

Midwest Wind Policy Institute

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Transmission Issues and Solutions for Wind Power

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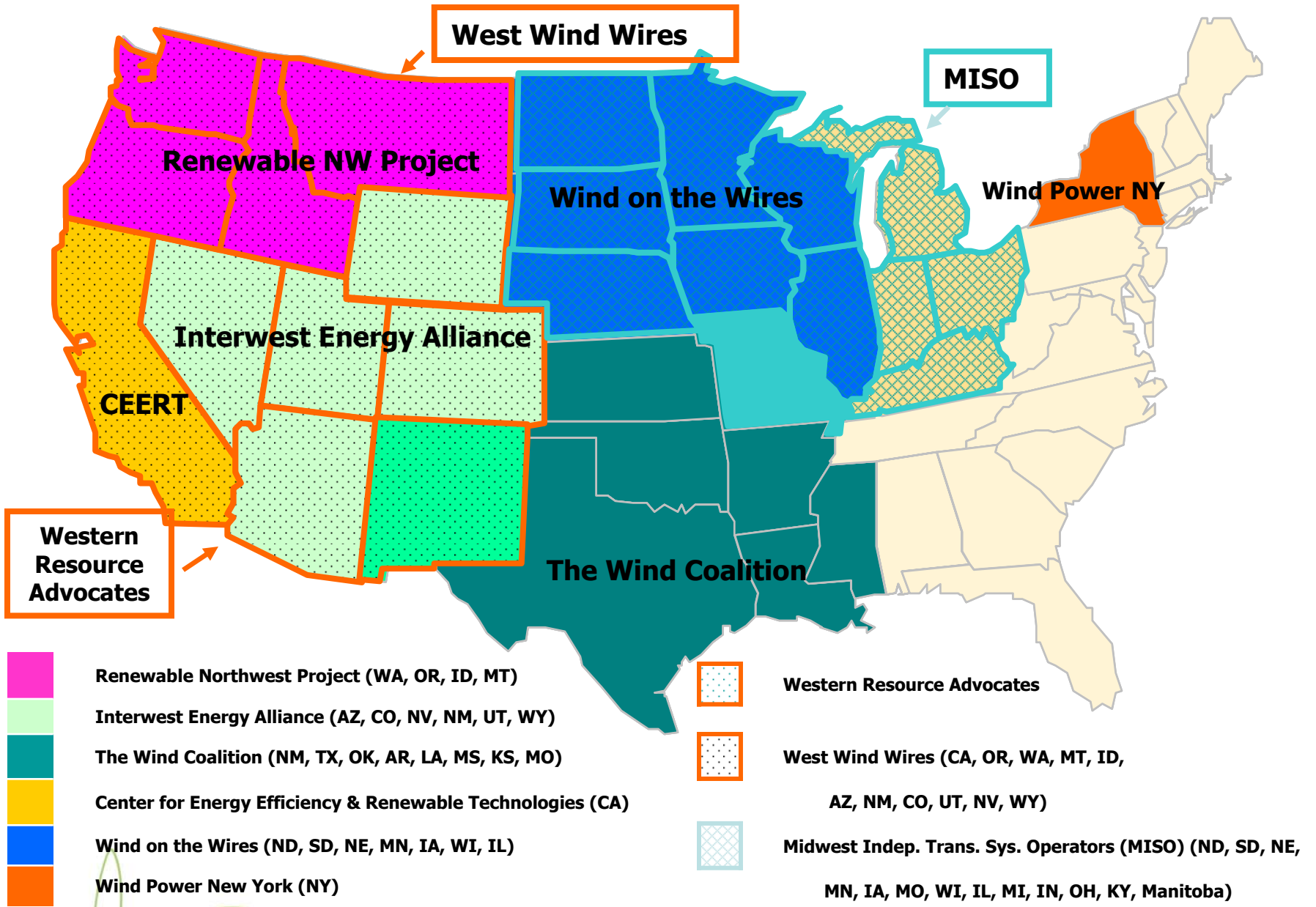
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Wind on the Wires

