

Andrew Gohn

Eastern Region Director of State Policy

American Wind Energy Association

NASEO



The American Wind Energy Association (AWEA) is the national trade association for the U.S. wind industry – the country’s fastest growing energy industry.

With thousands of wind industry members and wind policy advocates, AWEA has been promoting wind energy as a clean source of electricity for American consumers since 1974.

Wind now powers 5.5% of America, 25 million homes' worth

Top states at start of 2017:

Texas (21,044 MW)

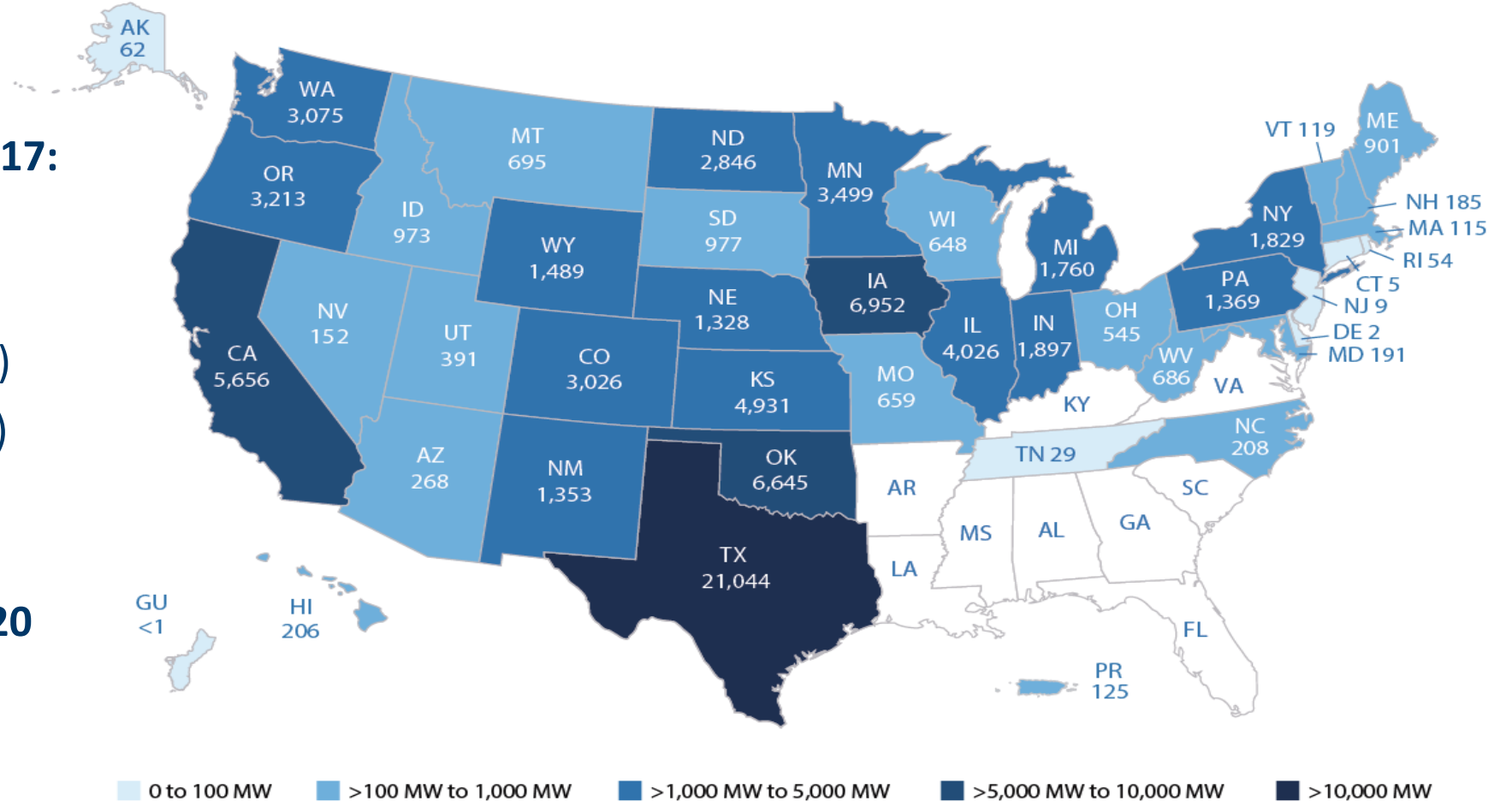
Iowa (6,952 MW)

Oklahoma (6,645 MW)

California (5,656 MW)

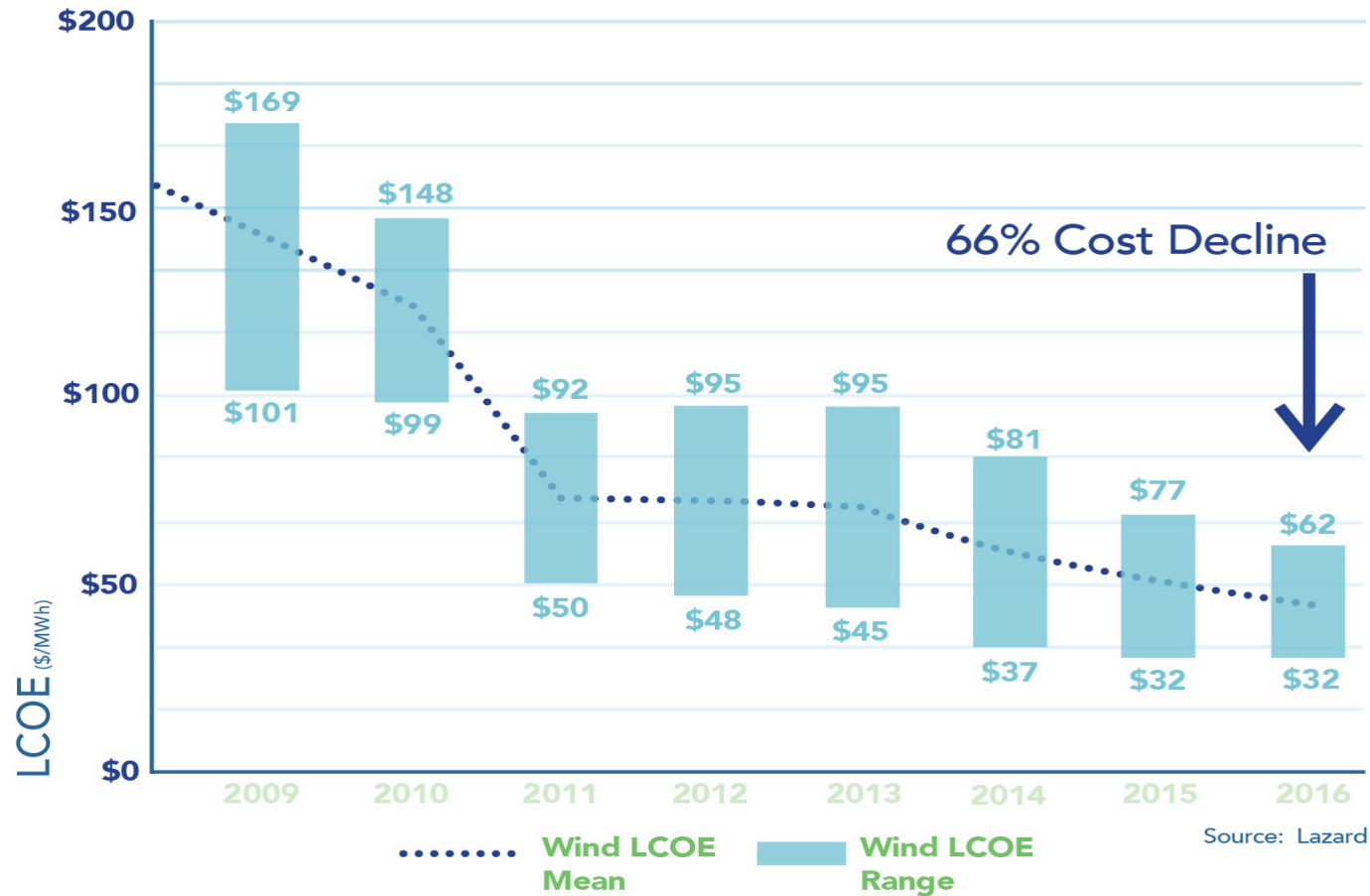
Kansas (4,931 MW)

