Wind and Renewable Energy: Nebraska's Growth Opportunity.

Dan McGuire

Co-Chair-Nebraska Wind and Solar Conference

Director-ACGF *Wealth From The Wind*

Facilitator-NREL Nebraska Wind for Schools

September 4, 2014

Sustainability Leadership Presentation Series Partners:

Central Community College; Metropolitan Community College;

Joslyn Institute for Sustainable Communities; WasteCap Nebraska

7TH ANNUAL NEBRASKA Wind and Solar CONFERENCE & EXHIBITION

Turning Challenges into Nebraska Opportunities!

SAVE THE DATE Wednesday, October 29 &
Thursday, October 30, 2014
LaVista Conference Center – LaVista, NE

Federal & State Public Policy either facilitates or slows Economic Development with Renewable Energy

Here are Two Parallel Policies Benefiting Nebraska:

Federal Renewable Fuels Standard **RFS-Ethanol** Policy Benefits :

- Ethanol costs less than wholesale gasoline
- Ethanol is the lowest cost transportation fuel and octane source from 2010-2013
- An Iowa State University study shows that ethanol in gas saves all U.S. consumers $1/gal. at the pump or $1,200 per household annually
- Ethanol extends motor fuel supplies
- Ethanol Increases U.S. energy security
- U.S. ethanol growth reduced U.S. oil imports from the Middle East and Persian Gulf by 25% since 2005, a big national security benefit
- 13.3 billion gallons of ethanol supported 86,504 jobs directly and 300,277 indirect jobs
- Ethanol increased corn prices and farm income
- Nebraska's 26 ethanol plants produce 2.0 billion gallons or 13% of the U.S. supply, create 1,200 jobs represent $5 billion in capital investment
- A $3.60 bu. of corn produces 2.8 gallons of ethanol plus high value animal feed and oils vs. the same $3.60 buying one gallon of gasoline

Source: ABF Economics Study, July 2014, Renewable Fuels Association, NE Ethanol Board Fact Sheets

Federal Production Tax Credit **Wind PTC** & **ITC** Policy Benefits:

- Improvements in wind turbine technology allows electric utilities and consumers to lock in low, affordable rates via 20-30 yr. contracts
- Wind PPA Prices Have Reached All-Time Lows especially in the interior US according to DOE.
- Domestic manufacturing content of nacelles, blades and towers is strong according to DOE
- In 2012 559 US manufacturing facilities were building wind energy components
- Wind related jobs exceeded 50,000 in 2013
- In 2013, the U.S. wind fleet reduced power sector emissions by 96 million metric tons, or 4.4 %, the equivalent of taking 16.9 million cars off the road. Wind energy is the lowest cost and most scalable zero-emissions electricity source.
- Wind energy uses no water for generation
- Wind energy enhances US economic security
- A 200 MW wind farm generates about $1.3 mil. In property tax revenue reports a NE study
- A 200 MW wind farm could generate from $800,000 to $1 million in annual lease payments
- Nebraska will have 1,206 MW of wind by 2015

Sources: American Wind Energy Association/EIA/DOE and LBNL Report. Bluestem, LLC & Baird Holm study.

Office of Energy Projects
Energy Infrastructure Update
For July 2014

Total Installed Operating Generating Capacity

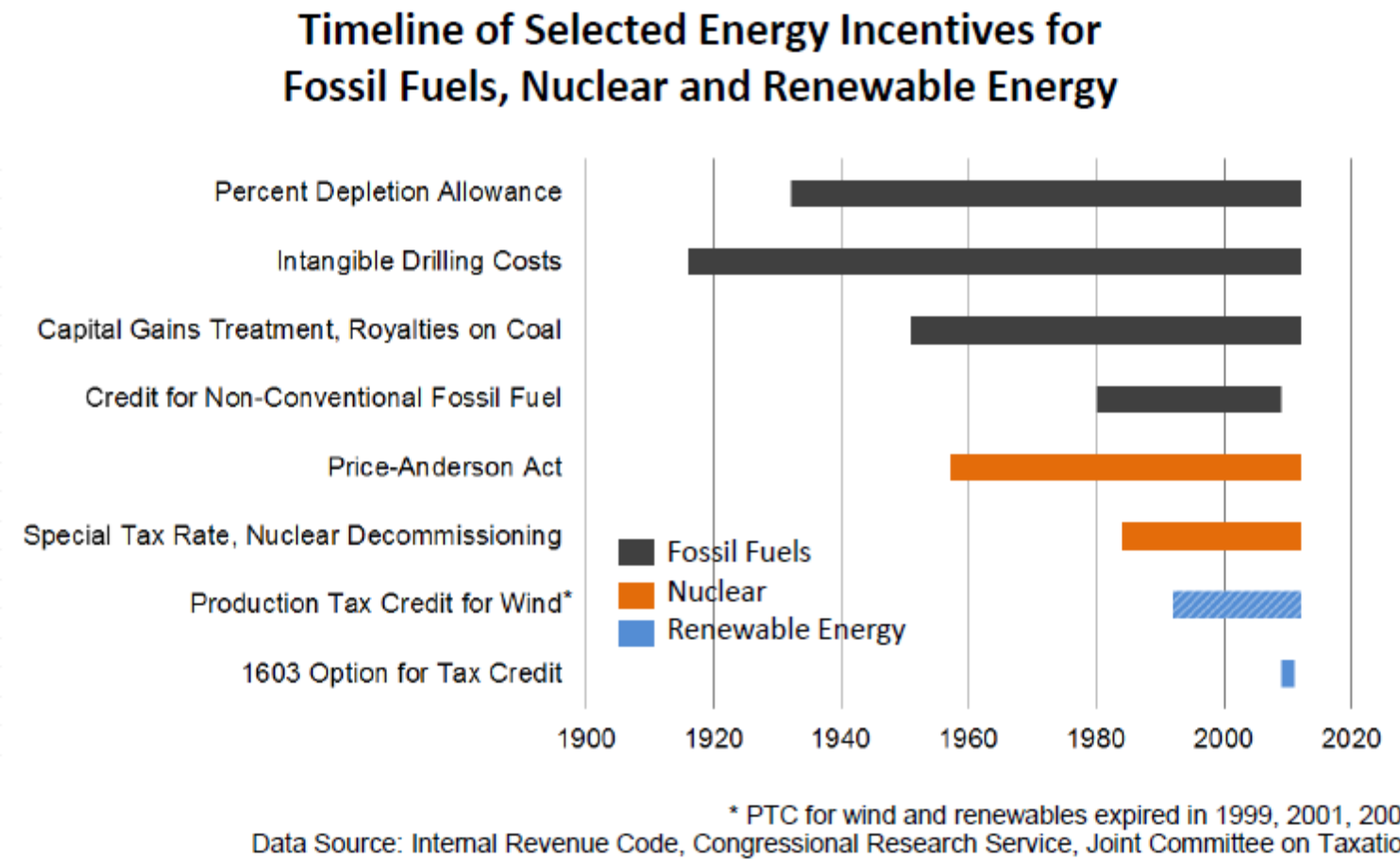
	Installed Capacity (GW)	% of Total Capacity
Coal	329.16	28.45%
Natural Gas	487.51	41.82%
Nuclear	107.41	9.24%
Oil	46.40	4.03%
Water	99.67	8.57%
Wind	61.95	5.26%
Biomass	15.94	1.37%
Geothermal Steam	3.87	0.33%
Solar	9.31	0.75%
Waste Heat	1.13	0.10%
Other	0.80	0.07%
Total	1,163.14	100.00%

Source: Data derived from Ventyx Global LLC, Velocity Suite.

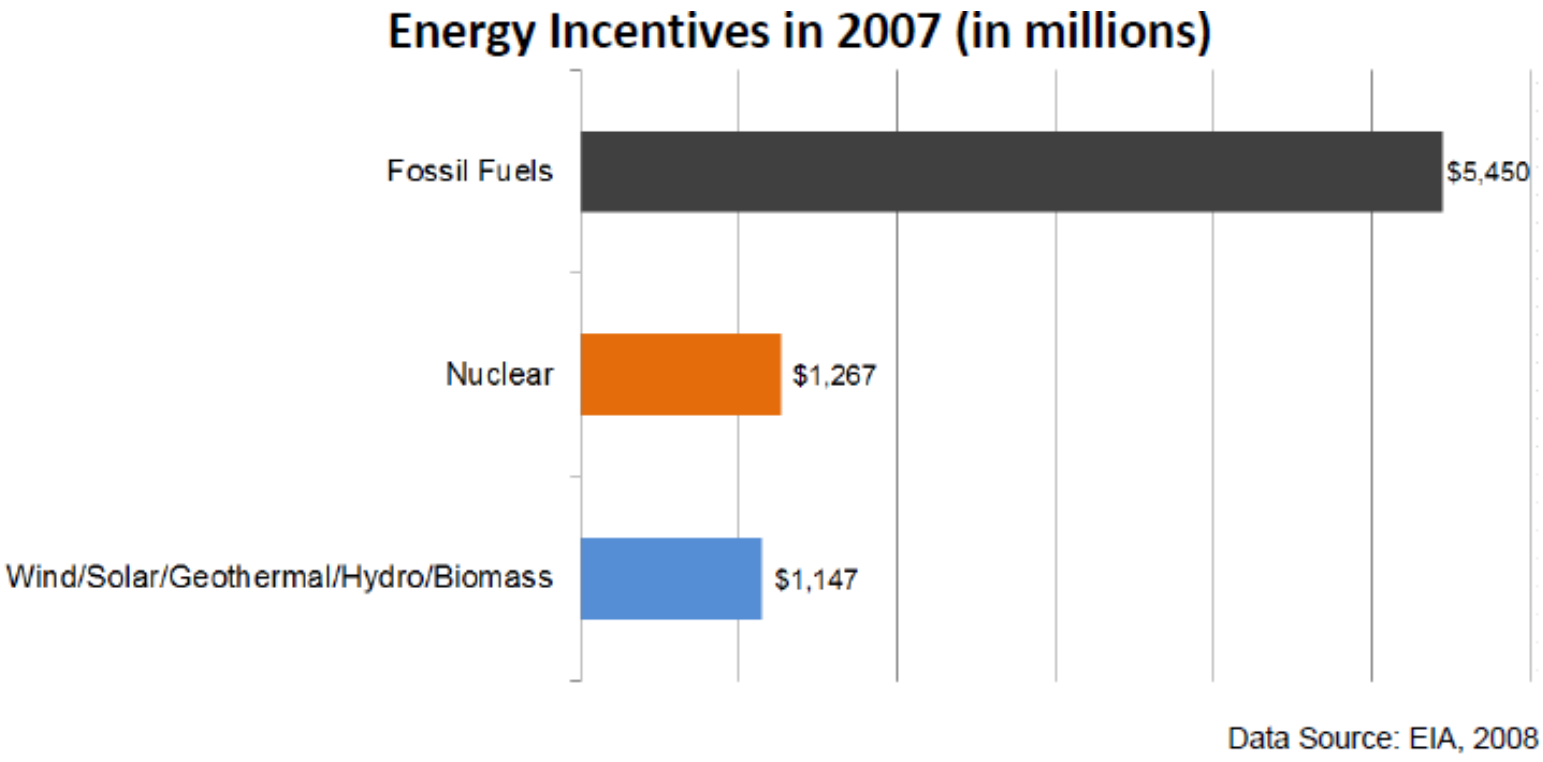
Keeping Energy Subsidies and Incentives in Perspective.

