



CLEAN LINE

ENERGY PARTNERS



New Transmission, Carbon,
and
Finding a Path Forward

ELPC April 2010



Who is Clean Line Energy Partners?

- ❖ Clean Line Energy Partners (Clean Line) is a project development company focused on developing long haul, high voltage direct current (HVDC) transmission lines across the US connecting the best renewable resources in the country with load
- ❖ Clean Line Energy Partners has financial backing from ZBI Ventures (a subsidiary of Ziff Brothers Investments), the Zilkha family, founders of Horizon Wind Energy, and the Clean Line management team.
- ❖ Clean Line is 100% independent with no ownership ties to power generation companies or incumbent utilities
- ❖ Upper Midwest: Currently developing 500-600kV DC line from South Dakota/Nebraska to Chicago, ~\$2 billion, 3500 MW of capacity utilizing ~4000+ MW of wind

What Is the Environmental Goal?

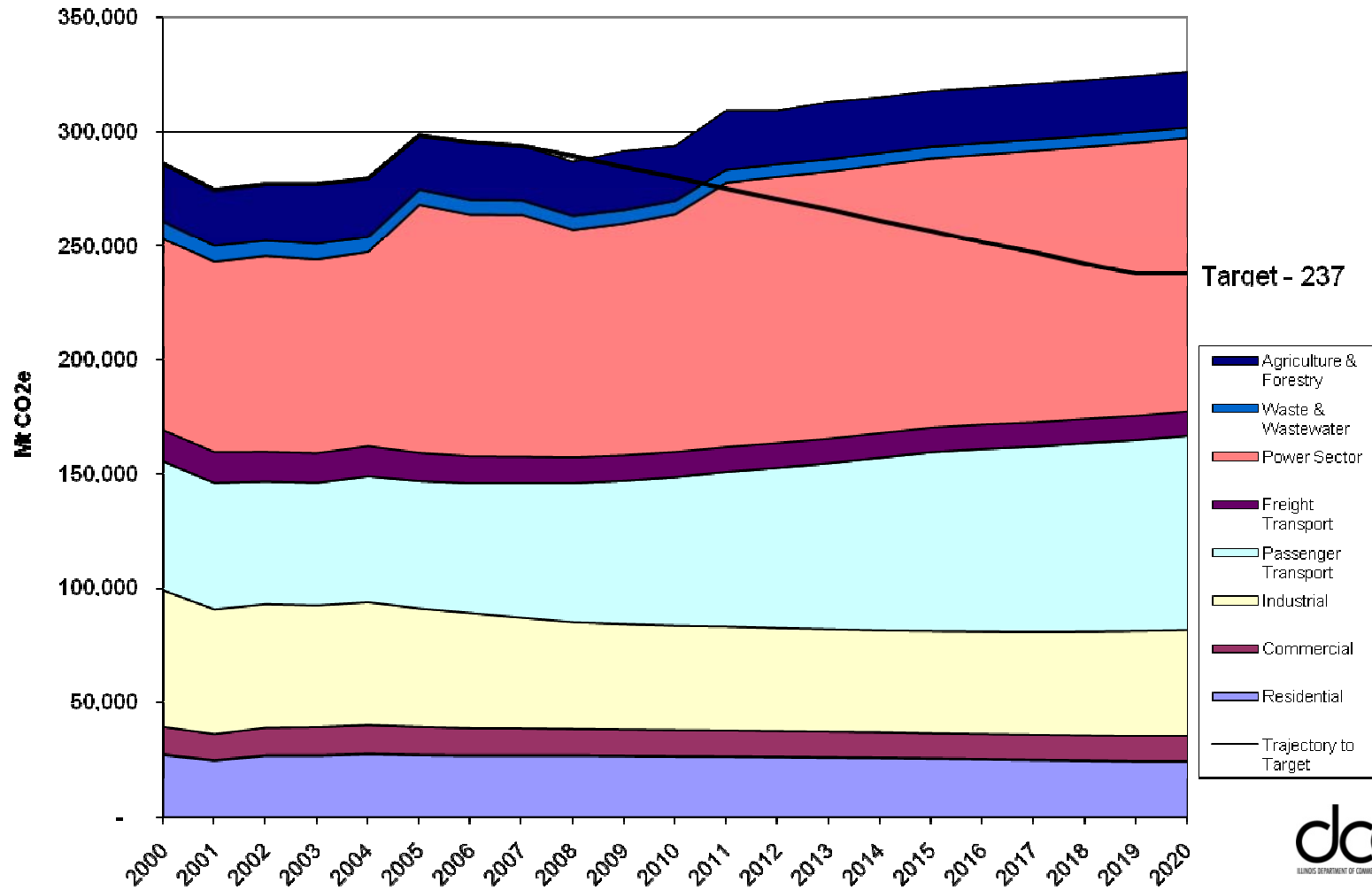
- ❖ 80% Reduction in CO₂ by 2050
- ❖ Consistent with the Intergovernmental Panel on Climate Change
- ❖ Consistent with Stern Report
- ❖ Consistent with UN Framework Convention on Climate Change

