



INDUSTRIAL COMMISSION OF NORTH DAKOTA

NORTH DAKOTA TRANSMISSION AUTHORITY

Governor
Doug Burgum
Attorney General
Wayne Stenehjem
Agriculture Commissioner
Doug Goehring

NORTH DAKOTA TRANSMISSION AUTHORITY Chapter 17-05 North Dakota Century Code

The North Dakota Transmission Authority (“Authority”) was created by the North Dakota Legislature in 2005. Since its inception the Authority’s mission has been to facilitate the development of transmission infrastructure in North Dakota. The Authority was established to serve as a catalyst for new investment in transmission by facilitating, financing, developing and/or acquiring transmission to accommodate new lignite and wind energy development. The Authority is a builder of last resort, meaning private business would have the first opportunity to invest in and/or build additional needed transmission.

By statute the Authority membership is comprised of the members of the Industrial Commission. The Director of the Authority works closely with the Executive Director/Secretary of the Commission. The Authority has no other staff and receives no direct General Fund appropriation. Funding for the Authority comes from the Lignite Research, Development and Marketing Program.

The powers of the Authority include: 1) make grants or loans or borrow money; 2) to issue up to \$800 million in revenue bonds; 3) enter into lease-sale contracts; 4) own, lease, rent and dispose of transmission facilities; 5) enter into contracts to construct, maintain and operate transmission facilities; 6) investigate, plan prioritize and propose transmission corridors; and 7) participate in regional transmission organizations. In 2009 the Legislature provided the Authority with the power to attach the moral obligation of the State on up to 30% of any revenue bonds sold in conjunction with the financing of a transmission line project.

The Authority’s work has focused on observation and achieving a high level of understanding of regional transmission planning. To accomplish this task, the Authority closely monitors and interacts with regional transmission organizations (RTOs) that represent North Dakota transmission developers. These include the Midcontinent Independent System Operator (MISO), and the Southwest Power Pool (SPP). The Authority also works with the Organization of MISO States, the Public Service Commission, and other regional and state planning and permitting authorities to ensure transmission policies developed will be favorable to any new North Dakota projects (coal, natural gas, wind or other renewable) that may come before these groups.

The Authority has continued to be engaged in MISO transmission line development work that seeks to identify lines that bring multiple values to transmission across the MISO footprint. The most recent studies of requests by developers to interconnect to the transmission grid in North Dakota have revealed that the high cost barriers to those interconnections are mostly outside of North Dakota. While progress has been made in planning solutions for those congested areas, there is little apparent progress on who is going to proceed and how the projects are going to be funded. It is common for transmission projects in similar areas to take up to ten years to get in service. Until there is a clear path forward on those solutions, additional buildout of the transmission grid in North Dakota will do little to increase the ND export capability.



North Dakota Transmission Authority
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In early 2020 it became apparent that Great River Energy was considering closure of Coal Creek Station. That decision was formalized and announced in May, 2020 with a planned closure in August, 2022. That has resulted in a year of concentrated effort to determine if a buyer can be found to continue to operate the plant and the DC line to Minnesota or if a future use of the line can be successful in enabling development of renewable generation that is currently held up for lack of transmission interconnections. As of this writing it is clear that there is interest in both options, but negotiations are underway, so a final outcome is not yet known.

Another matter that has become apparent this past year is the long-term future of the grid in North Dakota and the surrounding area. MISO has done long term modeling of future scenarios with high renewable generation driven by goals and mandates in surrounding states and utilities in those states. Within the MISO footprint North Dakota has very little in place for goals that have not already been achieved so the impact projected for North Dakota is primarily driven by our neighbors. The results are troubling to both MISO and to NDTA and clearly point to a need for different solutions than are currently in the modeling. A broad group of interests are focused on solutions and potential need for North Dakota to provide a statement of goals to MISO. Even though the urgency is driven by work from MISO, it is important that solutions also fit with the SPP portion of the grid. This is being worked on in the spirit of continuing the policy of North Dakota being an “all of the above” state in enabling a variety of energy development.

The Transmission Authority coordinates its activities with the Public Service Commission and the Department of Commerce and regularly reports to the Industrial Commission.

A copy of the Transmission Authority’s annual report is available on the Industrial Commission website at <http://www.nd.gov/ndic/> under publications.