Federal Policy Is a Major Driver of All Energy Generation.

Both federal Wind Energy Production Tax Credit (PTC) and Renewable Fuels Standard (RFS) for ethanol are under attack from fossil fuel (oil/coal/gas) interests. The federal wind energy PTC expired 12/31/13 and has yet to be renewed by Congress.



Comparing Energy Incentives



Data Source: EIA, 2008

Updated May 2011

DSIRE™

Database of State Incentives for Renewables & Efficiency

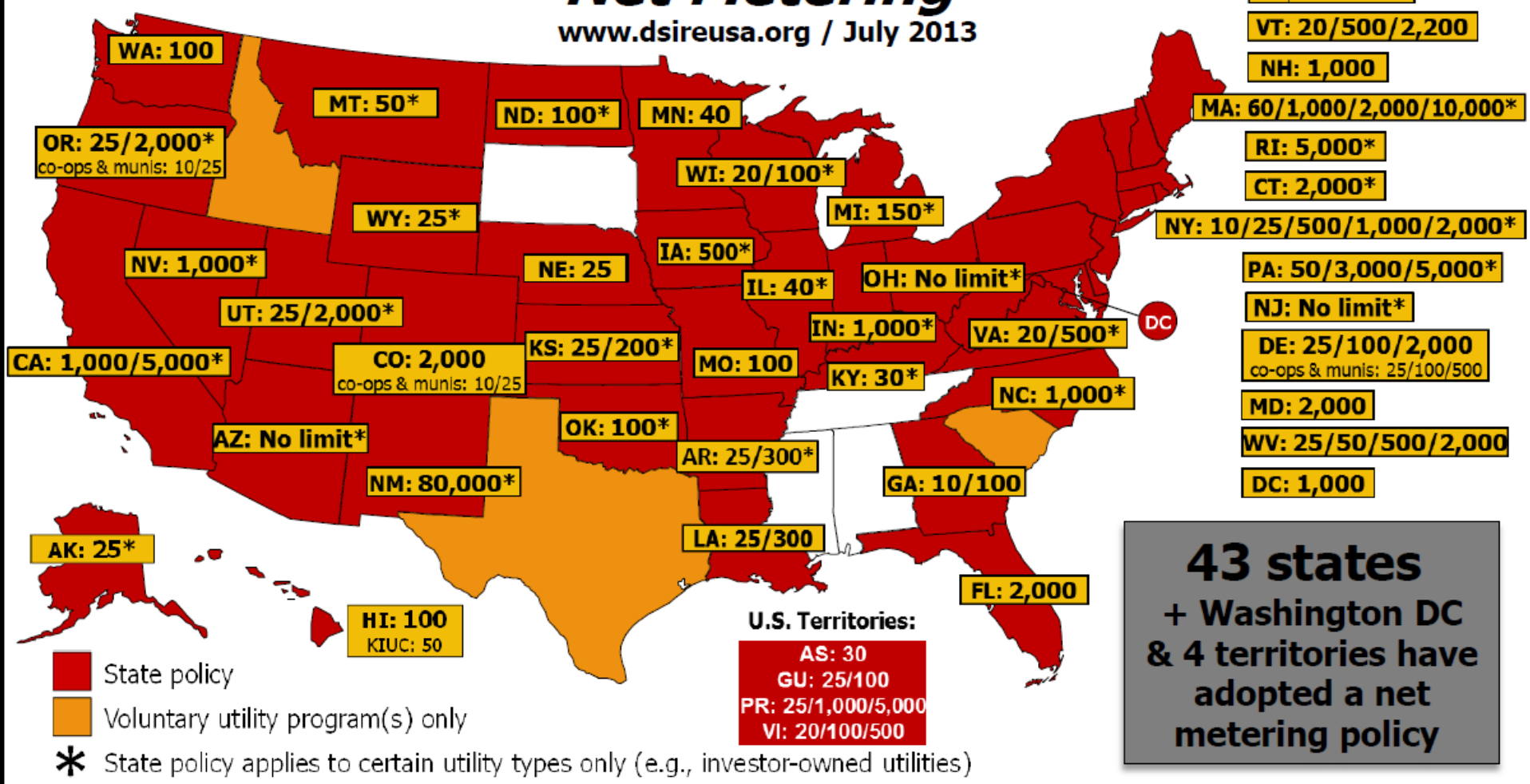
U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

IREC

NORTH CAROLINA Solar Center

Net Metering

www.dsireusa.org / July 2013



U.S. Territories:

AS: 30
GU: 25/100
PR: 25/1,000/5,000
VI: 20/100/500

State policy

Voluntary utility program(s) only

* State policy applies to certain utility types only (e.g., investor-owned utilities)

43 states
+ Washington DC & 4 territories have adopted a net metering policy

Note: Numbers indicate individual system capacity limit in kilowatts. Some limits vary by customer type, technology and/or application. Other limits might also apply. This map generally does not address statutory changes until administrative rules have been adopted to implement such changes.

Nebraska is a 100% Public Power State and Public Power serves Nebraskans very well. But, there's a very good reason we have Privately-Owned Wind Farms

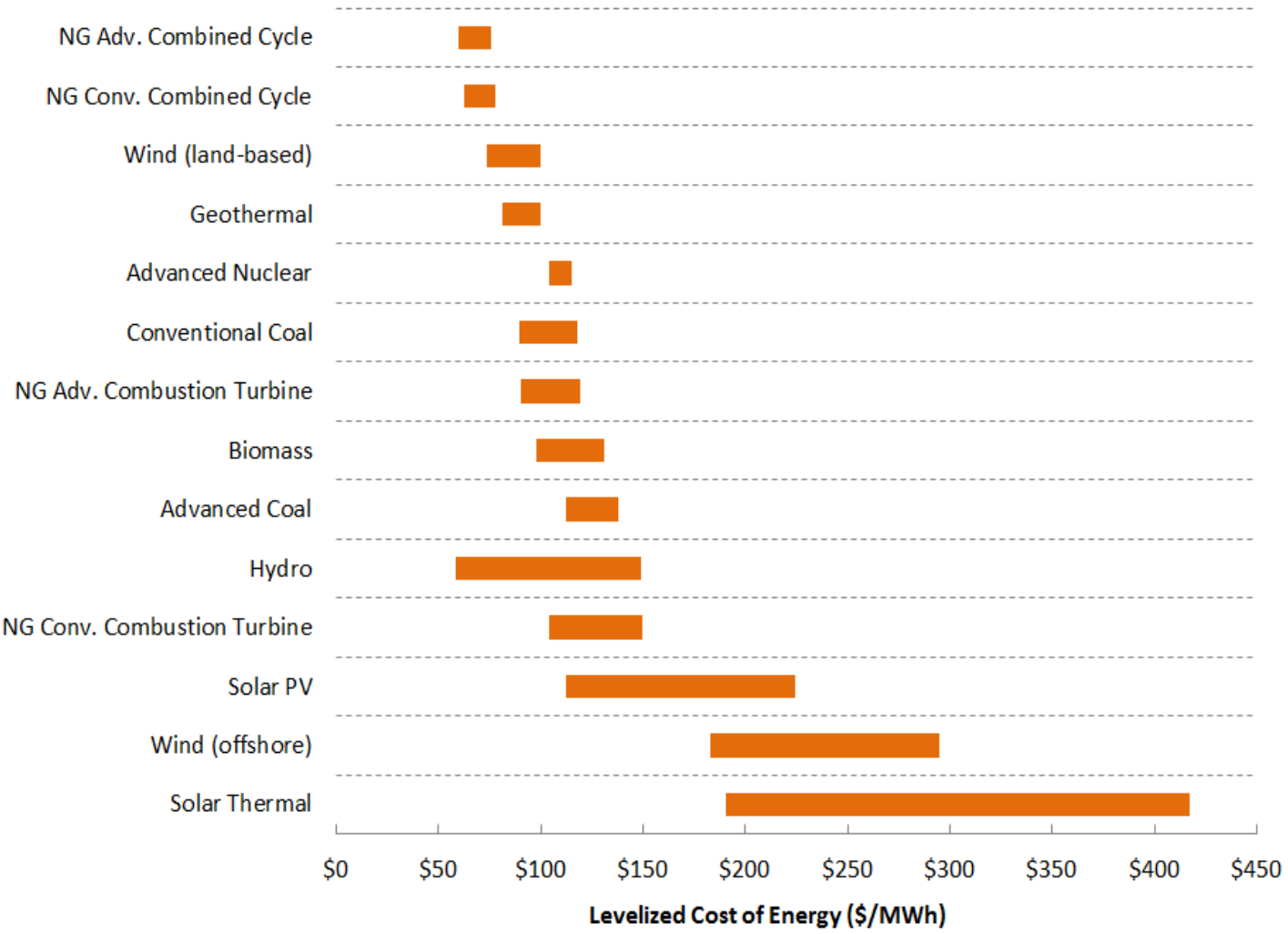
- The federal wind energy Production Tax Credit (PTC) is a major economic driver and wind project development factor
- Public Power entities do not qualify for the federal wind PTC
- Only privately-owned wind generation projects can use the PTC
- Privately-owned wind projects sell wind-generated electricity to public power entities (NPPD, OPPD, LES)

