

Transmission + Renewable Energy

The Perfect Couple



Where We're Going

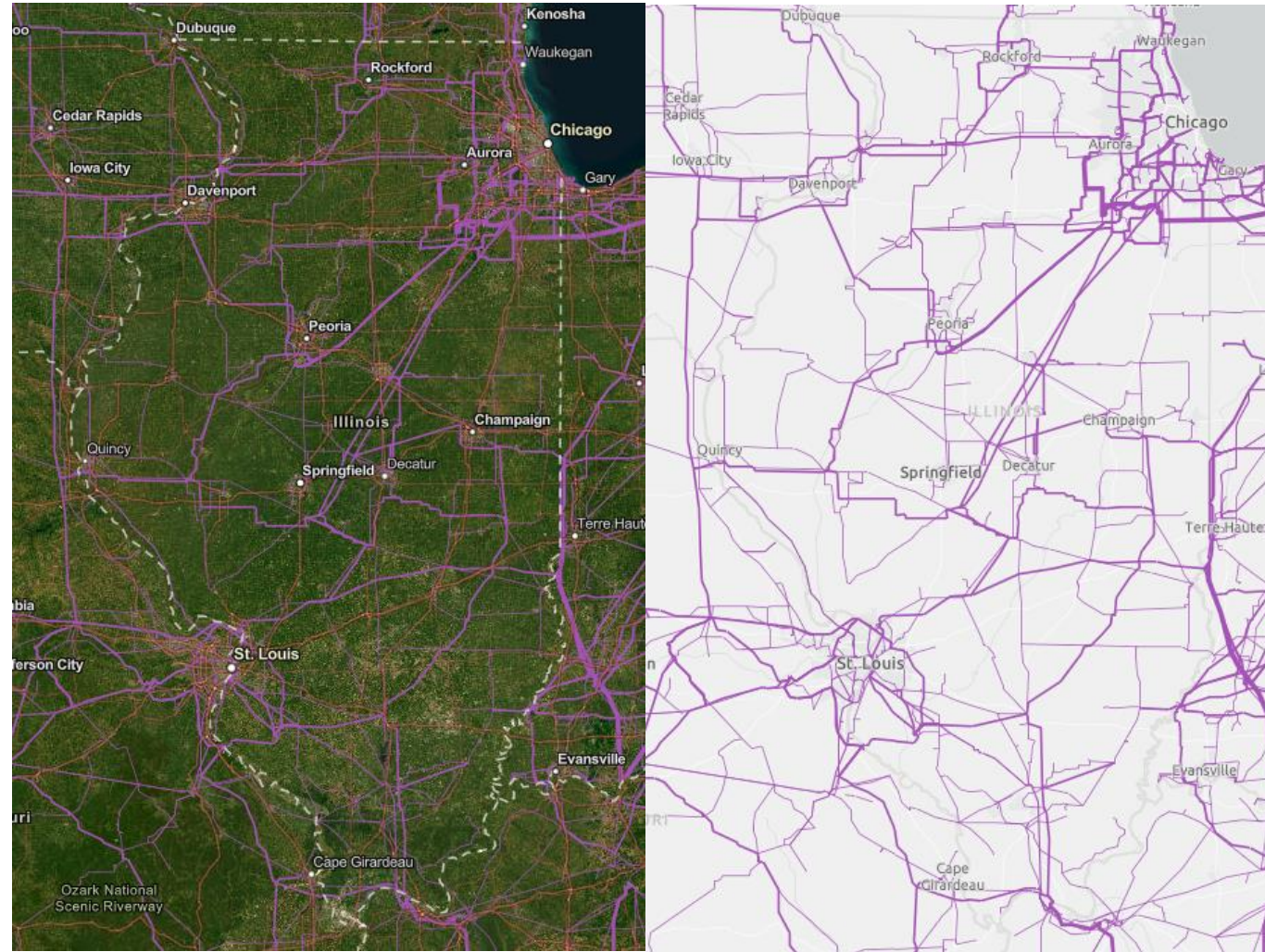
1. Terminology
2. Current Tx System in Illinois/Midwest
3. Why Tx and Renewables are the perfect couple
 1. Geographic mismatch between renewables and load
 2. Congestion raises renewable prices
 3. Capacity and reliability benefits
 4. Deep Decarb (80%+) Requires all-of-the above
4. How do we do it? (Time Permitting)