On track for 10% by 2020





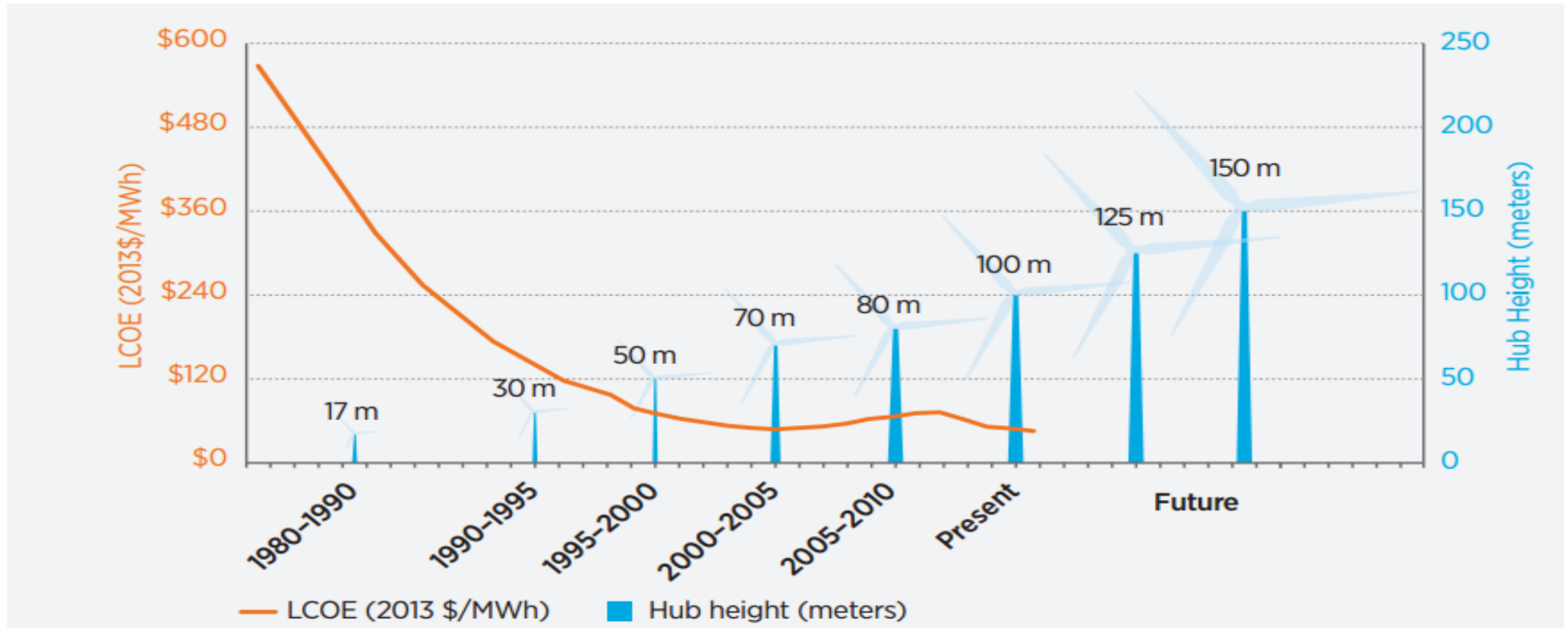
Wind energy is on sale in America: 66% off



Reasons for falling wind costs include

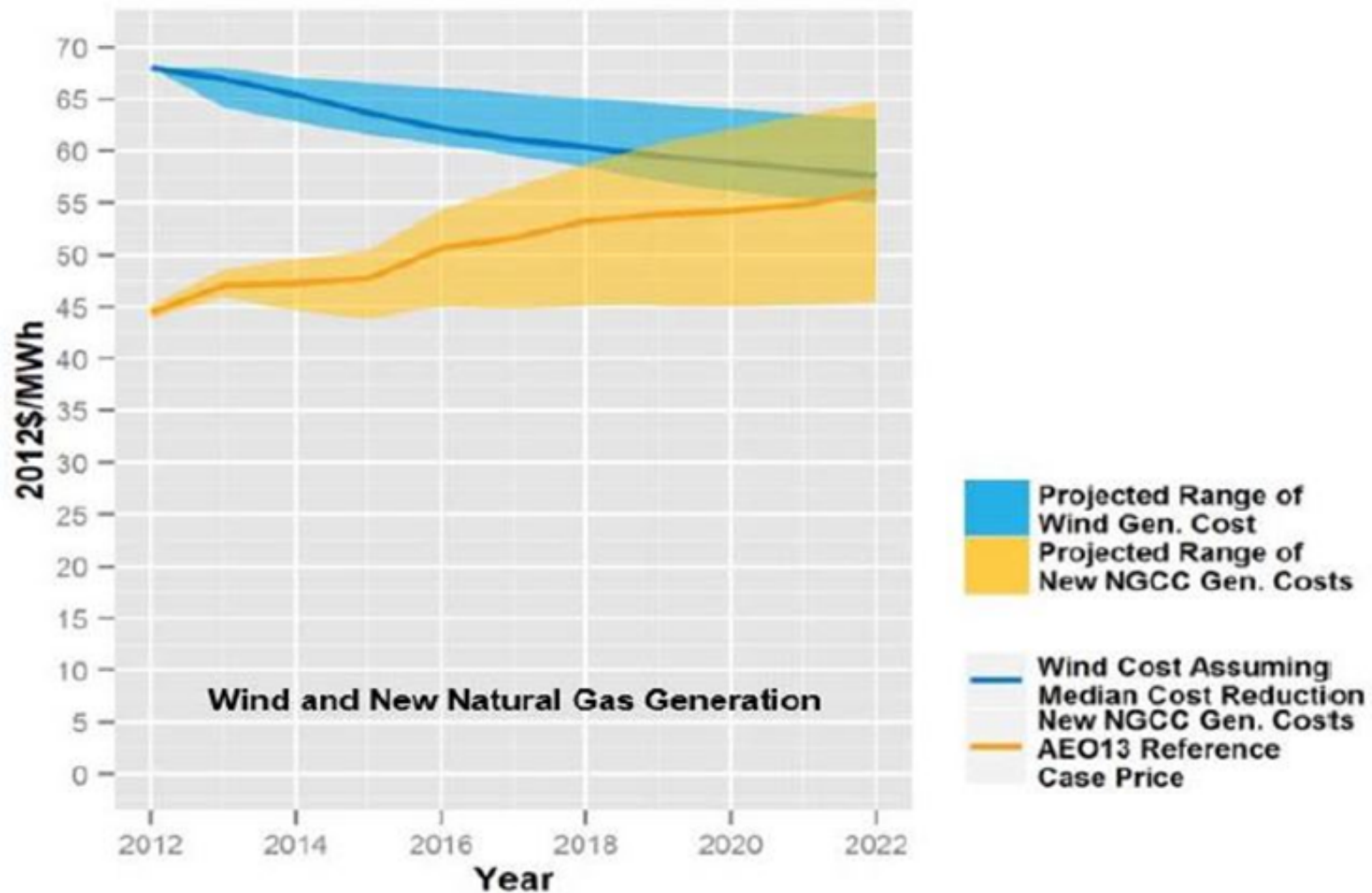
- Economies of scale (turbines, companies)
- Technology accessing higher winds
- Optimized siting
- Predictive O&M
- More transmission
- U.S. manufacturing
- Policies more predictable