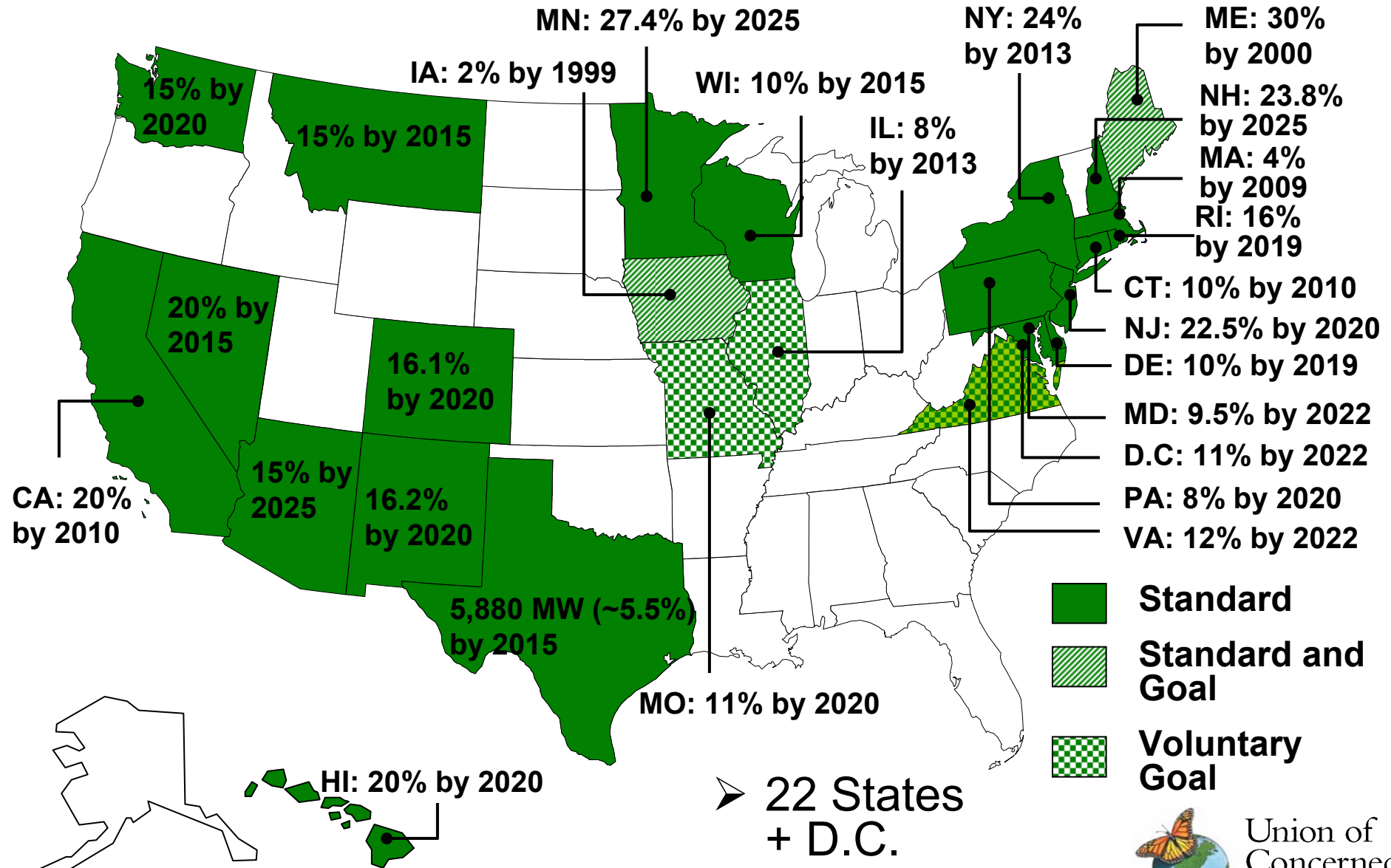


Background on Wind on the Wires

- **Organized** in 2001 to overcome the barriers to bringing wind power to market in the Midwest.
- **Members** include wind developers, turbine manufacturers, American Wind Energy Association (wind industry trade association), non-profit advocacy organizations, businesses that provide goods and services to the wind industry.
- **Work in 3 areas**: technical, regulatory, education/outreach
 - **Technical** – work with electric utilities and Midwest Independent System Operator (MISO – regional “grid” operator) on transmission planning for wind
 - **Regulatory** – involved in cases where states are approving new transmission lines that will advance wind power
 - **Education/outreach** – speak to many people and groups about our work and issues
- **Support** – Foundations and membership dues.