Availability of Federal Incentives for Wind Projects Built in the Near Term Has Helpe Restart the Domestic Market, but Policy Uncertainty Persists

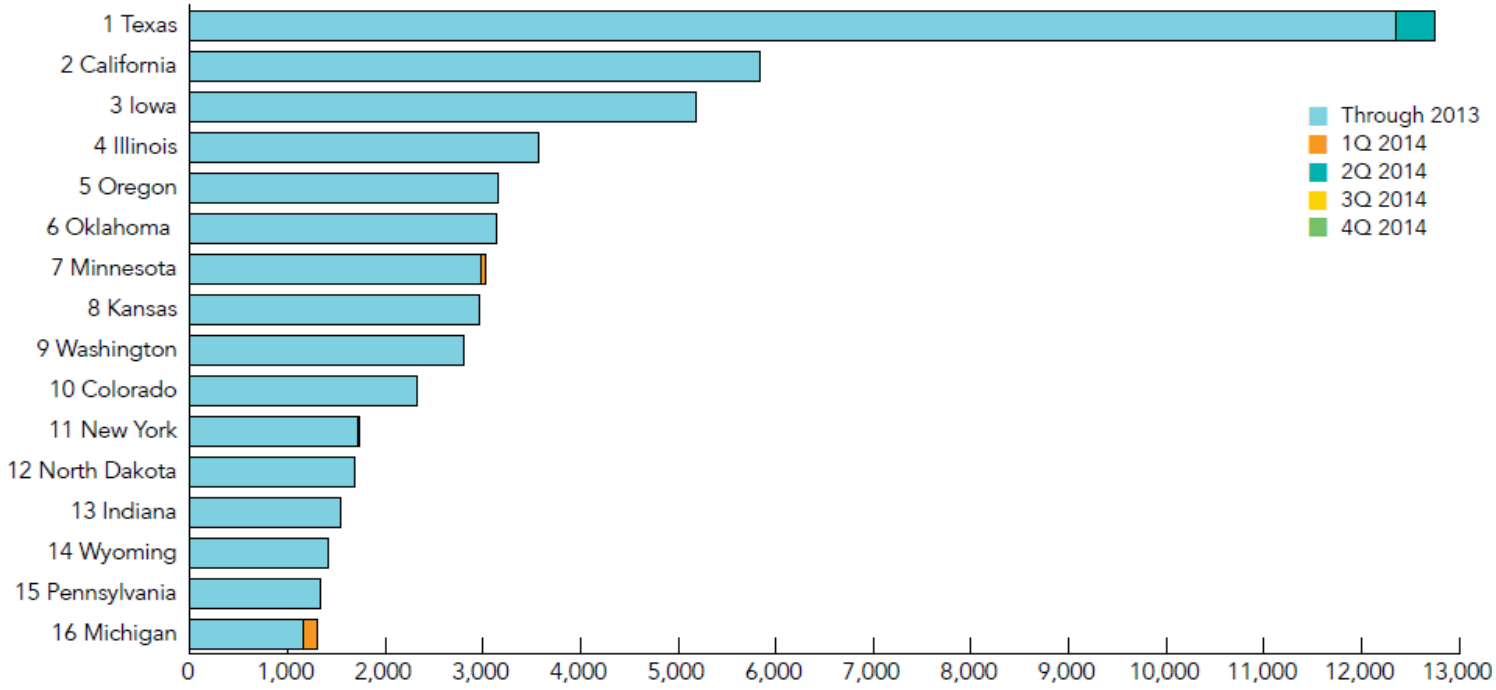
- Near-term availability of the PTC/ITC for those projects that reached t "under construction" milestone by the end of 2013 has helped restart t domestic market and should enable solid growth at least through 2015
- Little action in 2013 on what are among the wind industry's two highes priorities: a longer-term extension of federal tax incentives and passag of a federal renewable or clean energy portfolio standard
- Prospective impacts of more-stringent EPA environmental regulations including those related to power-sector carbon emissions, may create new markets for wind energy

The Cost of New Generation…A Key Economic Driver!

The Energy Information Administration (EIA), the statistical arm of the Department of Energy, finds wind energy to be one of the most affordable options for new electricity generation, alongside new natural gas units.



U.S. Wind Power Capacity Installations, Top States



Wind Power Capacity Additions during the First Quarter 2014, Top States

State	Capacity, MW
Michigan	136
Minnesota	48
New Mexico	20

Wind Power Capacity Additions during the Second Quarter 2014, Top States

State	Capacity, MW
Texas	398
Nebraska	201
Montana	20

From 1999 to 2014 the American Corn Growers Foundation Has Led on Wind Energy Stakeholder Outreach, Policy and Development Advocacy both Nationally and in Nebraska

ACGF-ACGA were early Leaders on the Federal Ethanol RFS and then Strongly Advocated the Federal Wind PTC Policy

“This industry has rocketed onto the mainstream energy landscape, with 61,000 MW now installed in the U.S.…[and] the cost of wind energy has fallen an impressive 43% in just the last four years.” Tom Kiernan, CEO of AWEA

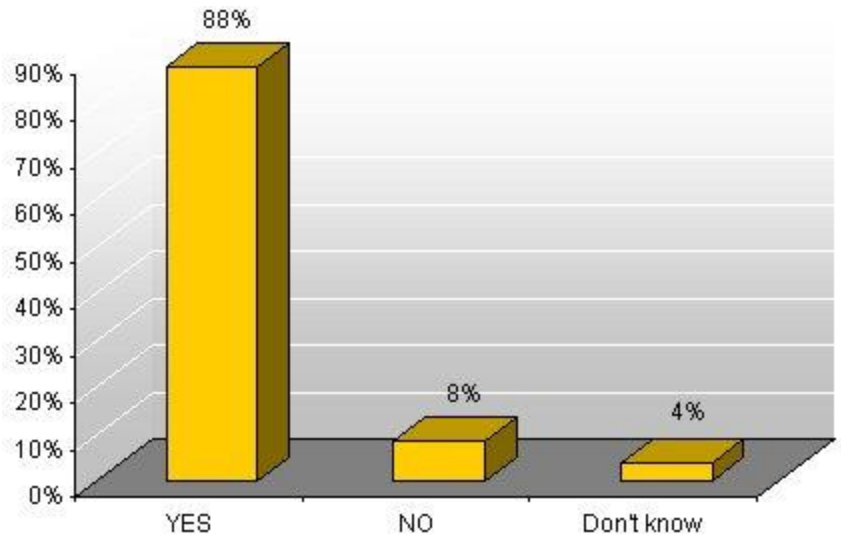
Bringing The Minnesota Wind Experience to Nebraska

L-Dan McGuire, ACGF **Wealth from the Wind *WFTW*** project leader and the ACGA Policy Chairman in early 2000’s at Dan Juhl’s (Juhl shown in far left photo) Woodstock MN wind farm, learning about utility-scale wind farming and C-BED wind ownership policy prior to arranging site visits for Nebraska political, policy, rural and farm leaders to Minnesota

WINDPOWER 2014 in Las Vegas. McGuire seated next to AWEA CEO Tom Kiernan with OPPD & NPPD officials

American Corn Growers 2001 Random Survey of 509 corn producers in the 14 states representing 88% of U. S. corn production. This survey included Nebraska corn farmers.

Do you support wind energy development?



This 2001 survey was conducted by the firm of Robinson and Muenster Associates, Inc. located in Sioux Falls, SD. A variety of wind energy questions were asked in the survey.

NOTE: Subsequent surveys of Nebraska electricity customers/public power ratepayers, including the 2003 NPPD Deliberative Poll and numerous UNL-IANR Rural Polls have confirmed the results of the ACGF 2001 and 2003 surveys and polls with 80-90% support for wind energy development in Nebraska.

2003 American Corn Growers Survey showed that 93.3% of corn farmers support the development of wind energy. The survey included corn farmers in Nebraska.

American Corn Growers Foundation April 21, 2003 news release.

- 93.3% of nation's corn producers support wind energy, 88.8% want farmers, industry and public institutions to promote wind power as an alternative energy source
- 87.5% want utility companies to accept electricity from wind turbines in their power generation mix," said Dan McGuire, ACGF Program Director and project director of the organization's Wealth From The Wind program. "It's great to see such a strong majority of farmers in agreement on these critically important wind energy and economic issues."

- 82.2% of corn producers support the Energy Title in the farm law and want to see that program continued and funded at the current $23 million level or greater for the purpose of renewable energy loans and grants.
- 76.7% agreement on the need for the country to be more energy independent for national security reasons and the belief that Congress and the Administration in Washington, DC should make a major commitment toward the promotion of wind energy;
- 82.2% agree that rural electric cooperatives should help support and promote wind energy;
- 75.7% want federal action to encourage upgrading of existing electric transmission lines and construction of new lines as a 'farm-to-market' road to deliver electricity from wind farms to consumers.