Cost of wind power falling with economies of scale



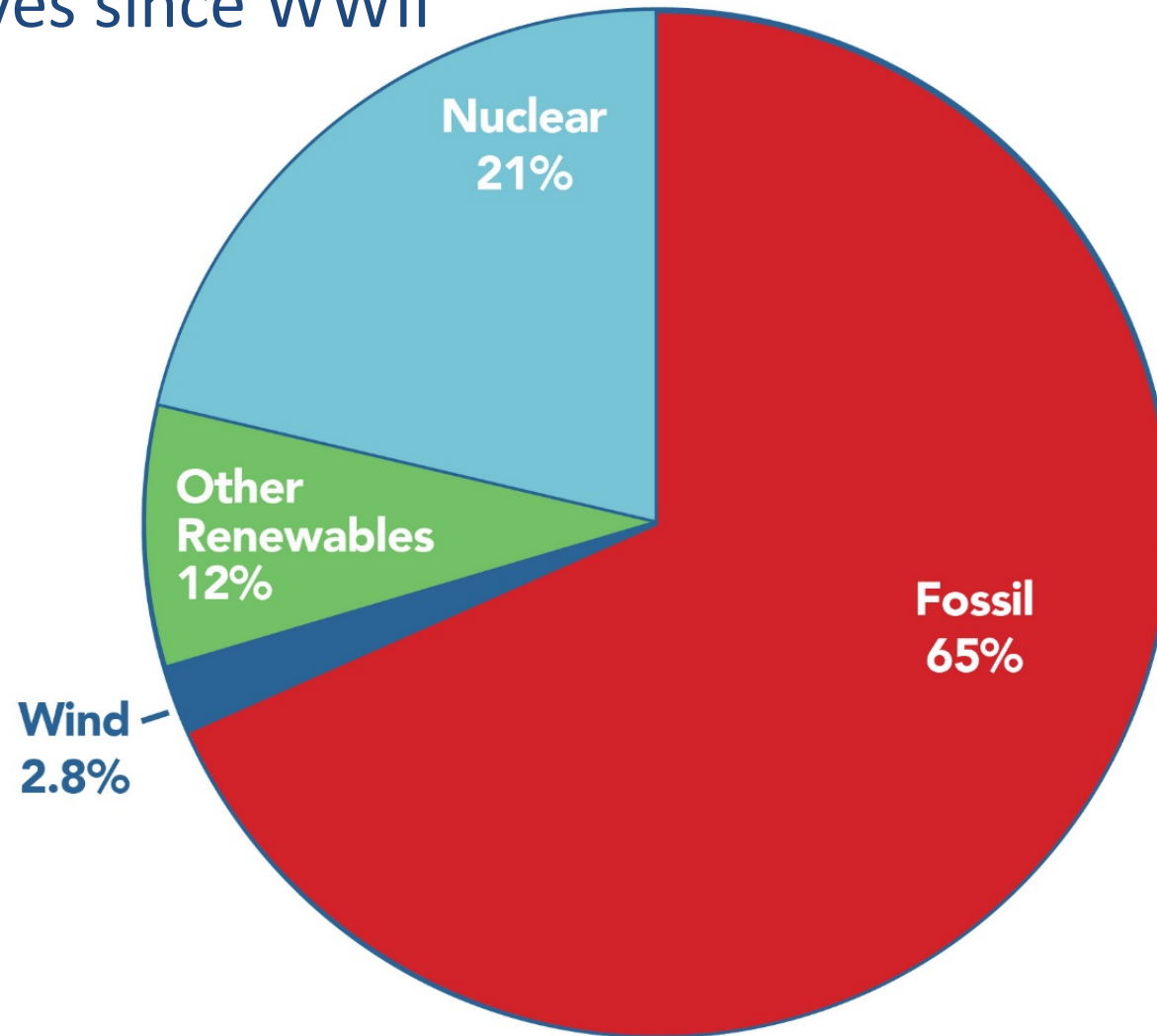


Wind cost vs. natural gas cost, 2012-2022





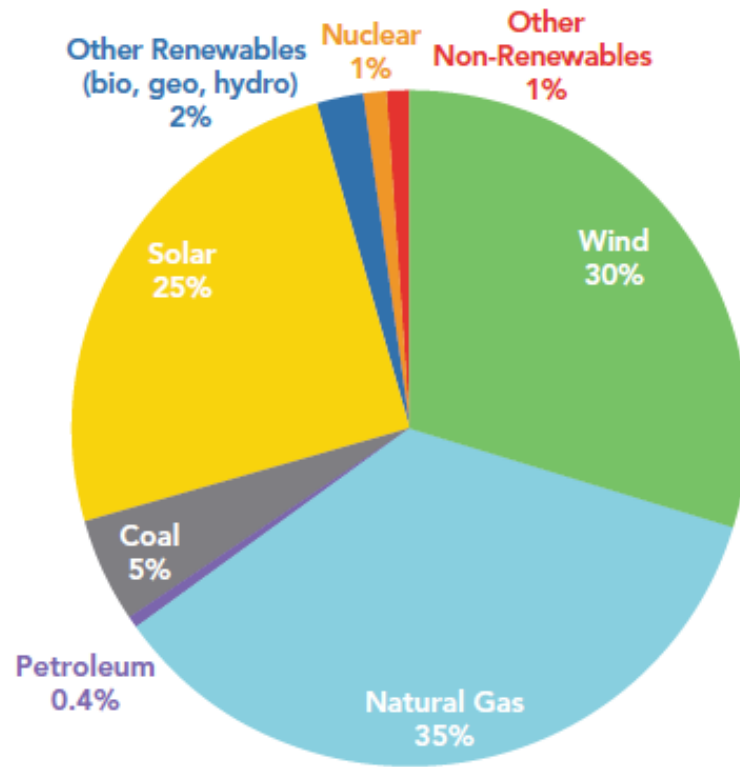
Federal energy incentives since WWII





Wind provided 30% of new U.S. generating capacity over the past 5 years

U.S. Annual Power Capacity Additions, 5-year Average

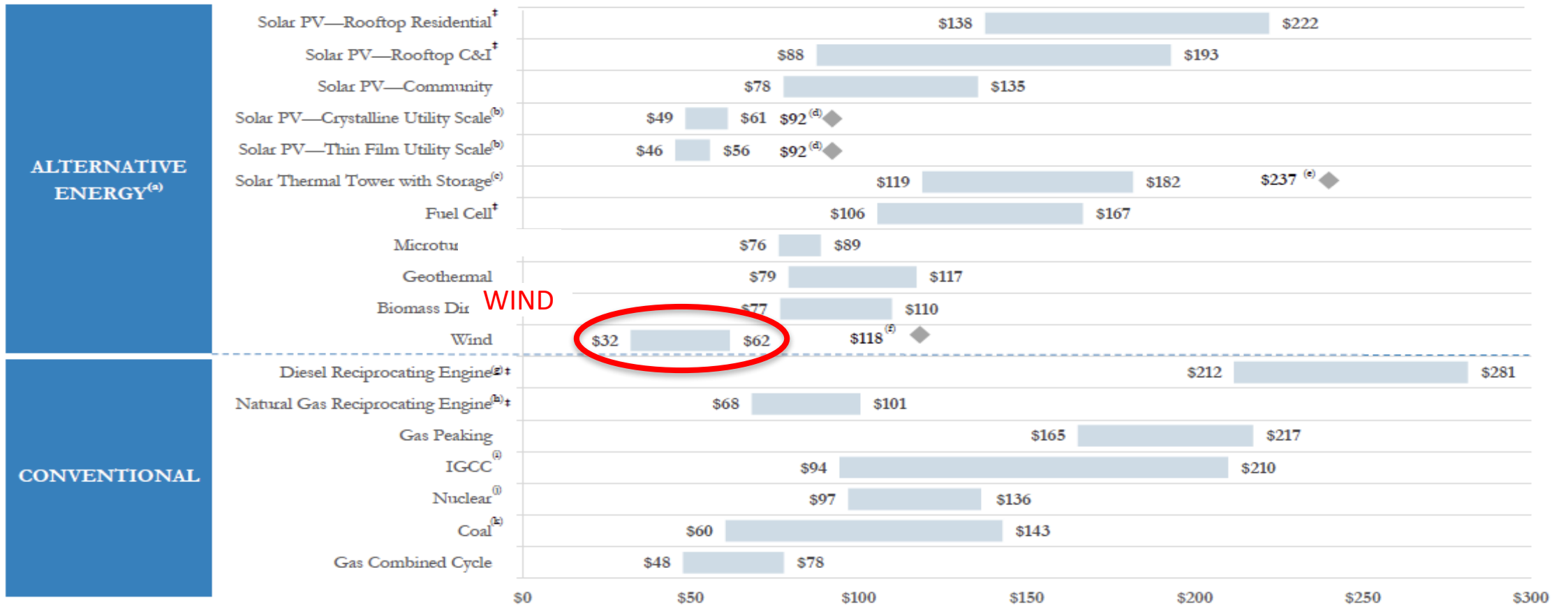


Data Sources: AWEA, EIA, SEIA, S&P Global



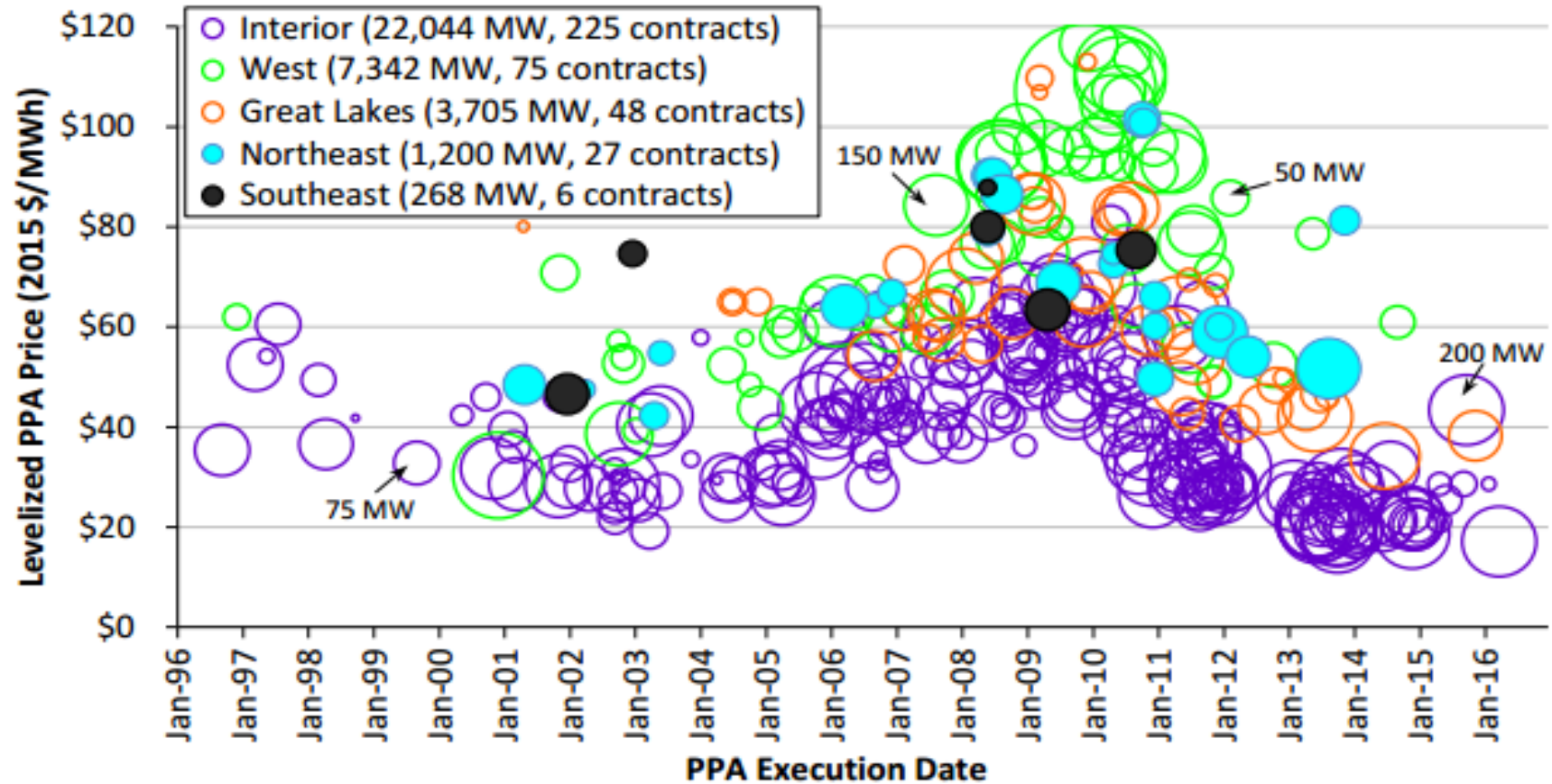
Wind power is increasingly cost-competitive

