

Catching Up with the Wind

Challenges for the Industry – Opportunities for
Nebraska

3rd Annual Nebraska Wind Power Conference
November 9-10, 2010

Dr. James A. Walker
Vice Chairman
enXco Inc.



- **enXco Inc. – A Leading Developer, Owner and Operator of Renewable Energy Projects**

- **Operating Projects**

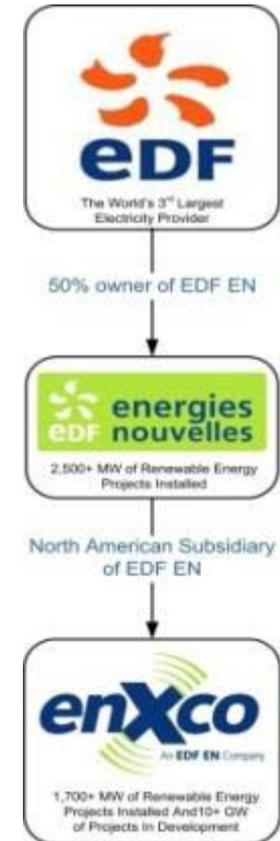
- **1,110.9 MW** installed capacity in North America (all segments)
- **964 MW** installed capacity US WIND
- **6 MW** installed capacity US SOLAR
- **50 MW** installed capacity US BIOGAS
- **23.4 MW** installed capacity CANADA SOLAR (EDF EN Canada)
- **67.5** installed capacity MEXICO WIND (EDF EN Mexico)

- **Projects Under Construction**

- **239.4 MW** under construction in North America (all segments)
- **201 MW** under construction US WIND (Nobles)
- **3.1 MW** under construction US SOLAR (Pocono & Stevens)
- **35.3 MW** under construction CANADA SOLAR

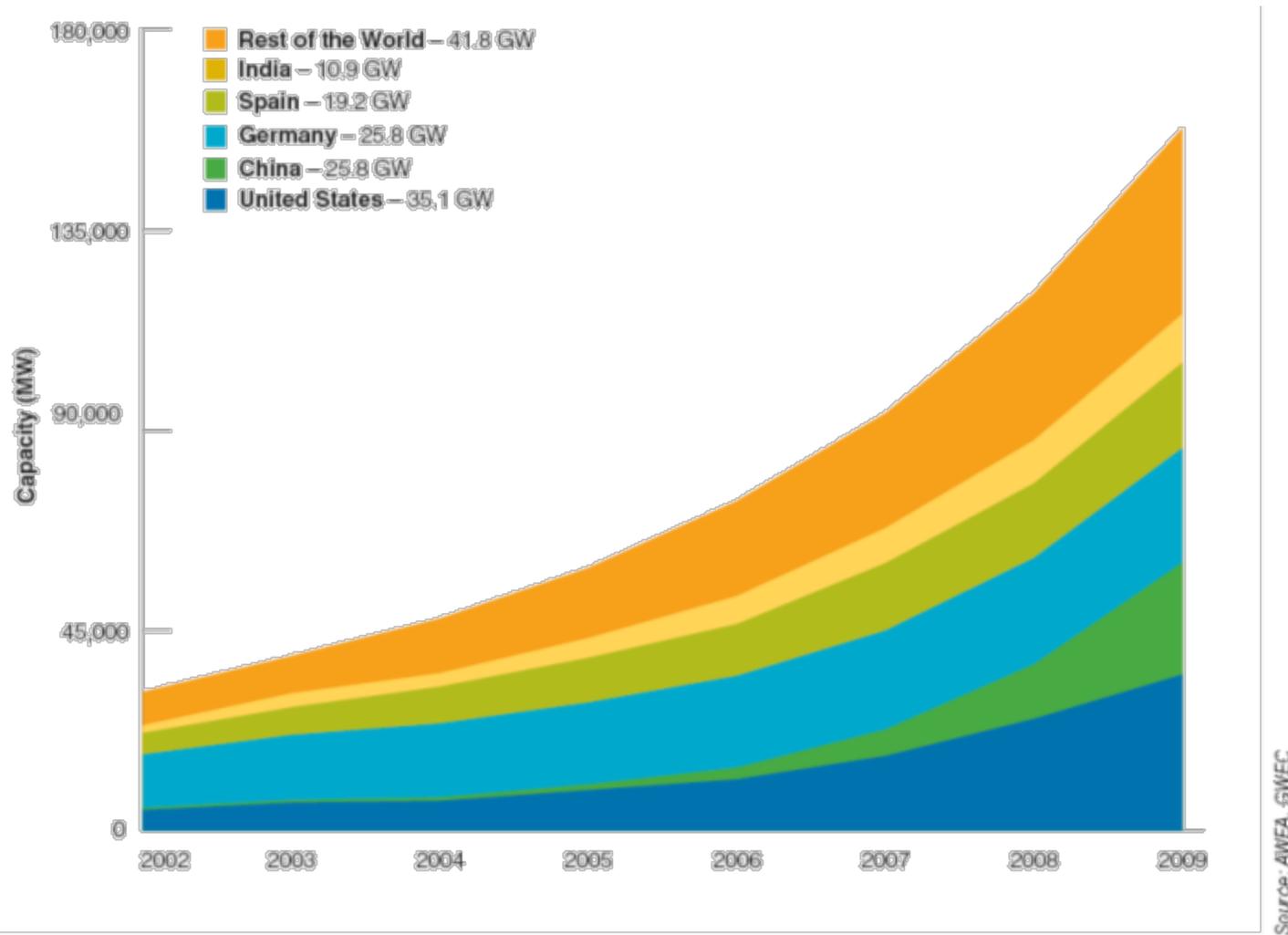
- **Projects Under Operation & Management**

- **5,230** turbines
- **4,588.5 MW**
- **16** different turbine manufacturers
- **74** projects in **14** states, Quebec & Oaxaca

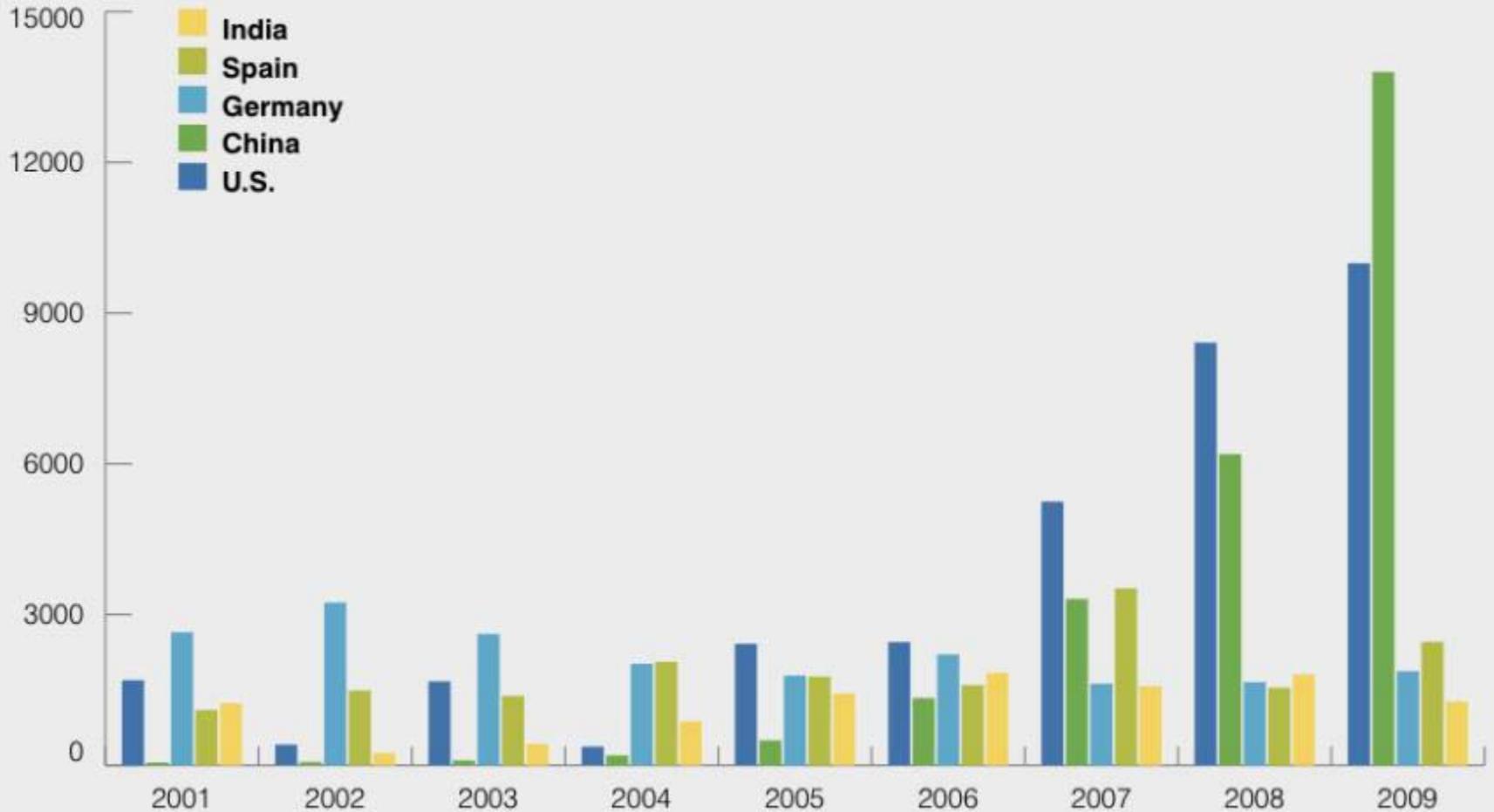


U.S. Wind Market Status

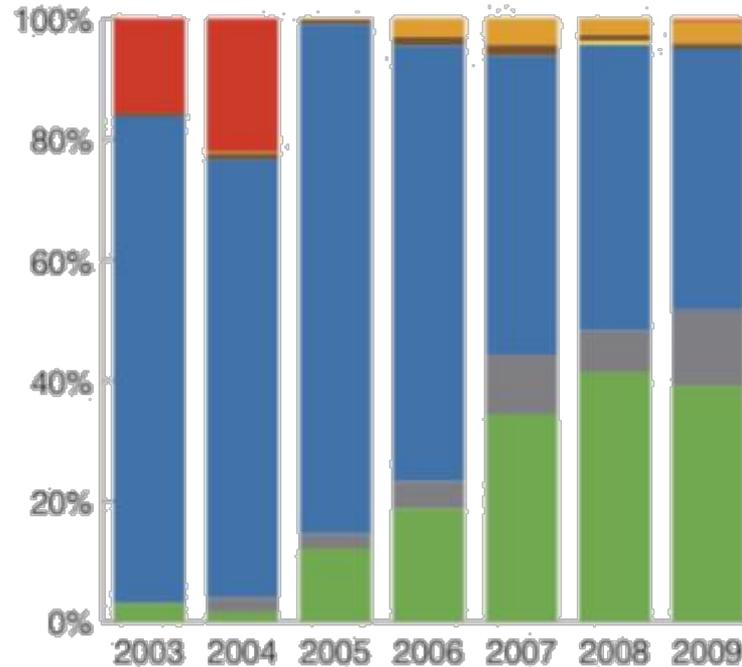
U.S. Leads World in Cumulative Wind Capacity (at least through 2009)