Terminology

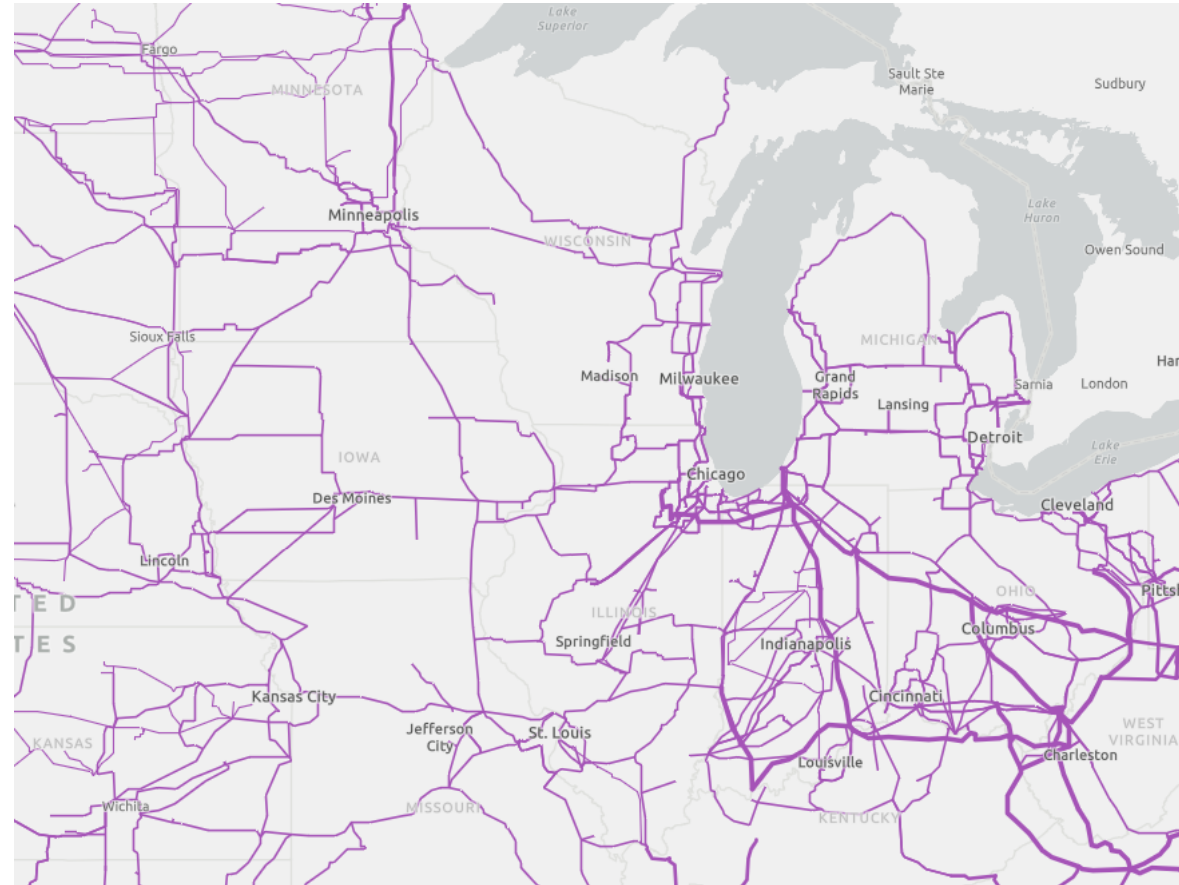
- Transmission = Voltage of 138kV +
- Subtransmission = 69kV or 34.5 kV (distribution-level)
- Regional transmission = within an RTO (MISO/PJM)
- Interregional = between RTOs
- “Local” or “bottom-up” transmission = proposed by Transmission Owner, generally for reliability purposes.



Lay of the Land: High Voltage Tx in Illinois



Lay of the Land: High Voltage Tx in the Midwest



Studies Show We Need More Tx to Meet CO2 Goals

- REPEAT Project from Princeton: “Over 80% of the potential emissions reductions delivered by IRA in 2030 are lost if transmission expansion is constrained to 1%/year, and roughly 25% are lost if growth is limited to 1.5%/year.”
https://repeatproject.org/docs/REPEAT_IRA_Transmission_2022-09-22.pdf
- NRDC: “interregional transmission (i.e., transmission between different balancing authorities) capacity doubles, then triples, then quadruples from today’s levels in each subsequent decade leading to 2050 (Figure 7).” <https://www.nrdc.org/sites/default/files/2023-04/clean-energy-pathways-net-zero-2050-report.pdf>