2016 Unsubsidized Levelized Cost of Energy (\$/MWh)



Source: Lazard, Version 10.0, 2016

Wind PPA prices are low



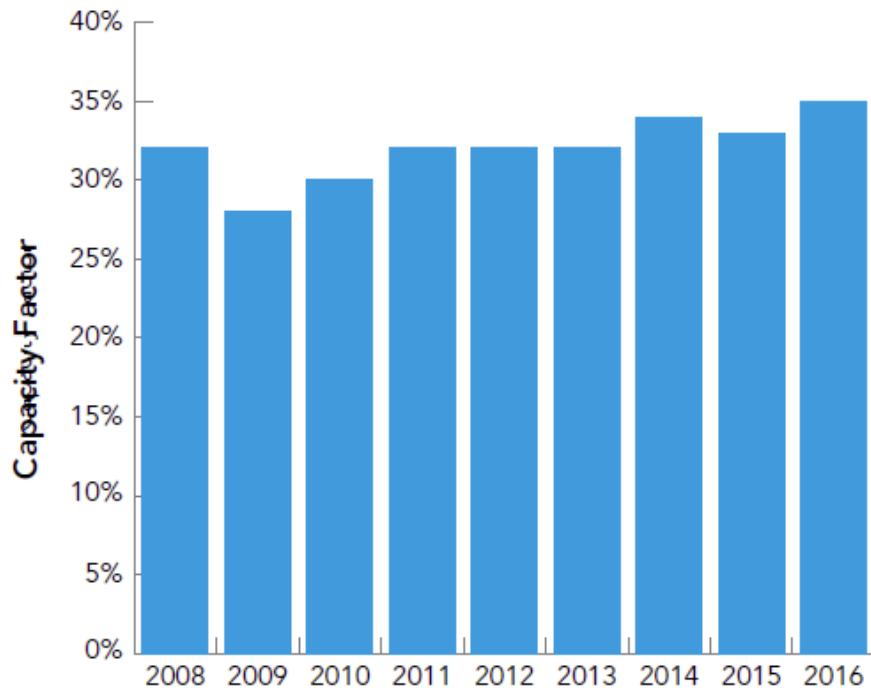
Note: Area of "bubble" is proportional to contract nameplate capacity

Source: Berkeley Lab



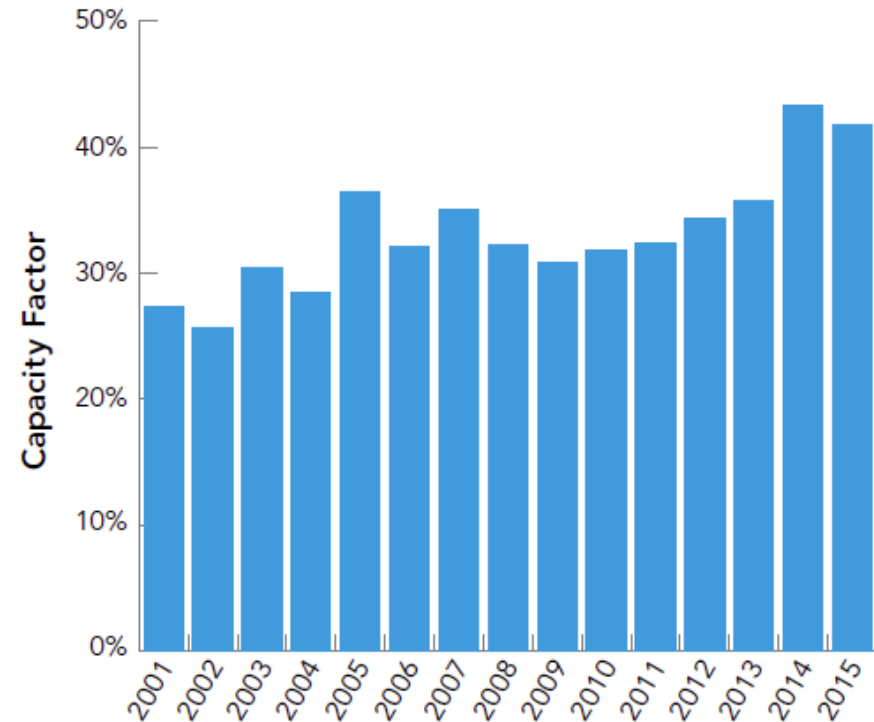
Technology innovation fostering increased performance

U.S. Wind Fleet Capacity Factors over Time



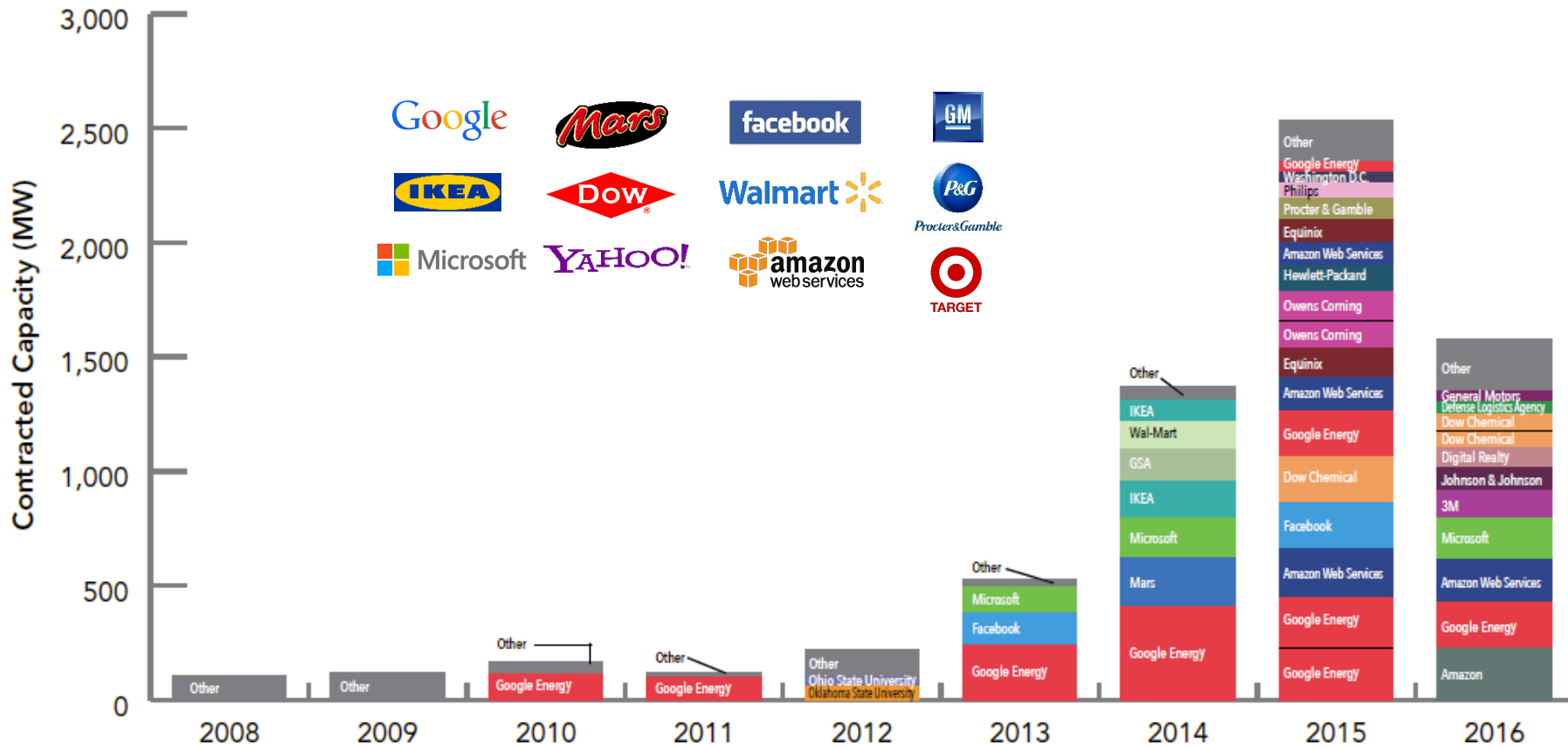
Data Source: EIA

2016 Wind Capacity Factors by Vintage Year



Data Sources: EIA, AWEA

Trend: Major brands cutting costs & pollution with wind



Source: Non-utility purchases by year of announcement, inc. physical and virtual PPAs, direct ownership, and large-scale REC purchases from a single wind farm, AWEA U.S. Wind Industry Annual Market Report Year Ending 2016

WHY COMPANIES ARE TURNING TO WIND POWER

GOOGLE

"Because energy is a large operating expense at Google, it is beneficial to power the data centers with low-cost wind power,"

DOW CHEMICAL

"Dow is always looking for win-win solutions – good for the environment and good for business. By entering into this agreement, Dow is taking a serious approach to our future energy needs in Texas and cost-competitive wind energy is a great opportunity."

IKEA

"The US has amazing wind and sun resources that will never run out. We are delighted to make this investment – it is great for jobs, great for energy security, and great for our business. Importantly, it's great for the future of our climate."

YAHOO!