Top Countries: Annual Wind Additions

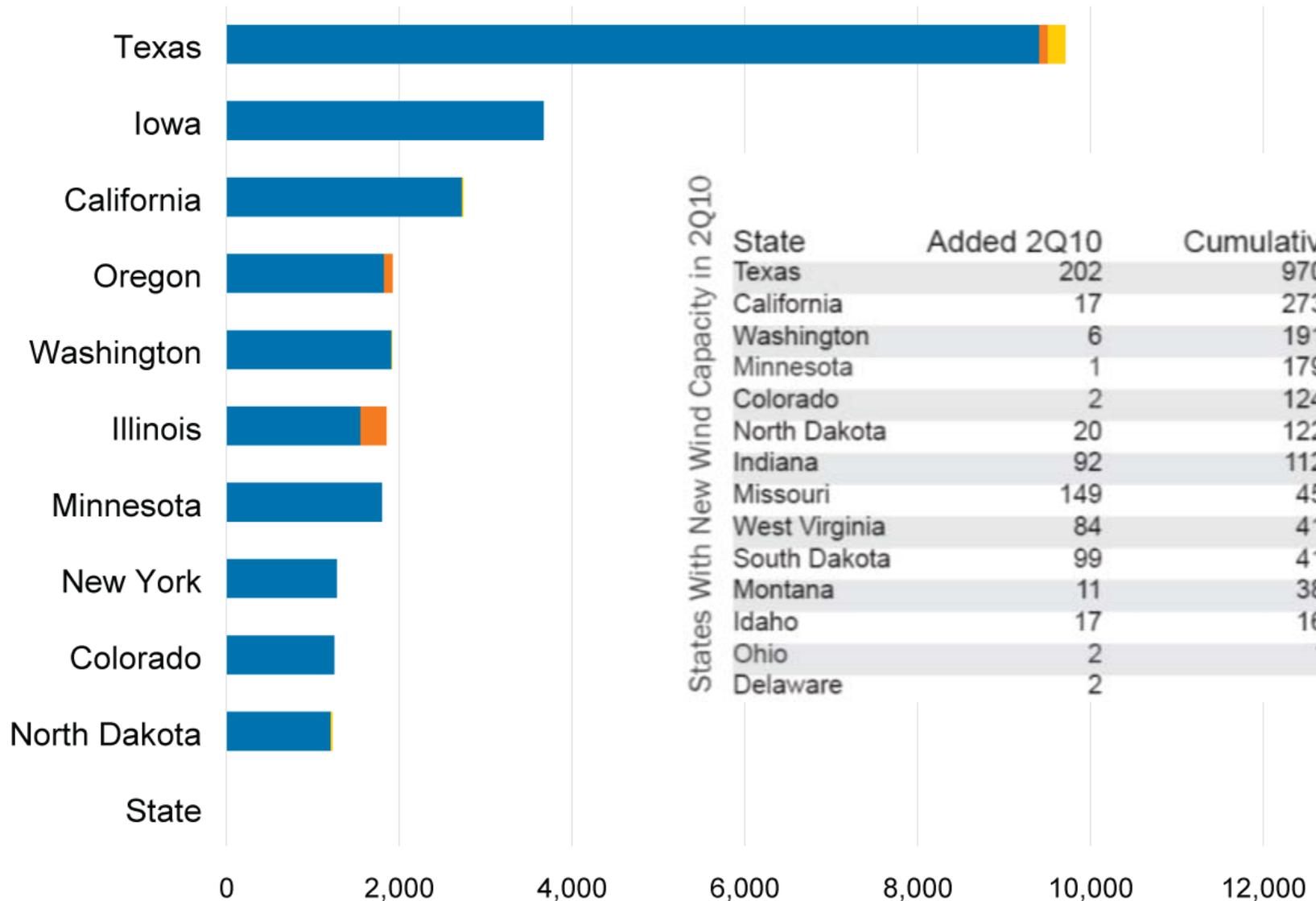


Wind Capacity Provided 40% of all New Capacity in 2008 & 2009

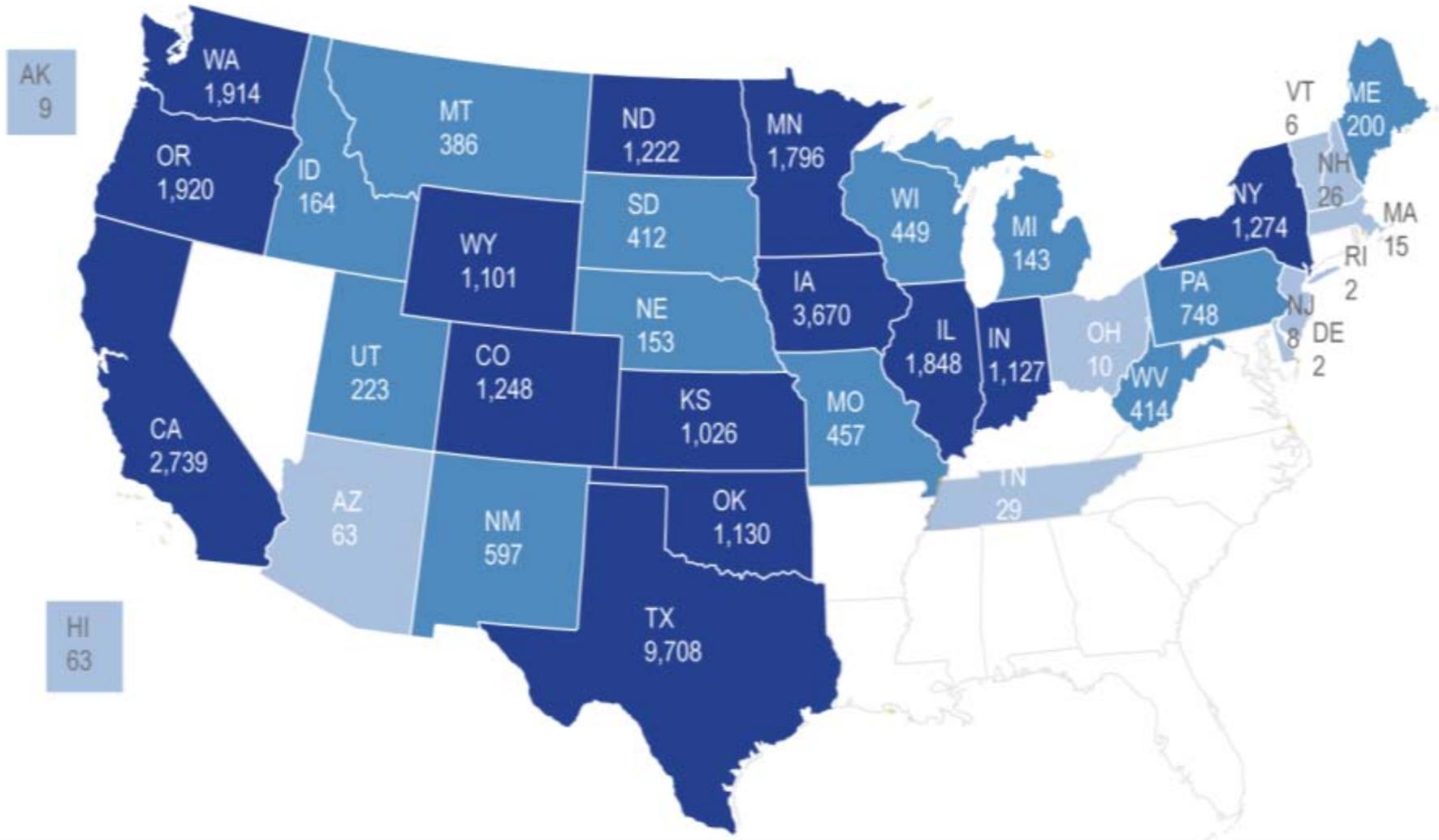


Source: AWEA, SEIA, SW, Lawrence Berkeley Laboratory

Wind Installations by State



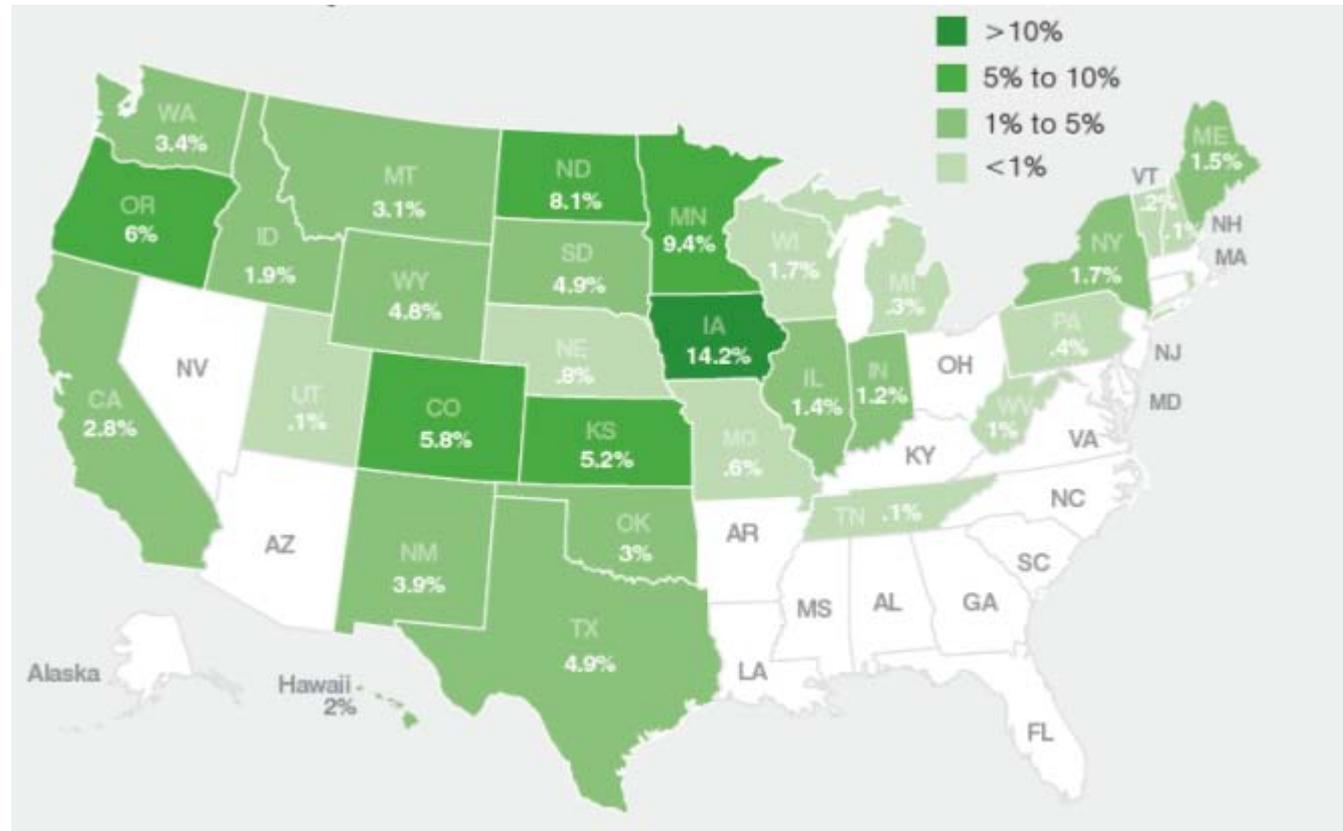
Installed Capacity by State



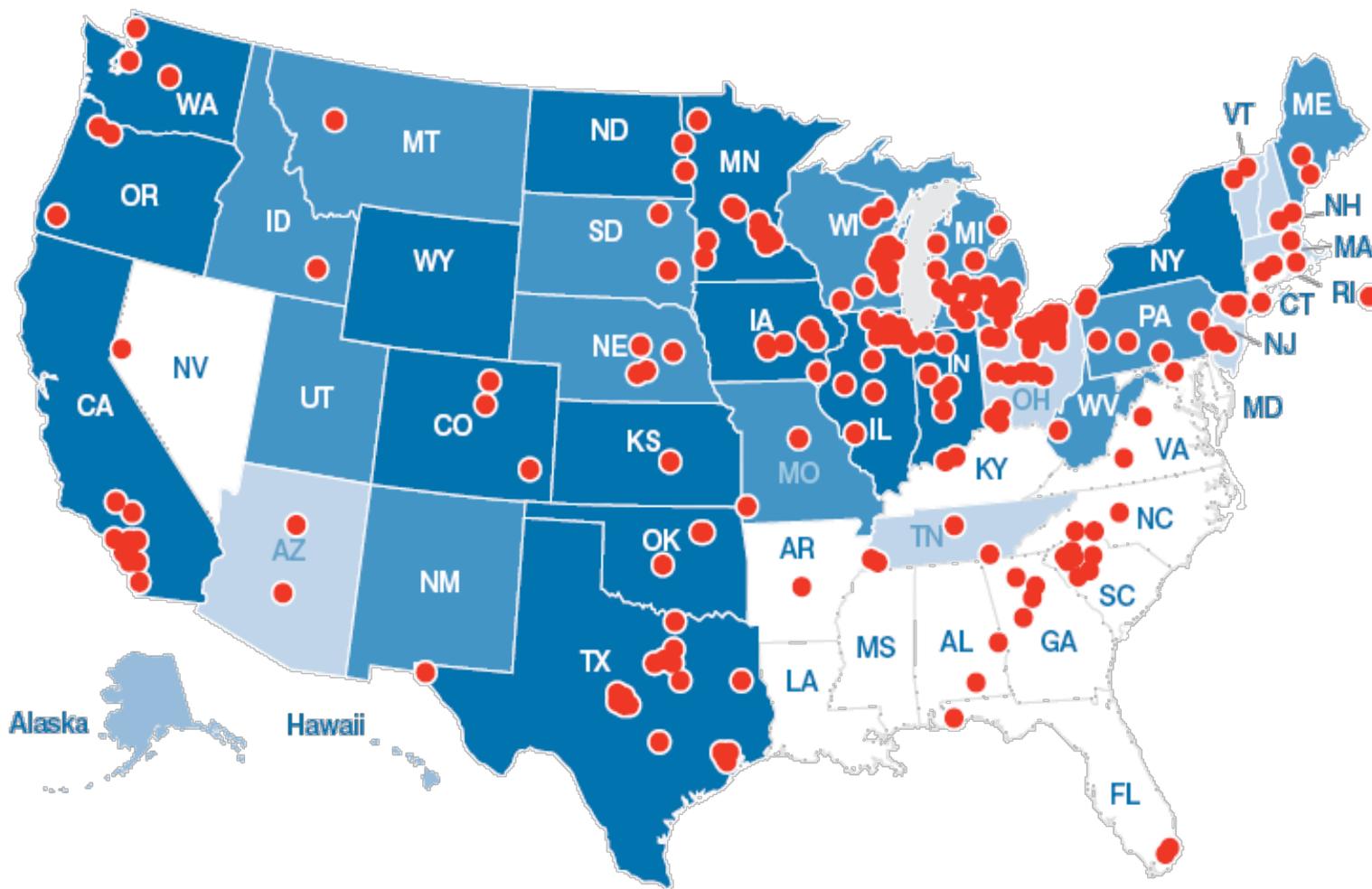
Source: AWEA, U.S. Wind Industry 2nd Quarter Market Report, July 2010

Percent Generation from Wind

- 6 states receive more than 5% of their electricity from wind
- Iowa reached 14.2% wind generation in 2009