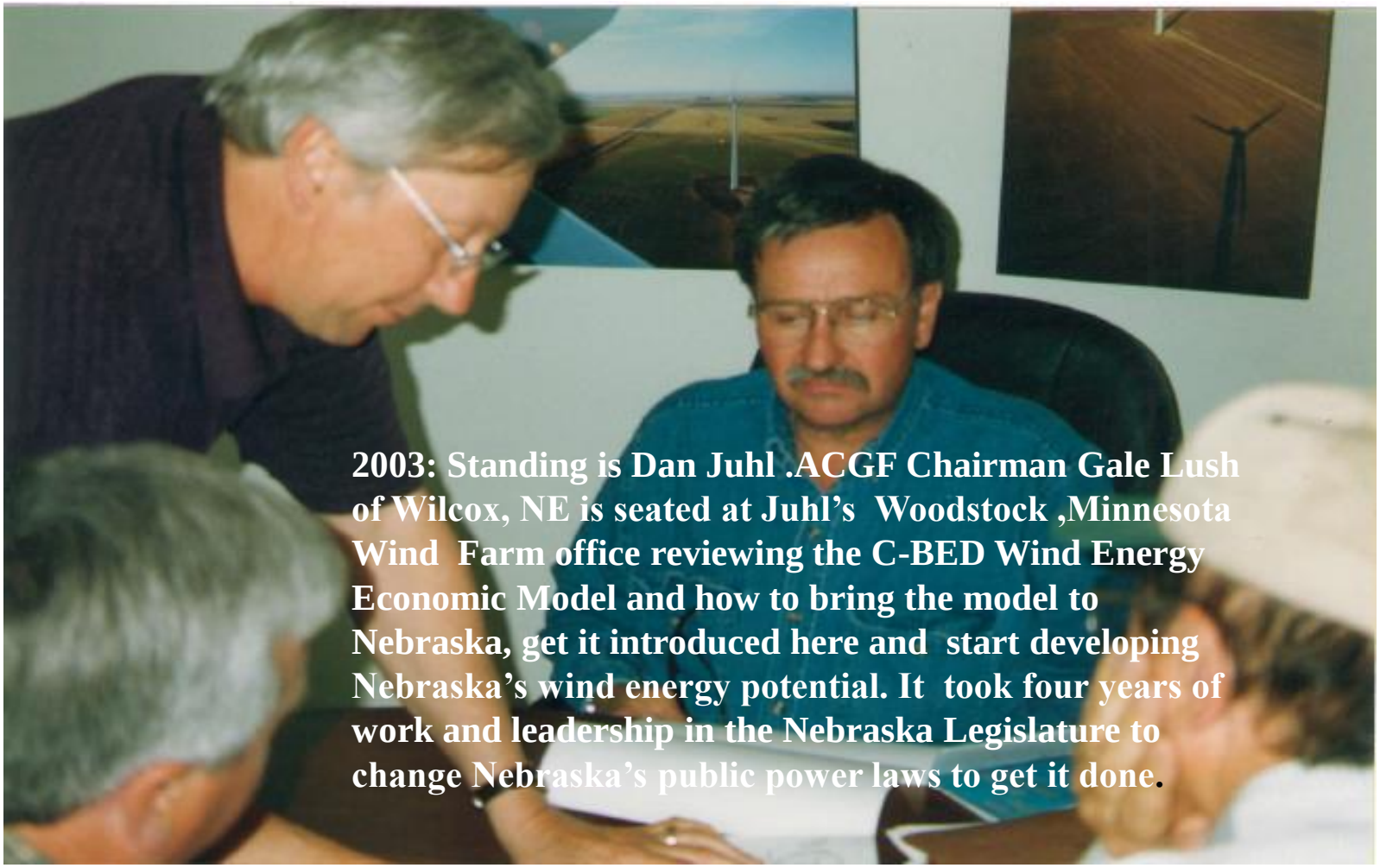
ACGF leaders learned how to create Wind Energy Opportunity in Nebraska from Minnesota wind development leader Dan Juhl

Dan Juhl of Woodstock, MN explains wind energy this way to ACGF Leaders on his wind farm tour in early 2000's. **"Wind turbines are like a crop harvester or combine 250 to 300 feet in the air harvesting wind energy as a new cash crop."**

L-R: Mike Alberts-ACGF, Ron Lush, Dan Juhl, ACGF Chairman Gale Lush

A Little History on Getting Nebraska Moving on Wind Energy:

ACGF's McGuire met community wind development pioneer Dan Juhl in 2000 at his Woodstock, MN wind farm and arranged for ACGF leaders to see and tour the wind farm and learn the potential for wind energy in Nebraska. ACGF arranged and sponsored Mr. Juhl to Nebraska beginning in 2003 to inform policy and farm leaders



2003: Standing is Dan Juhl .ACGF Chairman Gale Lush of Wilcox, NE is seated at Juhl's Woodstock ,Minnesota Wind Farm office reviewing the C-BED Wind Energy Economic Model and how to bring the model to Nebraska, get it introduced here and start developing Nebraska's wind energy potential. It took four years of work and leadership in the Nebraska Legislature to change Nebraska's public power laws to get it done.

The Nebraska Legislature Took Positive Action for Wind Energy in 2007 with a 49-0 Vote. American Corn Growers, NeFU and a coalition of wind energy advocates and leaders worked with the Nebraska Legislature to change Nebraska statutes so privately-owned wind farms could be built in Nebraska.

Shown Below is Governor Heineman in April 2007 signing LB 629 introduced by Senator Cap Dierks of Ewing. Prior to that policy change only public power entities could build/own wind energy generation projects.

L-R: LB 629 Co-Sponsor Senators Preister, McDonald, Dubas, Dierks, Wallman, Lathrop, and Karpisek

Governor Dave Heineman signs LB 629 with bill sponsor Senator Cap Dierks and other senators present

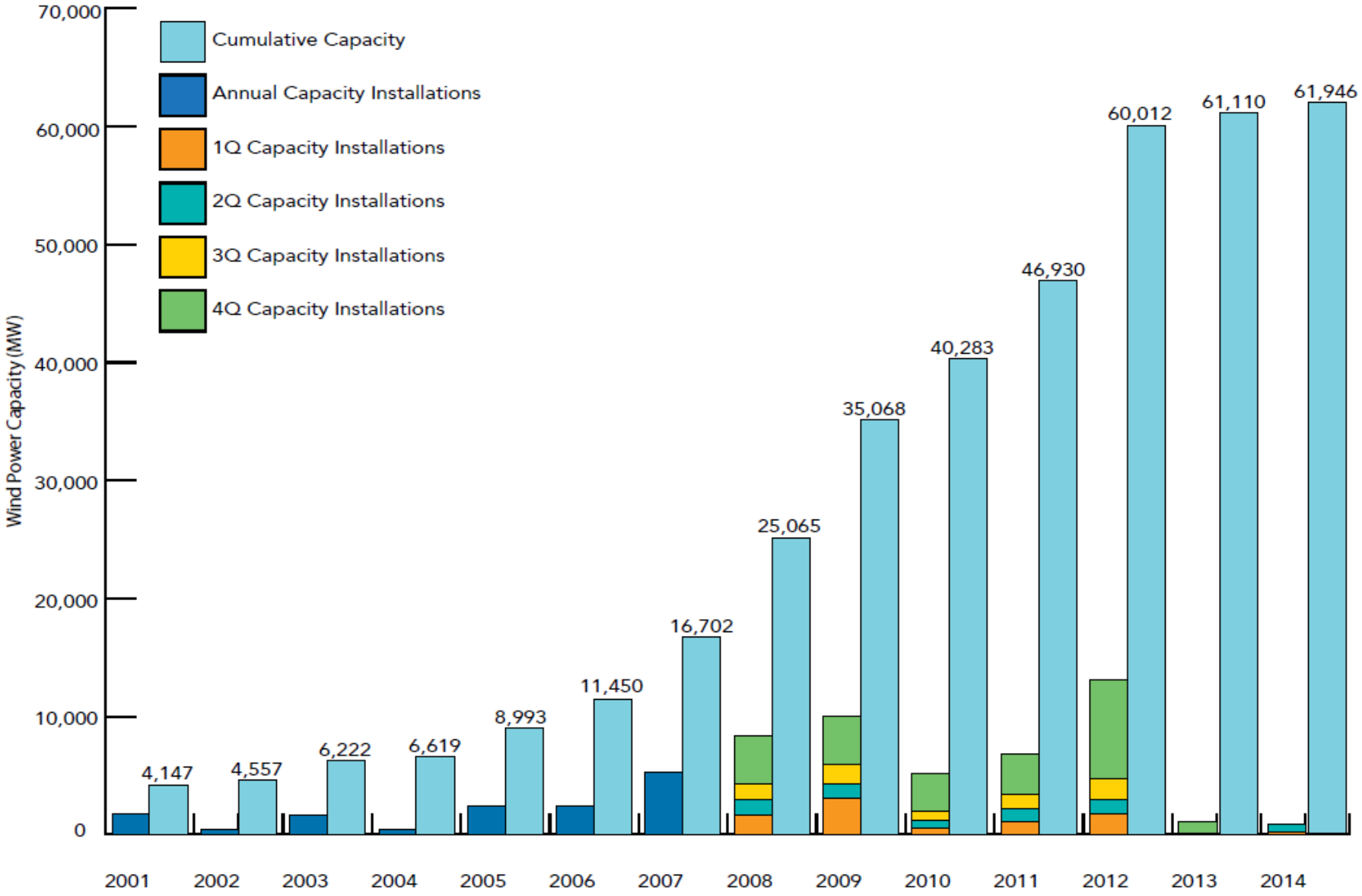
A coalition of LB 629 lead advocates, American Corn Growers, Nebraska Farmers Union and others with Governor Heineman following the bill signing in April 2007.

3rd from left, former State Senator Cap Dierks and 2nd from the left, former State Senator Don Preister receiving first Nebraska Dierks-Preister Wind Pioneer Awards at 2013 NE Wind-Solar Conference in Lincoln.

Our Nebraska Policy Success Was Noticed and Used To Help Other States Move Ahead
NREL, ACGF/I Did Stakeholder Outreach on Wind Energy Across the Nation.