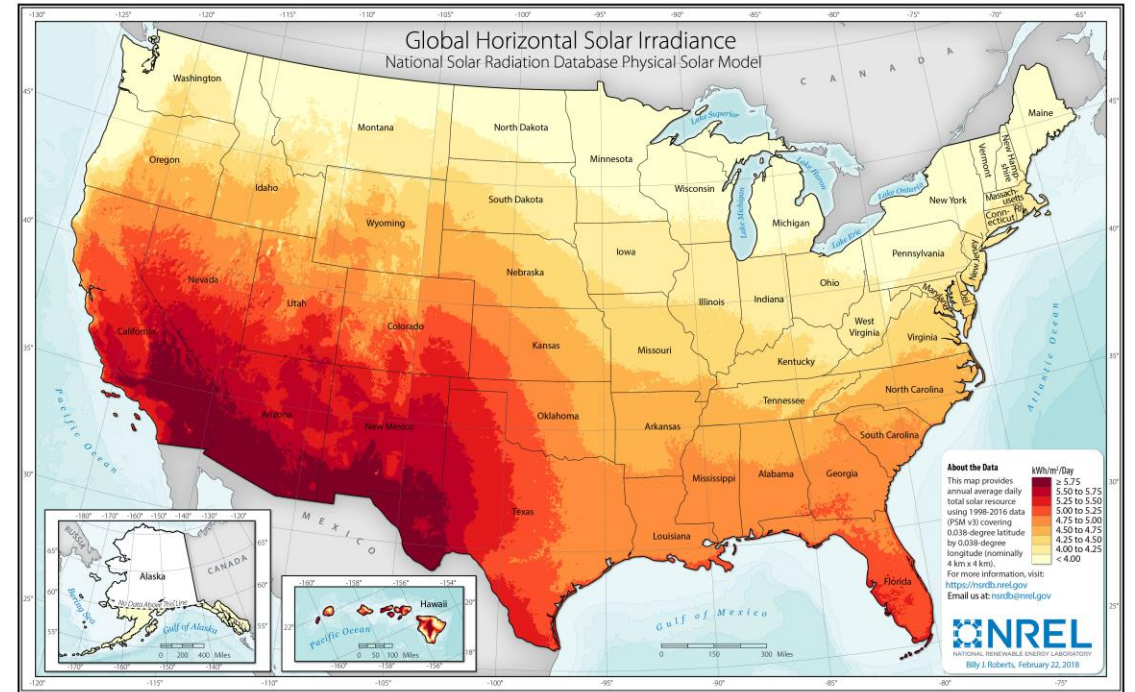
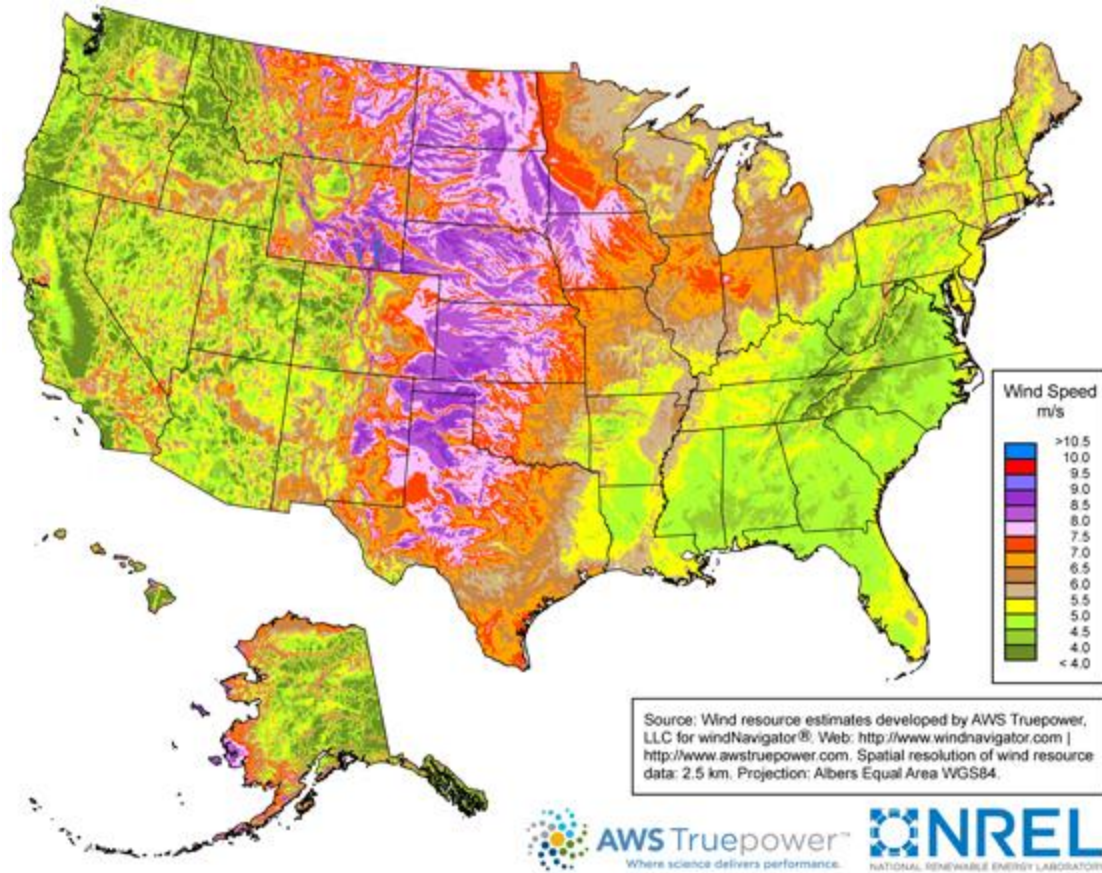