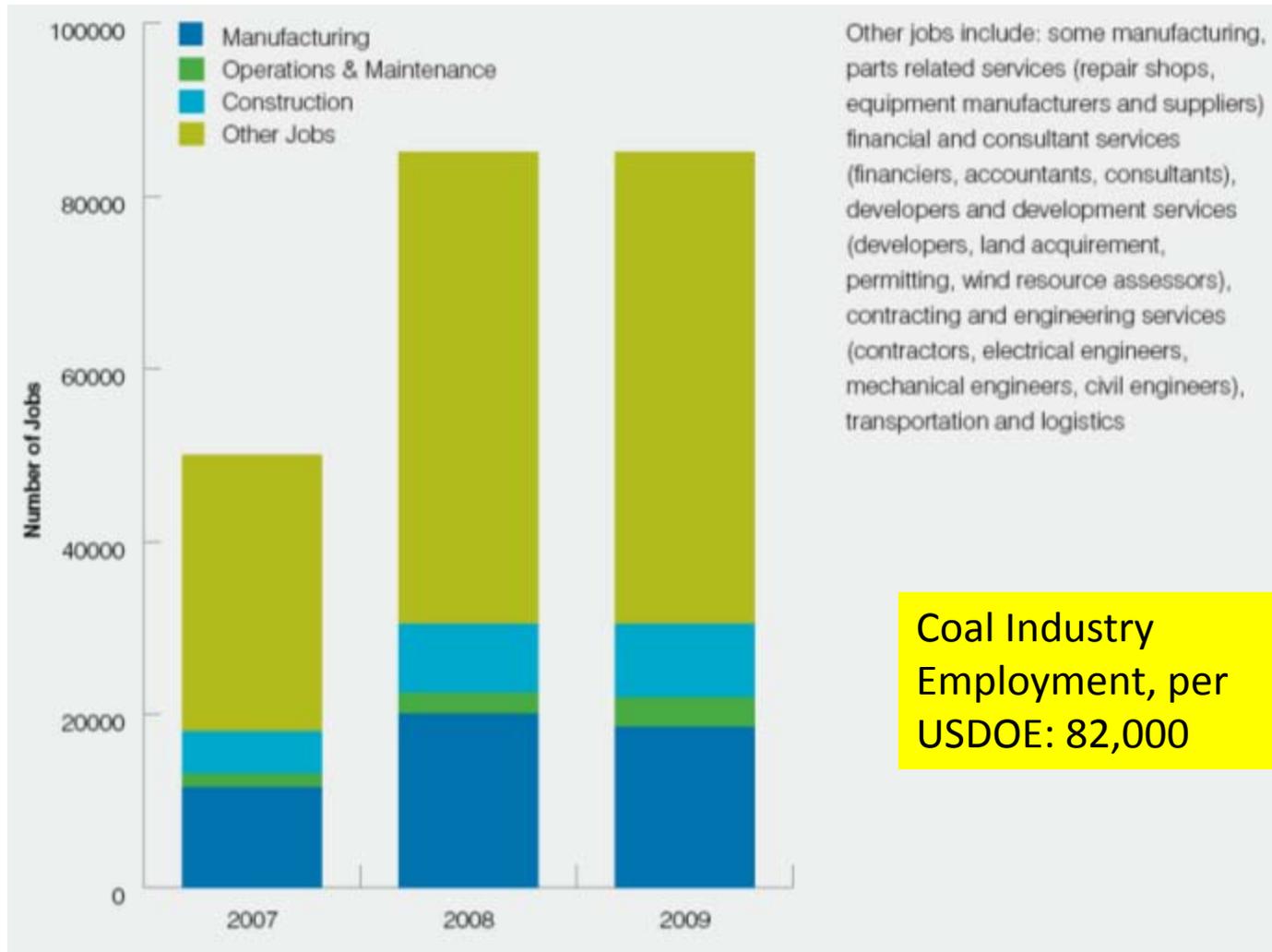


US Wind Manufacturing Facilities



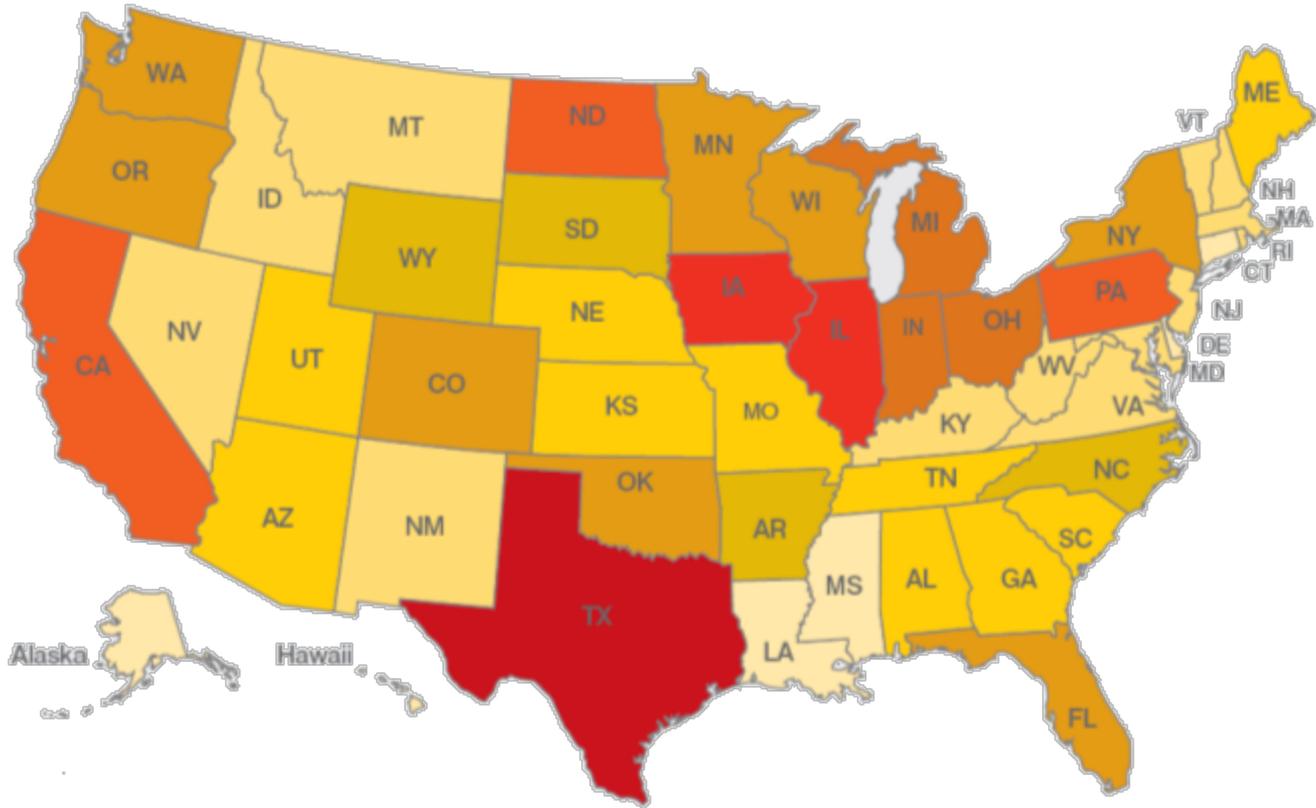
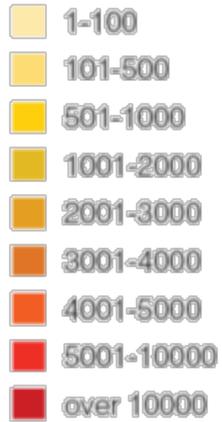
Over 200 facilities across the U.S. supply to the wind industry, and this figure does not capture the many additional facilities at the sub-supplier level.