North Dakota Energy and Natural Resource Committee

Report from North Dakota Transmission Authority

John Weeda

Director

January 7, 2021

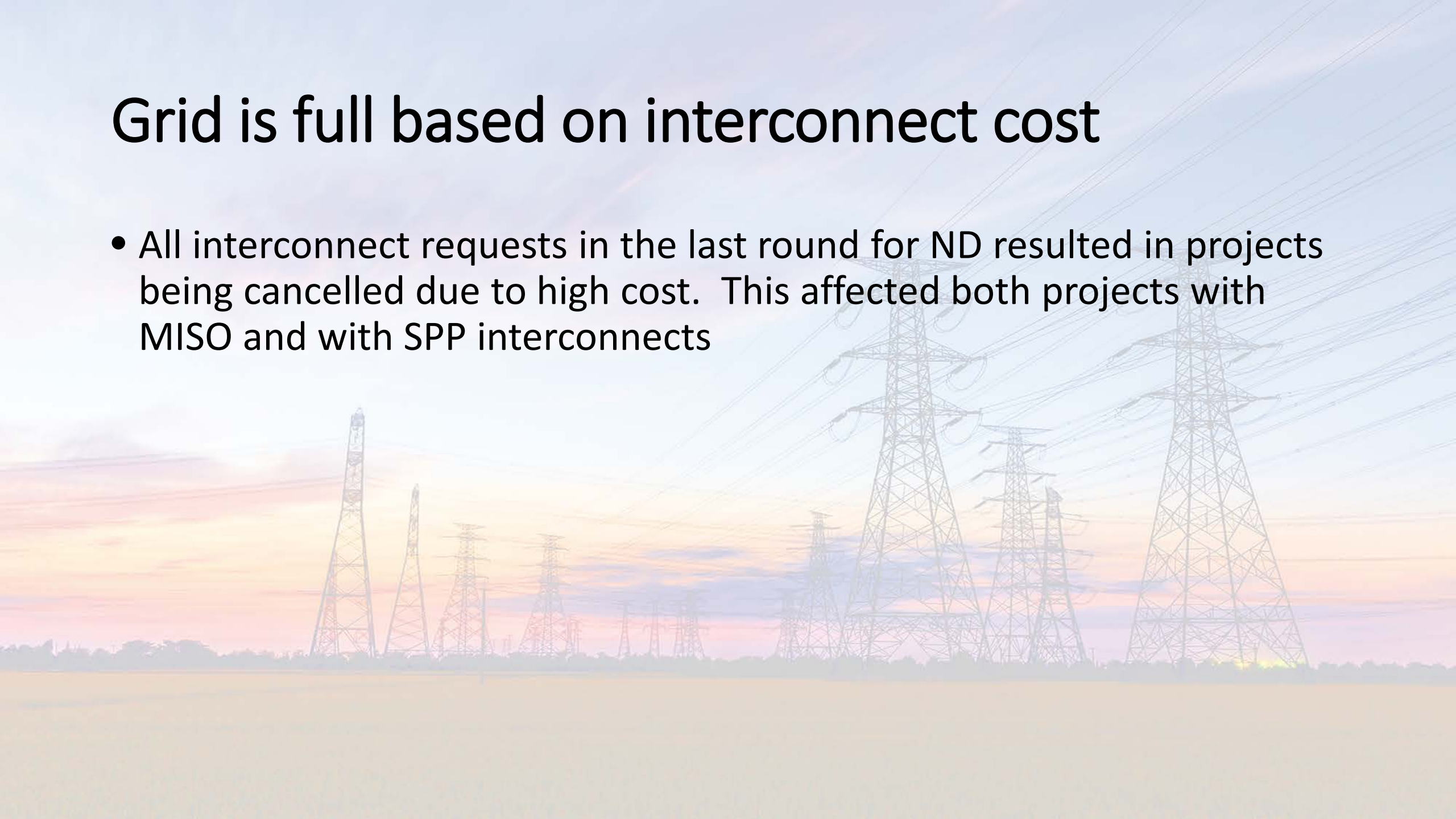
The key message

THE GRID IS FULL

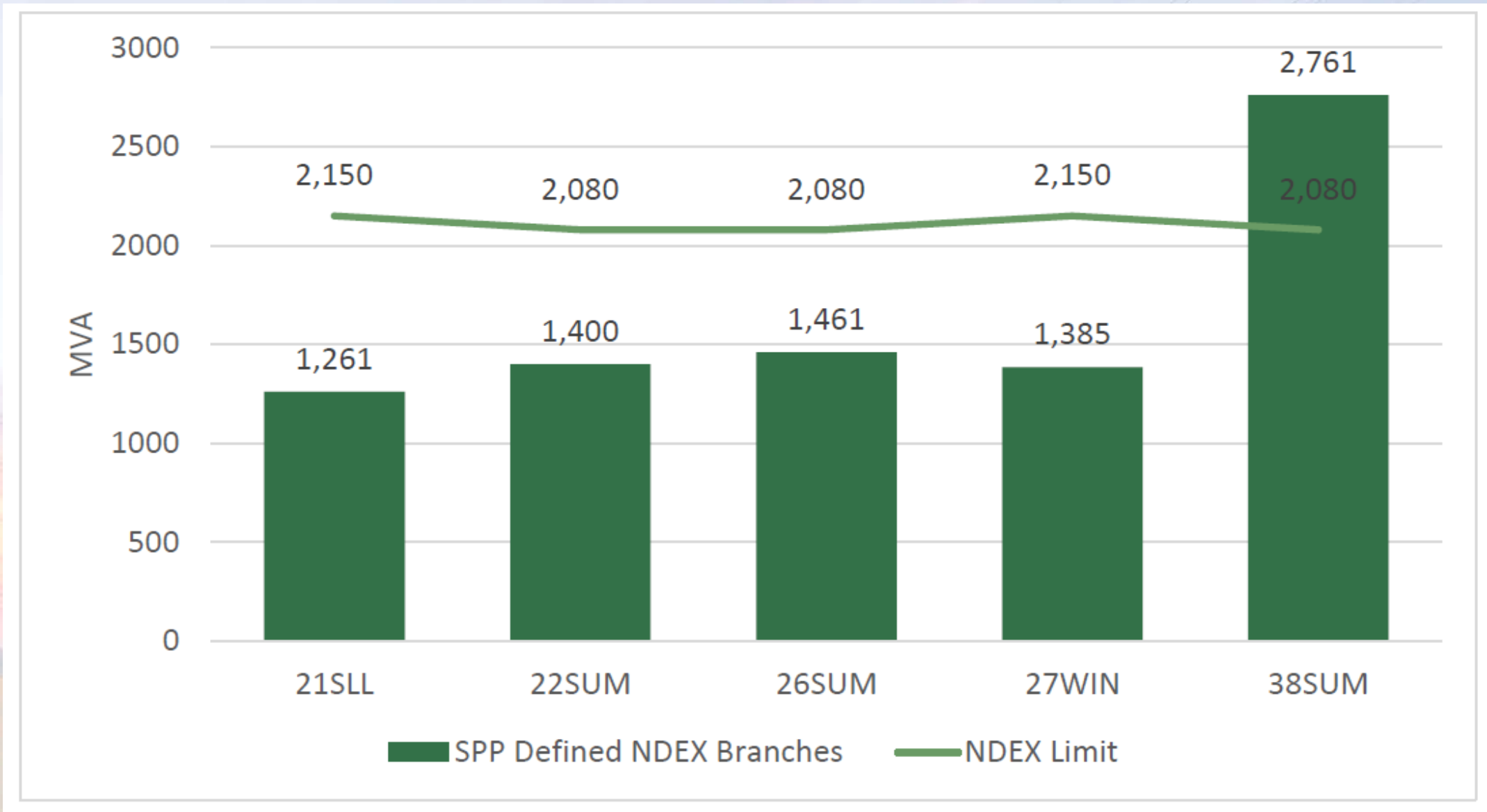


Grid is full based on interconnect cost

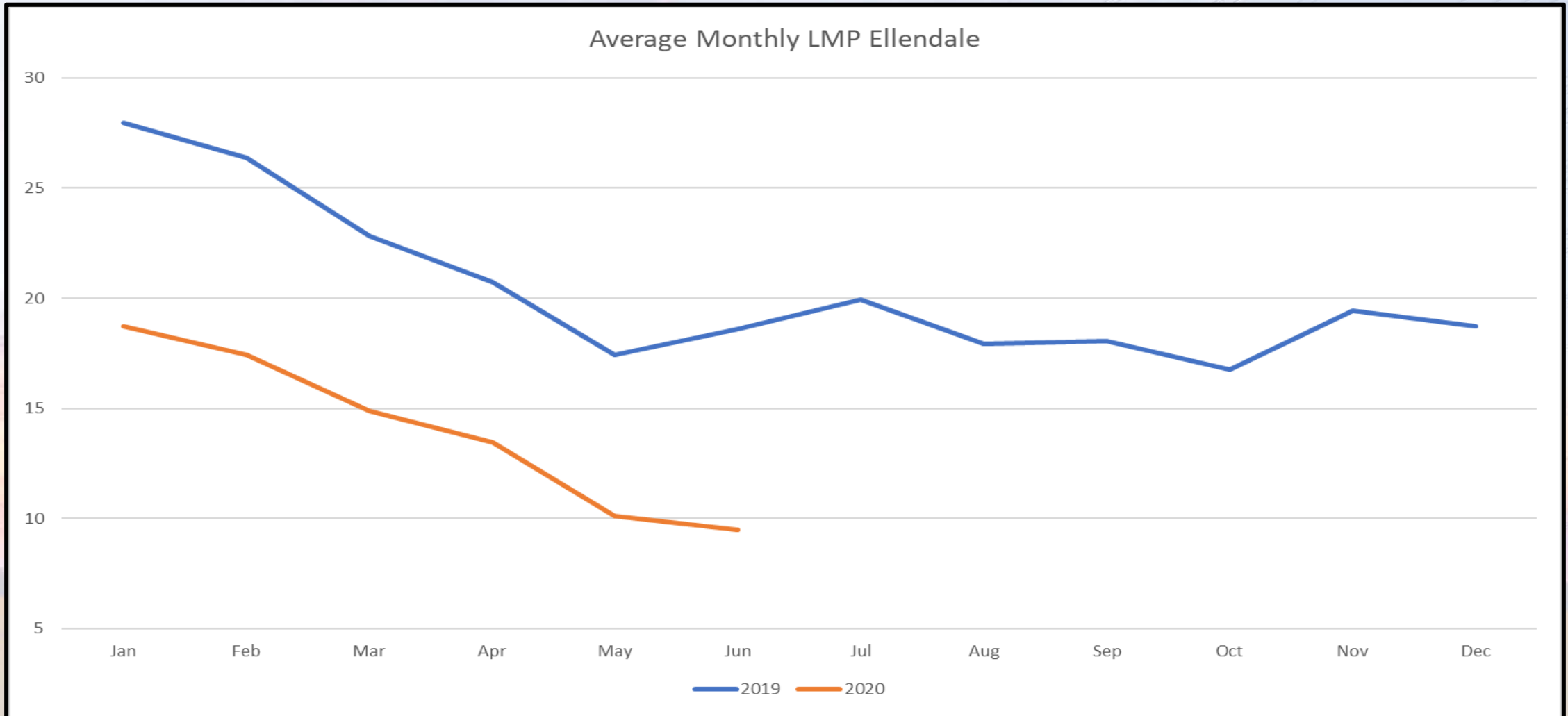
- All interconnect requests in the last round for ND resulted in projects being cancelled due to high cost. This affected both projects with MISO and with SPP interconnects



NDEX Tie Line MVA Flow Totals point to full grid



Full Grid indicated by Market pricing at Ellendale



Pricing on the full grid is also showing more volatility especially negative basis