Why Transmission and Renewables are the Perfect Couple

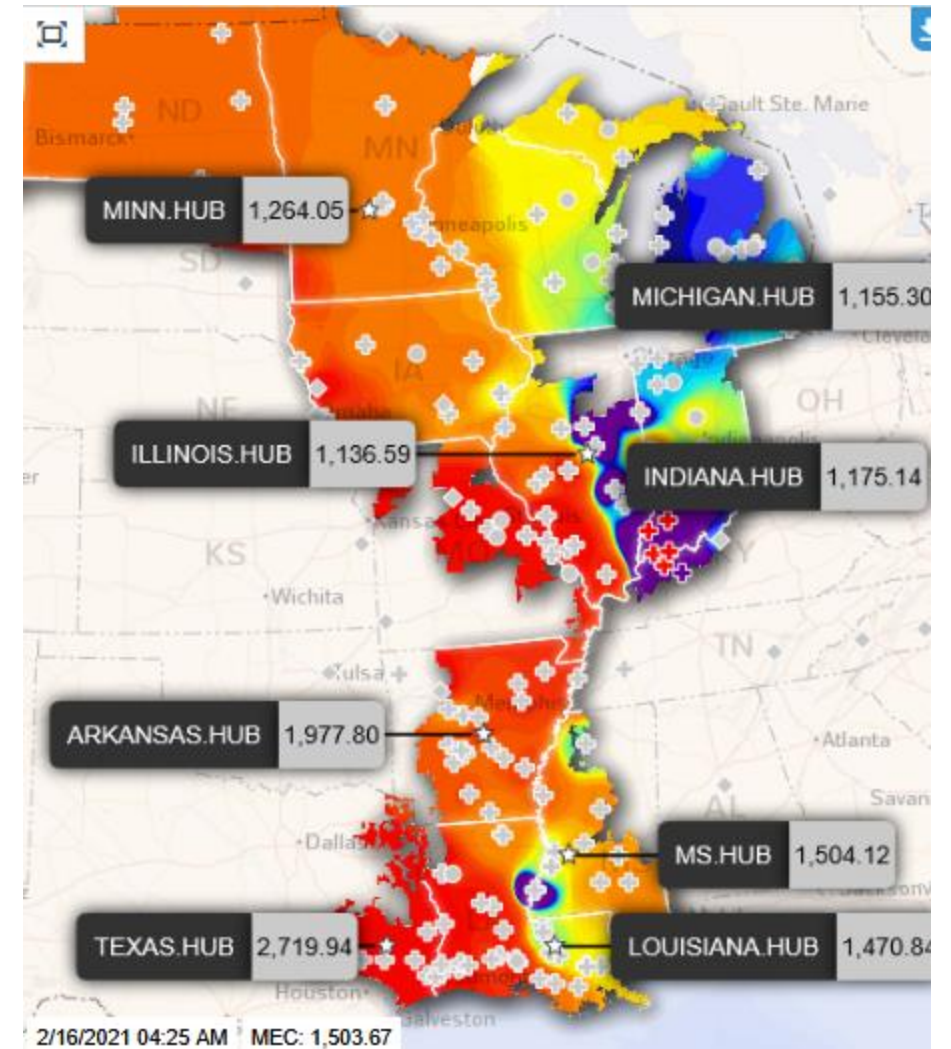
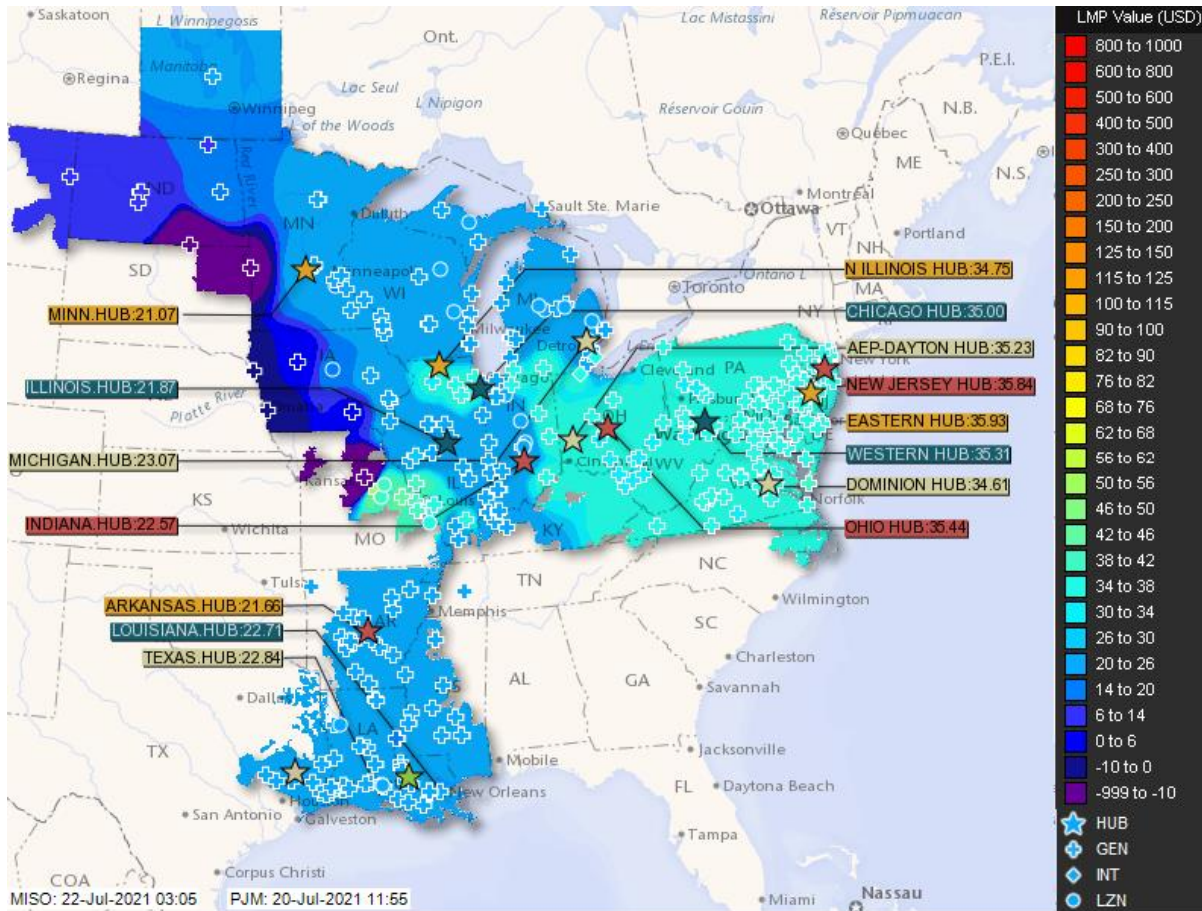