U.S. Wind Industry Employs 85,000



Coal Industry
Employment, per
USDOE: 82,000

Wind-Related Jobs

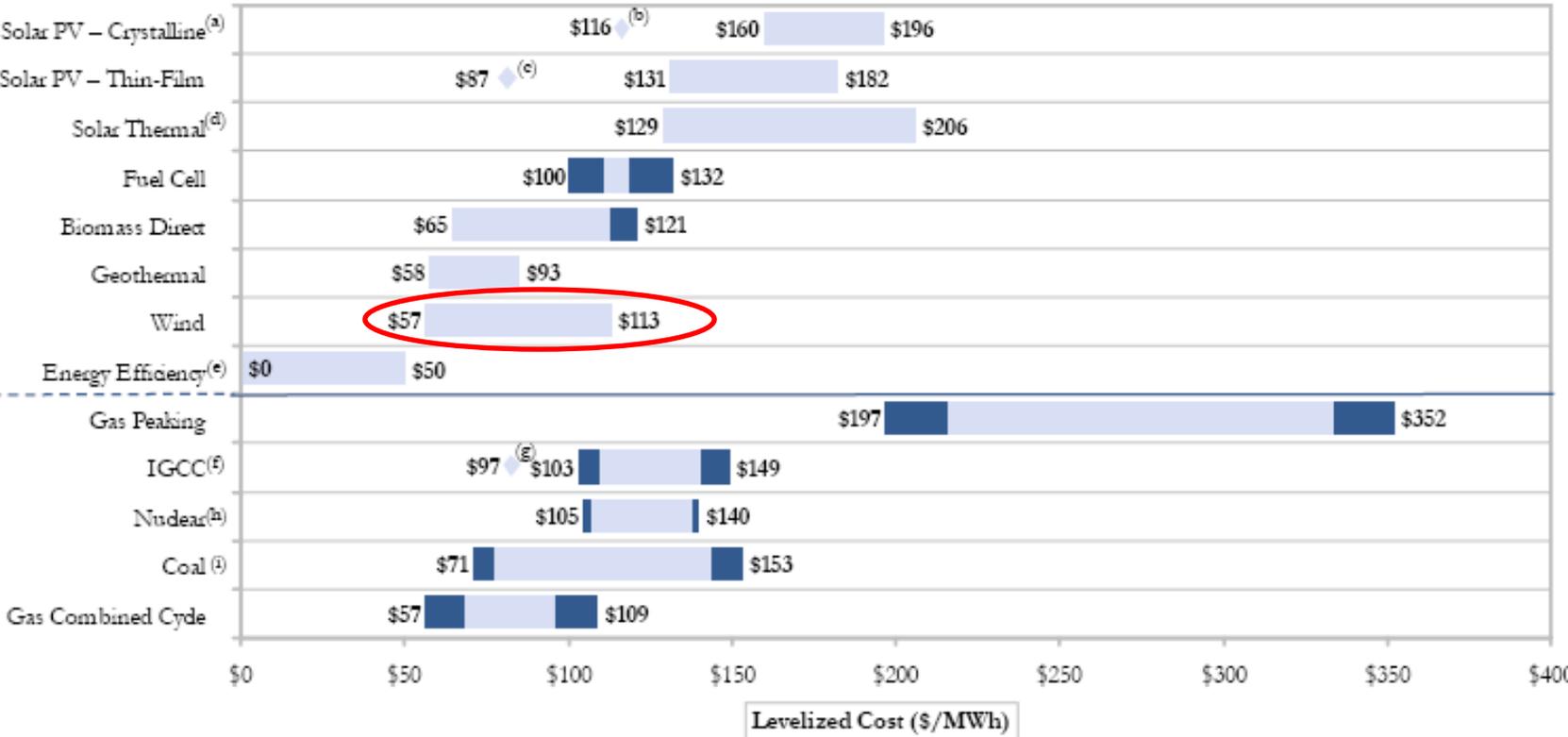


Wind Power Remains Cost-Competitive

Levelized Cost of Energy, \$ per MWh

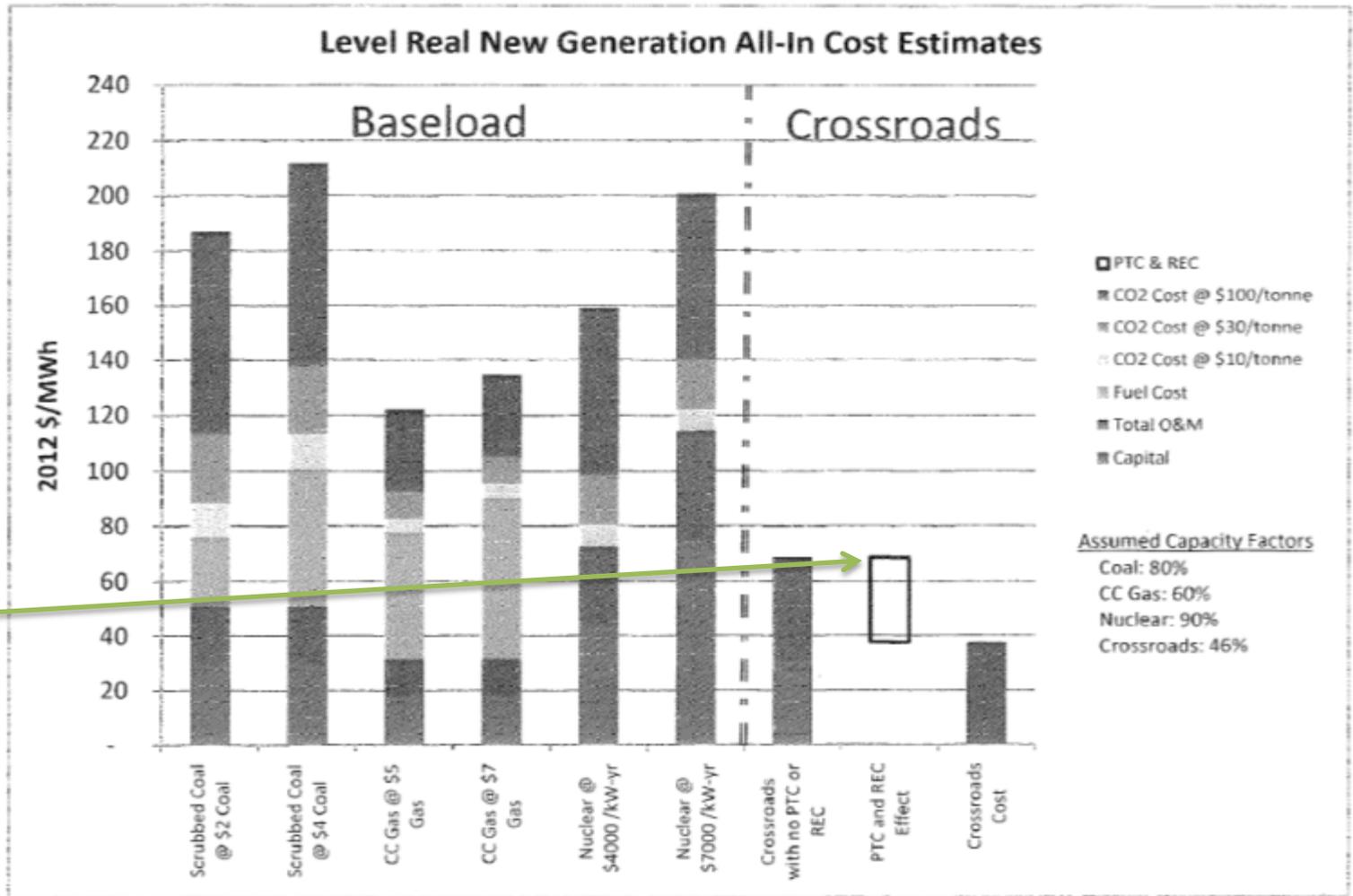
ALTERNATIVE ENERGY

CONVENTIONAL



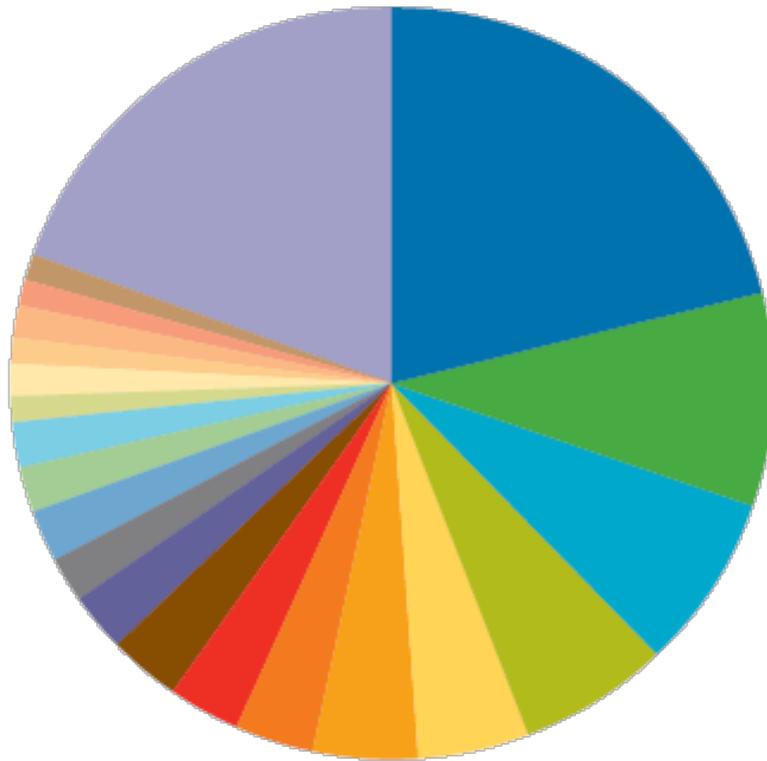
Source: Lazard, June 2009

Oklahoma Gas & Electric's View of Costs of New Generation



New wind is cheaper than new gas, coal or nuclear

Top Wind Owners



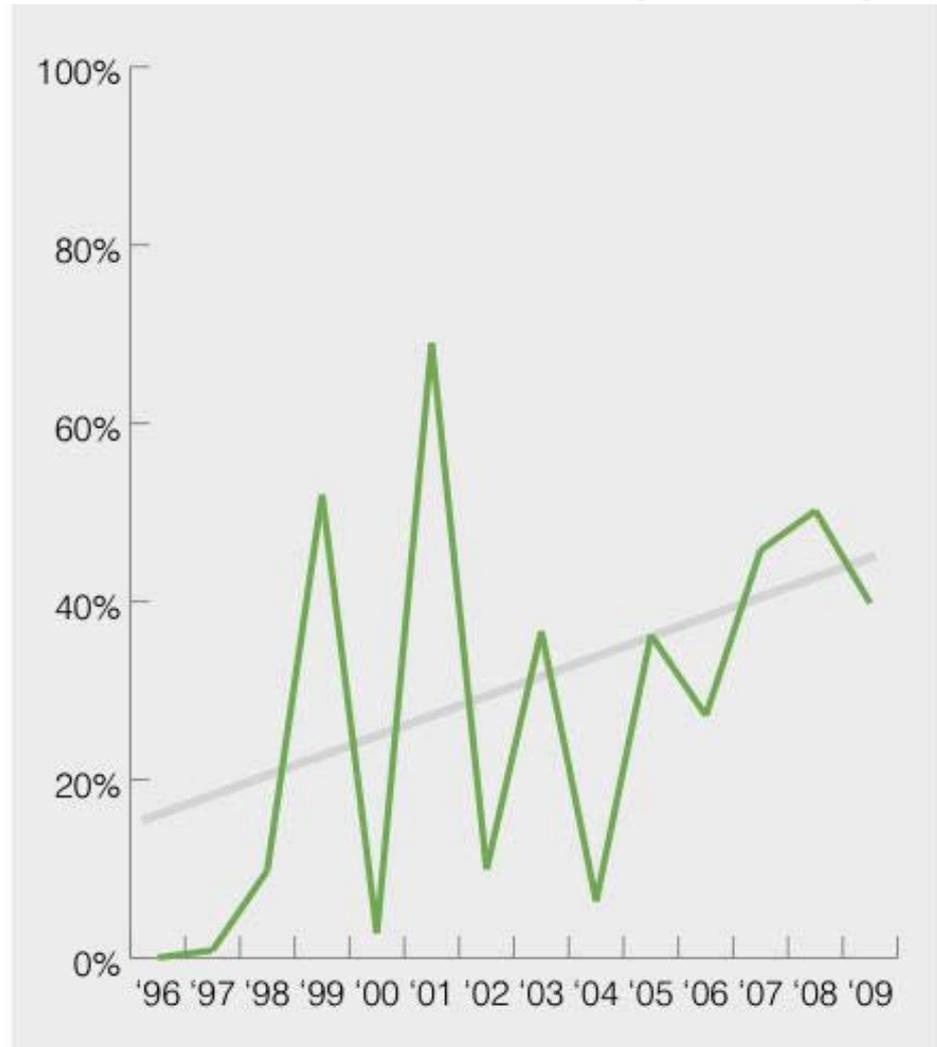
Ownership is on a net basis, so if two owners have a half share of a 100-MW wind farm, each company is credited with 50 MW. Ownership does not include structural investors, which may have a share of equity.

Company	MW under "managing ownership"
NextEra Energy Resources	7458
Iberdrola Renewables	3225
Horizon-EDPR	2642
MidAmerican Energy	2205
E. On Climate & Renewables	1720
Invenergy	1500
Edison Mission Group	1210
Infigen Energy (previously BBW)	1090
AES	1057
enXco	882
Duke Energy	735
Noble Environmental Power	726
John Deere Renewables	705
BP Wind Energy	679
First Wind	478
Shell	449
Puget Sound Energy	429
Eurus Energy	417
Acciona Energy	415
Babcock & Brown Ltd	413
Others	6630

Forward Look on U.S. Market Activity

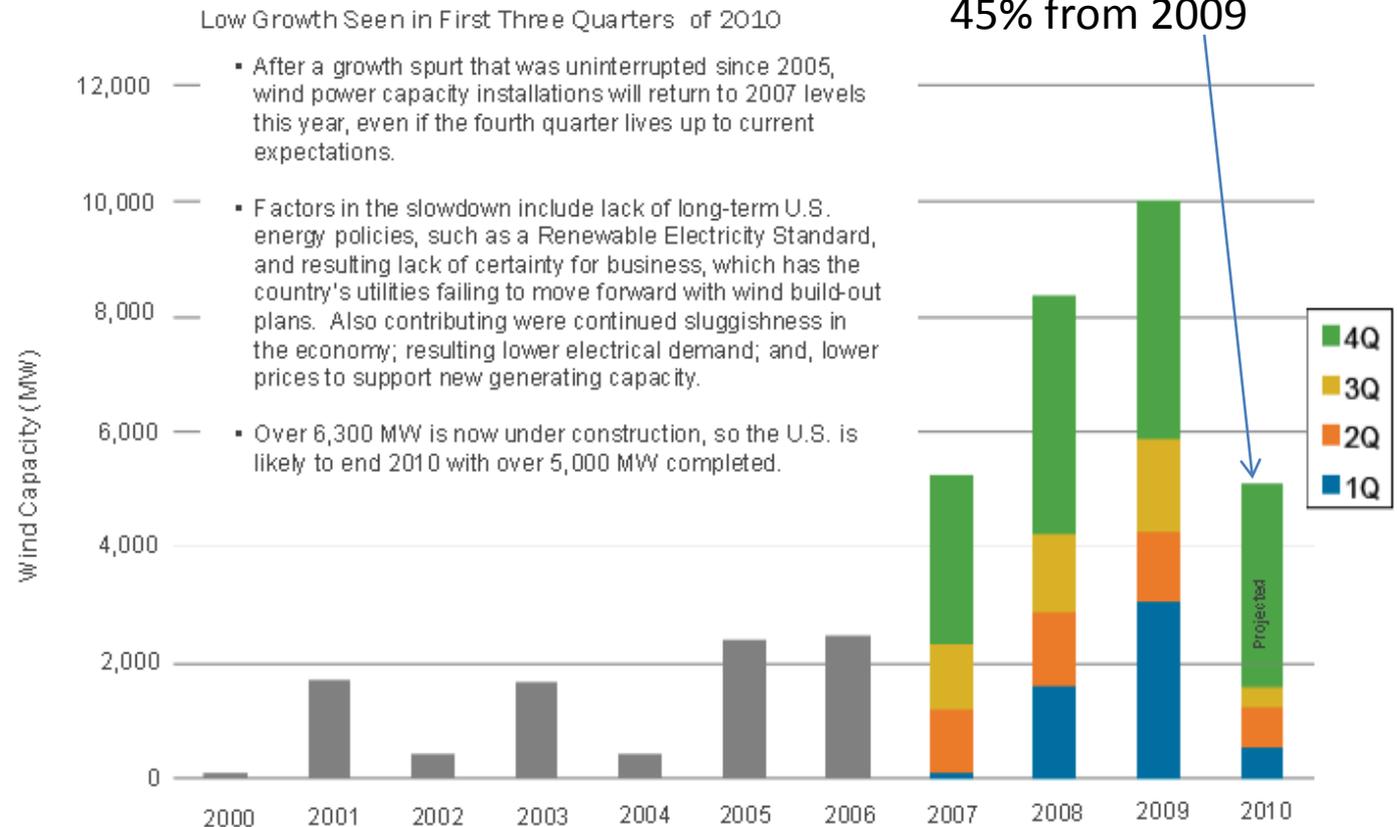
Growth of U.S. Wind Power Capacity

- 39% average annual growth rate for 2005-2009
- As annual installations have doubled twice in the last three years, the five-year annual growth rate continues to increase
- “Boom Bust” pattern largely due to Federal policy changes

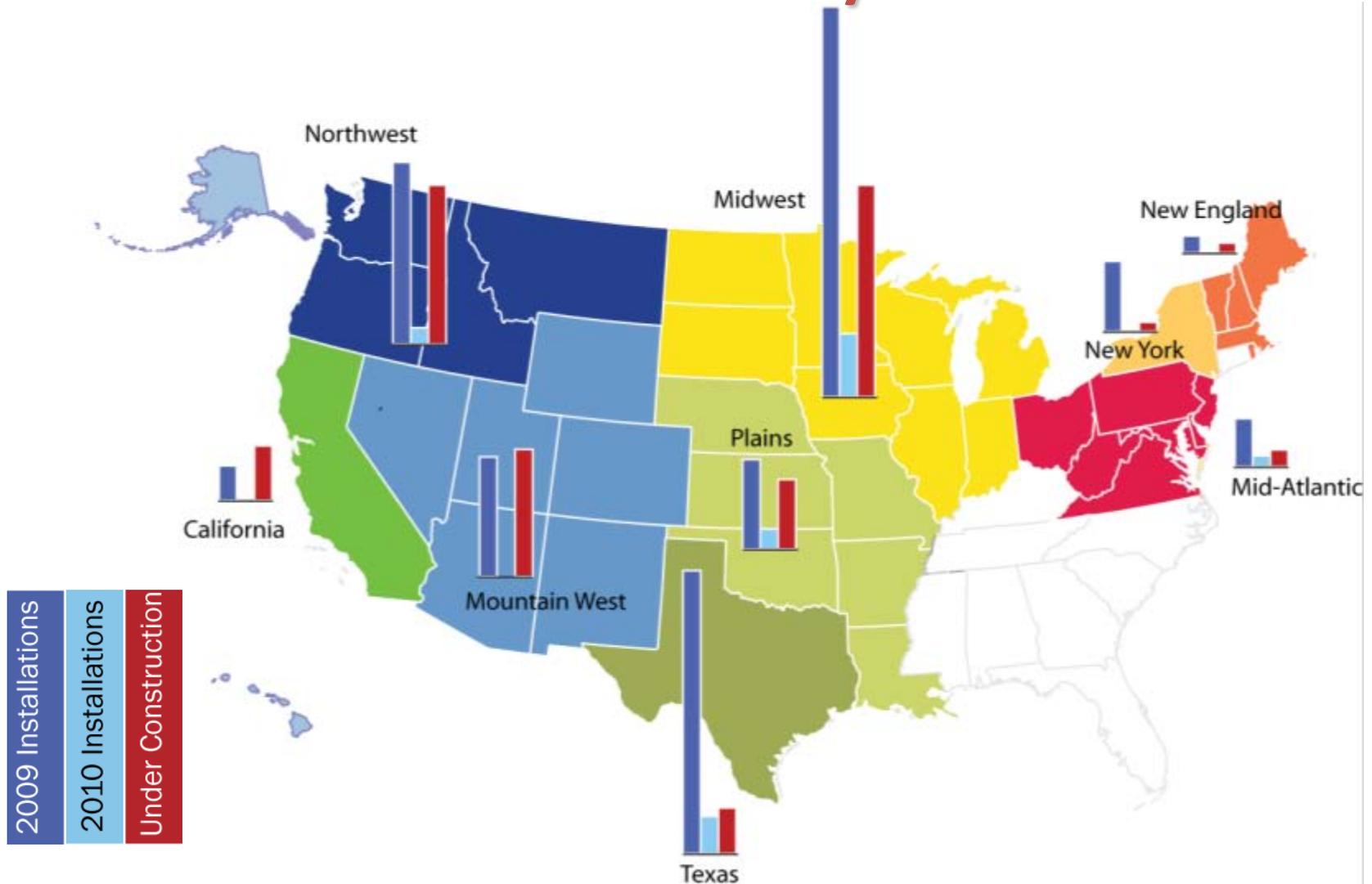


U.S. Annual and Quarterly Wind Installation

U.S. Annual Wind Power Installations



2010 Regional Installation & Construction Activity and Trends



Green Power Superhighways

- Link areas with vast supplies of renewables to areas of high electricity demand green power superhighways
- Improve grid operations