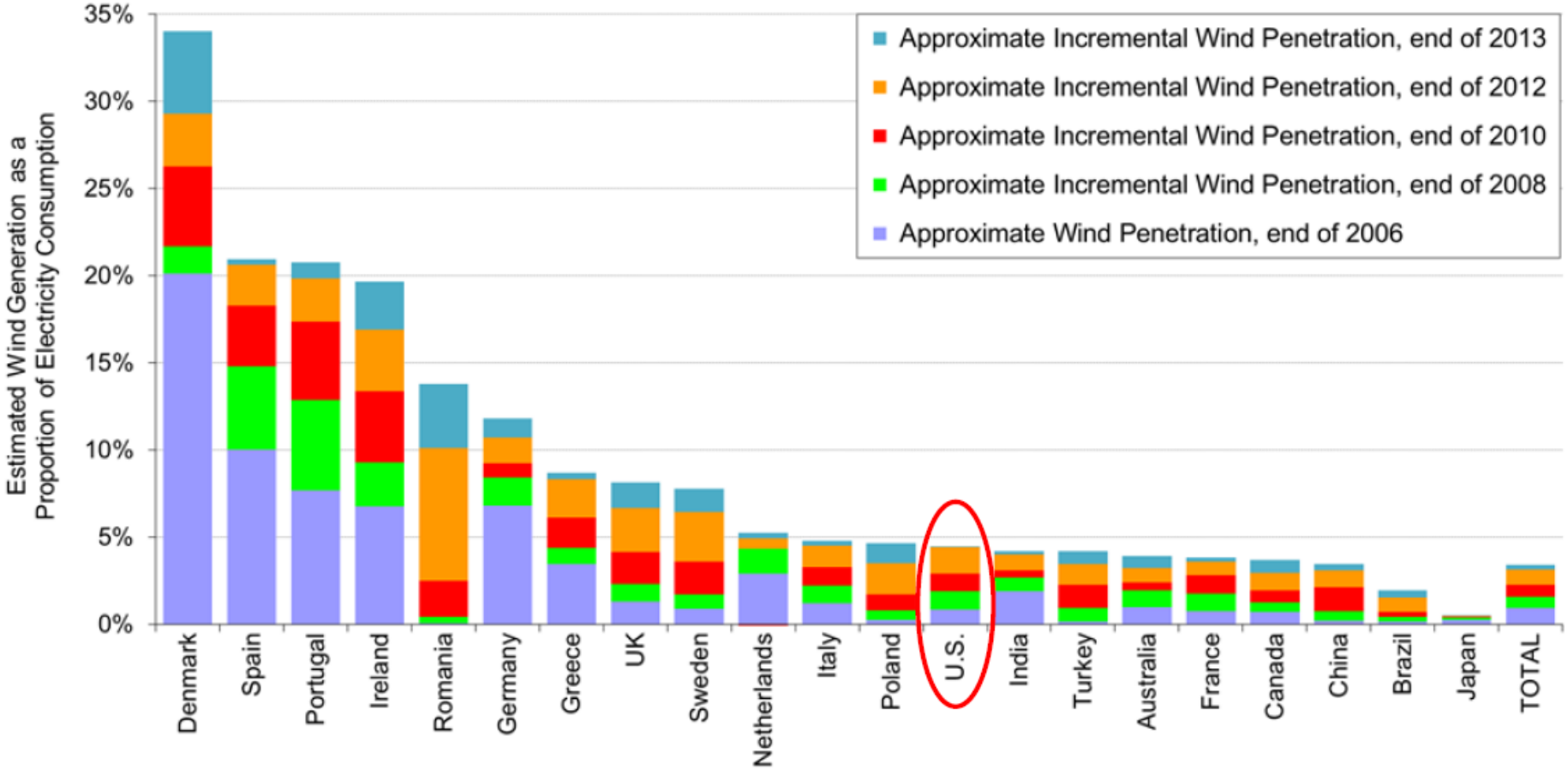
The photo below is at a wind energy workshop I presented in 2008 in Augusta, Maine. I gave Nebraska's 2007 wind energy law to the Speaker of the Maine House of Representatives. They passed a similar law and in 2013 Maine generated 7.4% of its electricity from wind generation.

U.S. Annual and Cumulative Wind Power Capacity Growth



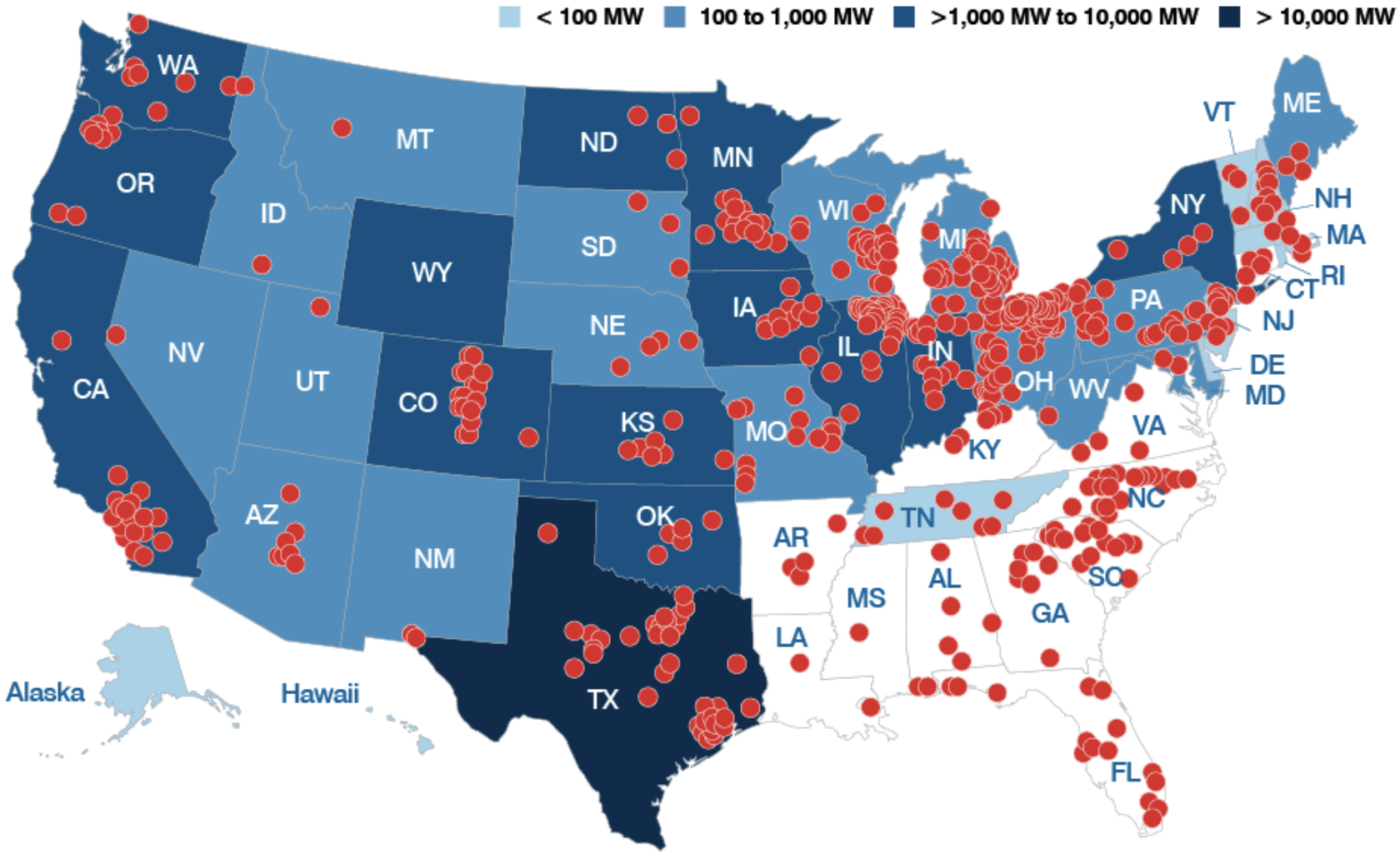
Note: *Utility-scale wind capacity includes installations of wind turbines larger than 100-kW for the purpose of the AWEA U.S. Wind Industry Quarterly Market Reports. Annual capacity additions and cumulative capacity may not always add up due to decommissioned, uprated and repowered wind turbines. Wind capacity data for each year is continuously updated as information changes.*