1. Geographical mismatch between renewable energy resources & load
 - Transmission -> lower costs
 - Renewables need land!
2. Capacity & reliability benefits of having widely dispersed resources
 - Less correlation between similar resources
 - Insurance policy
3. Deep decarbonization requires an all-of-the-above mindset

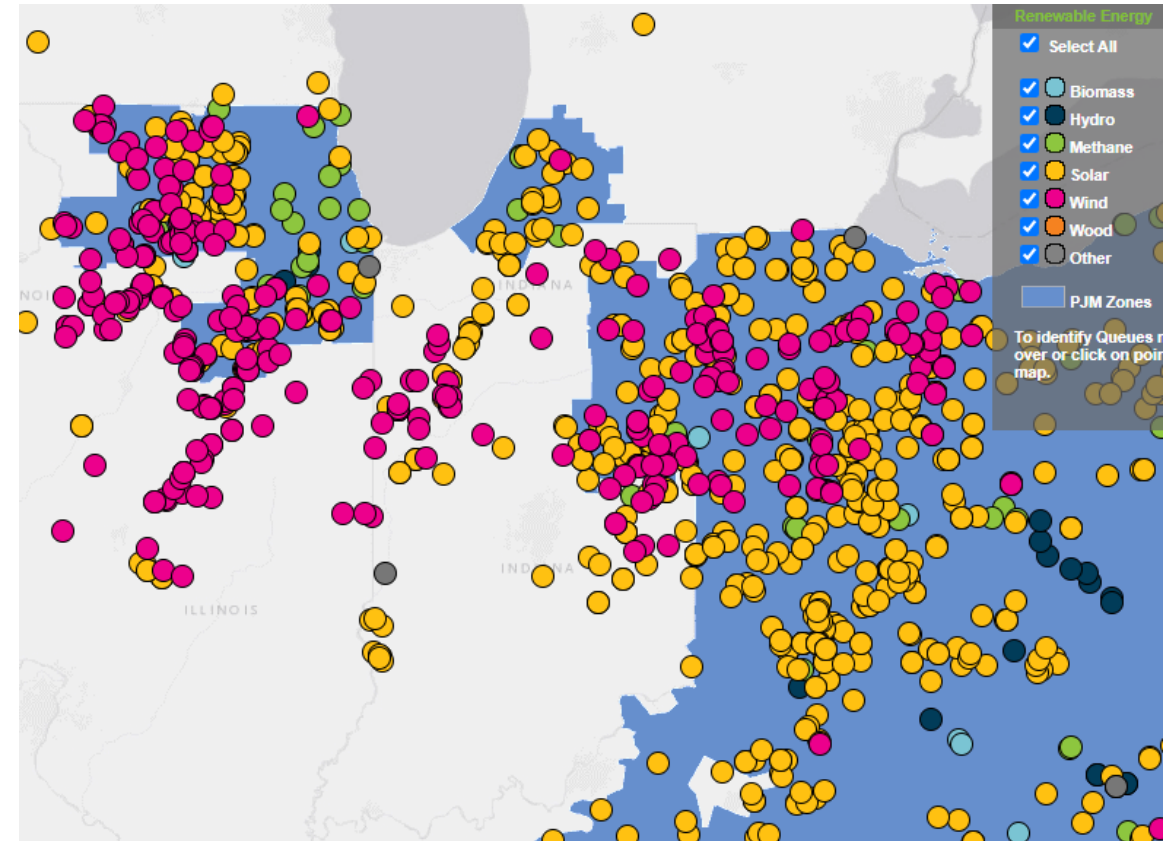
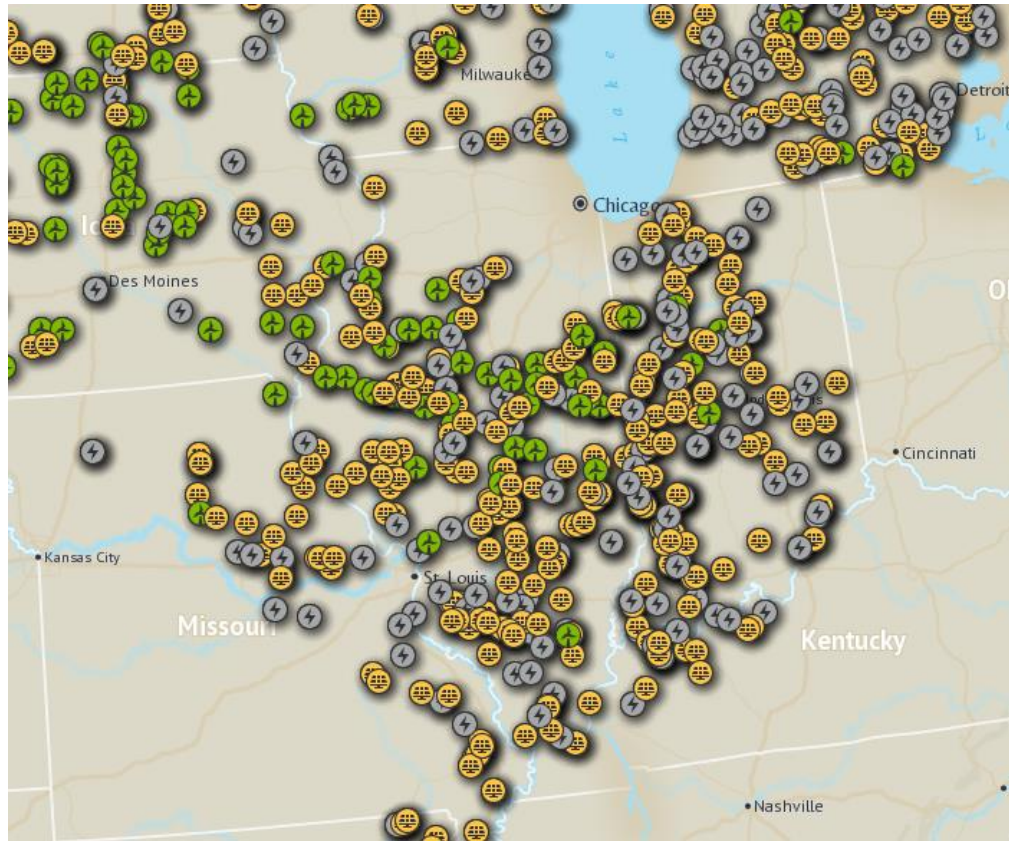
Geographic Mismatch