No Supergrid on the Horizon, but Many New Transmission Lines Proposed

Transmission Project Name & Location	Voltage (kV)	MW Expected	Year Online
Populus-Terminal (ID, UT)	Double 345	1,600	2010
Walla Walla-McNary (OR, WA)	235	400	2010
Southwest Intertie (ID, NV)	500	1,850	2011
Northeast Energy Link (ME, NH, MA)	(DC) 320	1,000-2,000	2012
BPA lines from Open Season (WA, OR)	500	2,800	2012
CREZ (TX)	345	9,859	2012-2013
CO-WY intertie (WY)	345	900	2012-2013
CapX (MN, SD, ND)	345	2,275	2012-2014
Tallgrass/Prairie Wind (KS, OK)	765	5,800	2013
Tehachapi (CA)	500	4,500	2013
Pawnee-Smoky Hill upgrade (CO)	345	500	2013
Total		~32,000 MW	

Source: AWEA, U.S. Wind Industry Annual Report, Year Ending 2009

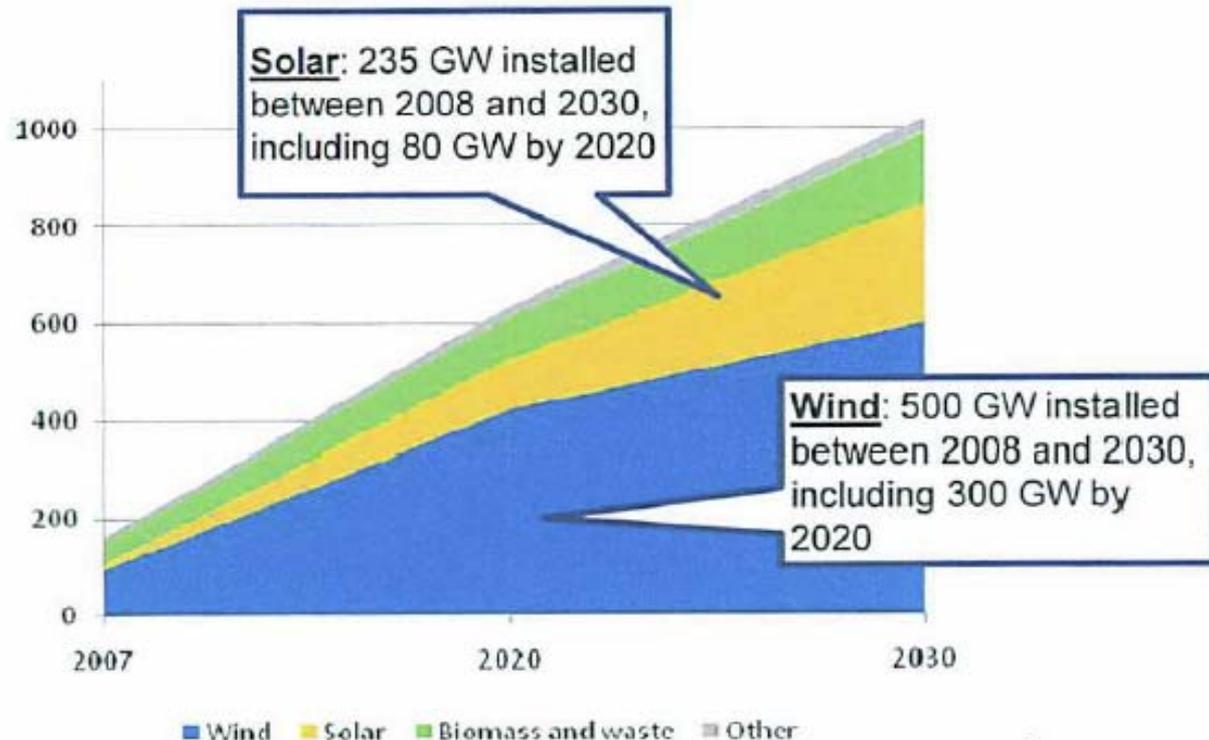
Policy Status & Path Forward

Is Clean Tech Real?

- John Doerr, Kleiner Perkins partner, at recent Clean Energy Summit noted:
 - Internet is a \$1 trillion business with 1.2 billion customers
 - Energy is a \$6 trillion business with 4 billion customers
 - If the energy system has to transform to a low carbon output system, then clean energy is “the business opportunity of the century.”

1000 GW =
1,000,000 MW of
new renewables by
2030 =
\$3 trillion
investment
opportunity

Renewable energy capacity installed worldwide (GW)



*excluding hydro

Source: IEA 2009

Reasons for Wind Development in the U.S. Remain Unchanged

- Inexhaustible resource with over 10,000 GW of potential, enough to power the U.S. nearly 10 times over
- Known long-term pricing of wind offers utilities a hedge against fuel price volatility risk
- Zero air impacts provides utilities a hedge against oncoming environmental regulations through EPA, federal legislation, state regulations
- As a non-thermal generation technology, wind limits water needs commonly needed for fuel extraction and thermal generation as water competition increases in arid regions of the U.S.
- Cost of wind remains in competitive zone

Activity at Federal Level on Long Term Energy Policy

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Activity at Federal Level on Long Term Energy Policy

- American Reinvestment & Recovery Act (Passed February 2010)
 - Included 3 year extension of Production Tax Credit - longest extension in history for wind energy
 - Included key reform to tax credit to convert into 30% investment tax credit or take equivalent cash grant – set to effectively expire this year with an under construction deadline of December 31, 2010
 - Energy R&D Programs significantly strengthened

- National Renewable Electricity Standard (RES) – Not Passed
 - Considered by Congress for 10 years, passed by Senate 3 times and House once on separate occasions.
 - Bipartisan group of Senators introduced RES in September 2010 and gained 33 co-sponsors
 - Possible “lame duck” action?

- Transmission Reform Legislation – Not Passed

- Climate Change Legislation – Not Passed

Public Support is Strong

Neil Newhouse of Public Opinion Strategies and Anna Bennett of Bennett, Petts & Normington Poll in March 2010:

89% of American voters: 84% of Republicans, 88% of Independents and 93% of Democrats believe increasing the amount of energy the nation gets from wind is a good idea

Harris Interactive Poll October 2010:

Big majorities in 6 countries favor the building of more wind farms in their nations -- 90% in Spain and 87% in the U.S.: Large numbers favor more wind "strongly"

Those who pay energy bills would be willing to pay up to 5% more for renewable energy.

U.S. Portfolio Approach to Policy

- U.S. approach to energy policy often involves a portfolio of policies at the state and national levels
- State jurisdiction over power generation through state regulatory process puts states in position to lead

State Leadership: Recent Successes

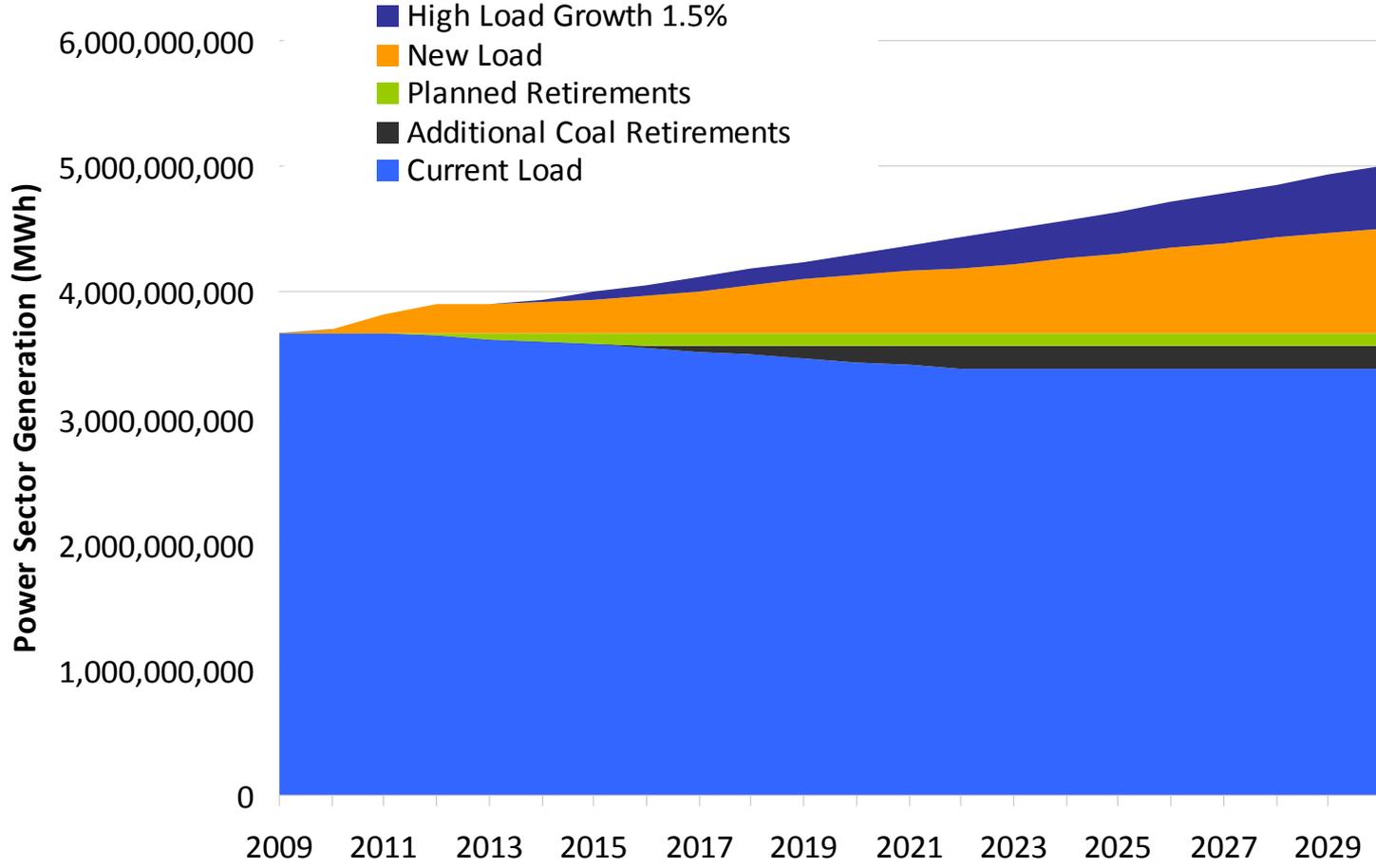
Ohio: After passing an aggressive 30% RPS, the state reformed critical state tax laws to provide better business environment for development. 1,100 MW of proposed projects can now move Ohio ahead to join the other 14 states in the “Gigawatt Club”.

Colorado: After passing by voter initiative in 2004, the state RPS has been increased twice, most recently to 30% by 2020.

Nebraska: One of the highest wind potential states in the U.S. passed a portfolio of policies in the “Wind Bill” to open the state for business

Oklahoma: This conservative plains state was the most recent state to pass a renewable energy target for its utilities

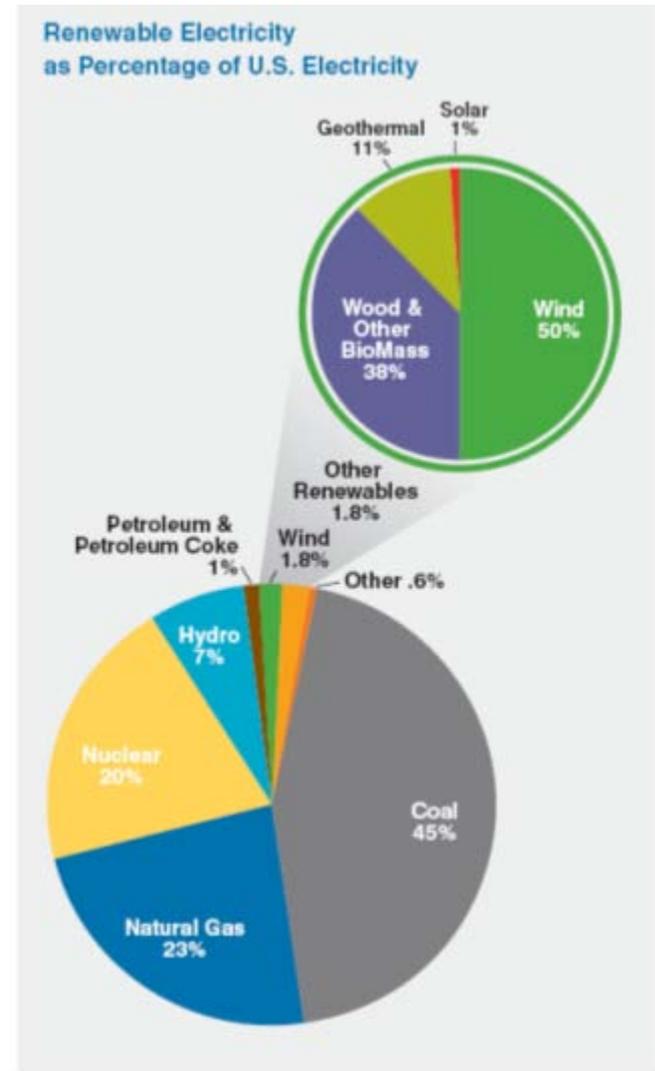
Looking Ahead: Market for Generation is Available