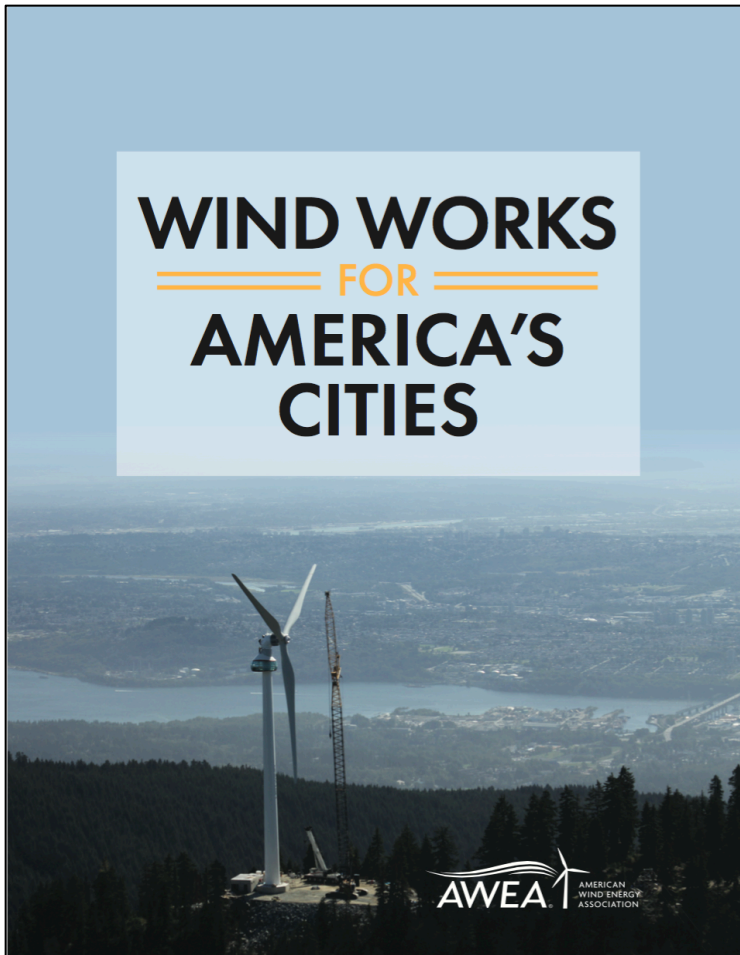
"At Yahoo, we're committed to being an environmentally responsible company...Driving the development of cleaner and renewable sources of power is an important piece of our sustainability strategy."

MICROSOFT

"The Pilot Hill Wind Project is important to Microsoft because it helps solidify our commitment to taking significant action to shape our energy future by developing clean, low-cost sources to meet our energy needs."

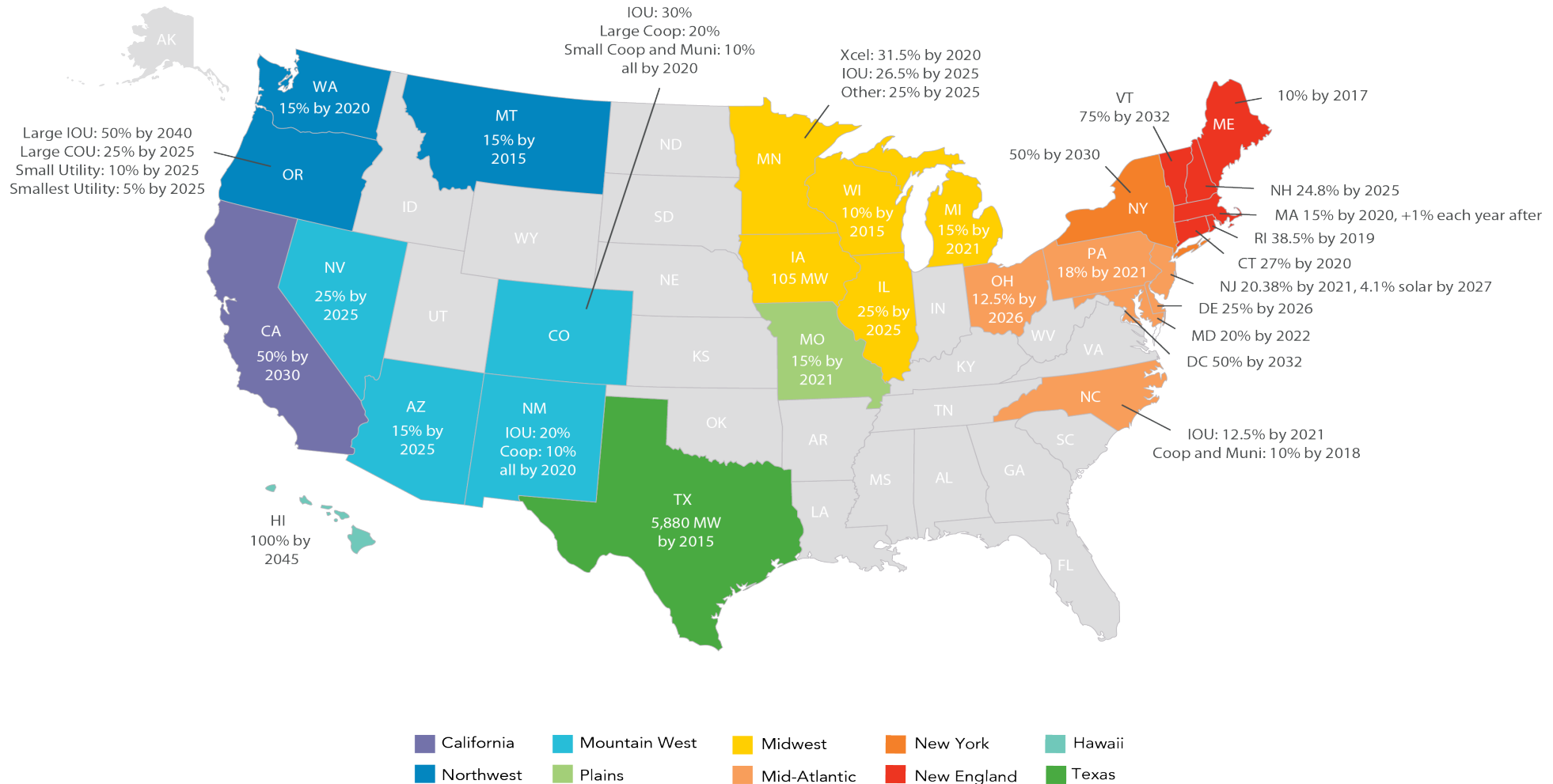


Expanding markets: municipal buyers



- Over 200 city purchases to date total nearly 7 percent of installed base
- Renewable commitments from Burlington, Aspen and Ithaca to Atlanta, San Diego, Chicago, Pittsburgh and many others

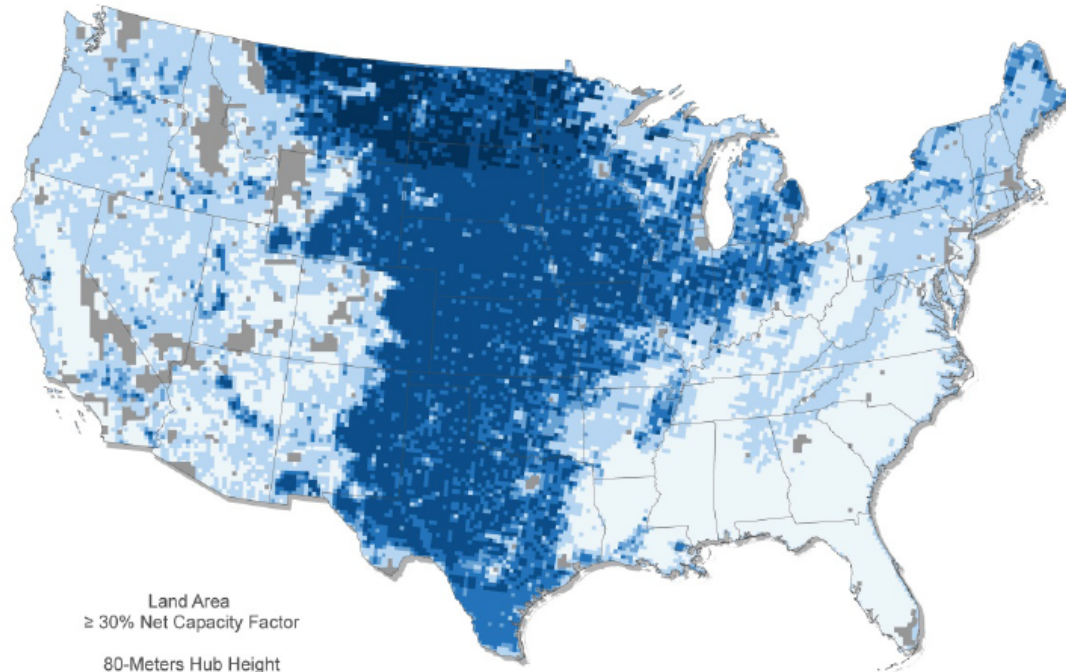
State renewable standards keep generating demand