How do we get there?

- ❖ One Example: Illinois Climate Change Action Plan
 - ❖ Seeking just to get back to 1990 levels by 2020 requires 16% reduction from 2007 levels and 26% reduction by 2020 based on a business as usual
 - ❖ State process to figure out how to get there found that if you throw in everything from 25% by 2025 RPS to EEPS to no till farming to LCFS improved curbside recycling to the kitchen sink, you still don't get there unless you also add Cap and Trade. So we've got to do it all.
 - ❖ That means we actually need to get to 25% renewables by 2025, and a lot more after that...

Illinois Greenhouse Gas Emissions

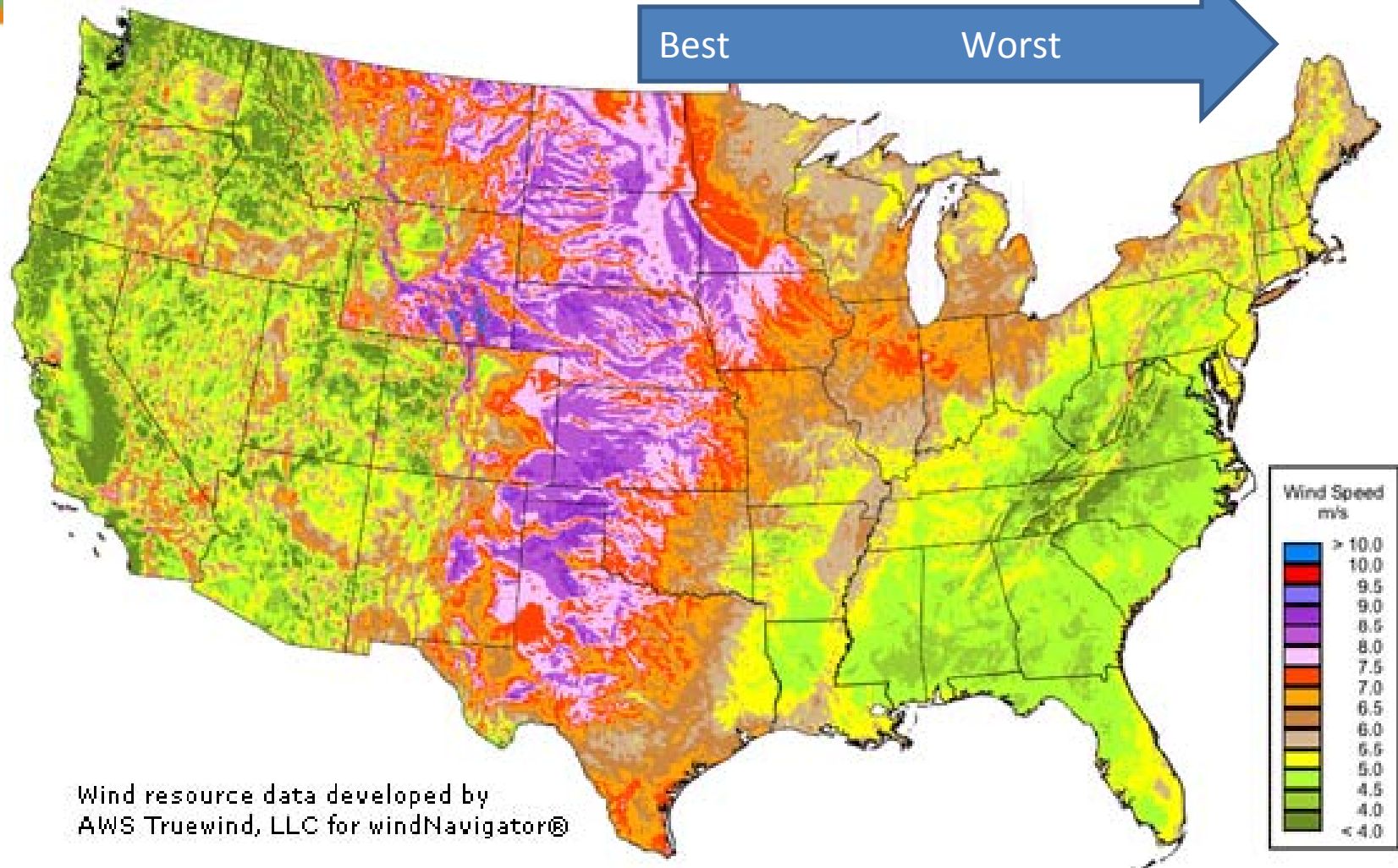
Illinois GHG Emissions - Reference Case



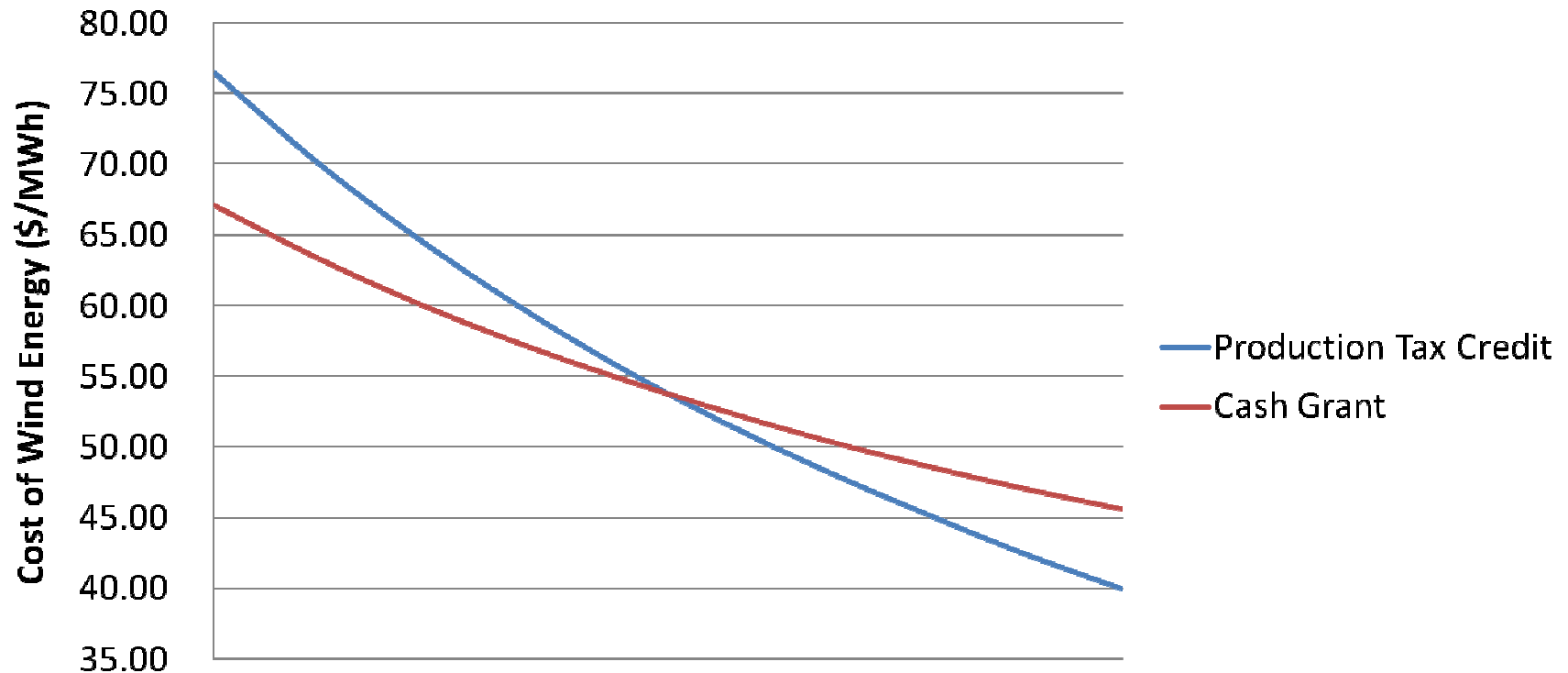
Do We Need Transmission for Renewables Goals?