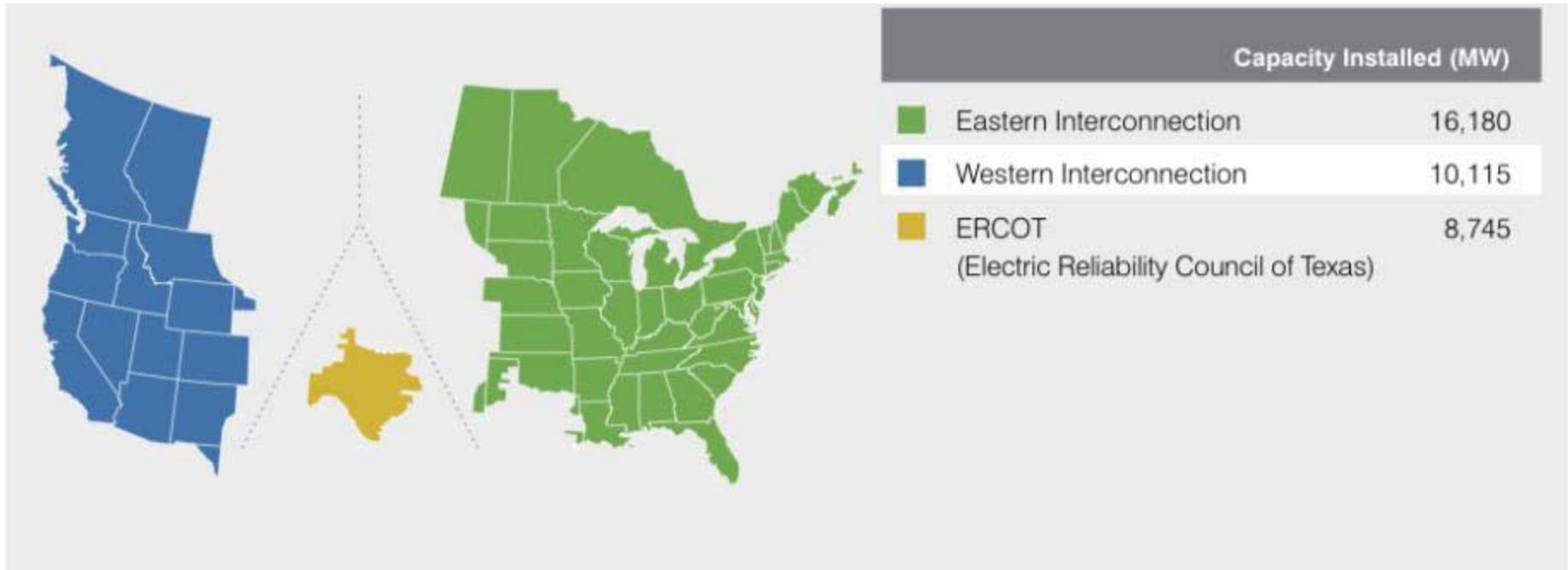
U.S. Generation Mix

In 2009,

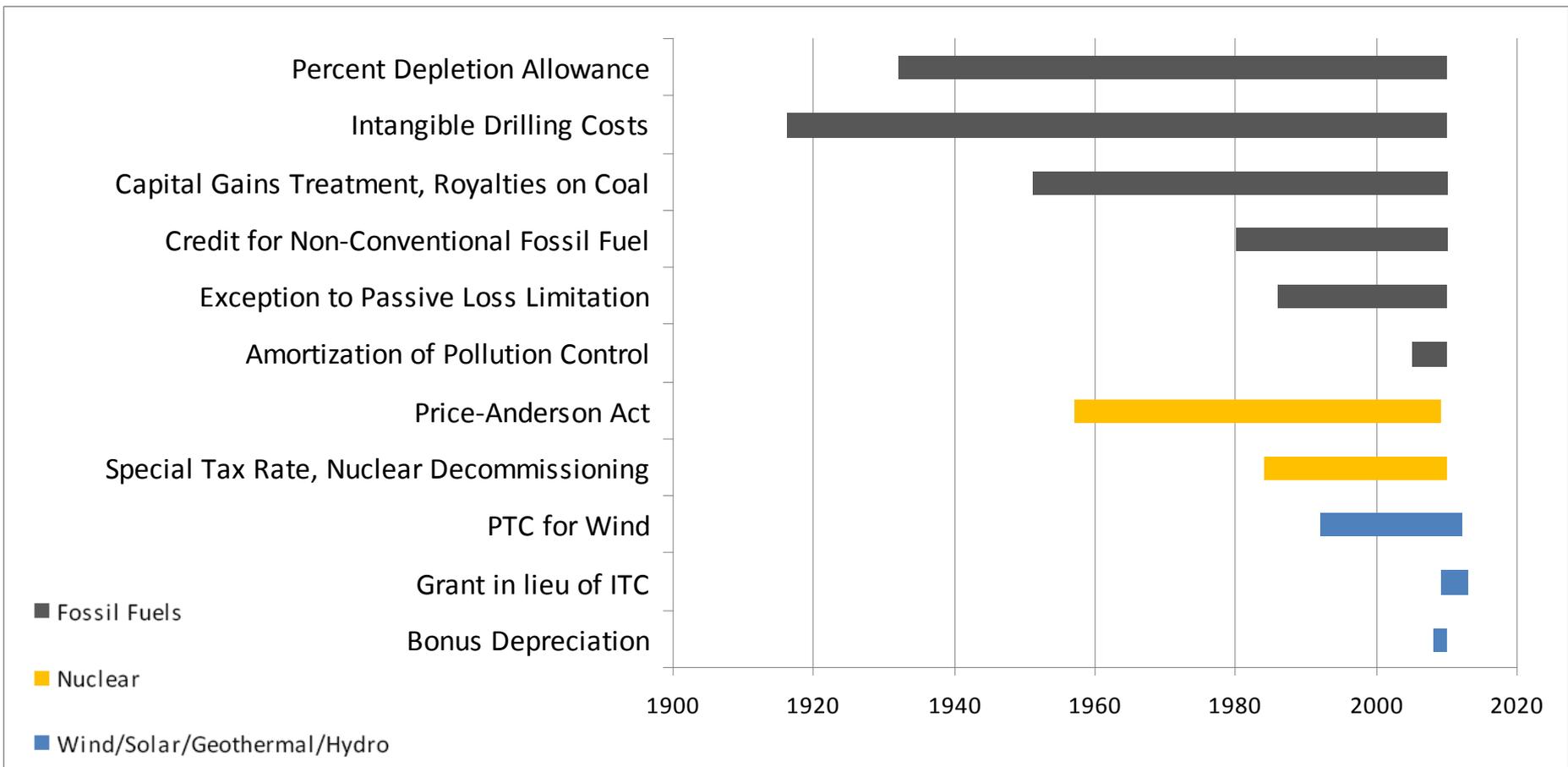
- Wind provided 1.8% of U.S. generation
- All renewable energy sources provided 10.5% of the U.S. generation



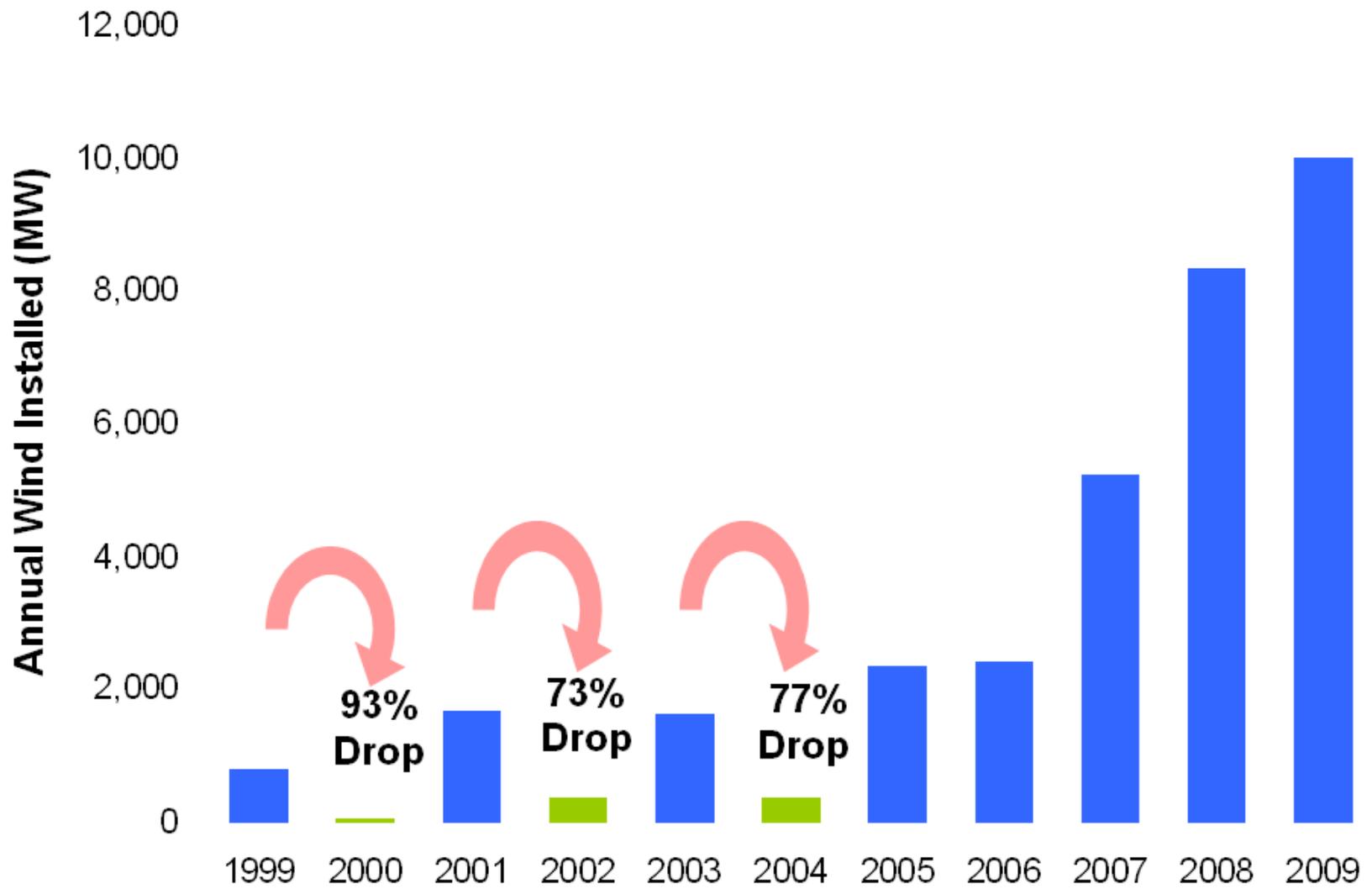
Installed Wind Capacity by Interconnection



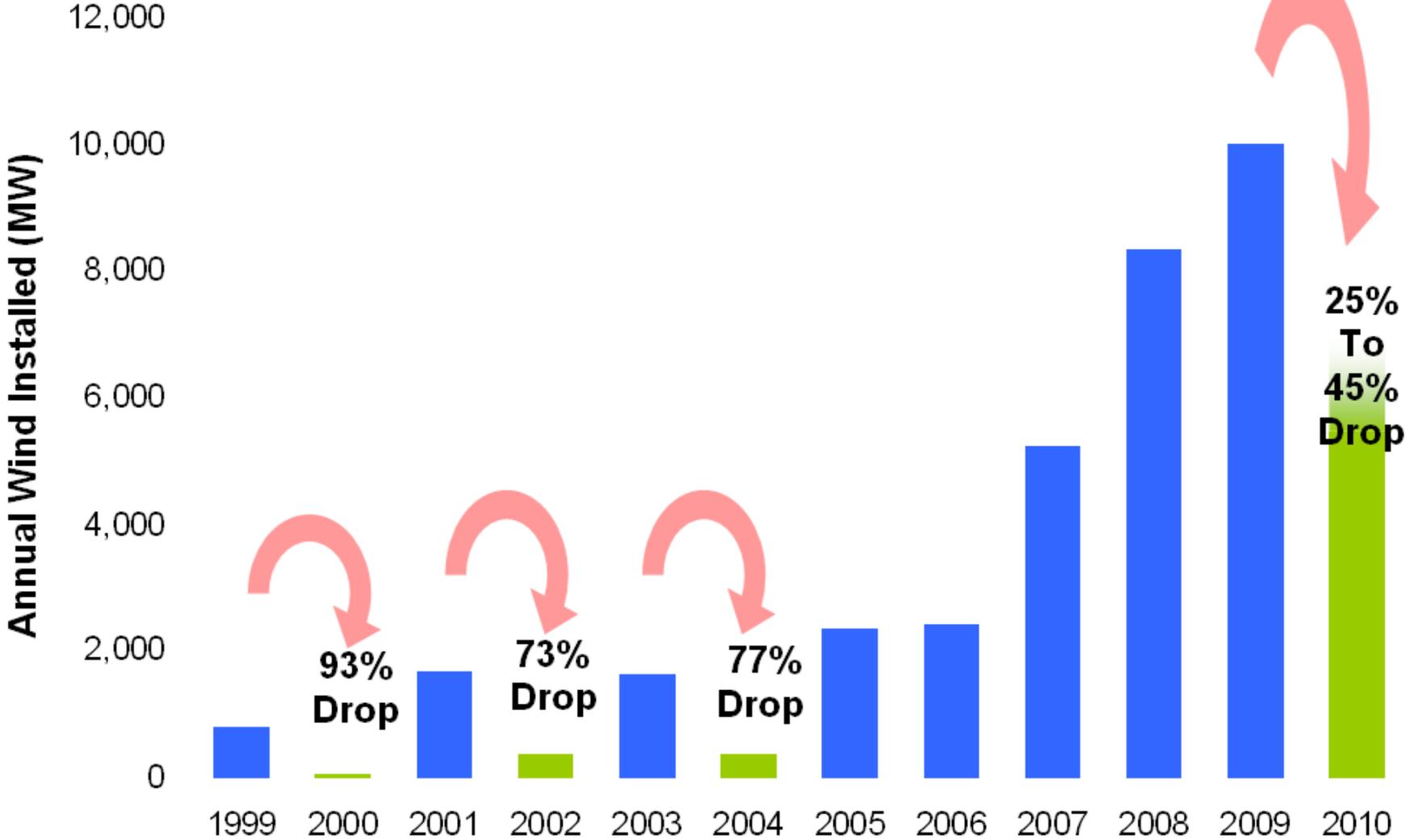
All Domestic Energy Has Had Long-Term Support, Except Renewables



History of Boom & Bust Tax Credit



Repeat of History?