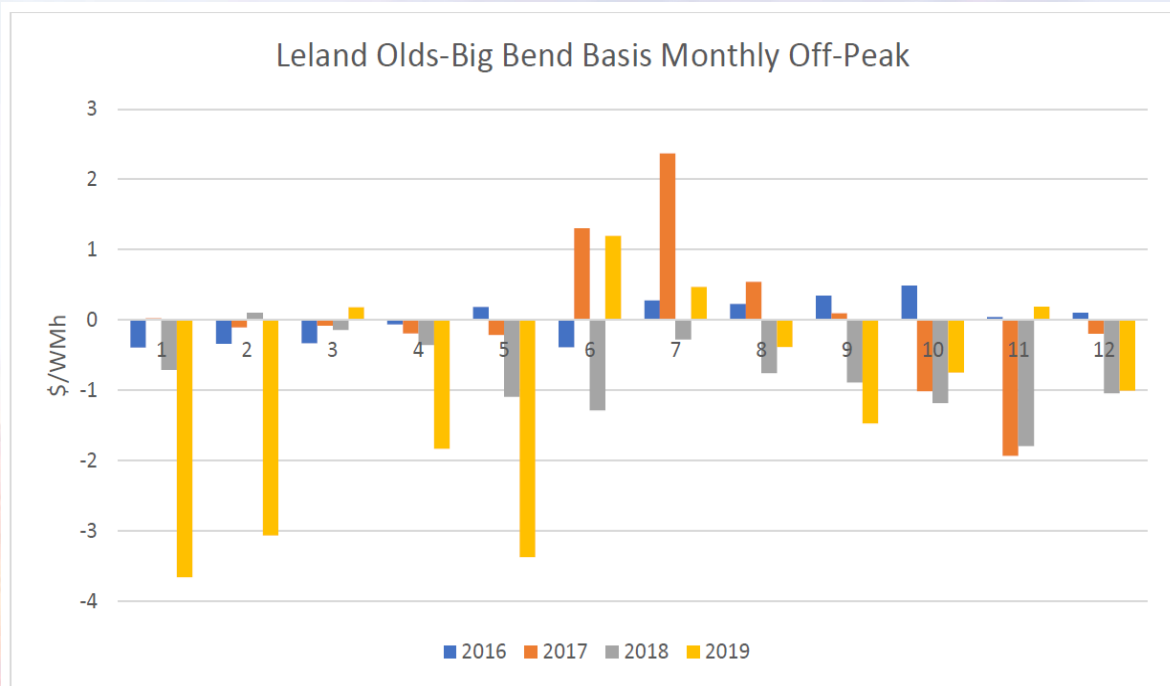


Figure 3-11: Leland Olds-Big Bend Basis Monthly Off-Peak