❖ Two Approaches

Eastern Interconnect Onshore Wind Resource Falls Off Considerably



With Serious Implications for the Competitiveness of Wind Power



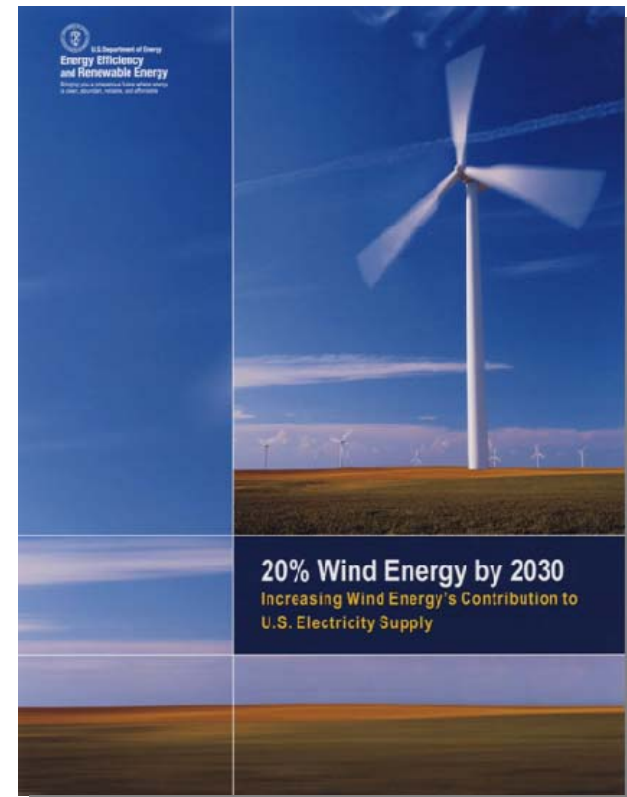
NCF 28% 30% 32% 34% 36% 38% 40% 42% 44% 46%

Approx. Range by State
 OH IN IL IA SD/ND/NE

Assumes Onshore \$2000/kw installed cost for wind

How Much Renewable Energy Do We Need? How Much Do We Have?

- ❖ U.S. Dept. of Energy: “20% Wind by 2030” report
 - ❖ Need 305GW by 2030
- ❖ LBNL: Currently 90% of State RES compliance is Wind
 - ❖ That is likely to decline
- ❖ AWEA: currently ~35GW of wind operating in U.S.
 - ❖ Built 10 GW in 2009
 - ❖ Built 8.3 GW in 2008