U.S. Lagging Other Countries in Wind As a Percentage of Electricity Consumption

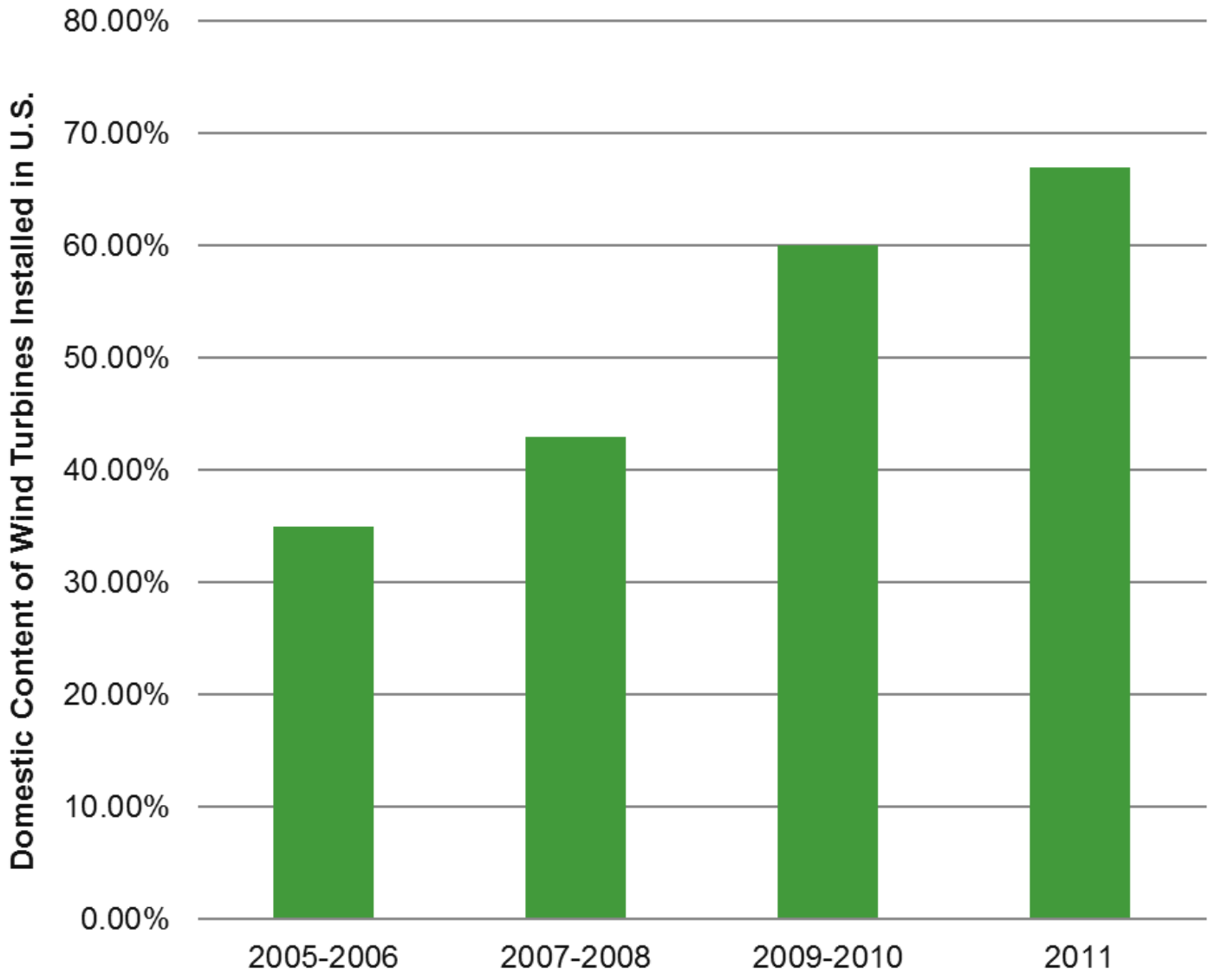


Note: Figure only includes the countries with the most installed wind power capacity at the end of 2012

It's Not Just About Rural Economic Development and Renewable Energy: At the end of 2012 there were 559 manufacturing facilities building wind components. Wind is One of the Fastest Growing Sources of U.S. Manufacturing Jobs (AWEA map)

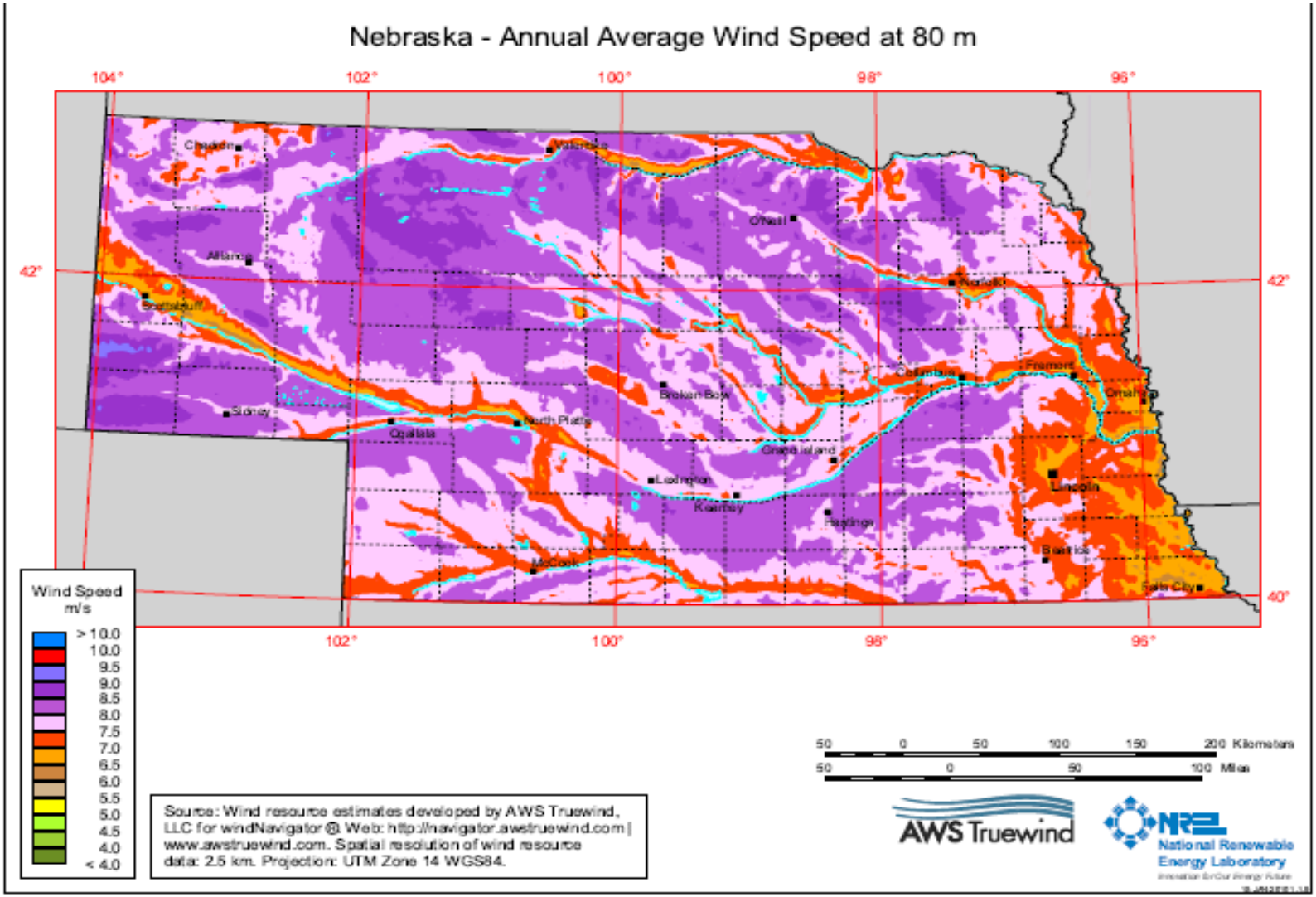


Domestic U.S. Content of U.S. Installed Wind Turbines…A Good Trend!
U. S. Domestic Manufacturing is a Very Good Thing (AWEA-NREL)

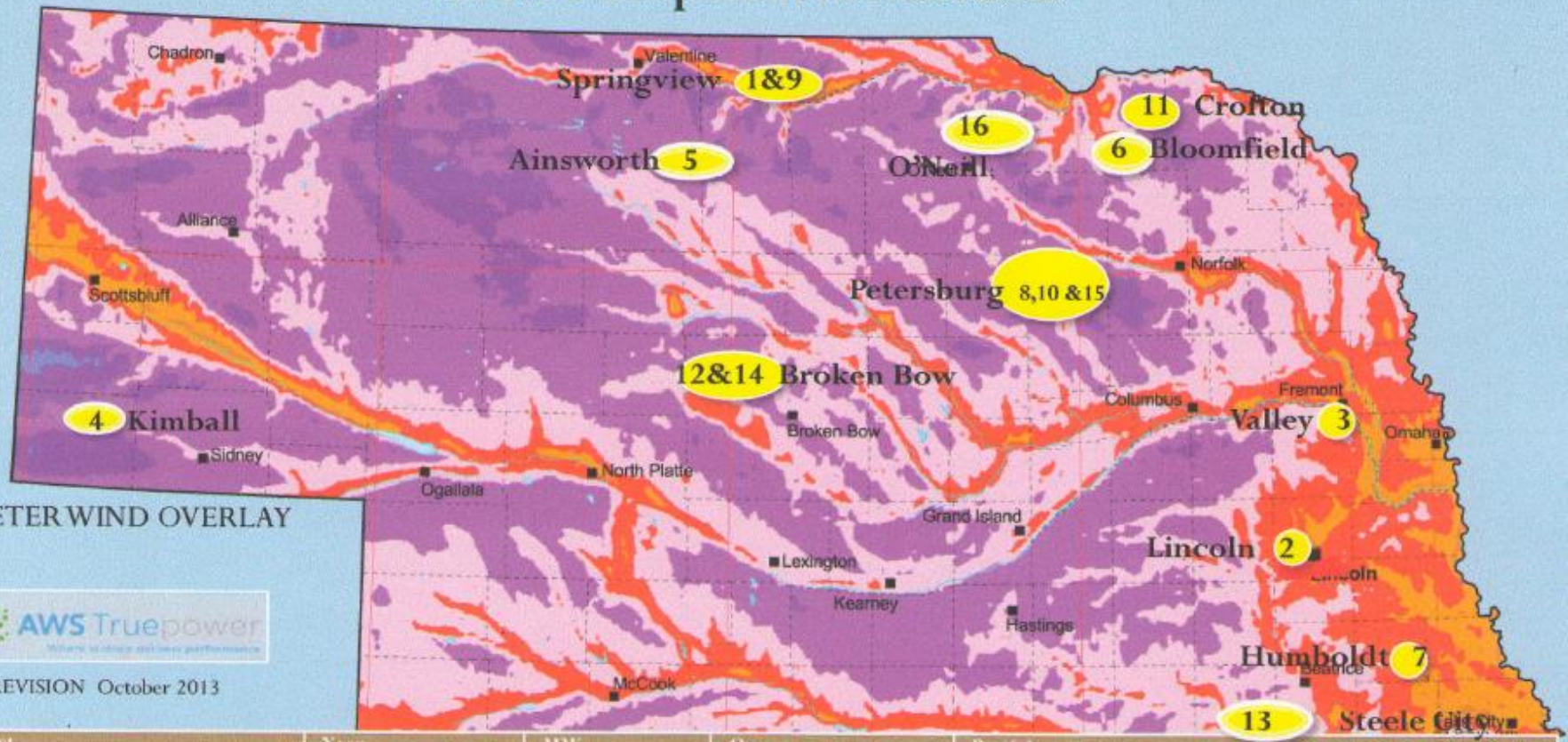


Nebraska has world class wind

…rated No. 3 wind resource in the U.S…but is just No. 18 in terms of wind energy as a percent of electric generation