Renewable Electricity Standards



Barriers to Wind Development:

Transmission

The problem:

- Best wind resources far away from load
- Transmission system not designed to carry wind power long distances
- Where will the new wind farms be located?
- Who pays for new transmission?
- Who gets to use the capacity on the new lines?
- Chicken and Egg problem
- Timing – transmission takes longer to build than a wind farm

Barriers to Wind Development:

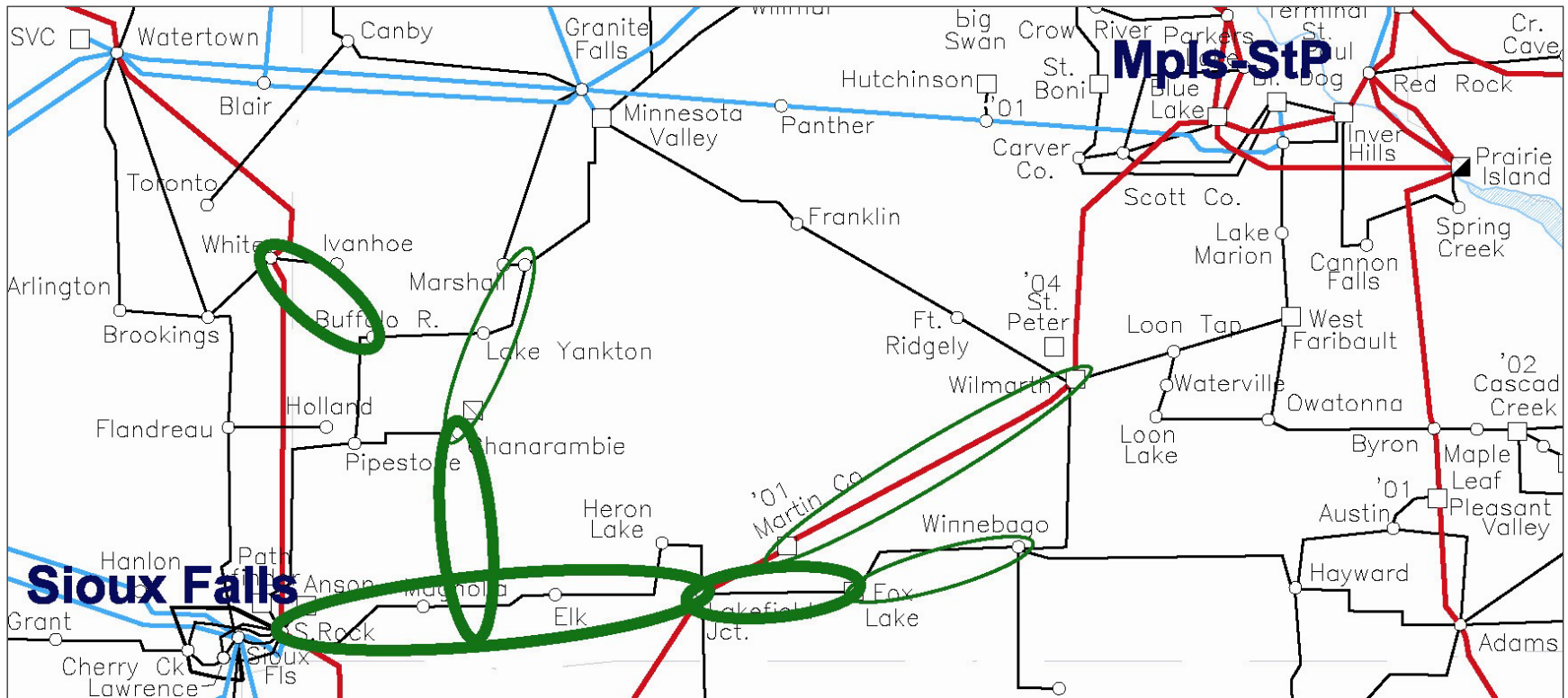
Transmission

The solution:

Integrated, aggregated, forward looking transmission planning

- **Integrated** – planning for wind power along with other generating resources
- **Aggregated** – large amount of wind power rather than one wind farm at a time
- **Forward looking** – plan infrastructure today for large amounts of wind power

New and Upgraded Transmission in SW MN for Wind Power



<u>New lines:</u>	Split Rock – Lakefield Junction*	345 kV
	Lakefield Junction – Fox Lake*	161 kV
	Nobles – Fenton – Chanarambie*	115 kV
	Buffalo Ridge – White*	115 kV
	Chanarambie – Lake Yankton – Lyon	115 kV
<u>Upgraded lines:</u>	Fox Lake – Winnebago	161 kV
	Martin Co – Wilmarth	345 kV