Source: AWEA State RPS Market Assessment 2016

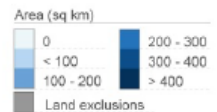


Trend: New turbines reaching higher winds and more areas



Land Area
≥ 30% Net Capacity Factor

80-Meters Hub Height
Current Turbine Technology

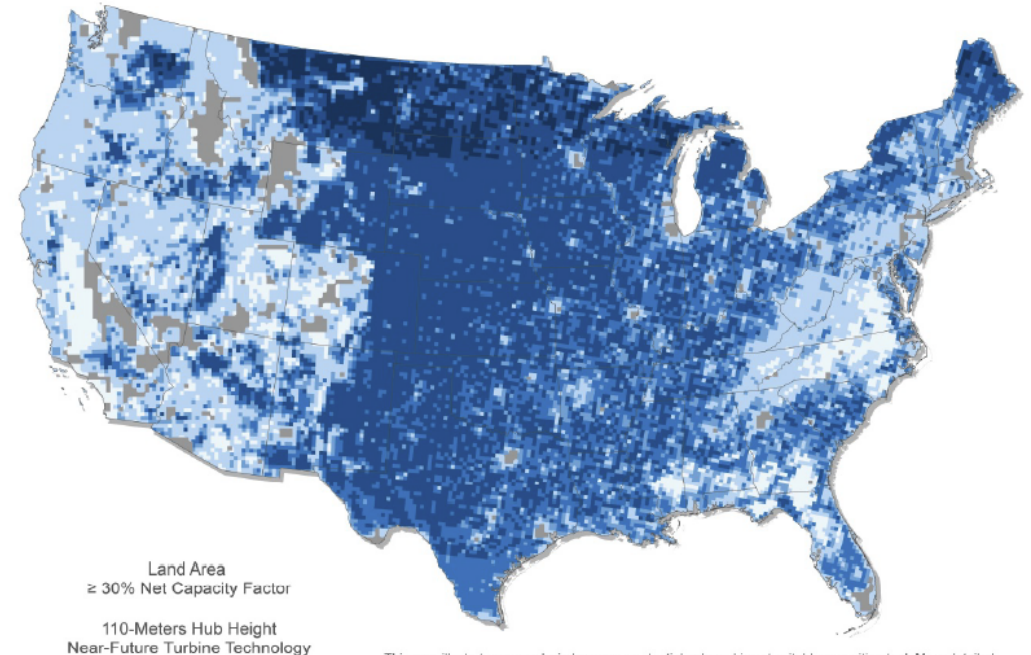


This map illustrates general wind resource potential only and is not suitable as a siting tool. More detailed site and wind speed data, as well as coordination with relevant authorities, are needed to thoroughly evaluate appropriate wind energy development at any given location.
Data sources: AWS Truepower, National Renewable Energy Laboratory

This map was produced by the
National Renewable Energy Laboratory
for the Department of Energy,
March 2015

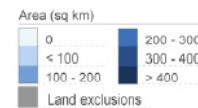


Wind resource at 80-meter turbine hub height



Land Area
≥ 30% Net Capacity Factor

110-Meters Hub Height
Near-Future Turbine Technology



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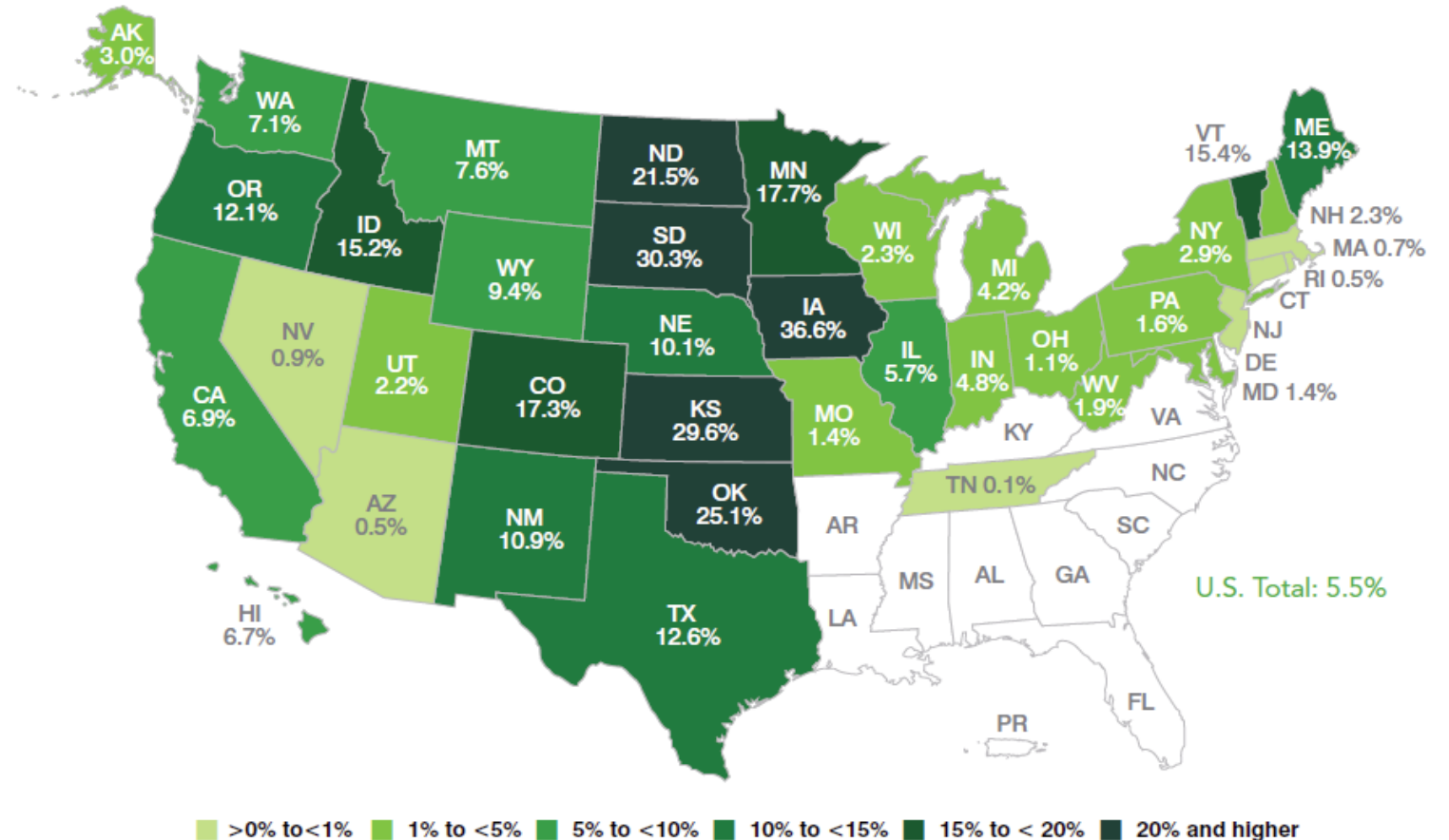
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Wind resource at 110 meters

Wind power is increasing on the grid, *reliably* integrated

- The SPP grid across 14 states got 52% of its electricity from wind on February 12, 2017
- Iowa now generates over 35% of its electricity year-round from wind
- 14 states produce over 10% of their in-state electricity from wind