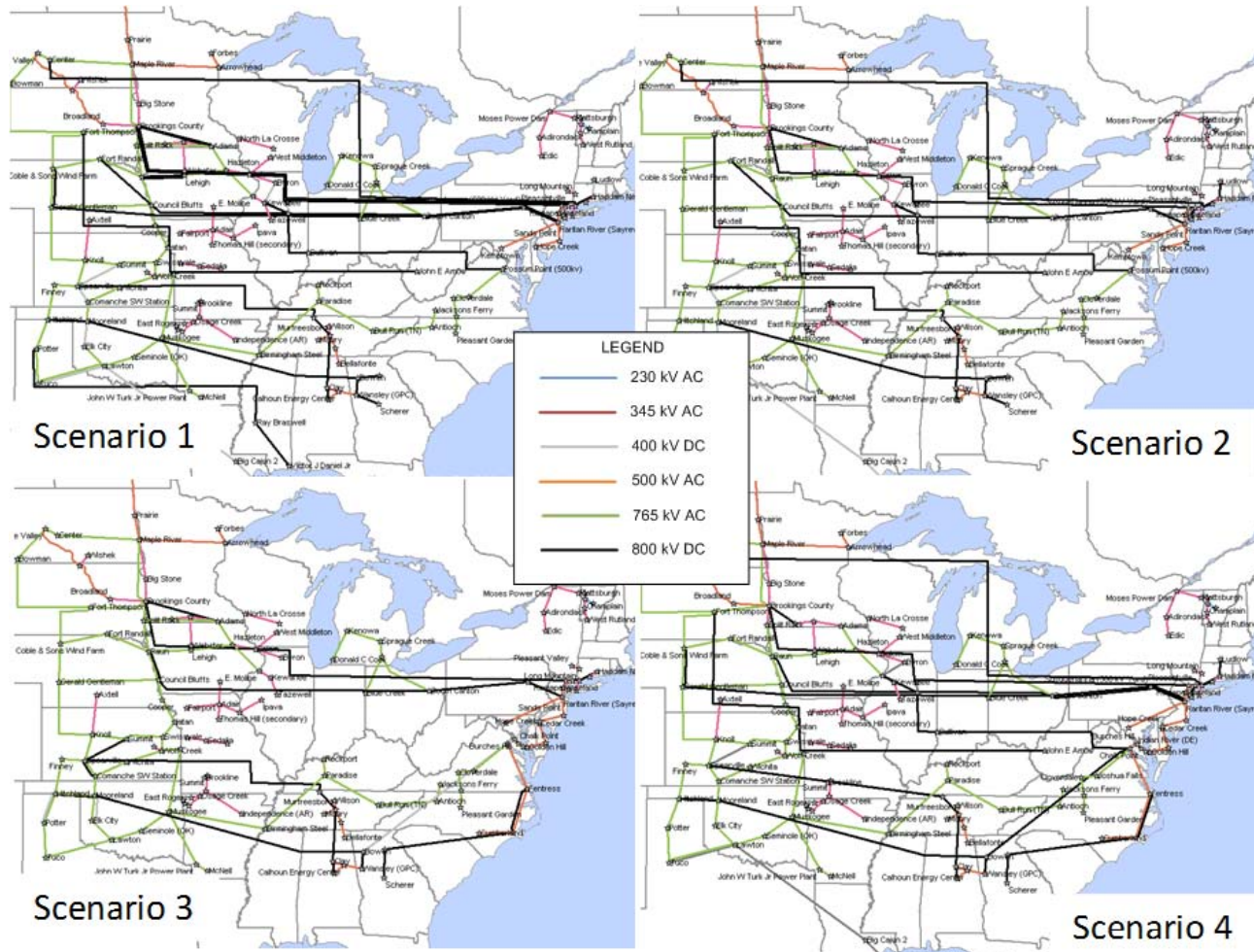
Black & Veatch Transmission Analysis

- ❖ Planned long distance lines = 70 GW of wind by 2015;
 - ❖ Likely capacity closer to 35 GW
- ❖ Existing Transmission Capacity estimated 18 GW
- ❖ “Local” Wind estimated at 3 GW annually (60 GW by 2030)
 - ❖ Requires minimal or no transmission upgrades
- ❖ Coal retirements should free up 10 GW of transmission
 - ❖ Based on calculating wind resource within 25 miles of retiring plants
 - ❖ Most of this capacity is in later years (post 2020)
 - ❖ Carbon may accelerate retirements
- ❖ Net Gap For 20% Goal **~163 GW**

Carbon and Transmission: EWITS

- ❖ NREL: Eastern Wind Integration Study, 2010, included 5 scenarios for modeling:
 - ❖ Scenario 1: 20% wind, capturing high on-shore capacity factors in the Great Plains
 - ❖ Scenario 2: 20% wind, “hybrid”, some Great Plains, some offshore
 - ❖ Scenario 3: 20% wind, local wind and aggressive offshore
 - ❖ Scenario 4: 30% wind, aggressive everything, build it all
 - ❖ Reference: enough to meet state RES goals based on what is currently in queues (6% by 2024).

