

The background of the slide features a series of high-voltage power transmission towers and their associated power lines stretching across a landscape. The scene is captured during a sunset or sunrise, with a warm, orange and yellow glow on the horizon and a soft, hazy sky above. The towers are silhouetted against the bright light, creating a sense of depth and scale. The overall atmosphere is serene and industrial.

Keeping the Lights On – A U.S. Energy Reliability and Independence Discussion

Western Dakota Energy Association (WDEA)
Annual Meeting
October 12-13, 2022

John Weeda, Director
North Dakota Transmission Authority

Climate change leads to massive jump in weather-related power outages during past 10 years, study finds

How to Invest in Nuclear Energy and the Uranium That Powers It

Misleading Headlines

Nearly 100 million Americans could be banned from buying gas cars

A utility company locked thousands of customers out of their smart thermostats in Colorado

PRIME HAZARD:
Amazon powered down its solar panels because they kept catching on fire



Here's why California's grid is at risk of blackouts in the next few days

The situation has led the state's Democratic leadership to make a policy 180, supporting efforts to keep fossil-fueled plants online and to [extend the life of the state's last nuclear power plant](#) in the hope of avoiding a shortfall.

Misleading Headlines

Banks and bankers should not become 'climate police' to satisfy outrageous ESG demands

TRYING TO SAVE THE WORLD IS LEAVING YOUNG CLIMATE CHANGE ACTIVISTS EXHAUSTED AND FRUSTRATED

Bank Won't Give Loans For ICE Cars

California's energy meltdown evinces a stunning failure of progressive ideology



California is facing worsening power grid challenges on Monday and Tuesday. Starting tomorrow, this multi-day event is going to get much more intense," ISO CEO Elliot Mainzer said in a statement. "We are facing a load forecast of 48,817 megawatts and energy deficits between 2,000 and 4,000 megawatts for Monday, resulting in the highest likelihood of rotating outages we have seen so far this summer."

Misleading Headlines

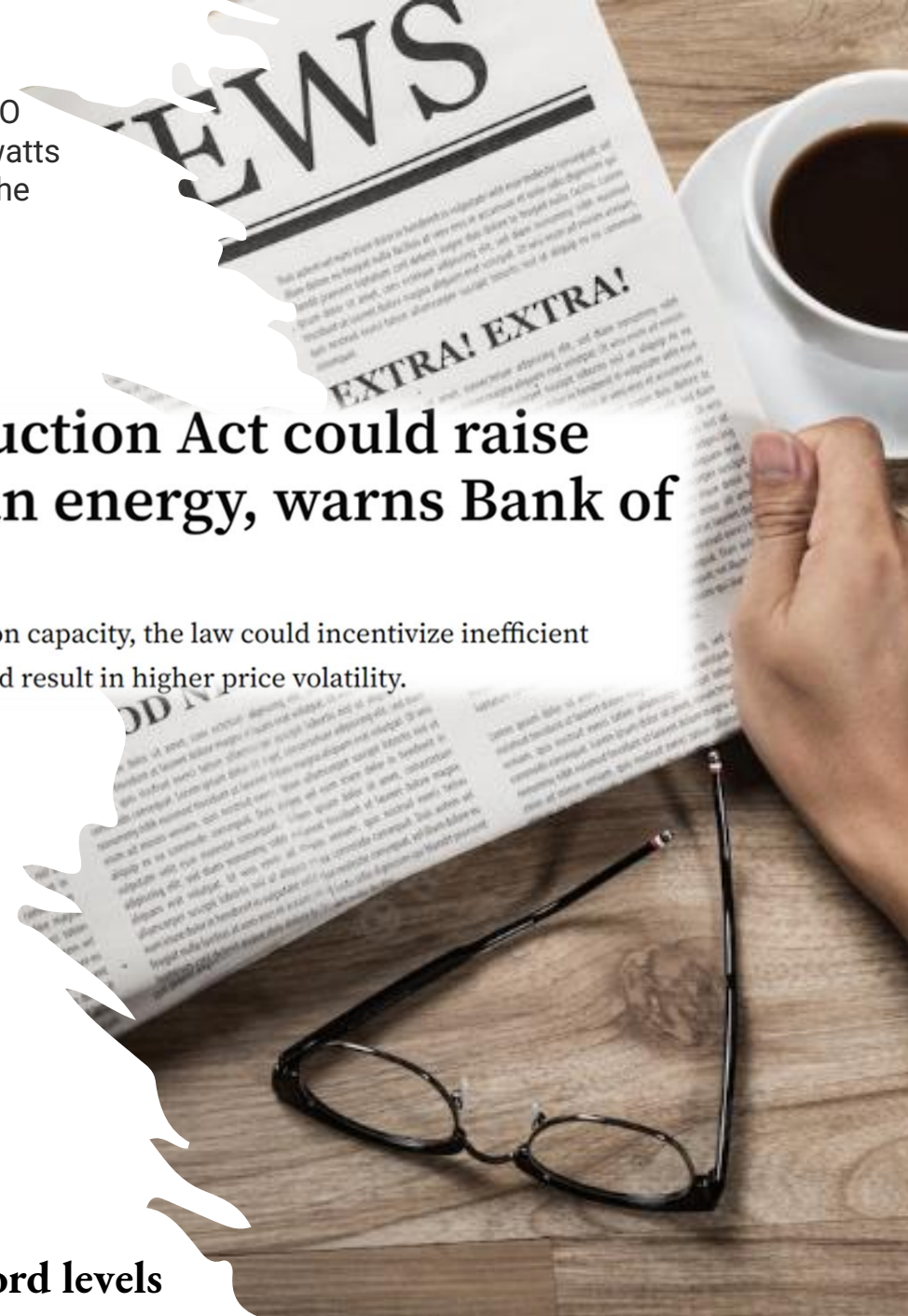
COULD A GIANT FIREPROOF BLANKET BE THE SOLUTION FOR STUBBORN EV BATTERY FIRES?

Inflation Reduction Act could raise prices on clean energy, warns Bank of America

With additional transmission capacity, the law could incentivize inefficient development of renewables and result in higher price volatility.