Updated as of 2Q 2010

National Support for Clean Energy from America's Competing Economies

■ Nations with hard renewable commitments

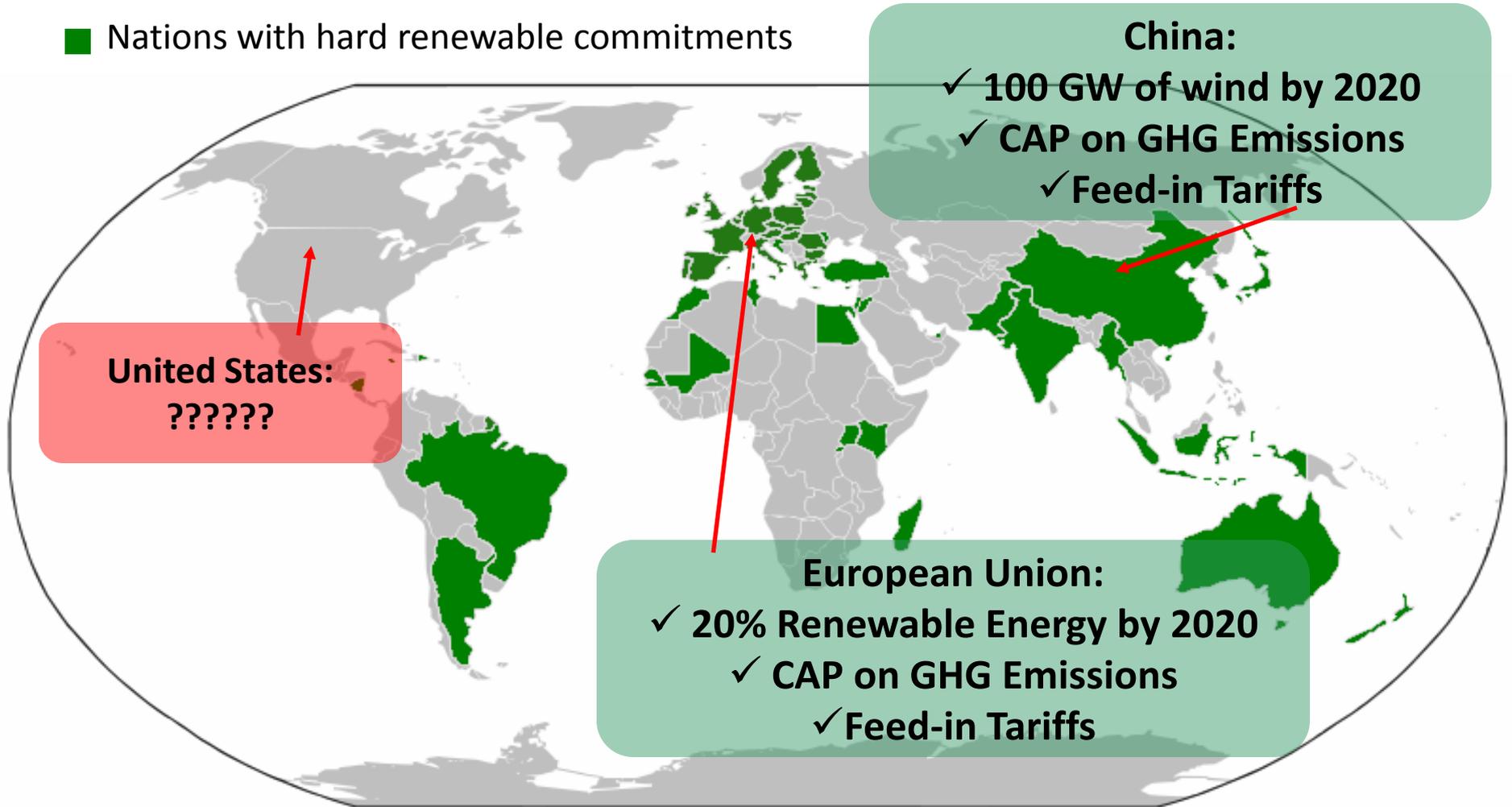
United States:
???????

China:

- ✓ 100 GW of wind by 2020
- ✓ CAP on GHG Emissions
- ✓ Feed-in Tariffs

European Union:

- ✓ 20% Renewable Energy by 2020
- ✓ CAP on GHG Emissions
- ✓ Feed-in Tariffs



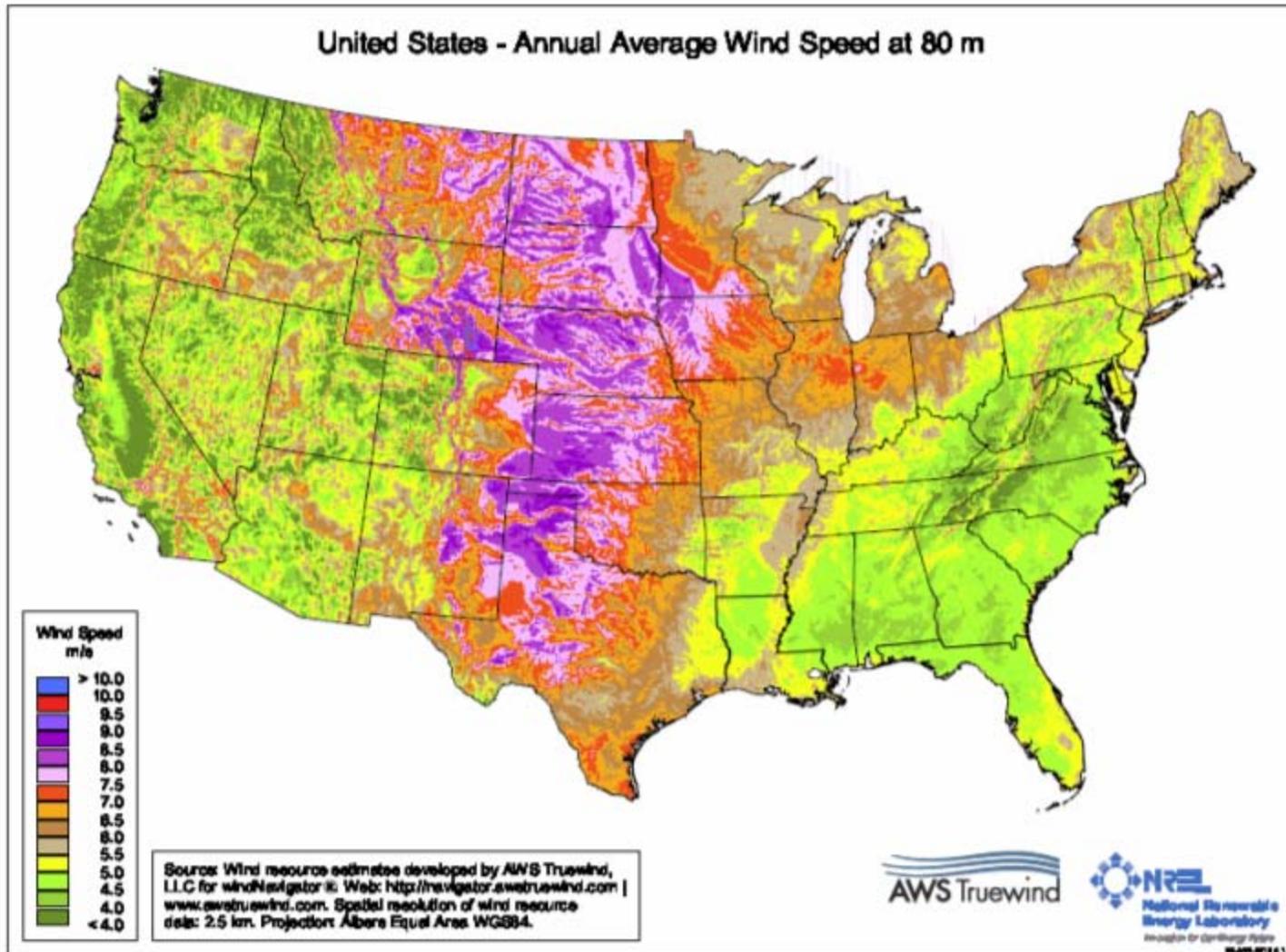
Transmission

- Continue to advocate for federal transmission legislation on cost allocation, planning and permitting
- Continue to participate in FERC proceedings on planning and cost allocation, and integration of variable resources
- Seek grid operation changes to improve integration of wind
- Oppose wind integration charges
- Seek improved leadership from DOE/BPA/WAPA
- Build coalitions in support of transmission

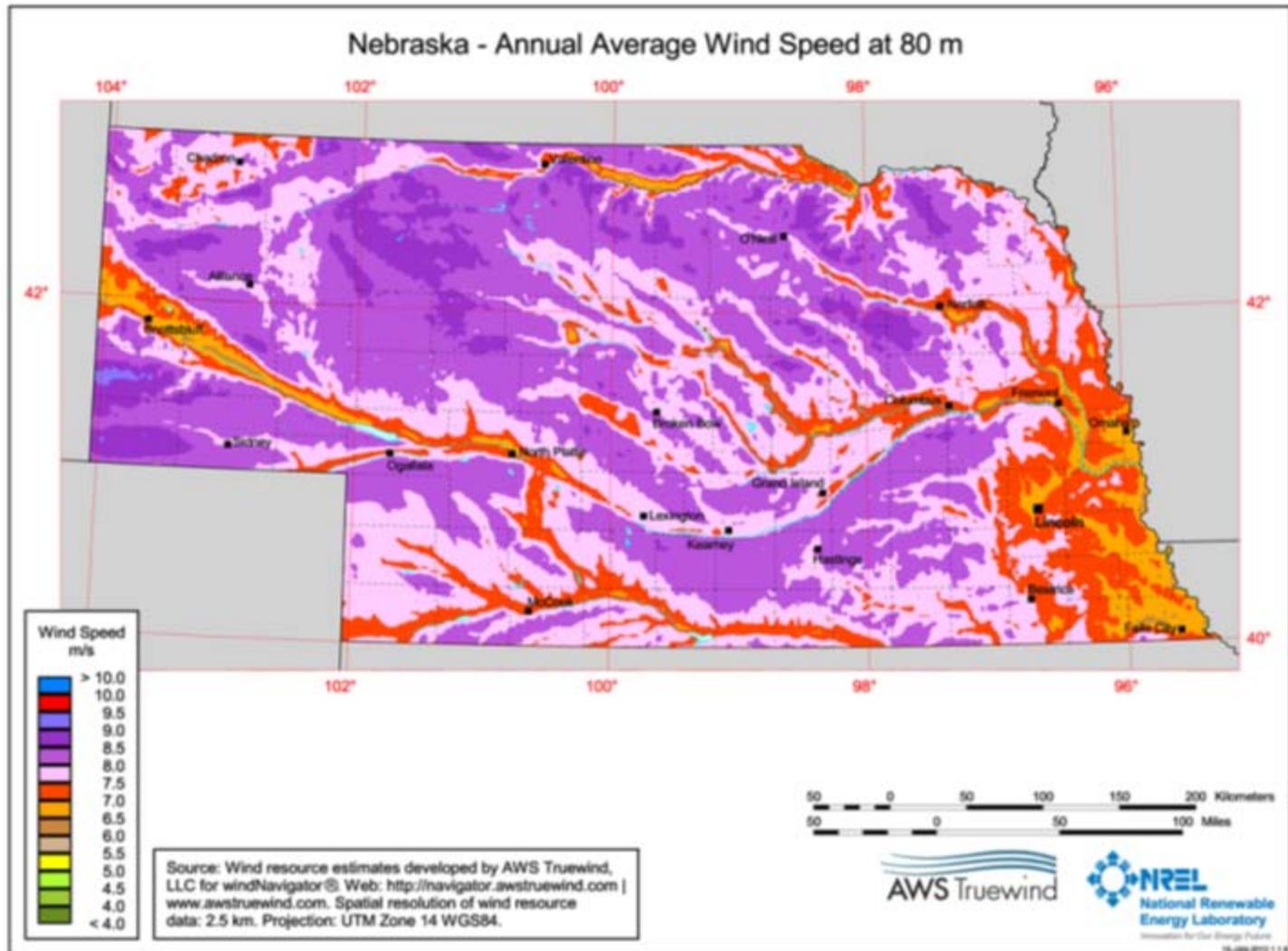
Siting

- **Species-specific strategies: whooping crane, lesser prairie chicken, Indiana bat, bald and golden eagles, sage grouse**
- **Effort to find resolution on radar/airspace issues with FAA/DOD etc.**
- **AWEA Siting Handbook**
- **AWEA/CanWEA sound/health report**
- **Commenting on legislation and regulatory proposals related to siting (radar, public lands, sound, wildlife etc.)**

What About Nebraska?



Nebraska Has Huge Wind Potential



NREL Data Says Nebraska is the 3rd Windiest State

Rank	Windy Land Area >= 30% Gross Capacity Factor at 80m		Available Wind Land as % of State	Wind Energy Potential		Wind Energy Actual	
	State	Total Area of State (km ²)		Potential Installed Capacity ³ (MW)	Potential Annual Generation (GWh)	Actual 2009 Installed Wind Capacity (MW)	Percent of Potential MW installed
1	Texas	435,639	56%	1,901,530	6,527,850	9,506	0.50%
2	Kansas	211,861	89%	952,371	3,646,590	1,026	0.11%
3	Nebraska	199,628	92%	917,999	3,540,370	153	0.02%
4	South Dakota	193,828	88%	882,412	3,411,690	313	0.04%
5	Montana	232,769	50%	944,004	3,228,620	375	0.04%
6	North Dakota	182,375	84%	770,196	2,983,750	1,203	0.16%
7	Iowa	134,900	78%	570,714	2,026,340	3,670	0.64%
8	Wyoming	146,166	44%	552,073	1,944,340	1,101	0.20%
9	Oklahoma	123,244	57%	516,822	1,788,910	1,130	0.22%
10	Minnesota	121,885	45%	489,271	1,679,480	1,796	0.37%

For reference, the total US generation in 2009 from all sources was **3,953,111 GWh**, worth about \$600 million a day at 6 cents/kWh



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THERE'S NO HEAVIER BURDEN
THAN A GREAT POTENTIAL!