Wind Development in Nebraska



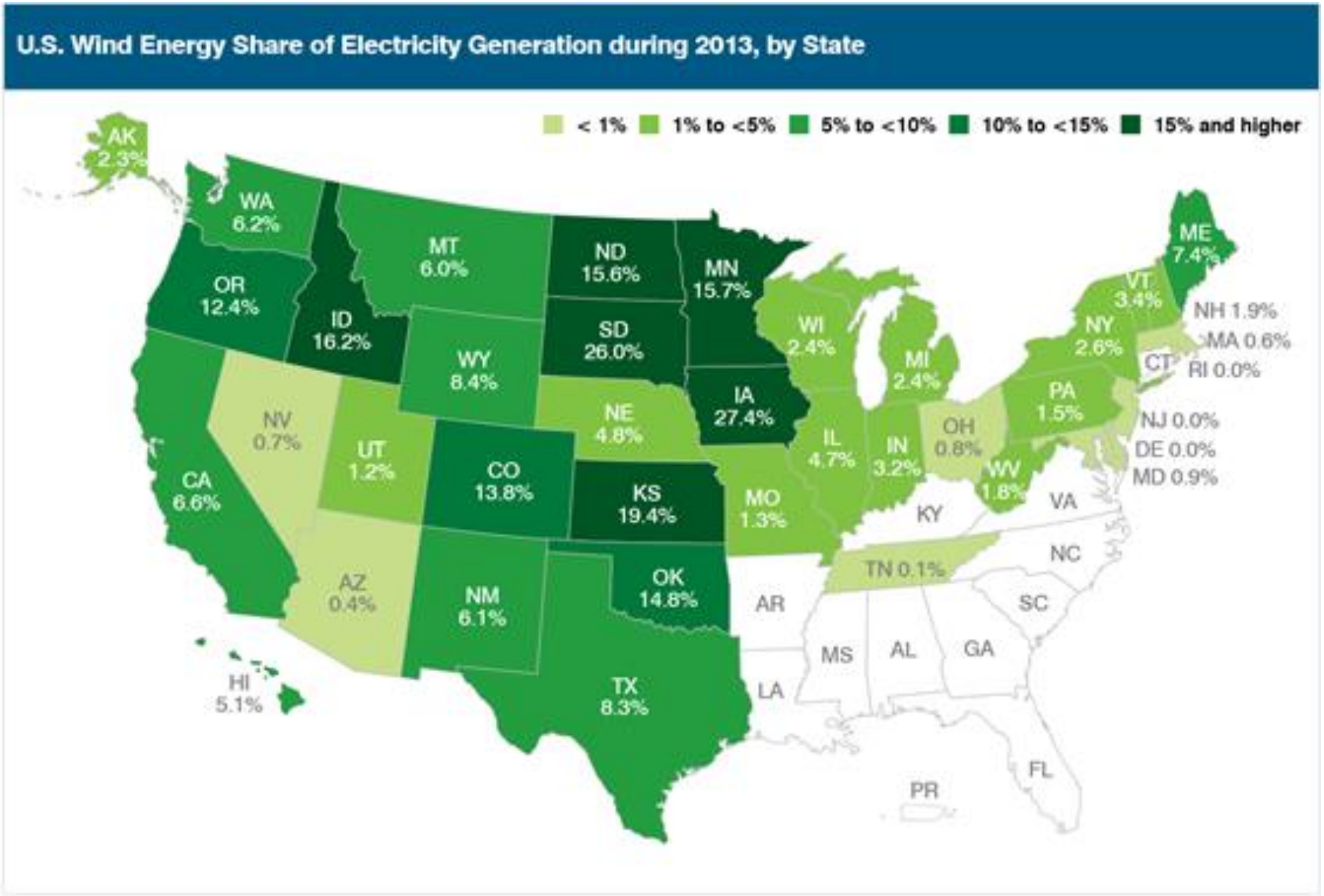
80 METER WIND OVERLAY

AWS Truepower

REVISION October 2013

Project	Year	MW	Owner	Participants
1) Springview Wind Energy	1998	Retired	NPPD	NPPD, LES MEAN, GI, KBR, Auburn
2) Salt Valley	1998 and 1999	1.32	LES	LES
3) Valley	2001	.66	OPPD	OPPD, Valmont
4) Kimball	2002	10.5	MEAN	MEAN
5) Ainsworth Wind Energy	2005	59.4	NPPD	NPPD, OPPD, MEAN, GI, JEA* *Financial Participant for RECs
6) Elkhorn Ridge Wind, LLC	2009	80	Edison Mission	NPPD, OPPD, MEAN, LES, GI
7) Flat Water Wind Farm, LLC	2010	60	Gestamp Wind N.A.	OPPD
8) Laredo Ridge Wind Farm	2011	80	Edison Mission	NPPD, LES, MEAN, GI
9) Springview II/Bluestem, LLC	2011	3	Bluestem, LLC	NPPD, OPPD**, LES**, GI**, **will receive direct drive knowledge and RECs
10) TPW Petersburg, LLC	2011	40.5	Gestamp Wind N.A.	OPPD
11) Crofton Bluffs Wind Farm	2012	42	Edison Mission	NPPD, OPPD, LES, MEAN
12) Broken Bow Wind, LLC	2012	80	Edison Mission	NPPD, OPPD, LES, GI
13) Steele Flats Wind	2013	74.8	NextEra	NPPD
14) Broken Bow II	2014	75	Edison Mission	NPPD, OPPD
15) Prairie Breeze	2014	200	Invenergy	OPPD
16) Grande Prairie	2015	400	Geronimo	OPPD
		~1207 Total MW		

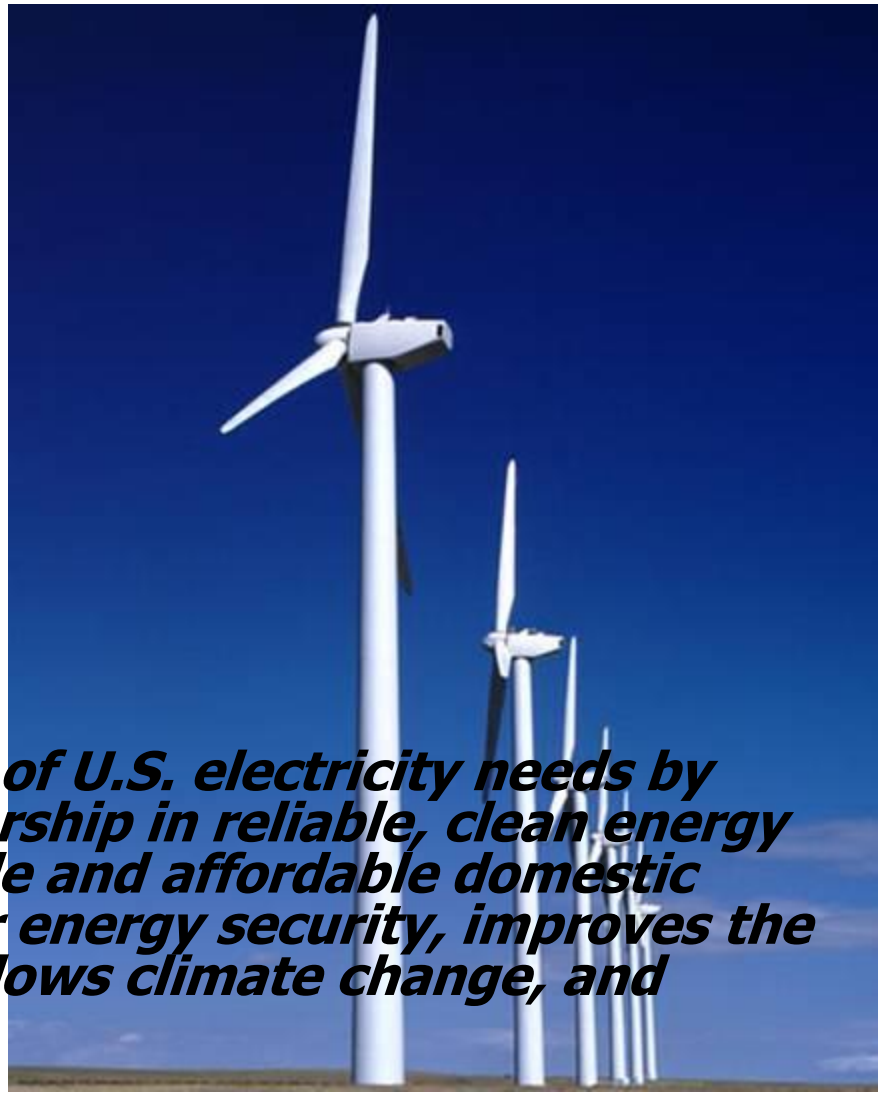
9 states have over 10% of their electricity supplied by wind power …some more than 20%



Environmental Benefits-2008 Vision of 20% Wind Energy by 2030

Source: NREL Wind Powering America PPT Presentation

- No SOx or NOx
- No particulates
- No mercury
- No CO2
- No water



Wind energy will provide 20% of U.S. electricity needs by 2030, securing America's leadership in reliable, clean energy technology. As an inexhaustible and affordable domestic resource, wind strengthens our energy security, improves the quality of the air we breathe, slows climate change, and revitalizes rural communities.

From 2008 DOE 20% Wind by 2030 Vision

Figure 1-12. Annual CO2 emissions avoided (vertical bars) would reach 825 million metric tons by 2030

The cumulative avoided emissions by 2030 would total 7,600 million metric tons.