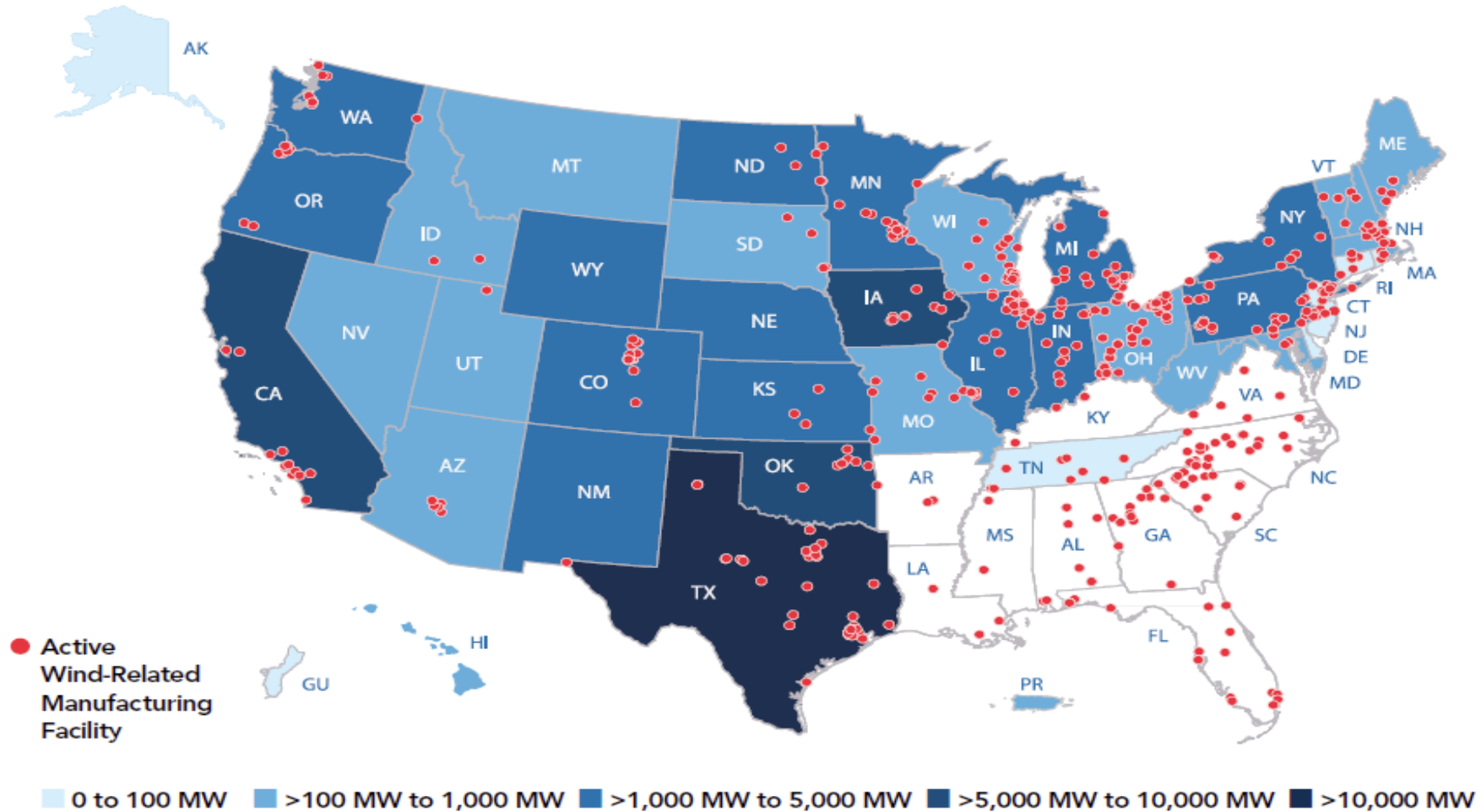


Wind power is increasing on the grid, *reliably* integrated

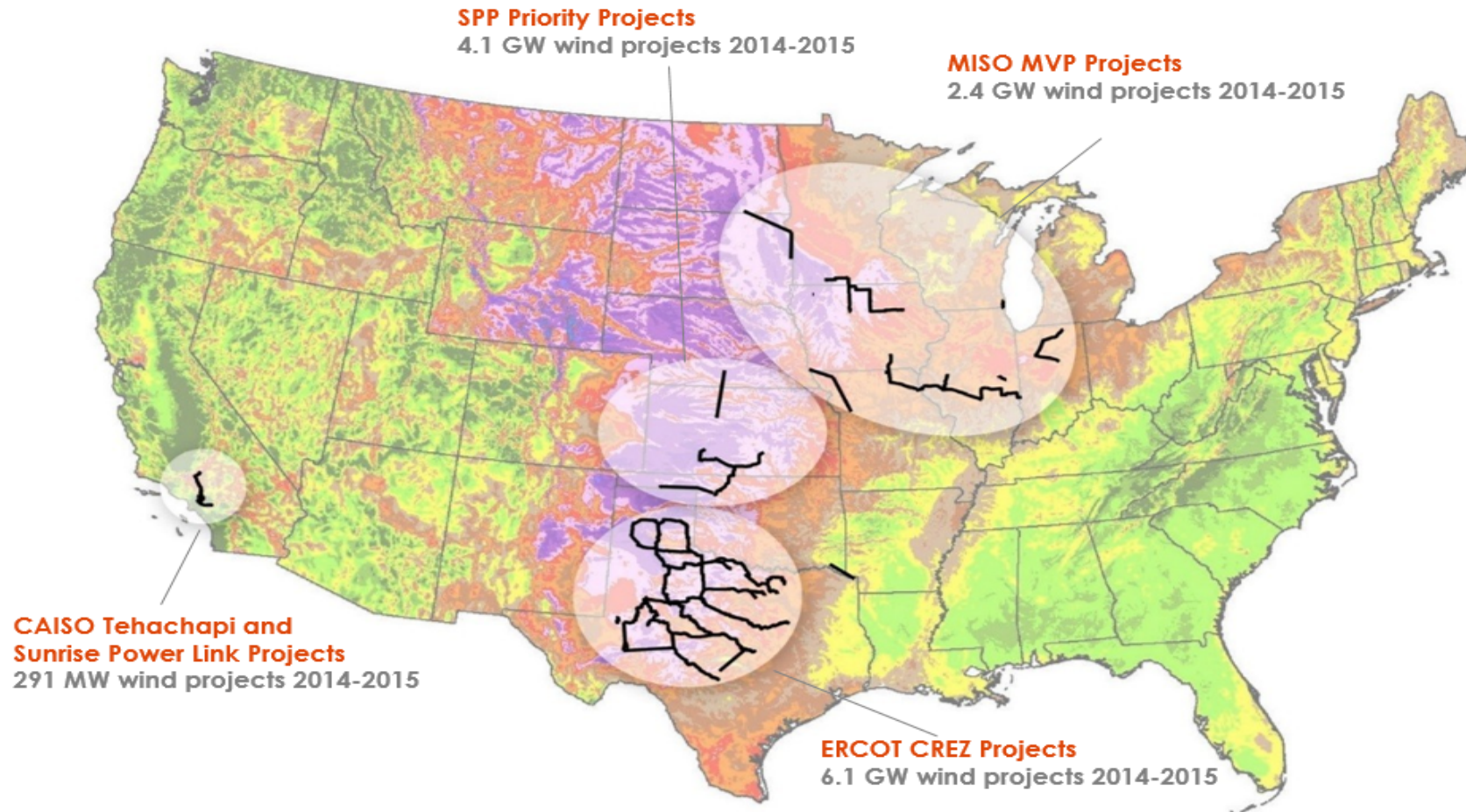
“Ten years ago, we thought hitting even a 25 percent wind penetration level would be extremely challenging, and any more than that would pose serious threats to reliability...Now we have the ability to reliably manage greater than 50 percent wind penetration. It’s not even our ceiling.”

Bruce Rew, VP of Operations, regional grid operator SPP
February 2017

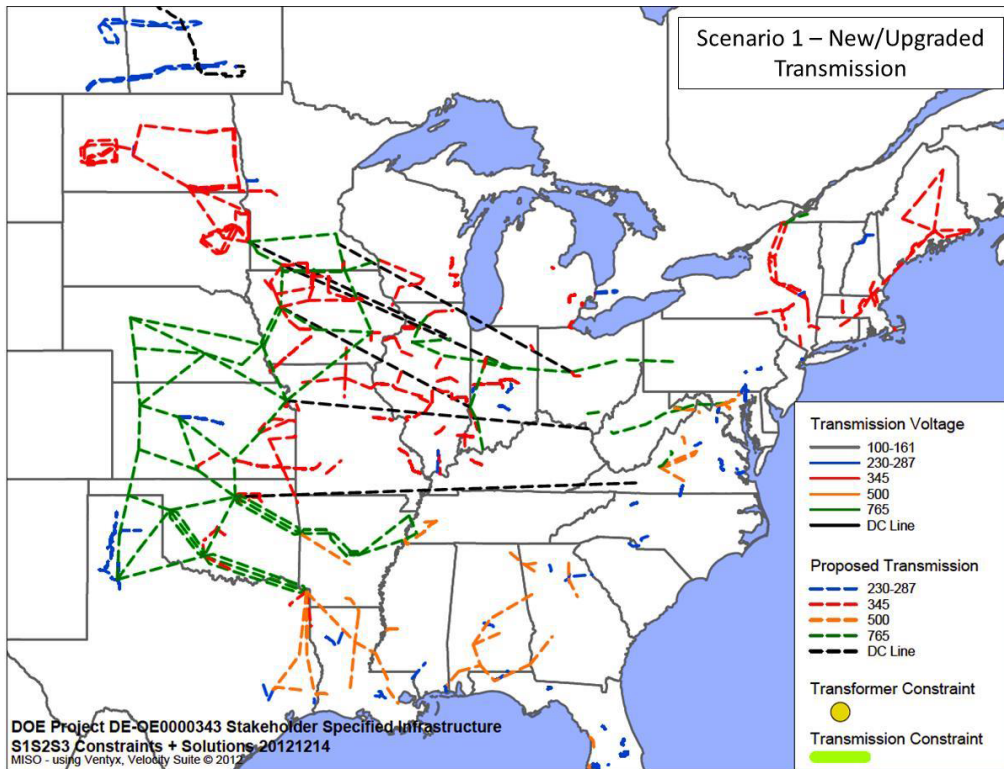
Wind farms and factories benefit all 50 states



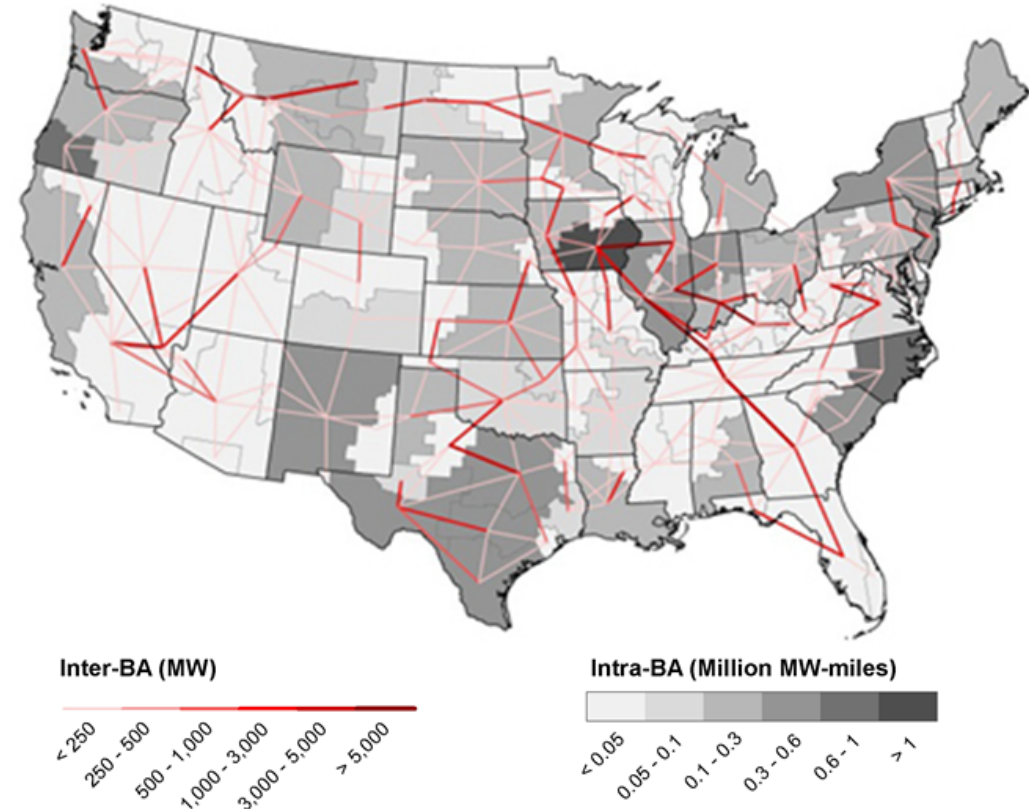
New lines accessing vast supply of carbon-free energy