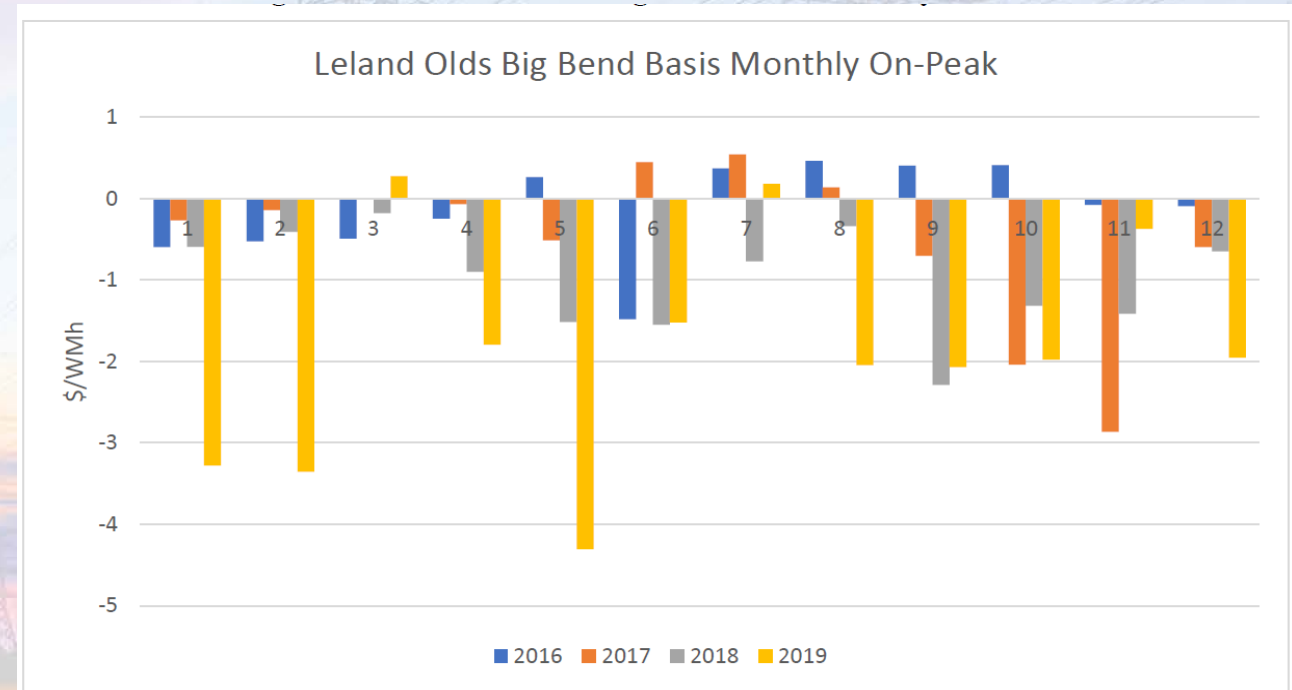
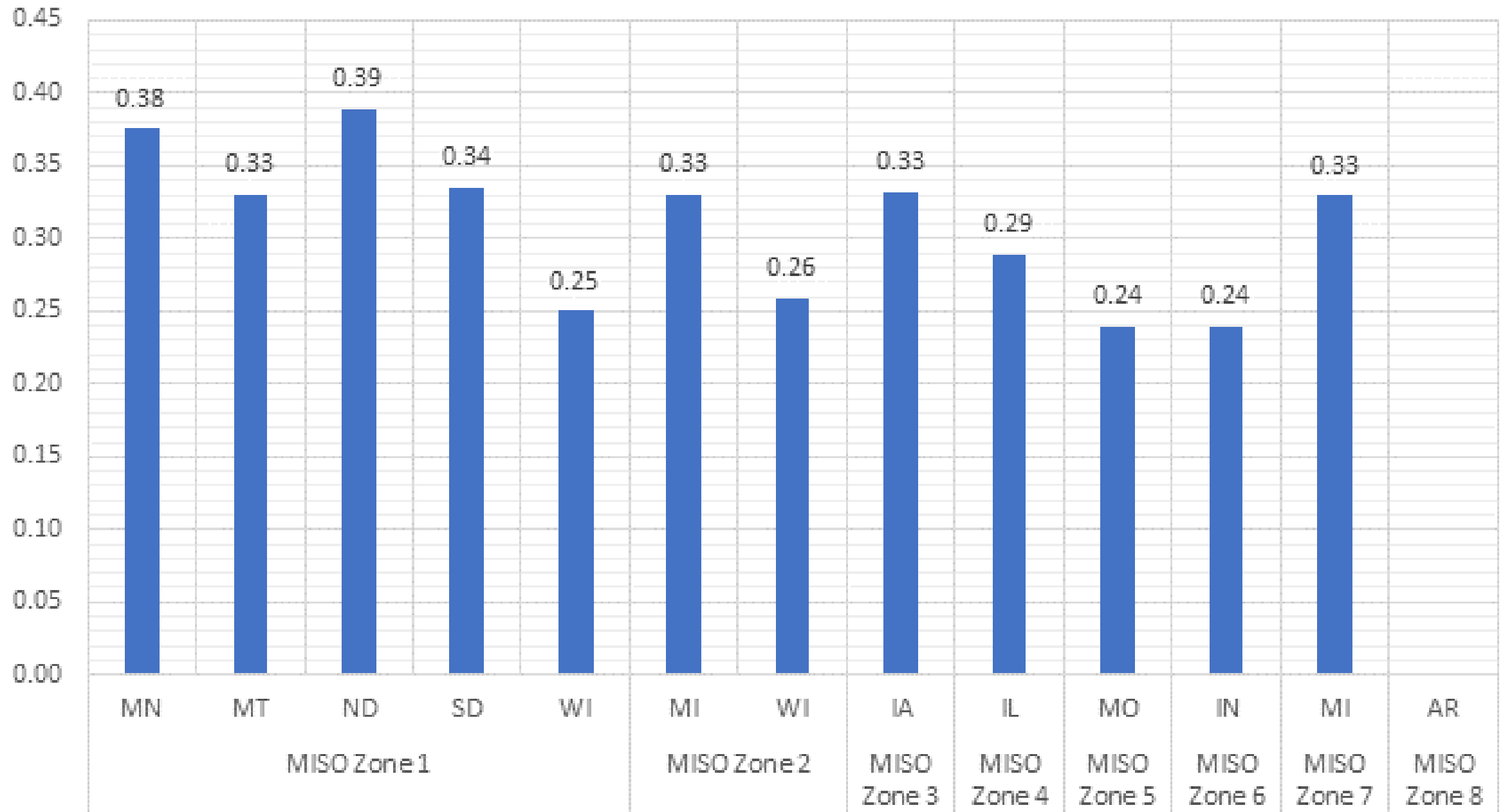