Experts blame green energy for Europe's full-scale energy crisis: 'A warning to the US'

California power grid operator says demand approaching record levels



California advises slower EV charging as state's electric grid struggles

Costs associated with carbon emissions three times federal estimate: study says

Misleading Headlines

Progressives' push for reduced emissions through government mandates and subsidies has collided with reality. Infrastructure for the state legislature's law does not preclude neighboring states from selling gas generators to California residents.

The European benchmark index measuring future electricity prices increased to a record \$993 per megawatt hour (MWh) on Monday, days after prices in France and Germany surged 25%, according to European Energy Exchange data compiled by Bloomberg. By comparison, the average price of electricity in the U.S. hit \$129 per MWh in June, federal data showed.



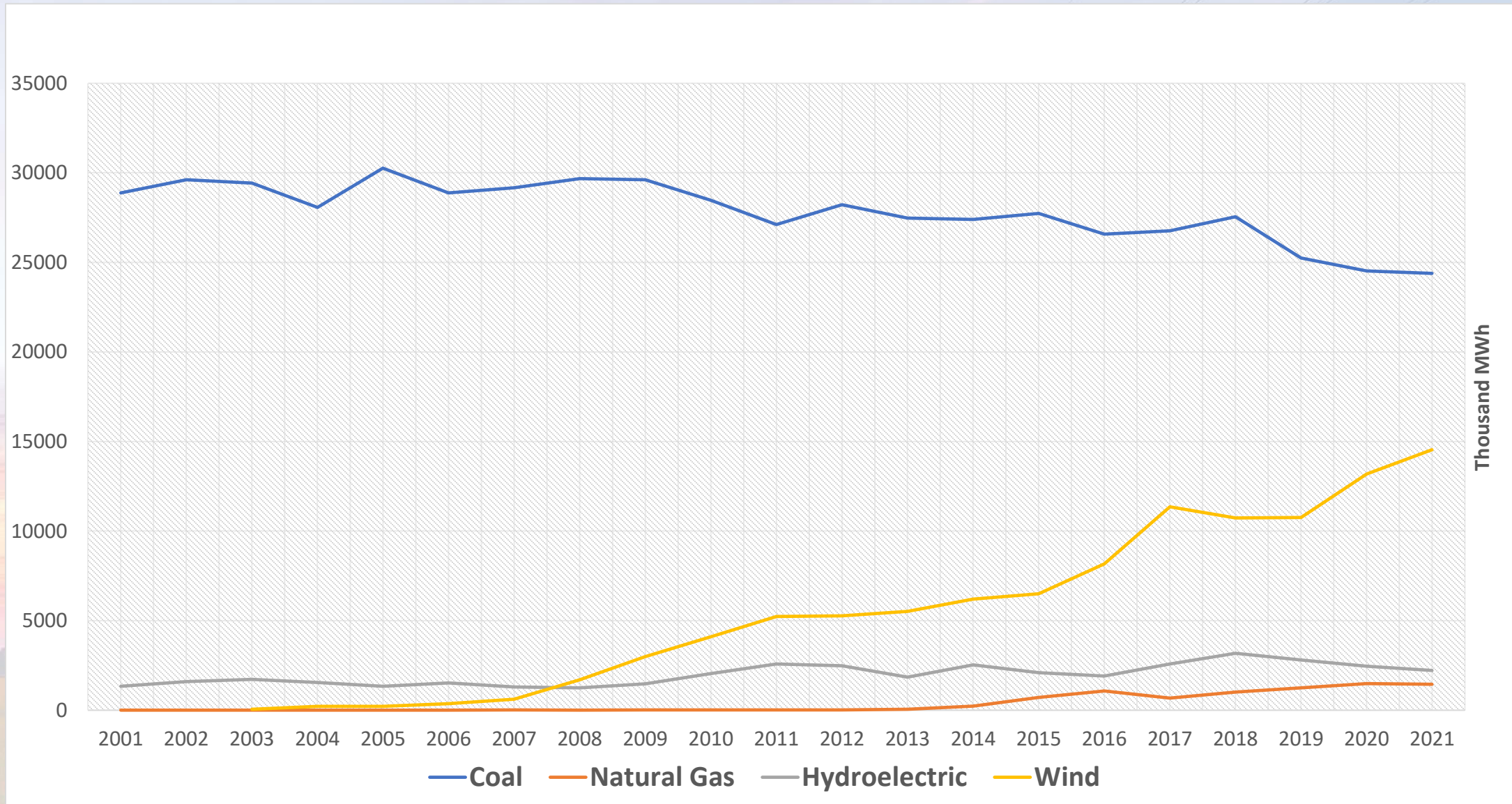
The Transmission Grid and Resources are stressed

- Congestion on the electric grid limits power from North Dakota getting to market
- Low to negative prices impact North Dakota generators of coal, gas and wind generation
- Both Independent System operators continue to be dependent on coal and gas fired plants that are subject to retirement
- Wind generation is the fastest growing resource
- Electric storage has not grown to meet market needs
- Stability issues concern the industry - an example in the Texas panhandle currently being investigate

