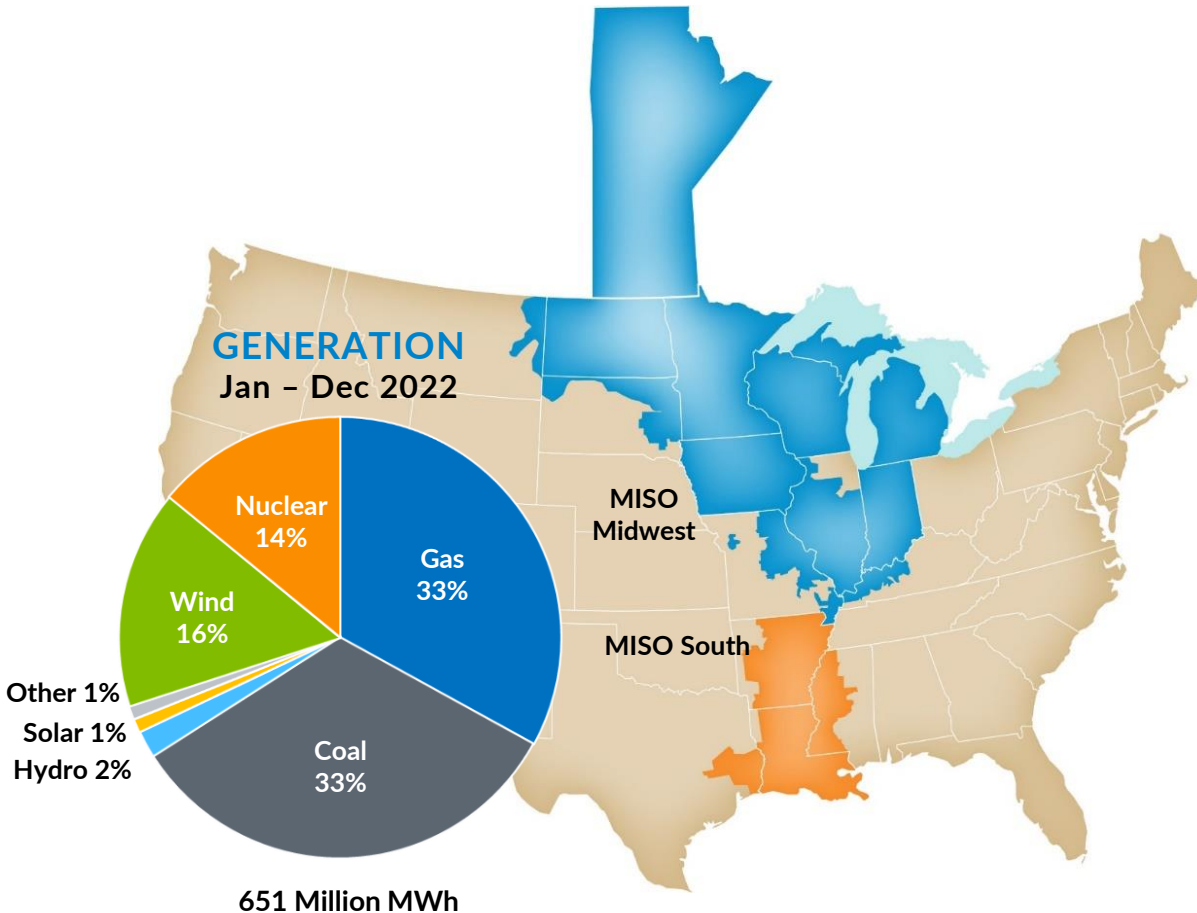


# Planning the energy transition: Global perspectives

Atlantic Council Global Energy Center

June 12, 2023

As a Regional Transmission Operator, MISO works collaboratively and transparently with stakeholders to enable the reliable delivery of low-cost energy through efficient, innovative operations and planning



### WHAT WE DO

- Provide independent transmission system access
- Deliver improved reliability coordination through efficient market operations
- Coordinate regional planning
- Provide a platform for wholesale energy markets

### MISO BY THE NUMBERS

- 15 states + Manitoba
- 45 million customers
- \$40 billion market
- 189,000+ MW generation capacity
- 72,000 miles of high voltage transmission lines

# MISO's Futures provide potential long-term scenarios for the broad MISO footprint, incorporating and building upon member plans

## Future 1

- Footprint develops in line with 100% of utility IRPs and 85% of utility/state announcements
- Emissions decline as an outcome of utility plans
- Load growth is consistent with pre-2019 trends