Figure 3-12: Leland Olds-Big Bend Basis Monthly On-Peak

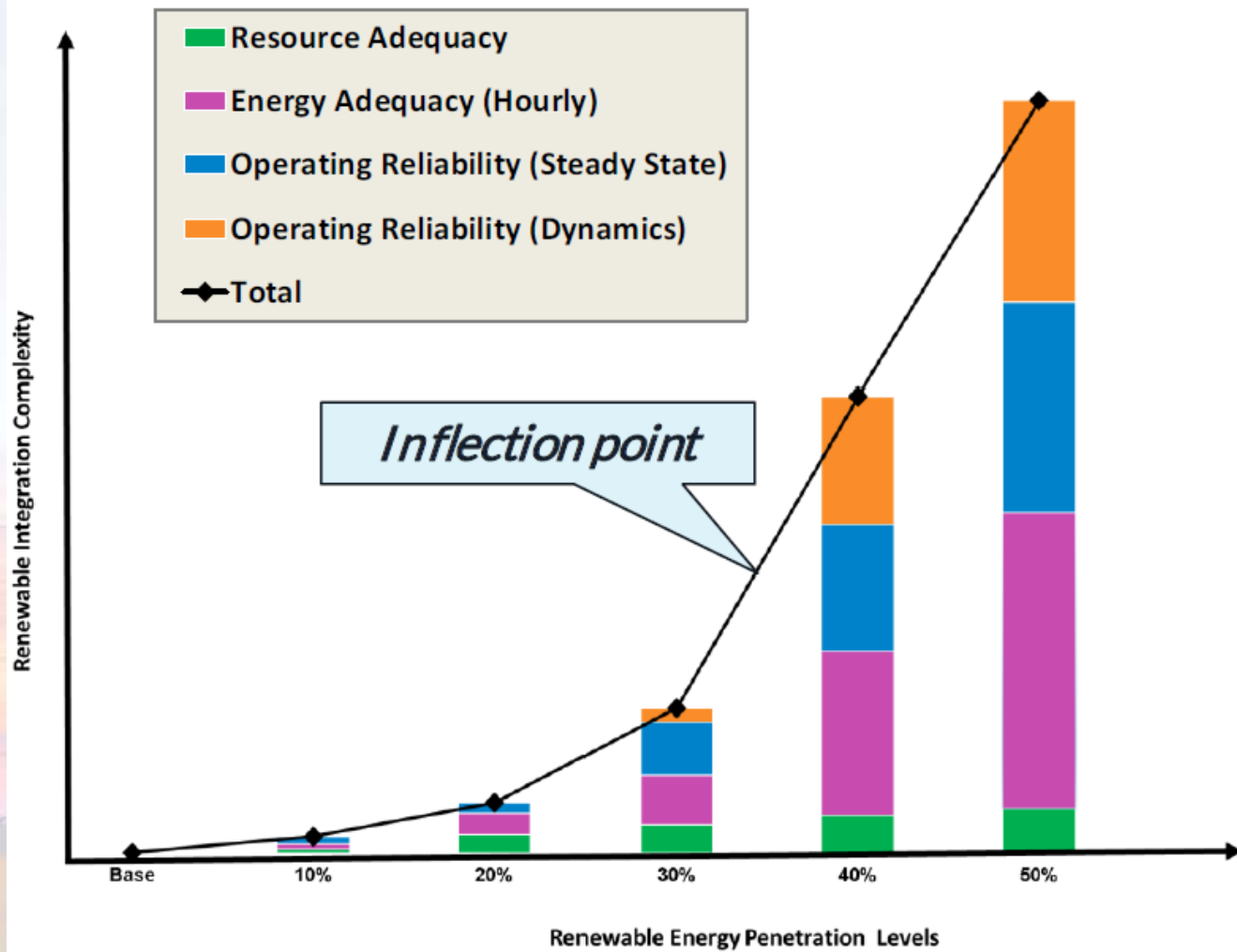
Competitive pressure from the market

- Markets at nodes in ND where generation is offered into the market have been in the sub \$20 per mwhr and even sub \$15 per mwhr in 2020.
 - Full cost of simple cycle gas fired generation exceeds that
 - Full cost of Combined cycle gas generation exceed that
 - Full cost of unsubsidized renewable generation exceeds that
 - Full cost of lignite generation exceeds that
 - Energy only cost of most generation exceeds that
- Bottom line- it is tough to make a business case for new generation

MISO CAPACITY FACTORS BY ZONE AND STATE --BNEF



MISO's Renewable Integration Impact Assessment (RIIA) indicates integration complexity increasing sharply beyond 30% renewable penetration



1. Risk of losing load compresses into a small number of hours and shifts into the evening
2. Existing infrastructure becomes inadequate for fully accessing the diverse resources across the MISO footprint
3. Regional energy transfer increases in magnitude and becomes more variable leading to a need for increased extra-high voltage line thermal capabilities
4. Power delivery from low short circuit areas may need transmission technologies equipped with dynamic support capabilities
5. Frequency response is stable up to 60% instantaneous renewable penetration, but may require additional planned headroom beyond
6. Grid technology needs evolve as renewable penetration increases, leading to an increased need for integrated planning
7. Diversity of technologies and geography improve the ability of renewables to serve load

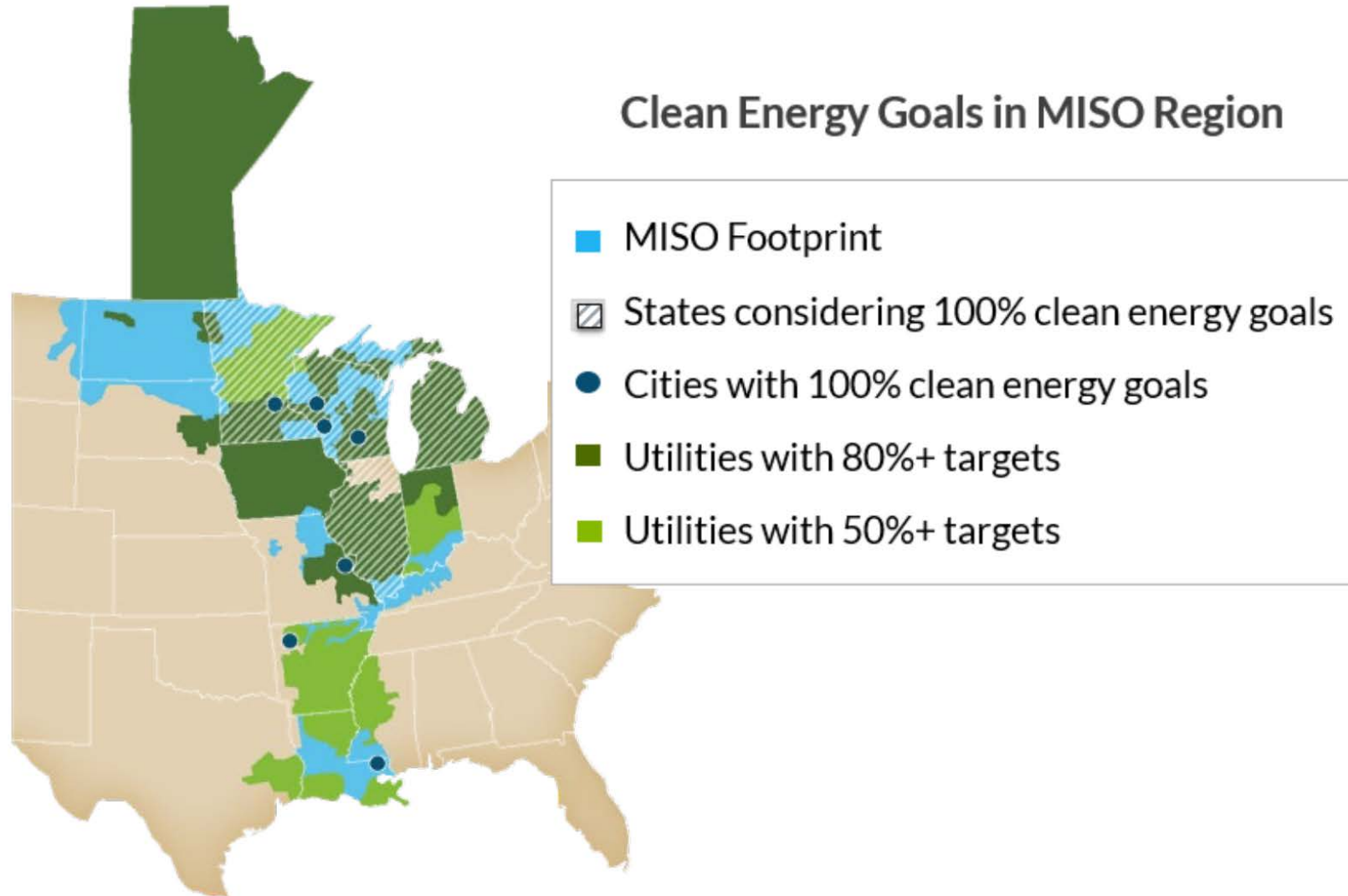
How does the “complexity” get paid for?