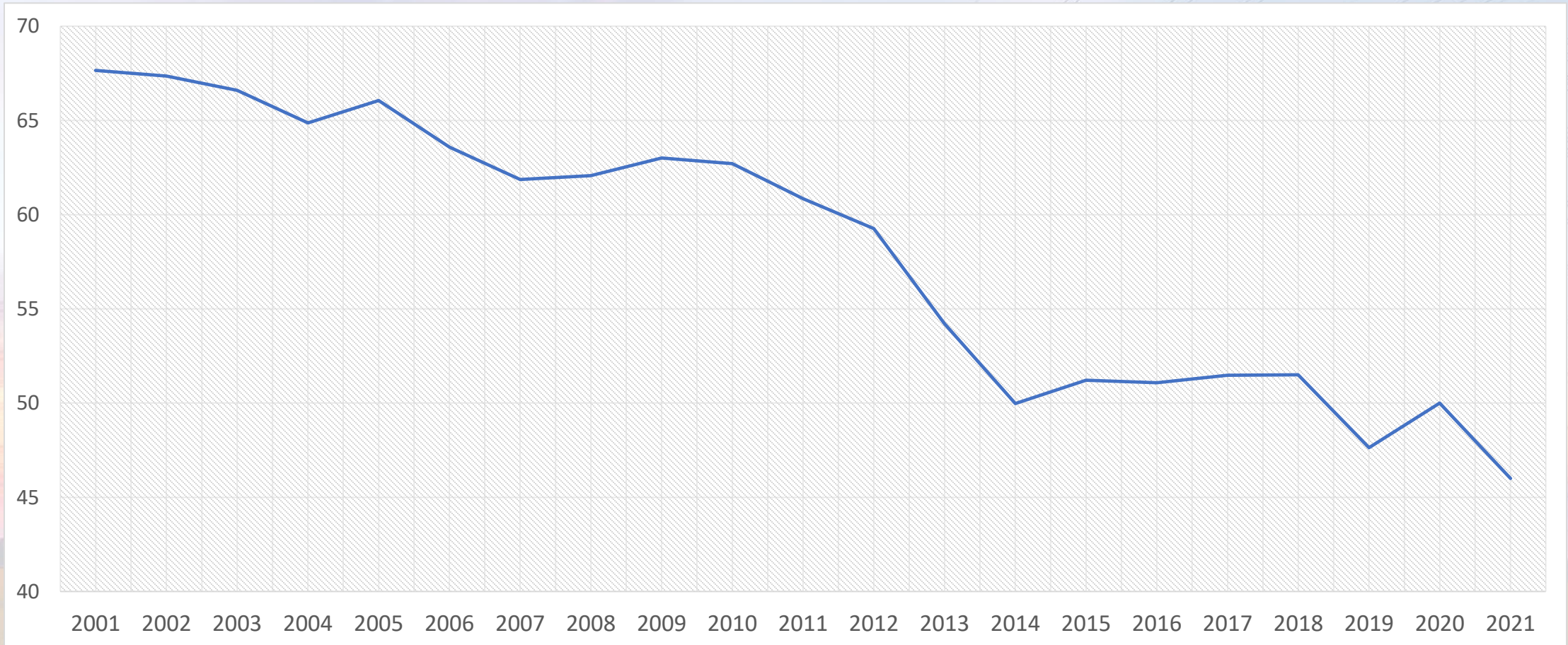
Summary of Generation Resource

- Renewable generation has increased to 4,250 MW of nameplate
 - Capacity factor of wind generation at 39%
 - No solar installations in service
- Coal Generation at 4,048 MW
 - Heskett Station 100 MW capacity retired in 2022
 - Rainbow Energy purchased Coal Creek Station May 1, 2022
 - Capacity factors on coal generation between 65% and 91%
- Gas generation of approximately 596 MW
 - Serves an important place in the Bakken
 - Adding to MDU capabilities in Mandan