More transmission will get more low-cost wind to market



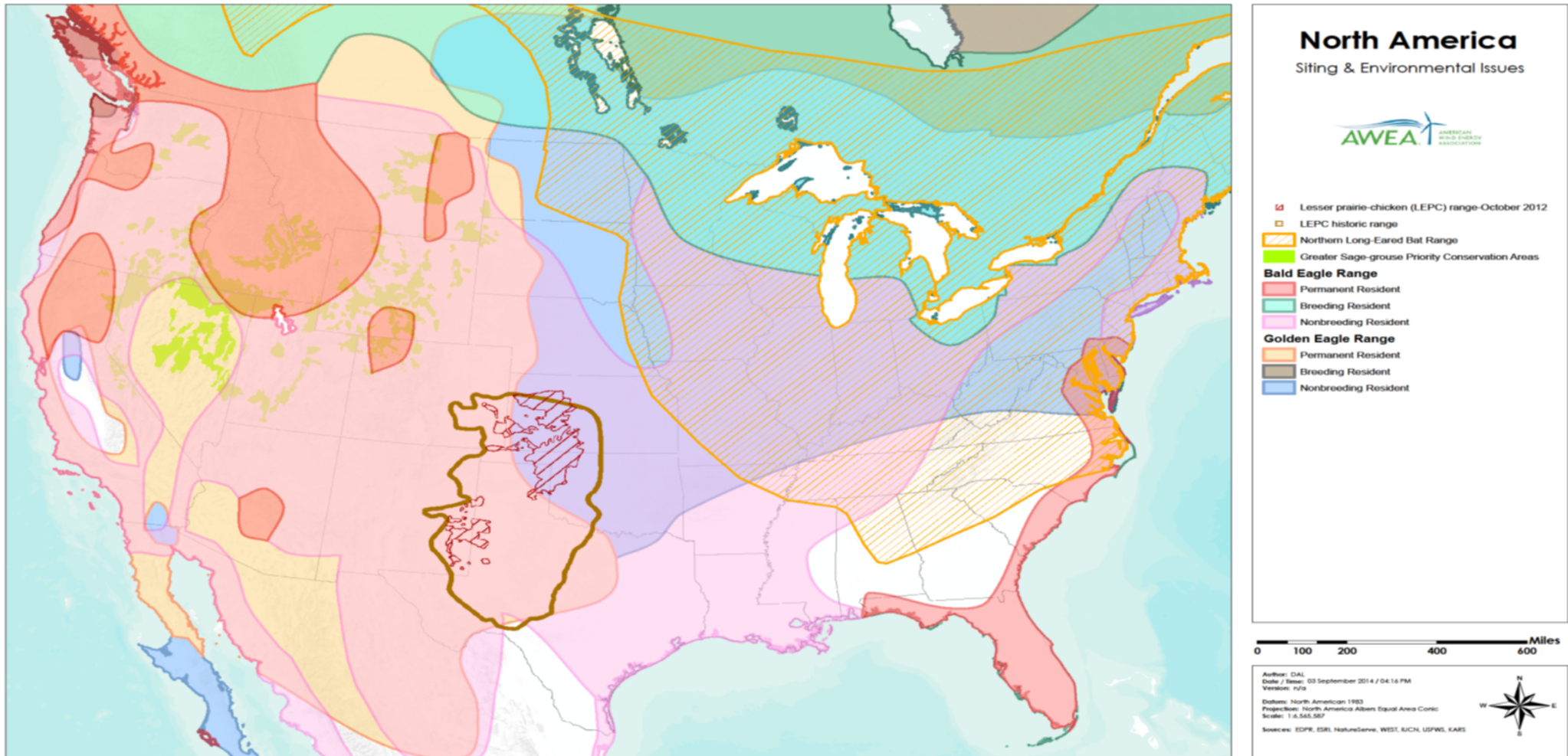
Eastern Interconnect Planning Collaborative



WindVision 2050 case

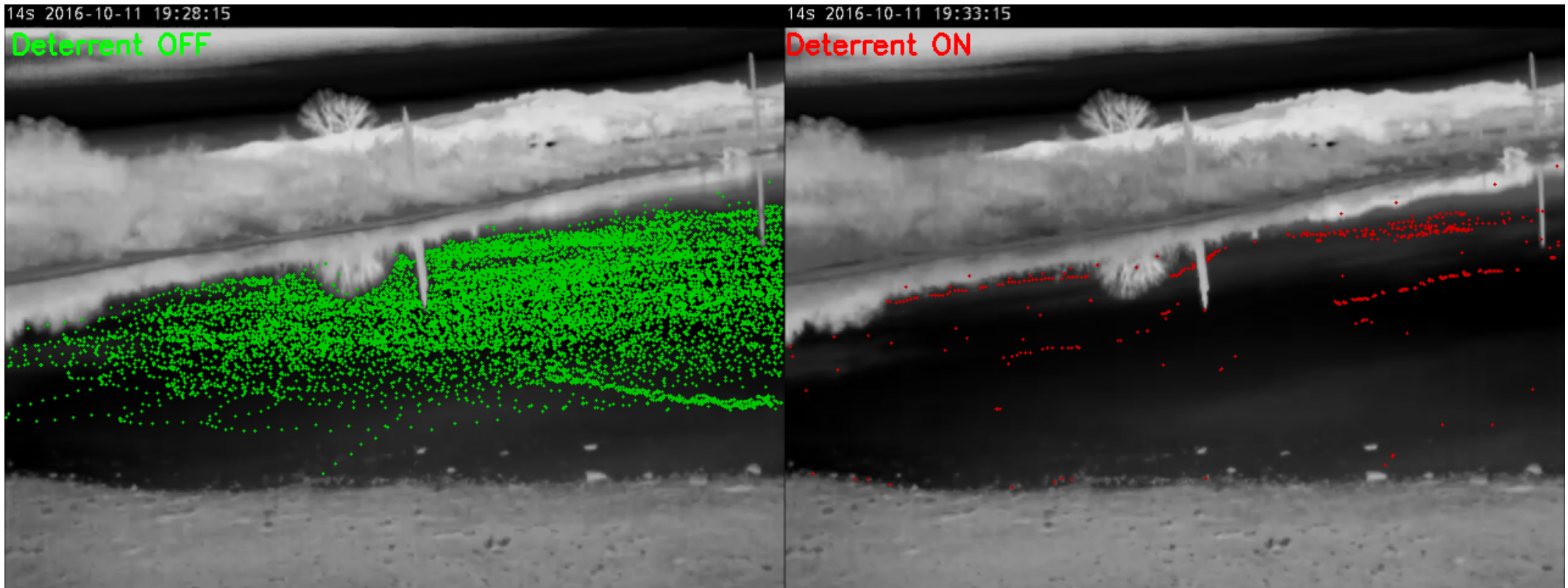


Siting and permitting also crucial to meeting wind potential





New technologies allow wind and wildlife to coexist



Bats feeding on pond

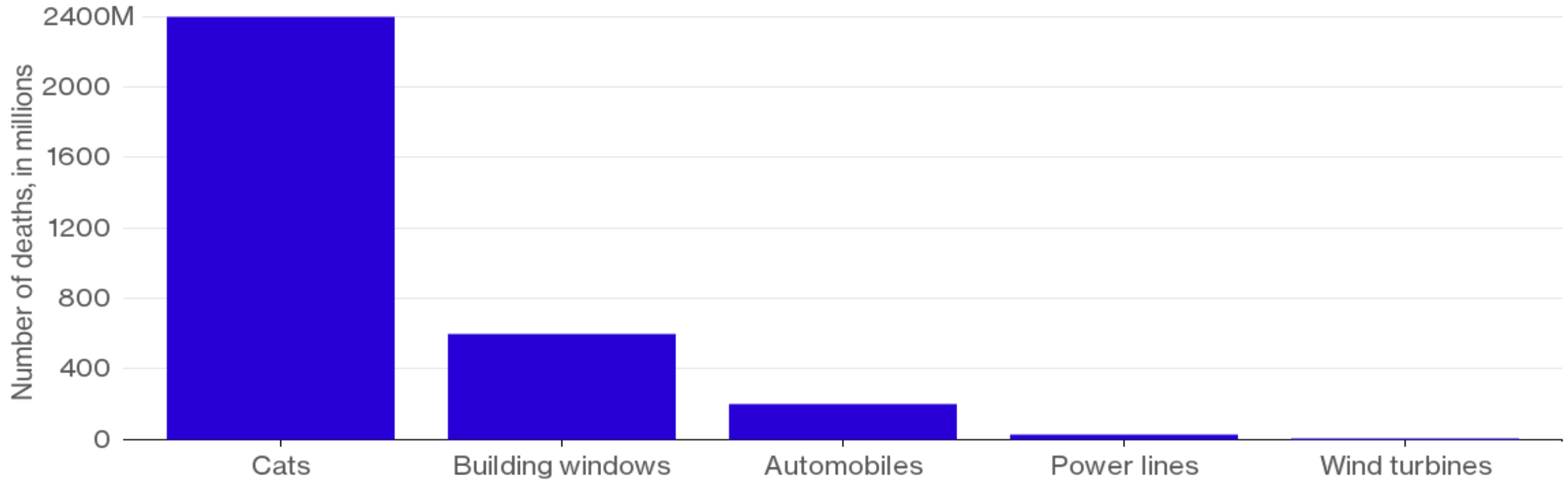
Five minutes after
acoustic deterrent turned on



No form of energy is without impacts; wind's among lowest

Bird Deaths

Aside from habitat loss, the greatest cause of bird deaths are cats, tall buildings



Source: National Audubon Society

U.S. offshore: the next frontier



88% of new wind capacity is in states that voted for Trump