Insufficient Transmission Leads to Congestion and Inefficient Pricing

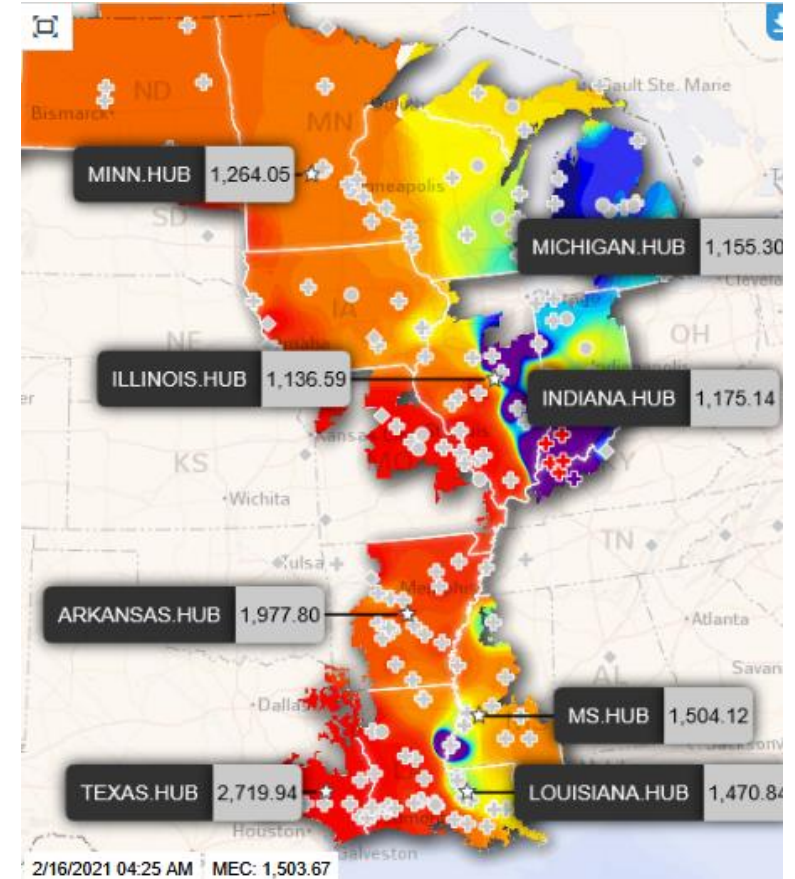


Congestion Contributes to Long Interconnection Queues



Capacity & reliability benefits of having widely dispersed resources

Making the grid bigger than the weather will become even more important as wind and solar provide a larger share of our electricity.¹³ Just as transmission helps cancel out the localized impact of severe weather events, it also captures geographic diversity in wind and solar output across larger regions. This reduces the variability of wind and solar output and ensures a higher level of dependable output during periods of peak need. Transmission also captures complementary output profiles between wind and solar resources in different regions on a daily and seasonal basis. For example, transmission will allow the Southeast to export solar power to the Midwest during the day and during summer months, and then import wind energy from the Midwest at night and during the winter.¹⁴



Source: M. Goggin and Z. Zimmerman, “The Value of Transmission During Winter Storm Elliot,” ACORE (Feb. 2023).