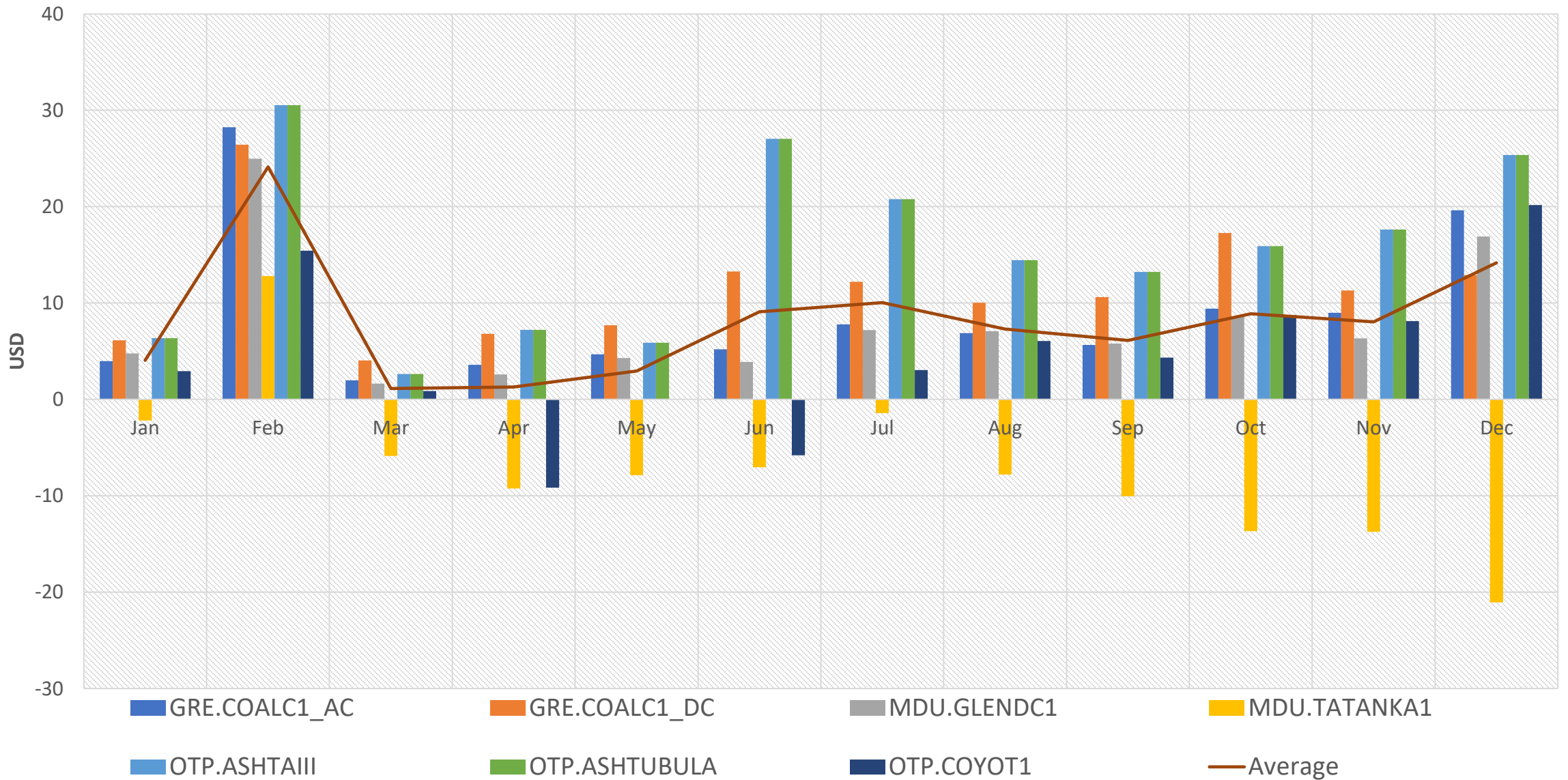
Generation by Type in North Dakota



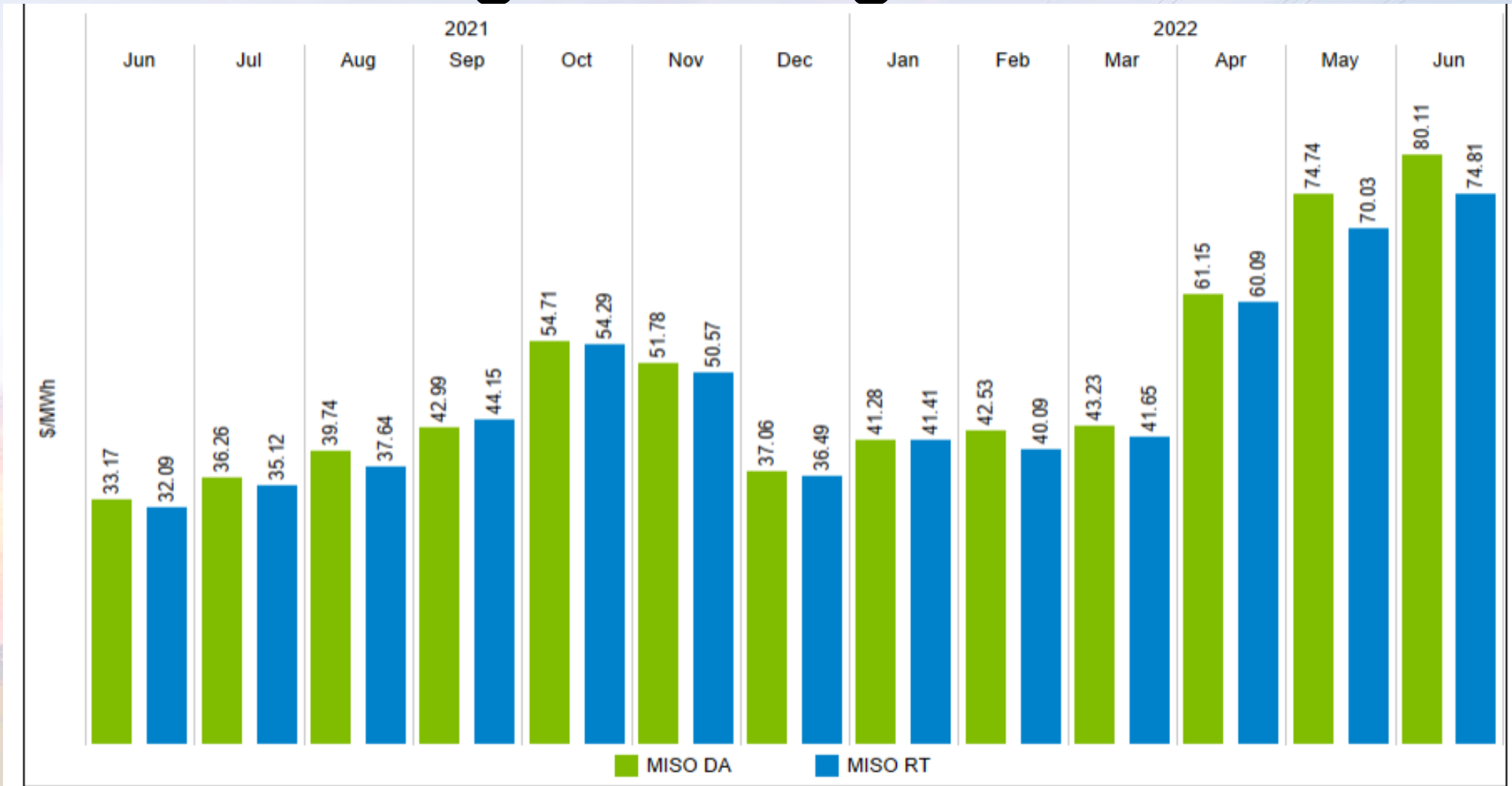
Percent of Generation Exported from North Dakota