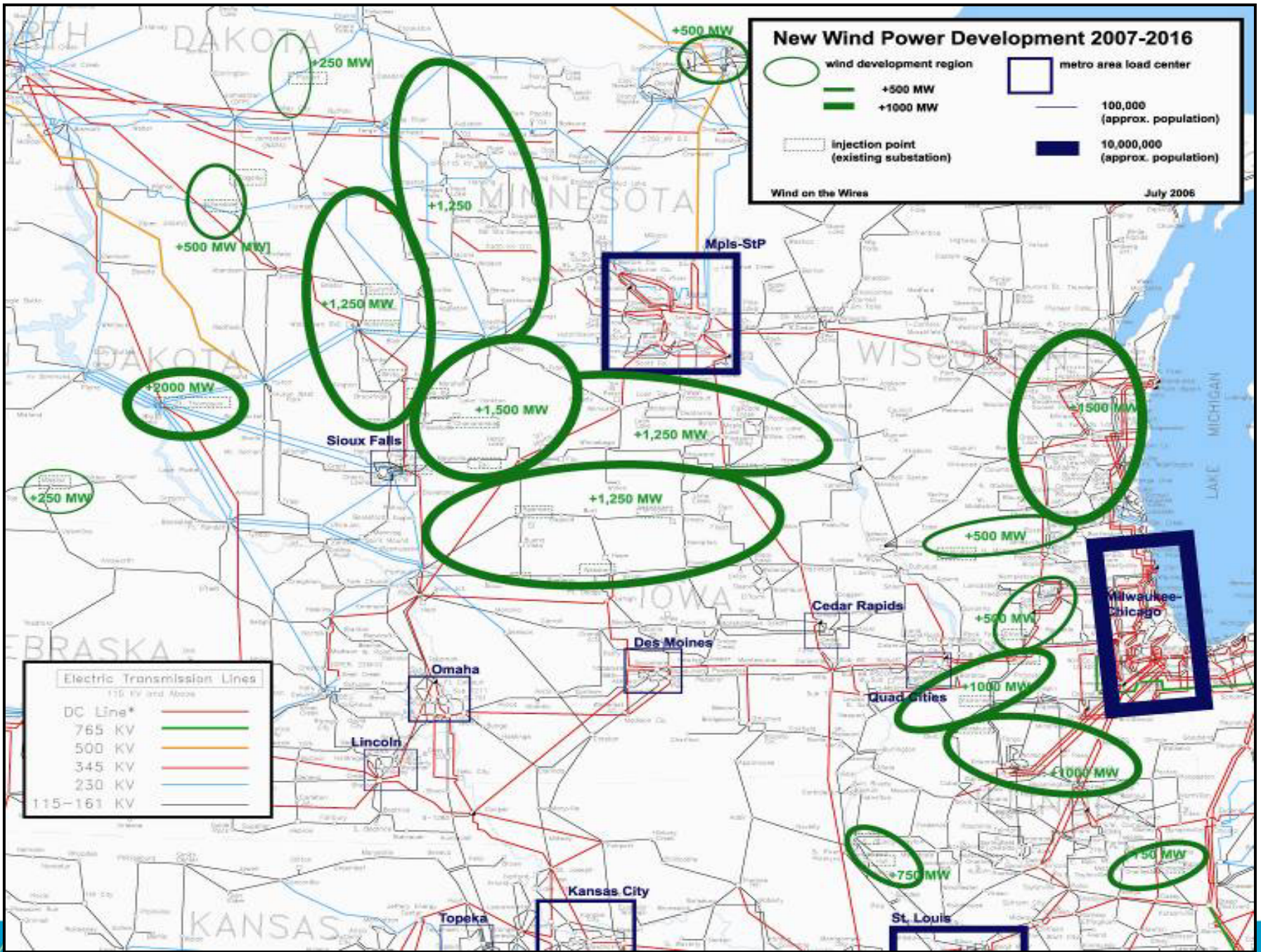
*Xcel Energy Certificate of Need, Minnesota Public Utilities Commission Decision 1/30/03

Evolution of MISO Transmission Planning

- **MISO Transmission Expansion Plan 2003**
 - Midwest Wind Development Plan – 10,000 MW wind
- **MISO Transmission Expansion Plan 2005**
 - Focus more on reliability
 - MISO Exploratory Studies for wind power
- **MISO Transmission Expansion Plan 2006**
 - Transmission for both reliability and economic (market) expansion
 - Studying transmission for 10% wind energy across MISO footprint (approx. 20,000 megawatts)

Evolution of MISO Transmission Planning

- MISO Transmission Expansion Plan **2007**
 - Base case includes all state renewable requirements
- MISO Transmission Expansion Plan **2008**
 - 4 “Futures scenarios” under development
 - High coal scenario
 - High renewables scenario (approx. 40,000 MW)
 - Environmental scenario
 - Constrained supply natural gas scenario



New Wind Power Development 2007-2016

- wind development region
- +500 MW
- +1000 MW
- metro area load center
- 100,000 (approx. population)
- 10,000,000 (approx. population)
- injection point (existing substation)