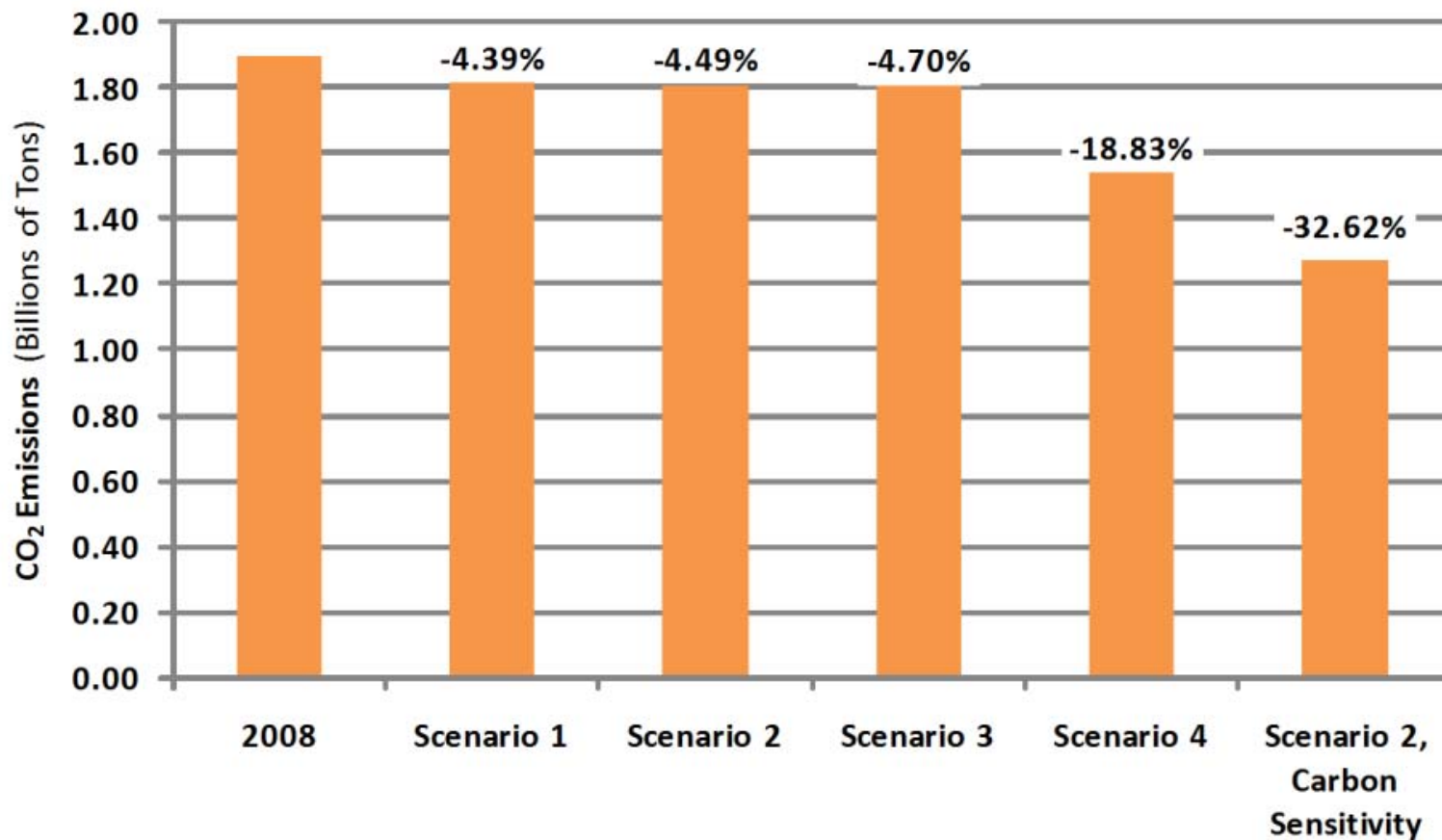
EWITS: All Scenarios Need New Transmission



EWITS: Key Findings

- ❖ New Transmission Required for All Scenarios, including the Reference
- ❖ Transmission reduces the impacts of the variability of wind, effectively adding capacity value, as wind is blowing somewhere
- ❖ “Carbon reductions in the three 20% wind scenarios do not vary by much, indicating that wind displaces coal in all scenarios and that coal generation is not significantly exported from the Midwest to the eastern United States”
- ❖ “Carbon emissions are reduced at an increased rate in the 30% wind scenario as more gas generation is used to accommodate wind variability.”