DA LMP Price 2021

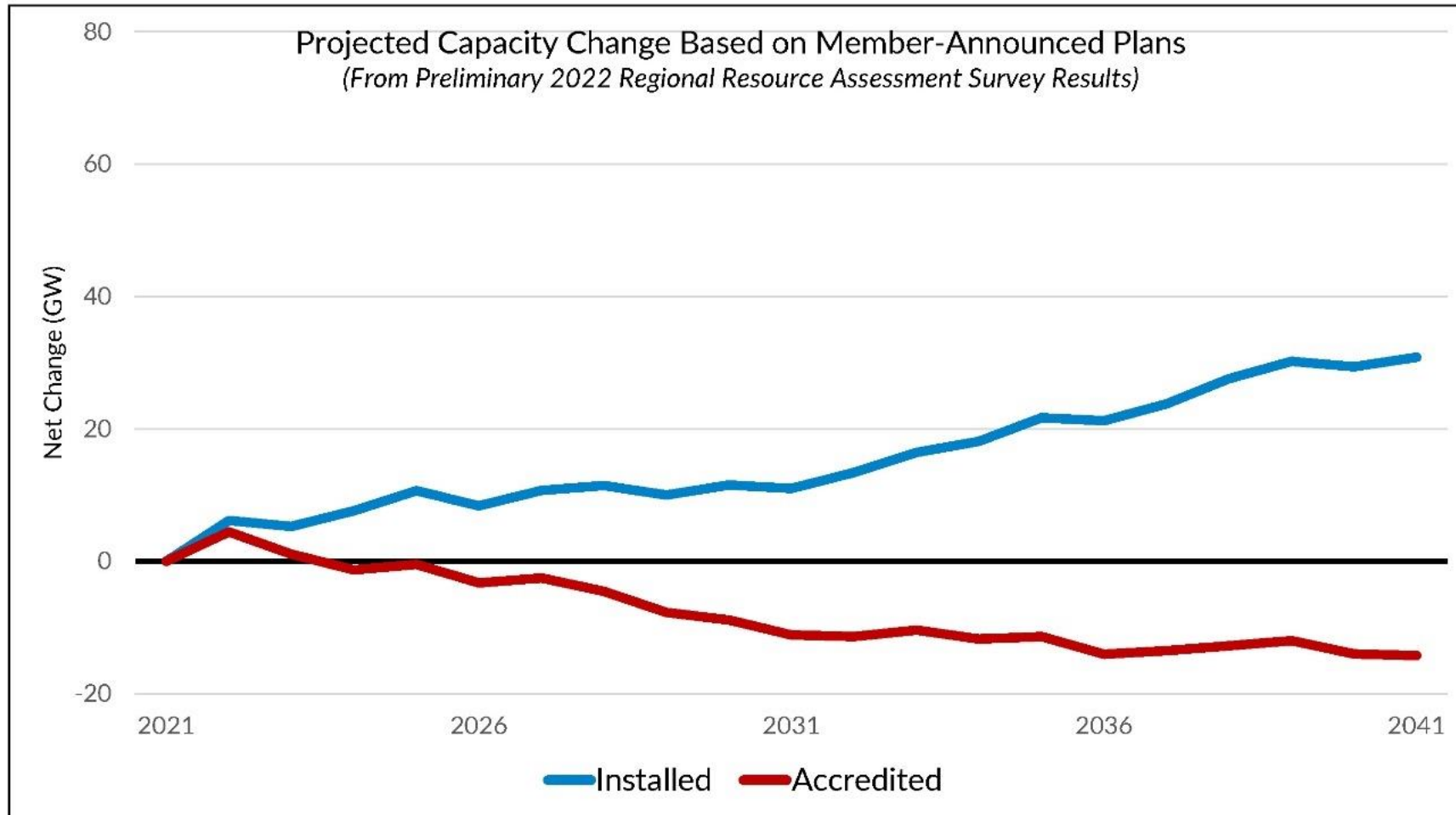


MISO System-wide Day-Ahead & Real-Time Locational Marginal Pricing



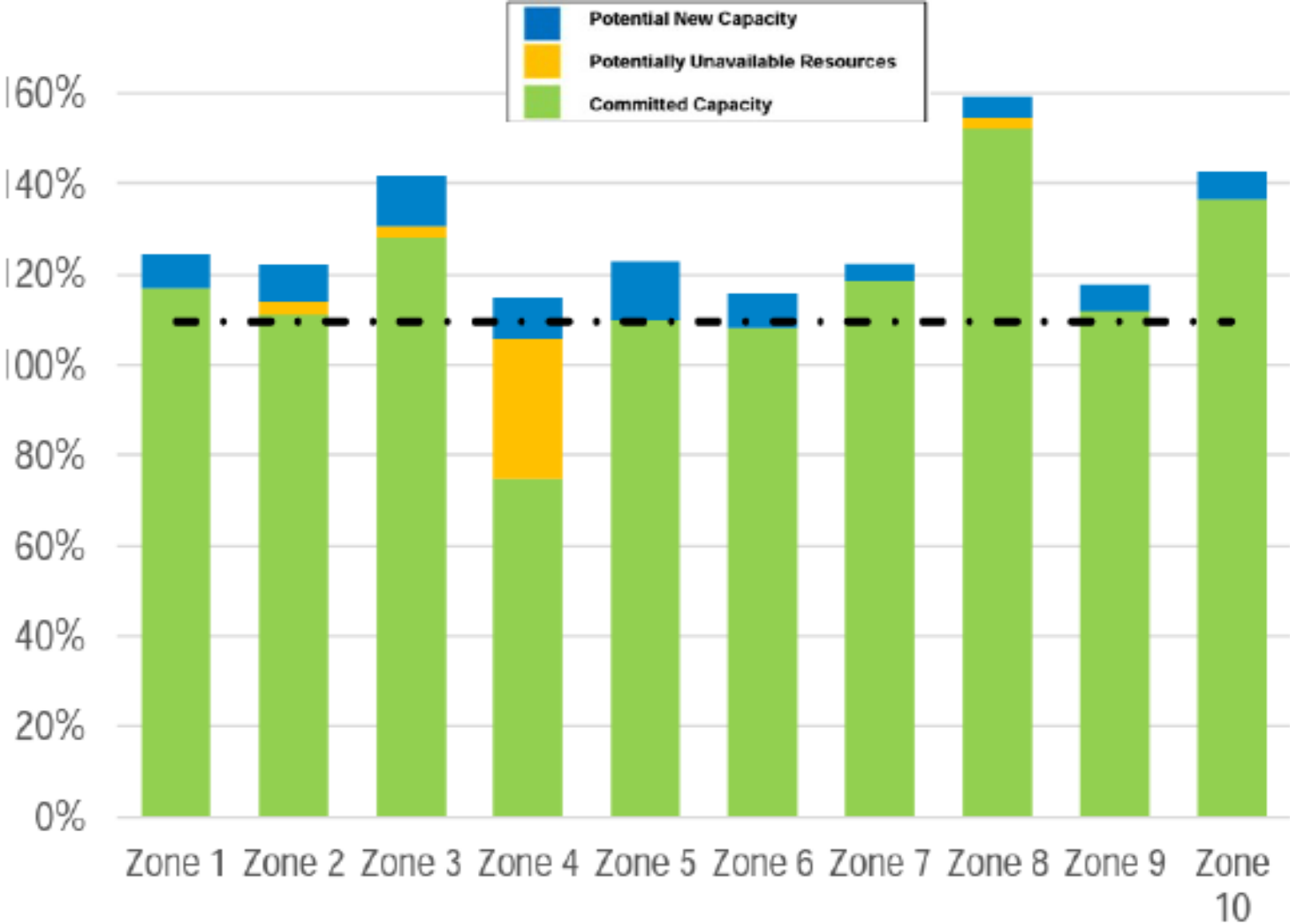
Note: MISO System-Wide price is based on the monthly hourly average of the active hubs
Source: MISO Market and Operations Analytics Department