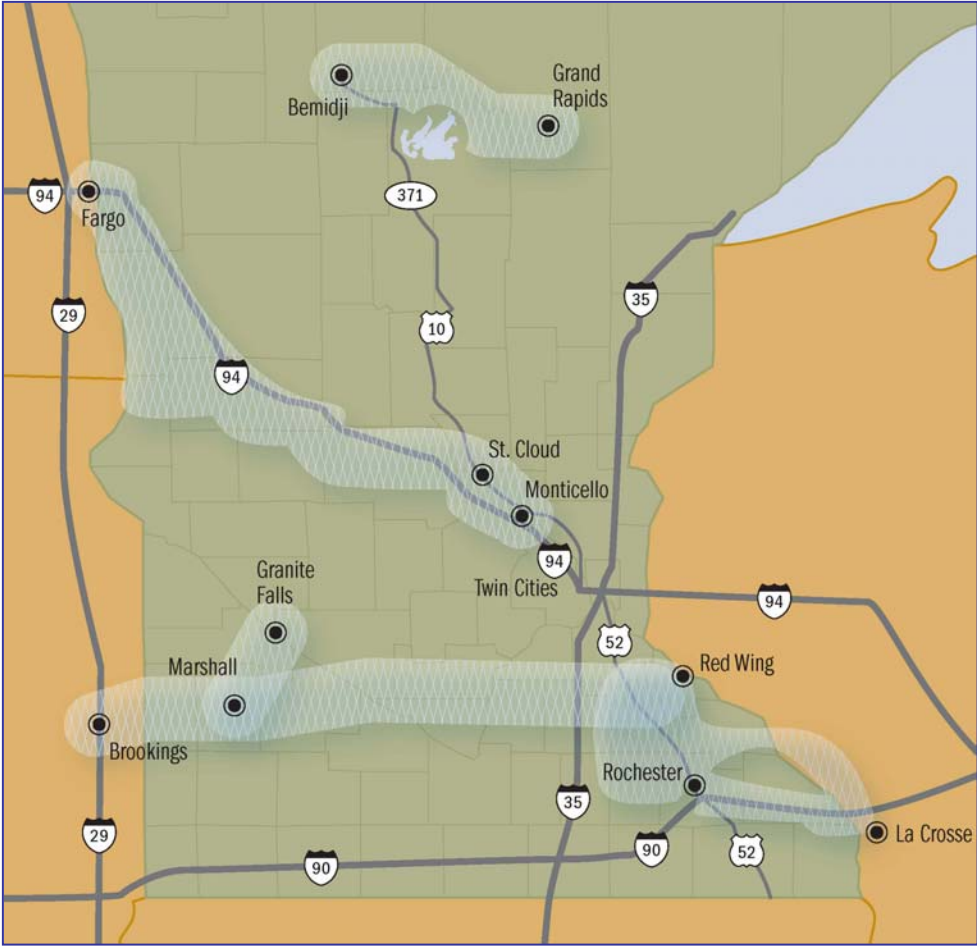
Wind on the Wires July 2006

Electric Transmission Lines

115 KV and Above

DC Line*	—
765 KV	—
500 KV	—
345 KV	—
230 KV	—
115-161 KV	—

CapX 2020 - Group 1 Lines



Michigan Wind Power and Transmission

- **Michigan's 21st Century Electric Energy Plan**
 - “Between 1,100 MW and 2,700 MW of new renewable generation could be available by 2015, mostly in the form of wind power.”
 - RPS of 10% by 2015; possibly 20% by 2025
- **Transmission Discussed in The Plan**
 - Issues with transmission in state and for import into the state
 - Tier I and Tier II; also ITC/AEP study of 765 loop through lower Michigan

Michigan Wind Power and Transmission

- **Recommendation:**

- *Scope a proactive transmission study for wind*

- An aggregated amount of MW based on likely RPS
 - Predevelopment work on wind farms
 - MISO generator interconnection queue
 - Wind resource map
 - Existing transmission lines
 - Select likely delivery points
 - Both load flow and Promod work
 - Participants include MISO, utilities, independent transmission companies, wind developers, agency staff, other stakeholders, etc.

Michigan Wind Power and Transmission

- **Recommendation continued:**
 - *Study process should include a technical group that can discuss and agree on correct technical inputs so the outcome is credible*
 - *State regulators need to understand the study results*
 - *A utility or independent transmission company separately or jointly construct the facilities*
 - *State transmission facilities need to be compatible with the larger regional transmission plan*
 - ***Don't delay - start today!***

Contact Information

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