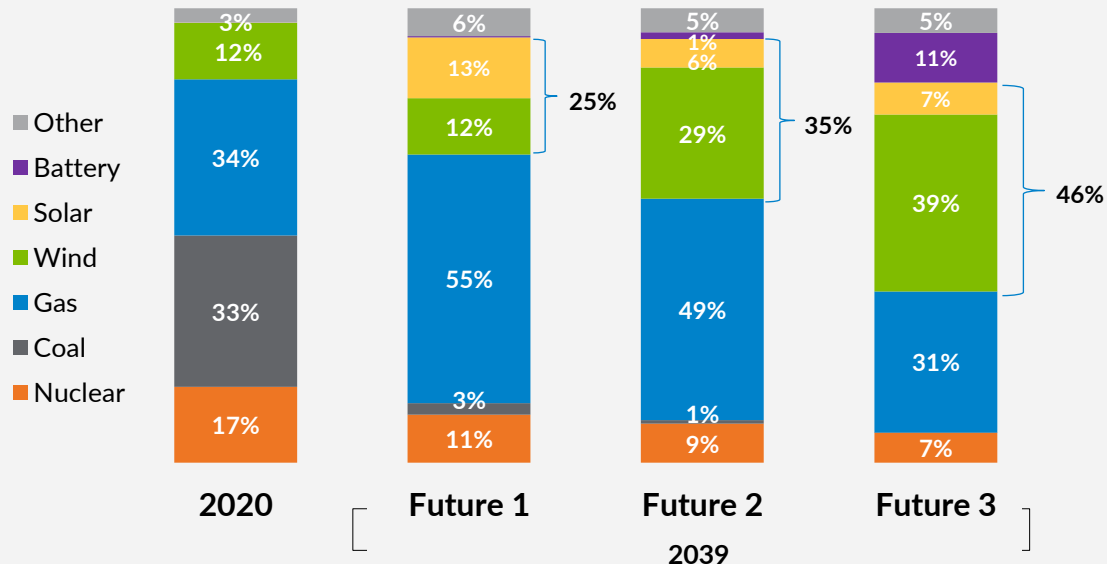
## Future 2

- Companies/states meet their goals, mandates
- Footprint-wide carbon reduction of 60%
- Energy increases 30%, driven by electrification

## Future 3

- Changing federal and state policies support footprint-wide carbon reduction of 80%
- Increased electrification drives a footprint-wide 50% increase in energy demand

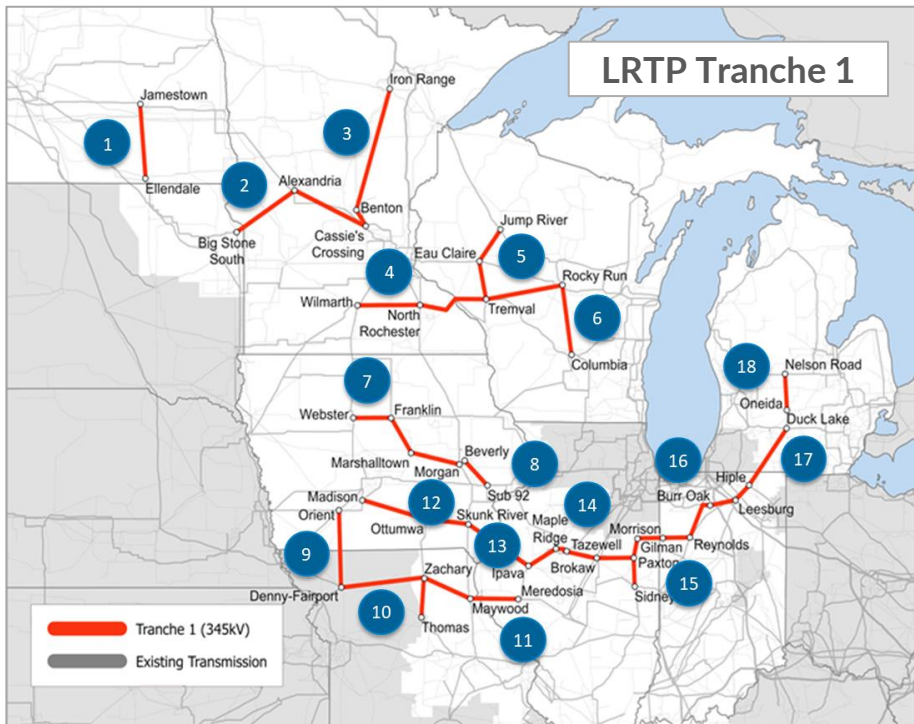
### MISO 2021 Futures



### Renewable Penetration

20% in 2030	20% in 2029 30% in 2036	20% in 2024 30% in 2027 40% in 2034
-------------	----------------------------	---