...accredited capacity is declining due to the rapid pace of retirements of controllable resources

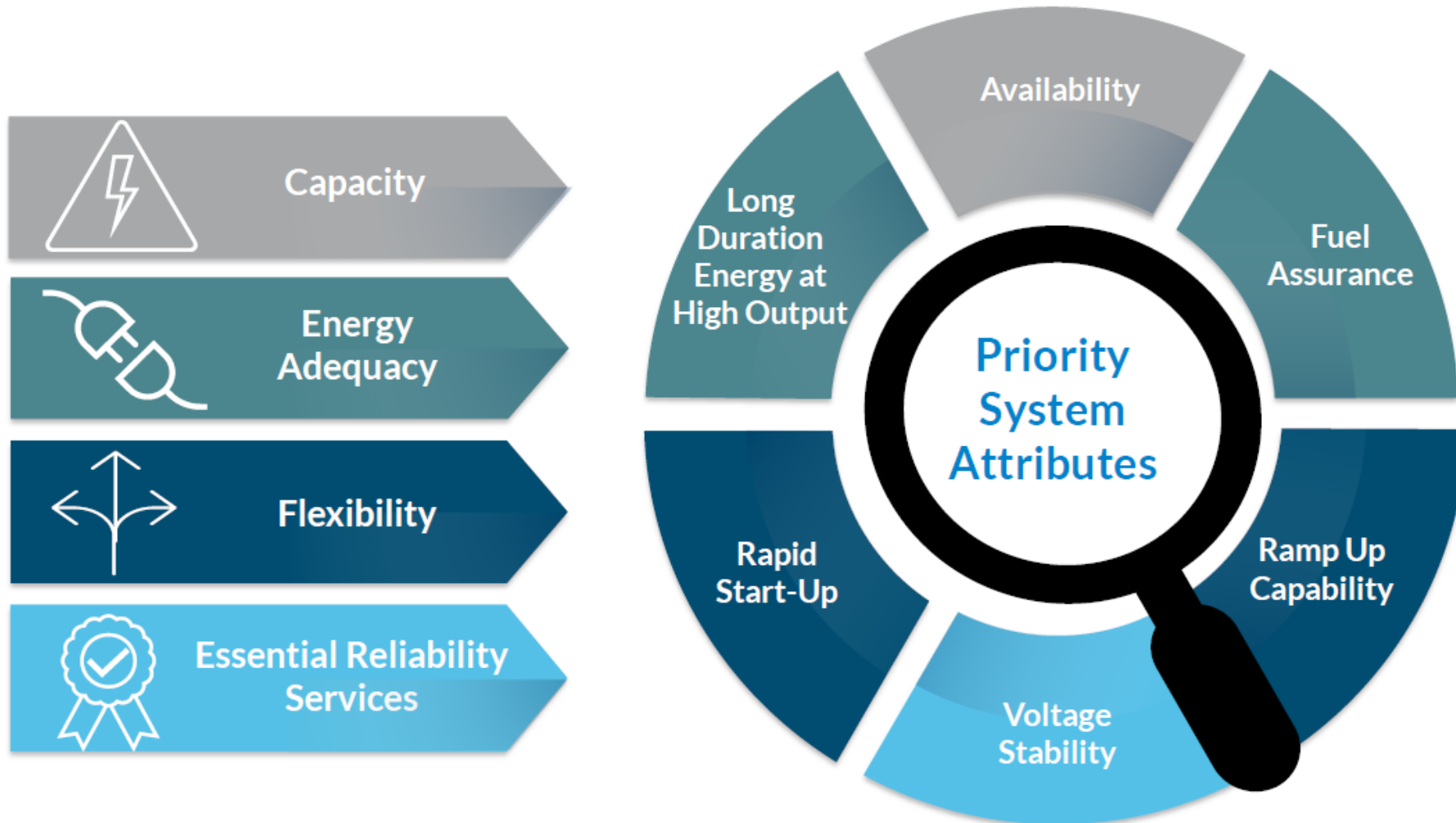


MISO 2022 Outlook

2022 Outlook - UCAP (GW) as a % of forecasted load



Based on insights, MISO proposes six reliability attributes as initial priorities