- Green-generation resources both existing and new (smallest part of the graph)
- Magenta- energy adequacy is having the needed energy at the right time so involves matching generation to demand (largest component)
- Blue- operating reliability is mostly associated with having enough transmission lines to provide electricity even under adverse conditions (second largest)
- Orange- operating reliability to protect from low voltage, frequency swings and other dynamic conditions that occur periodically in the grid (third largest)

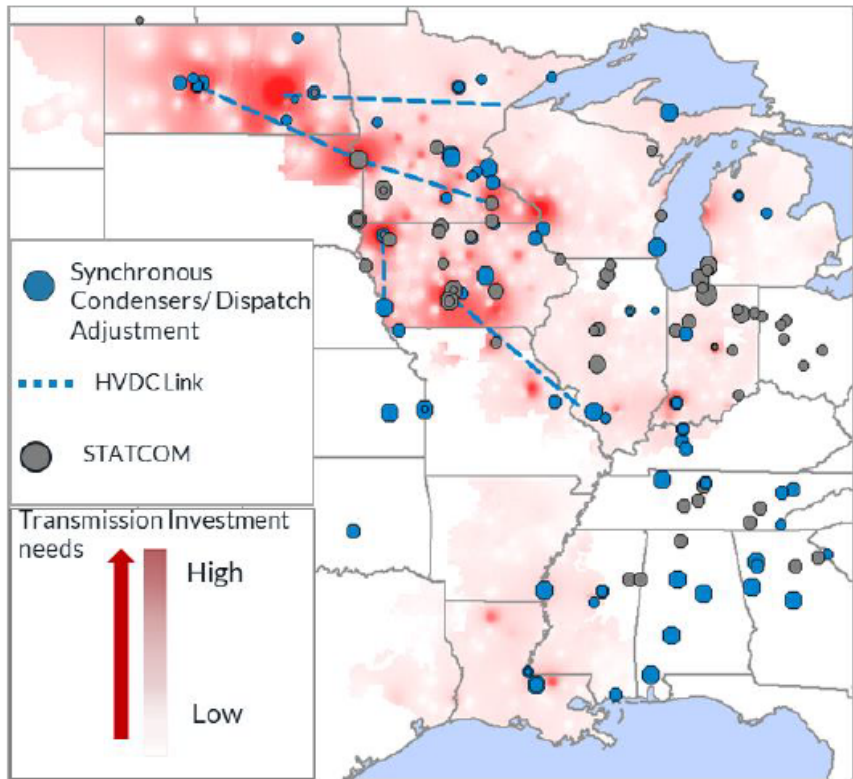
Who pays is a contentious matter

- Currently interconnection request are being assessed so the impact is hitting wind generation particularly hard
- Multi-value projects used by MISO in the past are unpopular in a lot of circles and results in cost to all consumers
- Reliability is the responsibility of the ISOs such as MISO and SPP but they would fund thru tariffs that are not popular
- Resource adequacy is said to be a responsibility of the states, but states need to be careful about mandating attributes that affect interstate commerce

There is an urgent need for MISO to take action to ensure the goals / targets set by our states and members can be achieved in a reliable, efficient manner