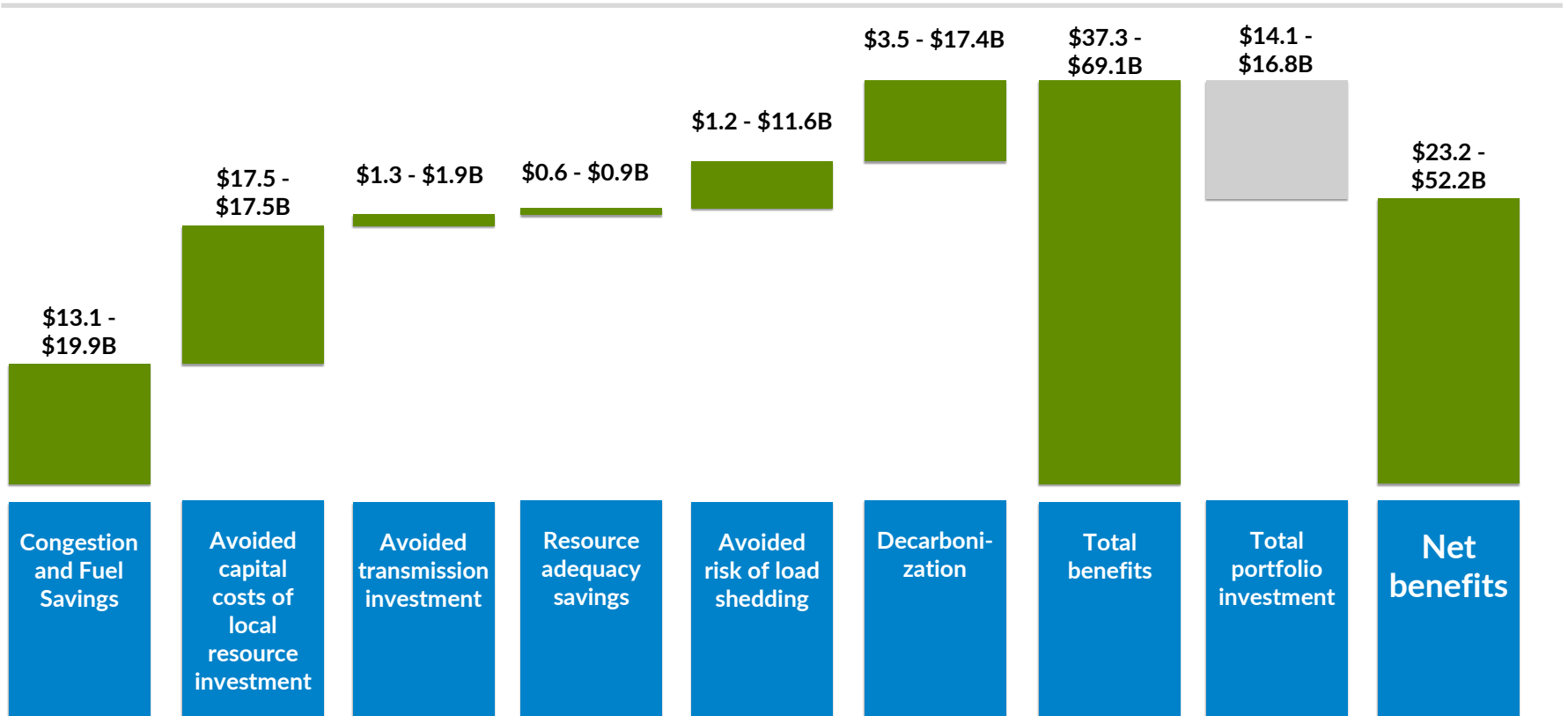
We seek to resolve these future needs through our Long Range Transmission Plan (LRTP) which is being approached through four phases or tranches. The first phase, Tranche 1, was approved in 2022.



ID	Project Description	Est. Cost (\$M, 2022)
1	Jamestown – Ellendale	\$439
2	Big Stone South – Alexandria – Cassie's Crossing	\$574
3	Iron Range – Benton County – Cassie's Crossing	\$970
4	Wilmarth – North Rochester – Tremval	\$689
5	Tremval – Eau Clair – Jump River	\$505
6	Tremval – Rocky Run – Columbia	\$1,050
7	Webster – Franklin – Marshalltown – Morgan Valley	\$755
8	Beverly – Sub 92	\$231
9	Orient – Denny – Fairport	\$390
10	Denny – Zachary – Thomas Hill – Maywood	\$769
11	Maywood – Meredosia	\$301
12	Madison – Ottumwa – Skunk River	\$673
13	Skunk River – Ipava	\$594
14	Ipava – Maple Ridge – Tazewell – Brokaw – Paxton East	\$572
15	Sidney – Paxson East – Gilman South – Morrison Ditch	\$454
16	Morrison Ditch – Reynolds – Burr Oak – Leesburg – Hiple	\$261
17	Hiple – Duck Lake	\$696
18	Oneida – Nelson Rd.	\$403
<b>Total Project Portfolio Cost</b>		<b>\$10.3B</b>

# Tranche 1's total economic benefits significantly exceed costs

**L RTP Tranche 1 Benefits vs. Costs**  
**20 - 40-Year Present Value (2022 \$B)**



Work has begun on a second transmission portfolio, Tranche 2, as geographic diversity of projected resources drives the need for additional, long-distance transfer capacity and higher voltage lines

## Elements of Evolution



### Geographic diversity

Transmission is centralized to distributed resources



### Resource & Load Evolution

Different attributes correlate to different risks

## Tranche 2 considers 765 kV & HVDC solutions