LINUS

Many Potential Benefits

- Good jobs in rural areas
- A second crop – land lease payments
\$2,667/MW/year
- Export power sales to keep rates low now and in future
- Property taxes \$3,940/MW/year
- Water savings – 1,840 million gallons for every 1,000 MW built
- CO2 reductions – like taking 70,000 cars off the road for every 1,000 MW operating

Nebraska Economic Impacts

from 1,000 MW of New Wind Development

Wind Energy's Economic "Ripple Effect"

Direct Impacts

Payments to Landowners:

- \$2.7 million/year

Local Property Tax Revenue:

- \$3.9 million/year

Construction Phase:

- 1,634 new jobs
- \$188.5 million to local economies

Operational Phase:

- 260 new long-term jobs
- \$21.2 million/year to local economies



Indirect and Induced Impacts

Construction Phase:

- 1,664 new jobs
- \$149.1 million to local economies

Operational Phase:

- 191 local jobs
- \$18.4 million/year to local economies

Totals

(construction + 20 years)

Total Economic Benefit:
\$1.1 billion

New Local Jobs During Construction: 3,298

New Local Long-term Jobs: 451

Construction Phase = 1-2 years
Operational Phase = 20+ years

Challenges

- No investor owned utilities to make direct use of federal tax incentives or earn rate based returns
- Among the lowest electric rates in the country
- Significant investment in coal generation
- No State RPS; utilities likely exempt from federal RES due to size
- Low local demand
- Lack of transmission for large exports of wind

A Realistic Plan – What Can Nebraska Do Now to Get Ready for the Future?

- Keep track of the economics – you may be pleasantly surprised
- Keep going after those green jobs
 - But manufacturers need some local markets
- Don't get left out of transmission opportunities
- Build on strengths
 - Rail network, central location, insurance and financial services

Plan Part 2

- Do your siting homework ahead of time
 - Map wildlife and habitat on state and regional basis
 - Anticipate radar and other National Airspace issues
 - Plan Transmission corridors to avoid sensitive areas
- Use the educational system
 - Training – engineers, wildlife biologists, technicians, developers
 - Research – wind/wildlife interactions, grid integration, small wind, etc., etc.
- Educate & involve the public
 - Community wind, small wind in addition to big wind
- Combine with state's leading role in Bio-energy

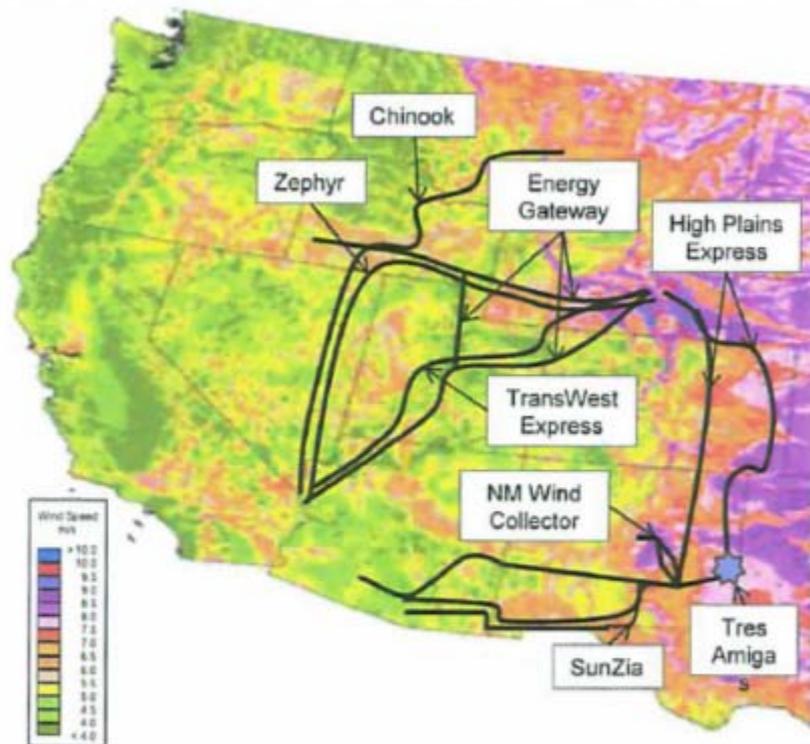
Nebraska Already Attracting Manufacturing Jobs



- It can get more.
- It has great rail transportation
- Nobody has the aftermarket parts business for wind tied up
- You need some local market to be competitive with other states
- Get everyone working together (like Kansas City C of C)
- Consider incentives

WECC Transmission Initiatives Link Resource to Load

Select WECC Renewables-Based Transmission Initiatives



Note: Locations are approximate; map is not comprehensive of all transmission upgrades proposed in the region; not all transmission lines are focused on just wind, and could carry other renewables and conventional power; wind speeds based on 80 meter hub height
 Source: NREL, IHS Emerging Energy Research

Analysis

PacifiCorp's Energy Gateway project is a three-part, 6 GW line designed to supply the growing demand of the US Pacific Northwest and Southwest

- The project has a South, West, and Central portion, with segments of the Gateway Central under construction for completion in 2010
- Remaining 500 kV segments are scheduled to come online between 2013 and 2019

TransCanada had mixed success in its transmission open season for the 3 GW, 500 kV Chinook and Zephyr HVDC lines

- TransCanada filled the entire capacity of its Wyoming-originating Zephyr line, awarding 2.1 GW to Pathfinder Renewable Energy and the remainder to EDP-Horizon and BP. TransCanada anticipates the line to be in operation in 2015 or 2016
- TransCanada was unable to auction the capacity of the Montana-based Chinook line due to lack of interest, and has extended its open season to developers until the end of 2010

The High Plains Express (HPX) is a 3.5 GW to 4 GW AC line that will connect to the Tres Amigas Superstation and coordinate with other lines

- The Tres Amigas Superstation will be a 5 GW superconducting hub in Clovis, New Mexico that will interconnect the Western, Eastern, and Texas Interconnections
- The route of the HPX overlaps with the New Mexico Wind Collector, SunZia, and the Wyoming-Colorado Intertie and HPX are working on coordinating development with these lines
- The SunZia will be capable of handling up to 4.5 GW of capacity and is currently undergoing WECC's Three Phase Rating Process to determine total capacity

Multi-state, multi-billion-dollar transmission proposals seek to link the best wind resource to demand regions in the US Southwest

Will Nebraska Have the Right Connections?

Compared to the Transcontinental Railroad this should be easy

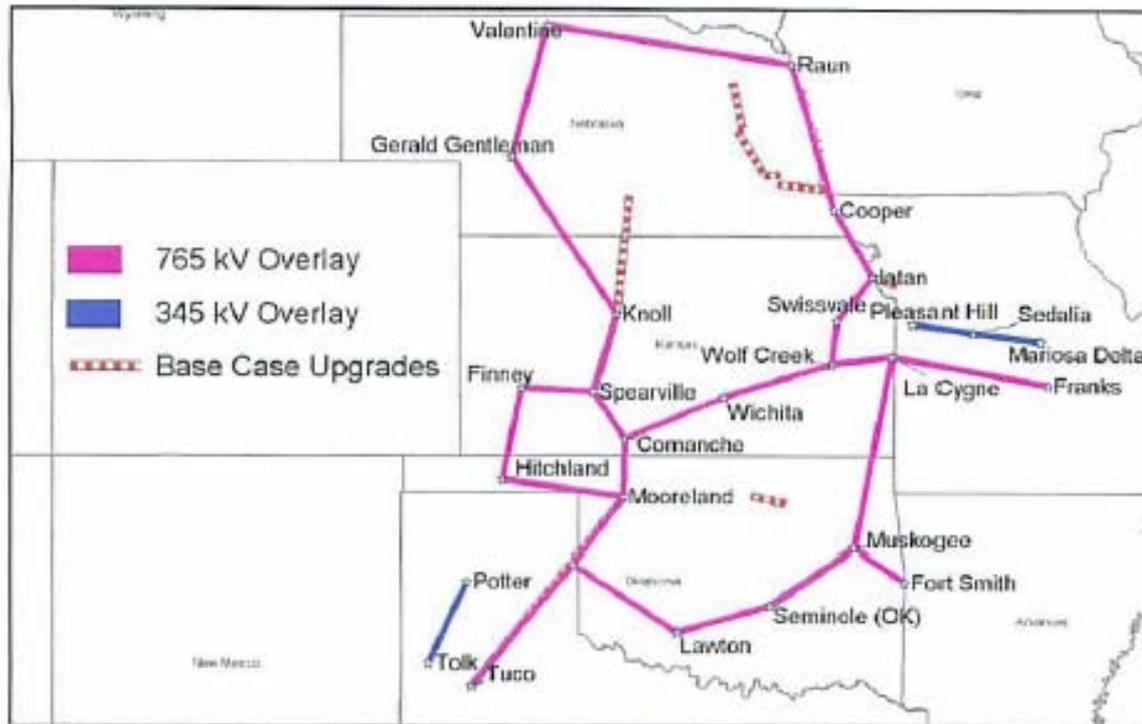
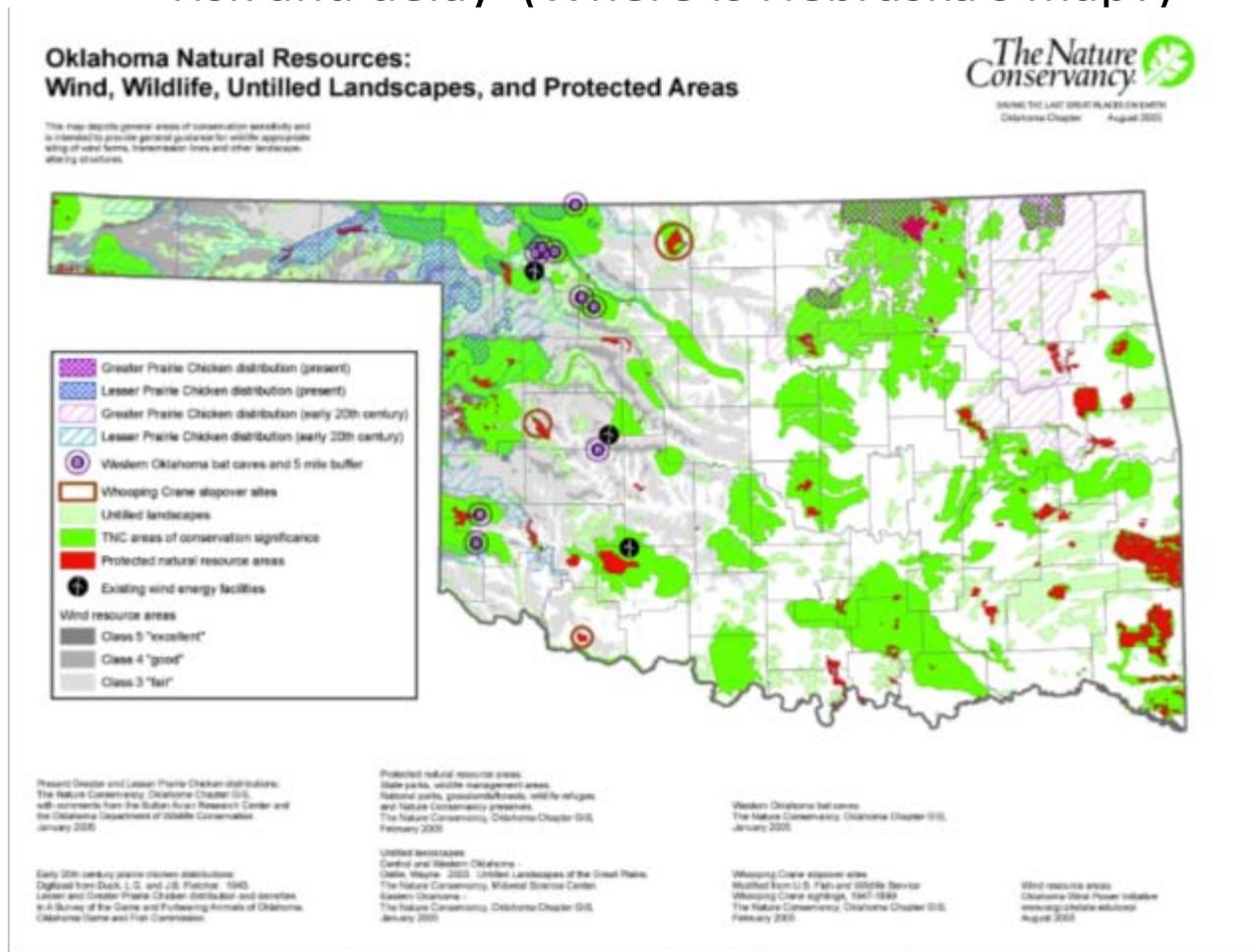


Figure 4: Base Case Conceptual EHV Overlay

Take Siting Concerns Seriously

NE has time to prepare and take care – minimizing impacts minimizes risk and delay (Where is Nebraska's map?)



“It’s tough to make predictions, especially about the future”

(Yogi Berra, or Neils Bohr, Mark Twain, Winston Churchill, Groucho Marx, etc.)

- Nebraska has huge renewable energy potential
- *With preparation*, it can create its own luck
- Wind is now an “overnight success,” and it only took 30 years to get here.
- Nebraska has all the tools to be another “overnight success” in renewables
- But the time has come to live up to its championship potential