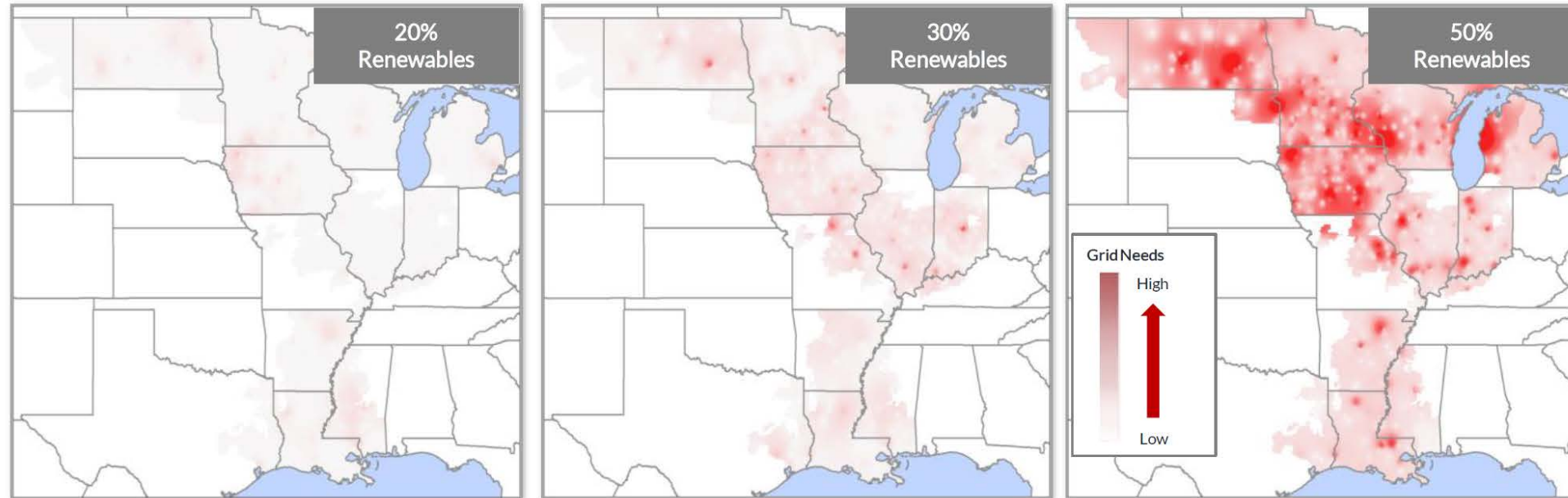


Work to date indicates expected portfolio changes will cause significant grid and stability issues requiring increased transmission investment

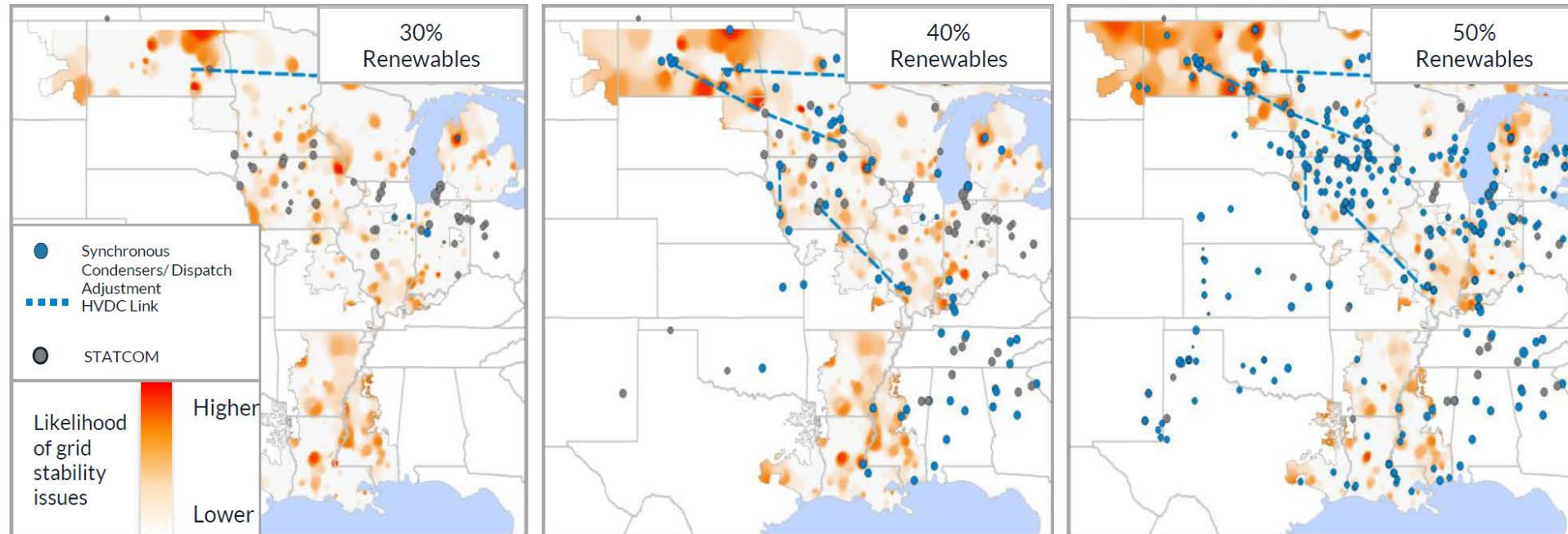


- Issues are driven by reduction in conventional generation and the increase in inverter based (i.e. wind/solar/battery) generation
- Regional energy transfer increases in magnitude and becomes more variable leading to a need for increased extra high-voltage line thermal capabilities
- Increase in renewable penetration causes different dispatch patterns of conventional generators, leading to several dynamic issues
- Power delivery from weaker areas may need transmission technologies equipped with dynamic-support capabilities

Risks are increasingly regional in nature beyond 30%, illustrating need for expansion of longer, higher kV, higher capacity transmission



Beyond 30%, system-wide voltage stability is the main driver of dynamic complexity and requires transmission technologies equipped with dynamic-support capabilities



* Maps reflect cumulative issues/solutions across milestones

Transmission options in North Dakota

- Utilization of the CU line
 - At least 2 entities are seeking to buy the plant and the DC transmission line
 - Operate with existing units and enhancement is CO₂, storage, wind, etc.
 - Brings additional investment up to \$2B
 - Offer variety of “products” on the line
 - Other entities seeking to buy the line and reserve it for themselves with wind generation only
- Other “merchant line” options outside the CCS DC line
 - MISO planning map shows priorities
 - Other companies are interested in evaluating the merchant line option
- MISO grid planning and tariffs
 - Long wait for tariff agreement as well as line justification

What can North Dakota do?

- Set clear goals that can be shared with MISO and SPP
- Support adequate transmission to move electricity from all generation to market
- Ensure that North Dakota's interests are fully represented in the RTO planning processes and in FERC proceedings
- Advocate for mechanisms in the market to sustain current operations and make new installations feasible to ensure continued reliability and resilience of the grid.
- Encourage development of installations of energy storage resources
- Fund research to help move technologies including the potential better use of natural gas products associated with oil exploration and the utilization of CCUS technologies on the existing fleet and funding of transmission grid R&D of technologies
- Encourage use of abundant local natural gas