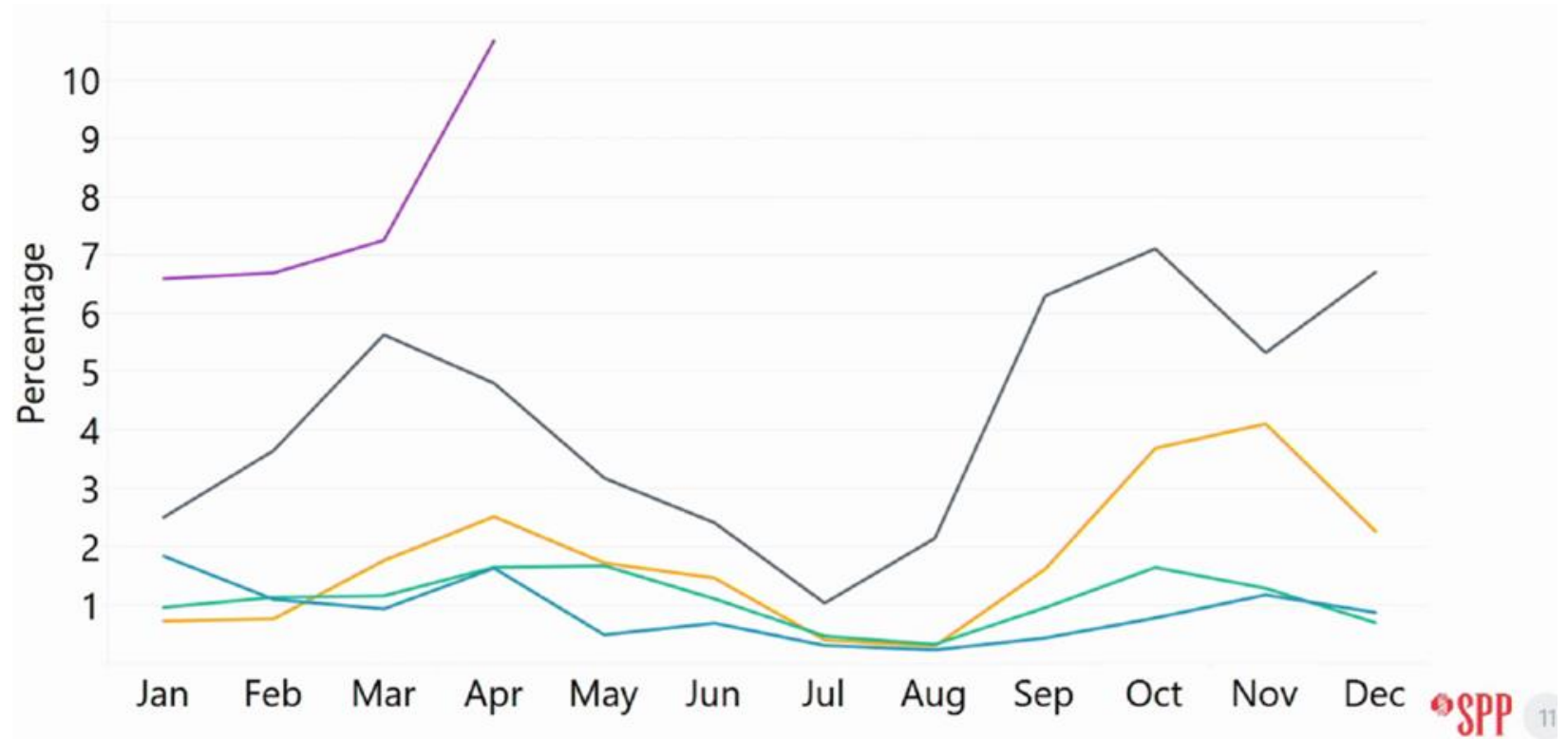


SPP Queues and Resource Projections

- SPP queue for interconnection requests in North Dakota
 - 6075.5 MW total requests
 - 1328.5 MW gas fired generation
 - 605 MW of storage
 - 1866 MW solar
 - 2276 MW wind
- SPP wide queue requests heavy on solar, wind and storage with very few dispatchable resources in the mix