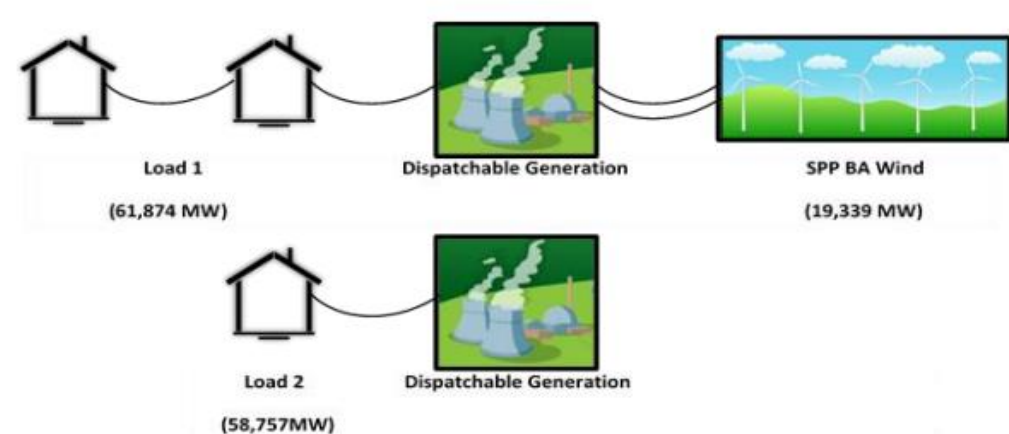
<https://acore.org/wp-content/uploads/2023/02/The-Value-of-Transmission-During-Winter-Storm-Elliott-ACORE.pdf>

ELCC – Effective Load Carrying Capacity

ELCC Class Ratings for the 2026/2027 Base Residual Auction

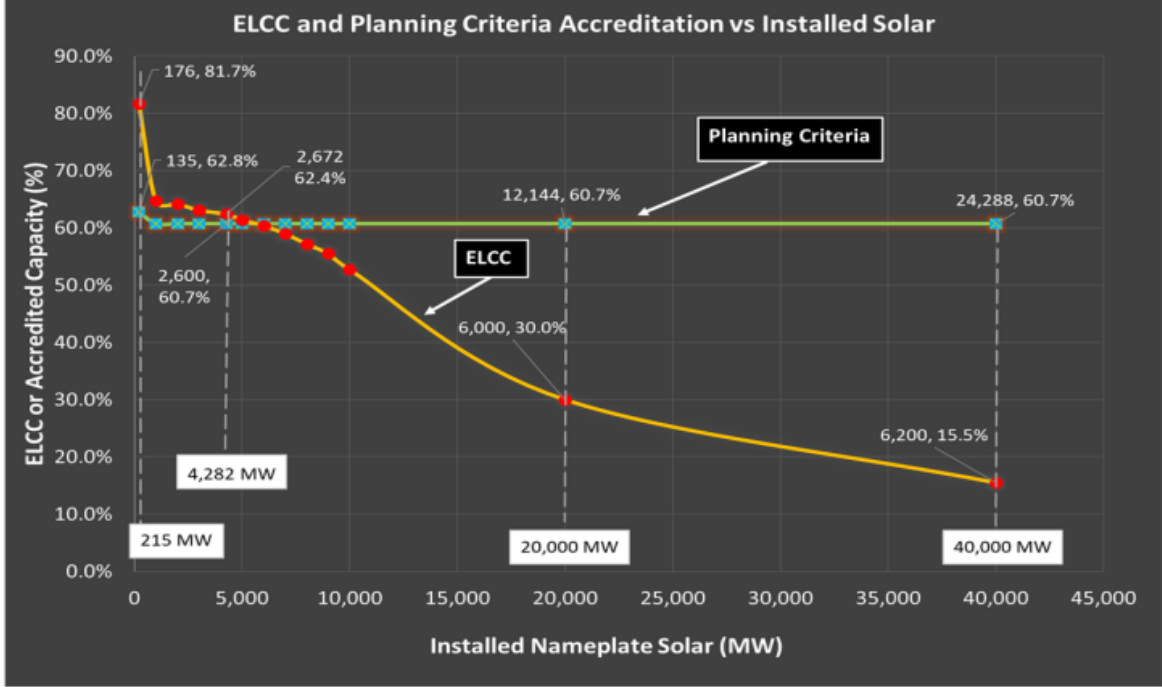
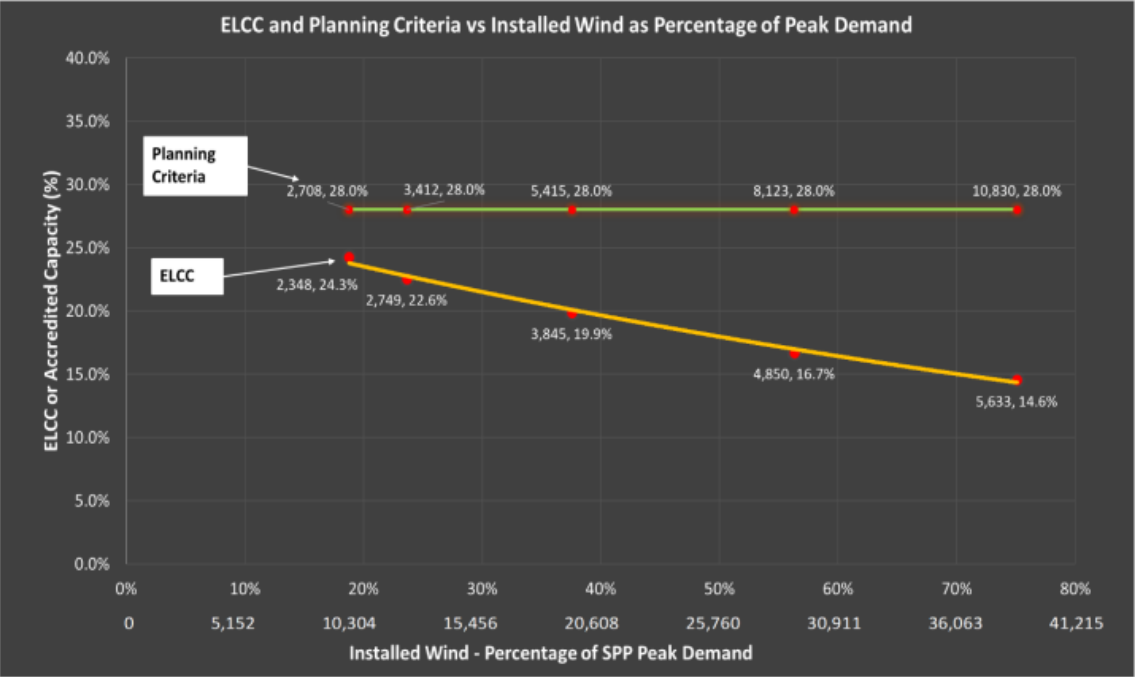
The following table provides the ELCC Class Ratings applicable to the 2026/2027 Base Residual Auction (BRA).