EWITS: Carbon Emissions



EWITS: Carbon Emissions

- ❖ Why?
- ❖ Coal does not ramp well
- ❖ If wind is getting PPAs to meet national RES, wind fills up the base markets and new lines
- ❖ Only opportunities for coal are peaking markets (when wind does not blow), which they already have or they'd already be closed

Conclusions

- ❖ If new transmission is accompanied by markets for wind, new transmission does not create significant new opportunities for coal
- ❖ Federal legislation supporting transmission not politically viable without broader package supporting renewables anyway
- ❖ Opposing new transmission will kill wind and derail progress on meeting carbon goals
- ❖ Other ways to reduce coal without collateral damage to RE are available
- ❖ Find your path tomorrow, but first:
DO NO HARM



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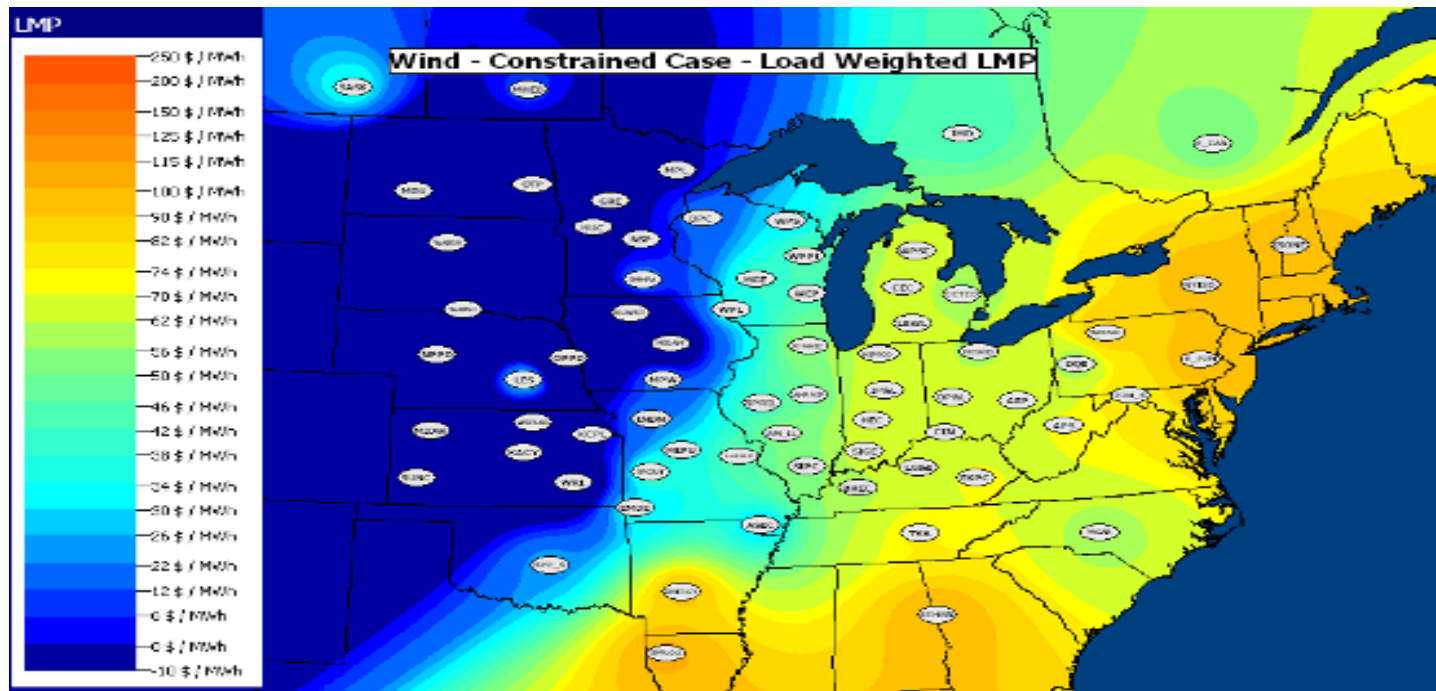
Thank You!

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High Wind Penetration Will Move Prices of Energy



* 20% Wind Full Constrained Case - Annual Load Weighted LMP - Source: Joint Coordinated System Plan, 2009

- ❖ Low LMP's for wind in rich resource areas is driving down the value of wind already, making the financing of new projects especially challenging
- ❖ Transmission is required to move energy out of wind saturated markets where renewables will move LMPs

Best Wind Resources Located in the Weakest Transmission Systems