Generation Curtailments at SPP

Monthly Average Curtailed Wind as a Percentage of Available Wind Capacity



NERC | State of Reliability Report | 2022

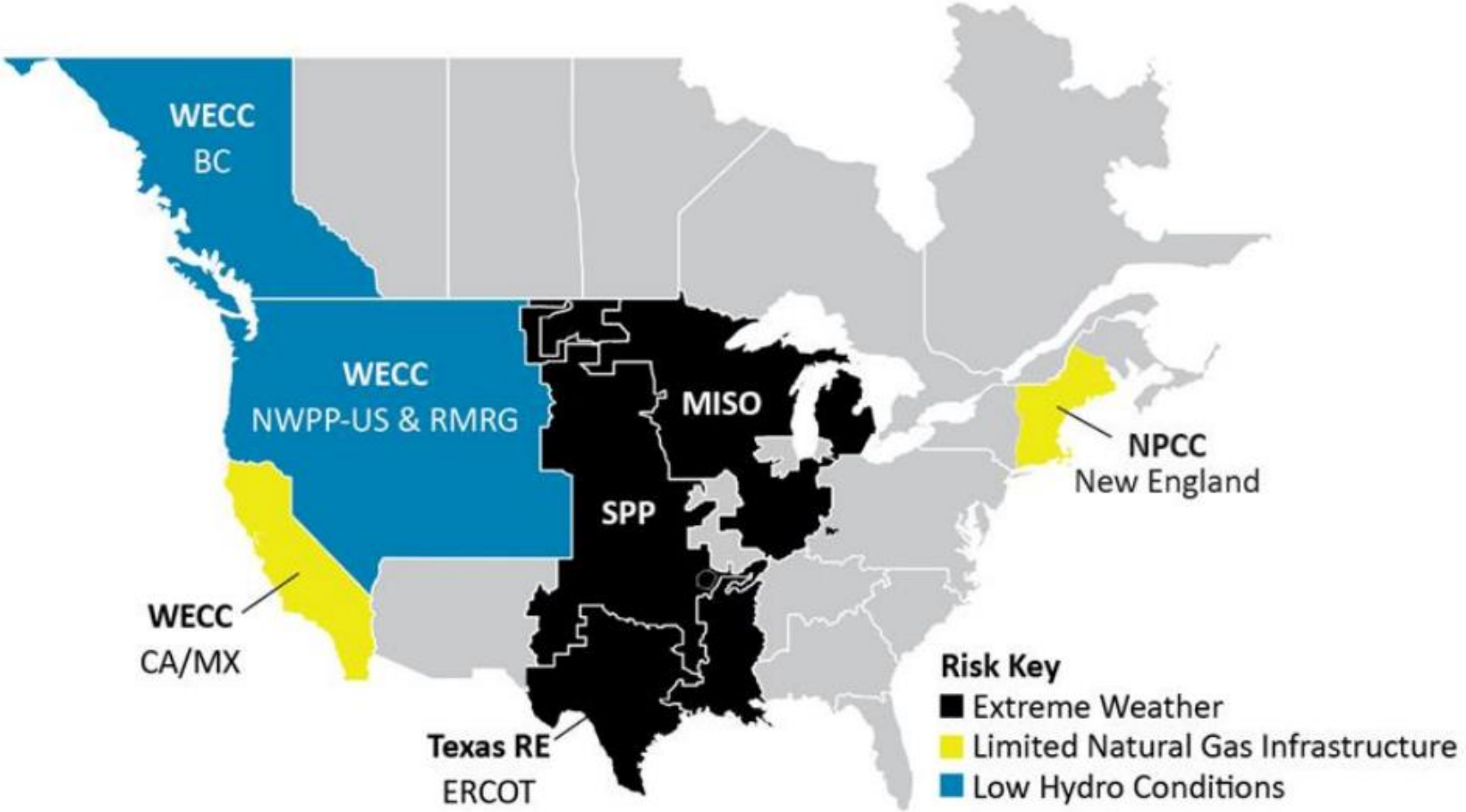

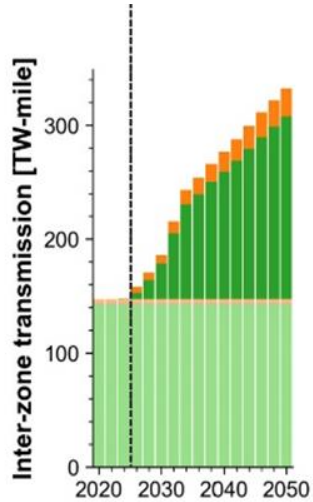


Figure 3.4: 2021–2022 Winter Reliability Assessment Risk Area Map

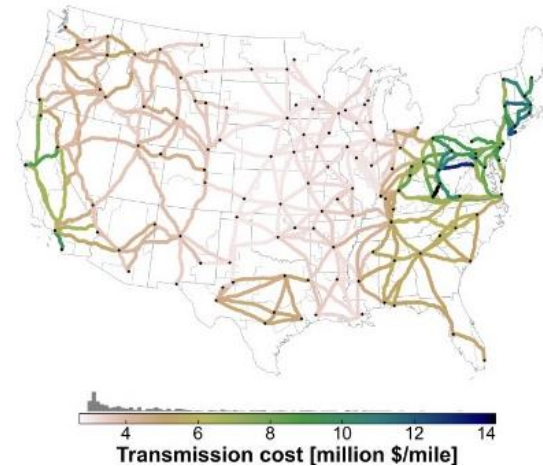


Transmission is
the key to the
grid transition

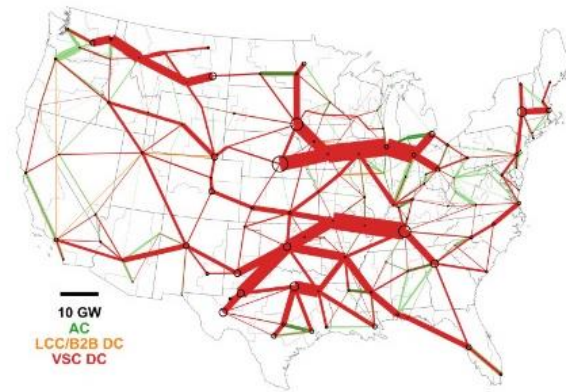
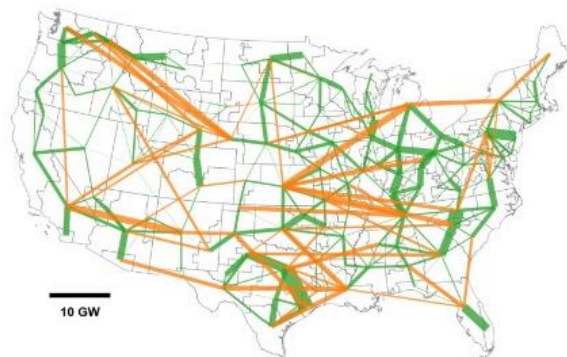
Key capacity-expansion questions for the TRC



1. In what year should new, **currently unplanned** transmission capacity additions start to be allowed?
Should it depend on technology, location, or other factors?



2. Are the assumed **cost and performance** characteristics appropriate?
Are there other characteristics that should be considered?



3. Is it worthwhile to consider both **LCC** and **VSC DC**, or other high-capacity options?

4. **What geographic resolution** for transmission construction is needed for actionable findings? (Total TW-miles, inter-region capacities, individual lines...?)

Inflation Reduction Act

- The IRA increased and extended opportunities for renewable energy and carbon capture and sequestration.
- EPRI provided very easy to follow graphic on what those opportunities are

45Q Carbon Sequestration Tax Credits

| Source of Carbon Oxides | Carbon Dioxide Storage Method | Current 45Q Credit Value (per metric ton) | Proposed 45Q Credit Value (per metric ton) |
|---|--|---|--|
| Industrial Facility (including electric generating units) | Enhanced Oil Recovery (EOR) with Geologic Storage or Utilization | \$35/ton | \$60/ton |
| Industrial Facility (including electric generating units) | Geologic Storage without EOR | \$50/ton | \$85/ton |
| Direct Air Capture Facility | Enhanced Oil Recovery (EOR) with Geologic Storage or Utilization | \$35/ton | \$120/ton |
| Direct Air Capture Facility | Geologic Storage without EOR | \$50/ton | \$180/ton |

Inflation Reduction Act Provide extension of and increase in renewable tax credits

- Extended to 2032
- Base plus bonus amounts if project meets certain criteria
- Investment tax credit up to 50% if project meets certain criteria

Seek professional interpretation if considering a project

Applying tax credits to a typical wind project

300 Mw project X \$28 per Mwhr= \$8400 per hour

Apply 50% capacity factor becomes \$8400/hr X 4380hours

Result= \$36,792,000 per year potential tax credit

Can Developers harvest these benefits without improvements to the Transmission system?

- **If generation is curtailed not tax credit is earned**
- **If market is negative tax credit erodes**

Opportunities for North Dakota

- Develop low carbon technologies through Clean Sustainable Energy Authority (CSEA)
- Install carbon capture to preserve existing coal-based generation
- Build gas-fired generation to keep adequate dispatchable resources on the North Dakota grid
- Continue with thoughtful development of wind and solar resources
- Tell the ESG world that we are on a faster track to reliable low carbon energy than mandatory approaches