	2026/2027 BRA ELCC Class Ratings
Onshore Wind	34%
Offshore Wind	61%
Fixed-Tilt Solar	8%
Tracking Solar	13%
Landfill Intermittent	54%
Hydro Intermittent	38%
4-hr Storage	57%
6-hr Storage	65%
8-hr Storage	68%
10-hr Storage	78%
Demand Resource	74%
Nuclear	95%
Coal	84%
Gas Combined Cycle	78%
Gas Combustion Turbine	68%
Gas Combustion Turbine Dual Fuel	79%
Diesel Utility	91%
Steam	74%



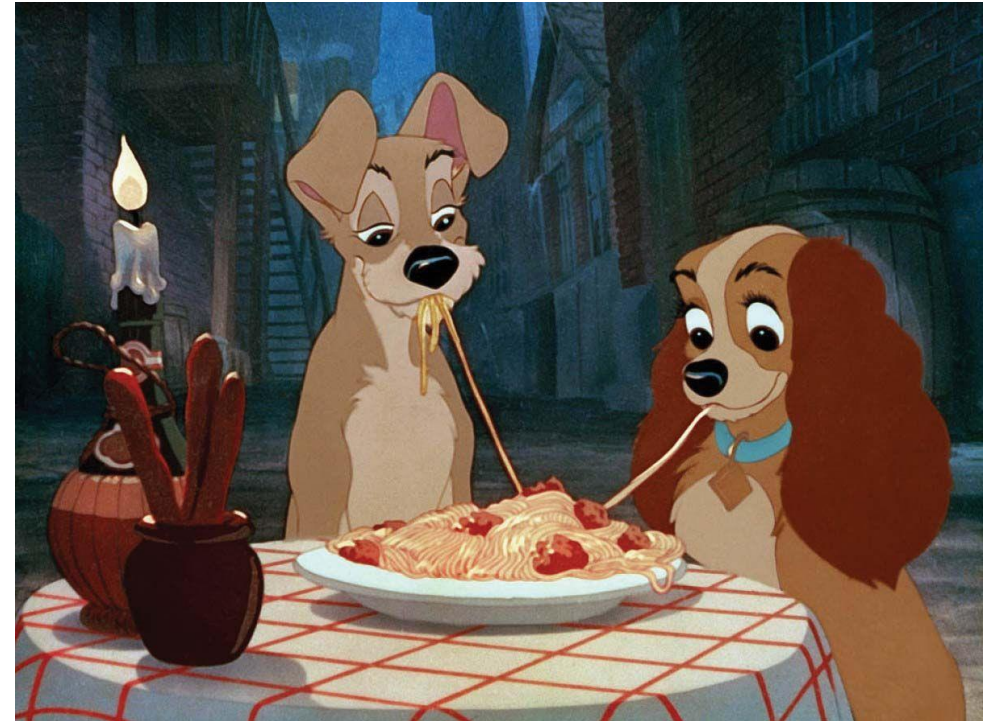
Difference = 3,117 MW / 19,339 MW. ELCC = 16.1%
Assumes Loss of Load Expectation of 1 day in 10 years

ELCC Decreases as Capacity Increases



Deep Decarb Requires an All of the Above Mentality

- Rooftop solar, storage, community solar, onshore wind, offshore wind, etc.
- MISO found that 30% renewables possible with existing system, using distributed generation, etc.
- 80%+ would need major transmission expansion



What/How?

- Regional & Interregional Planning
 - FERC Order No. 1920 and beyond
 - MISO LRTP
- Grid-Enhancing Technologies and High-Performance Conductors
- HVDC

Get in Touch

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