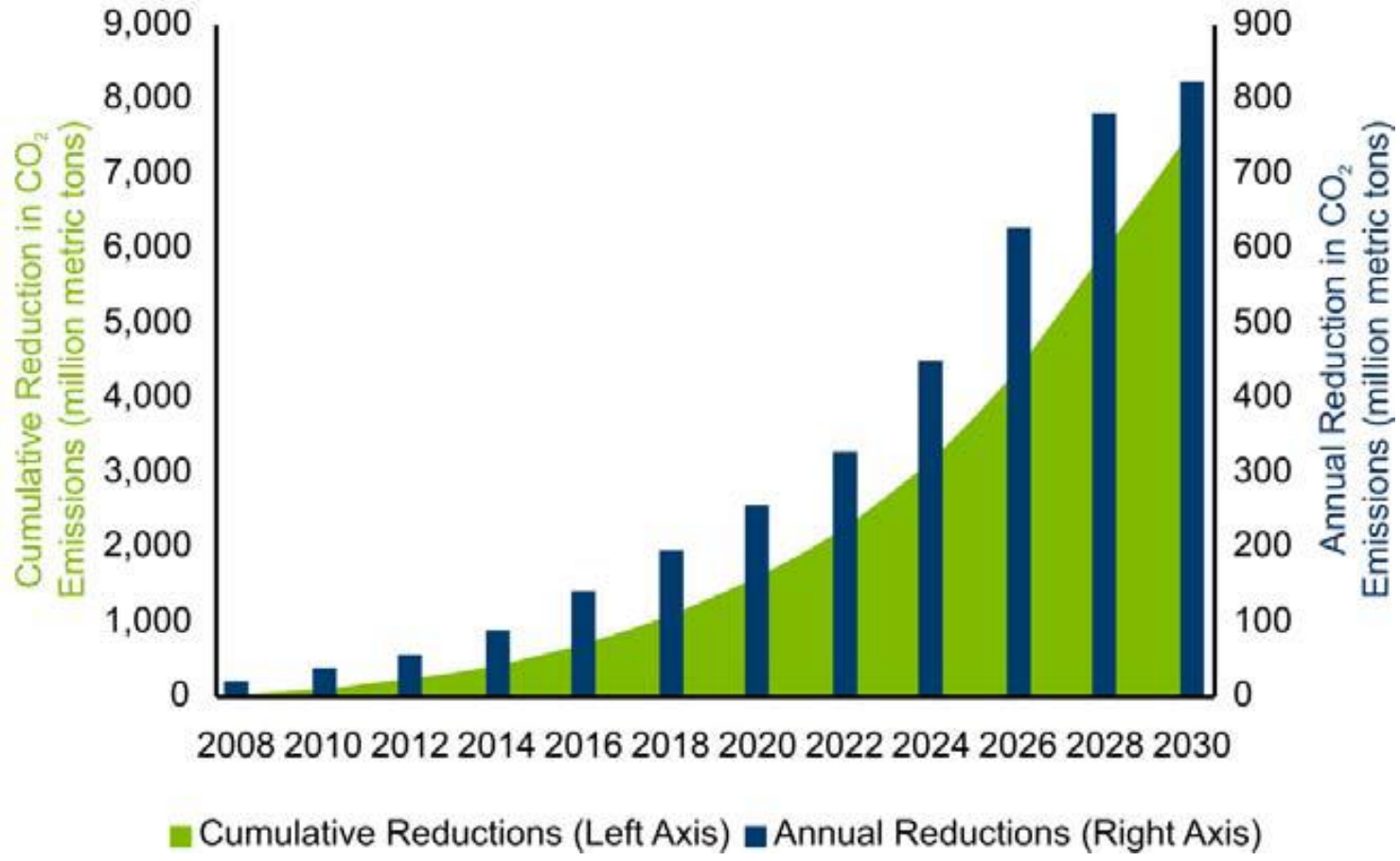
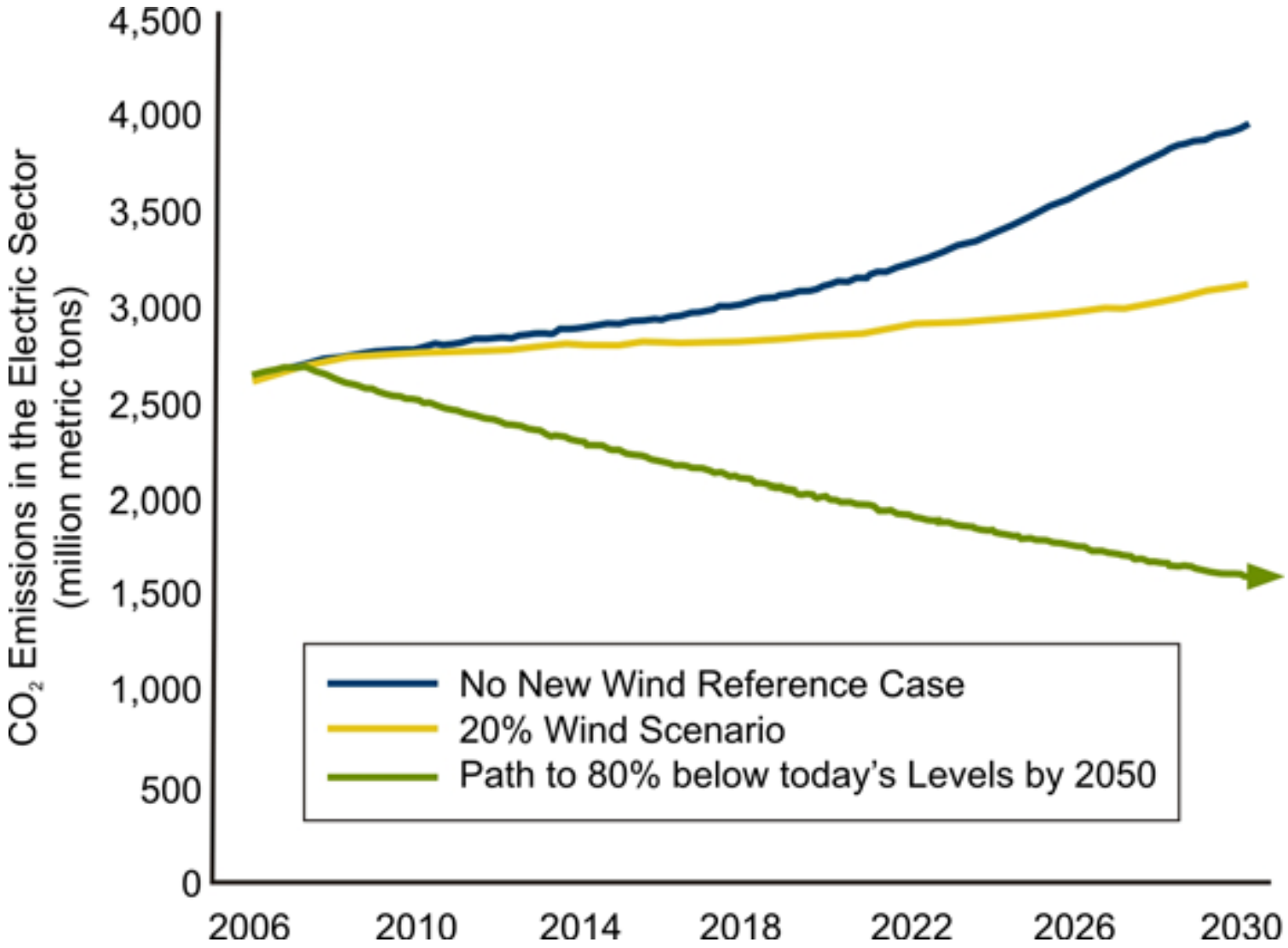
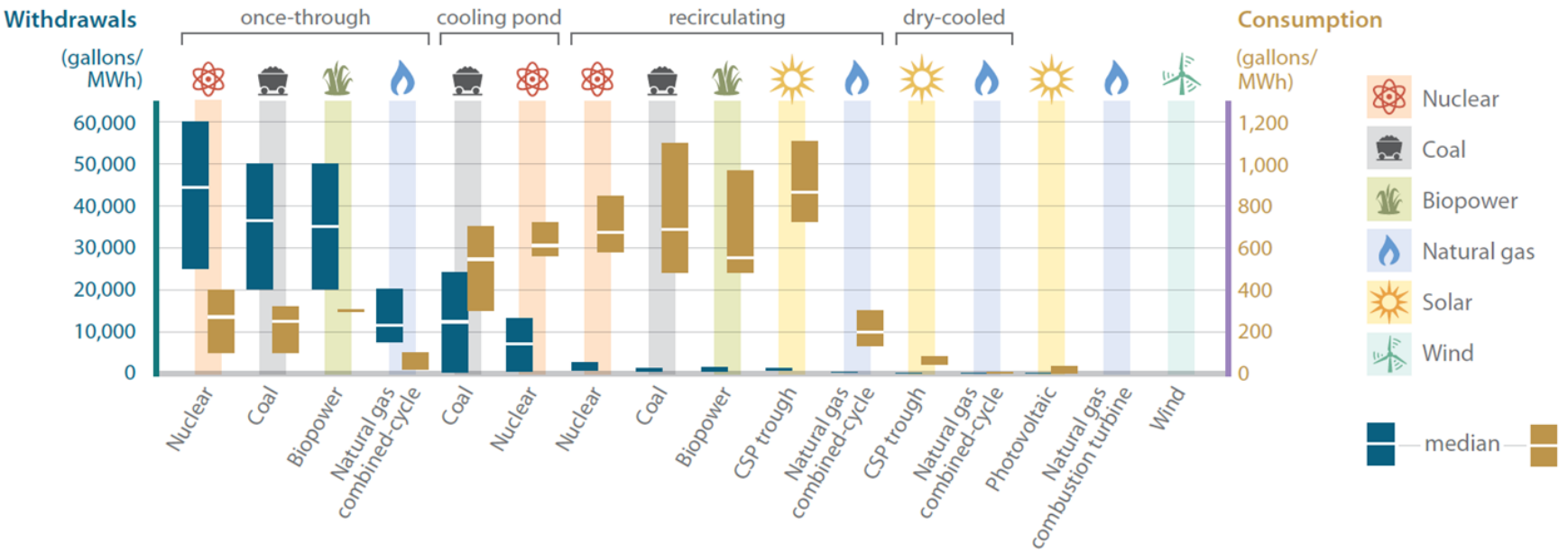


Figure 1-13. CO2 emissions from the electricity sector From 2008 DOE 20% Wind By 2030 Vision Report



UCS 2011 Report: Estimated Water Withdrawals and Consumption, by Energy Technology

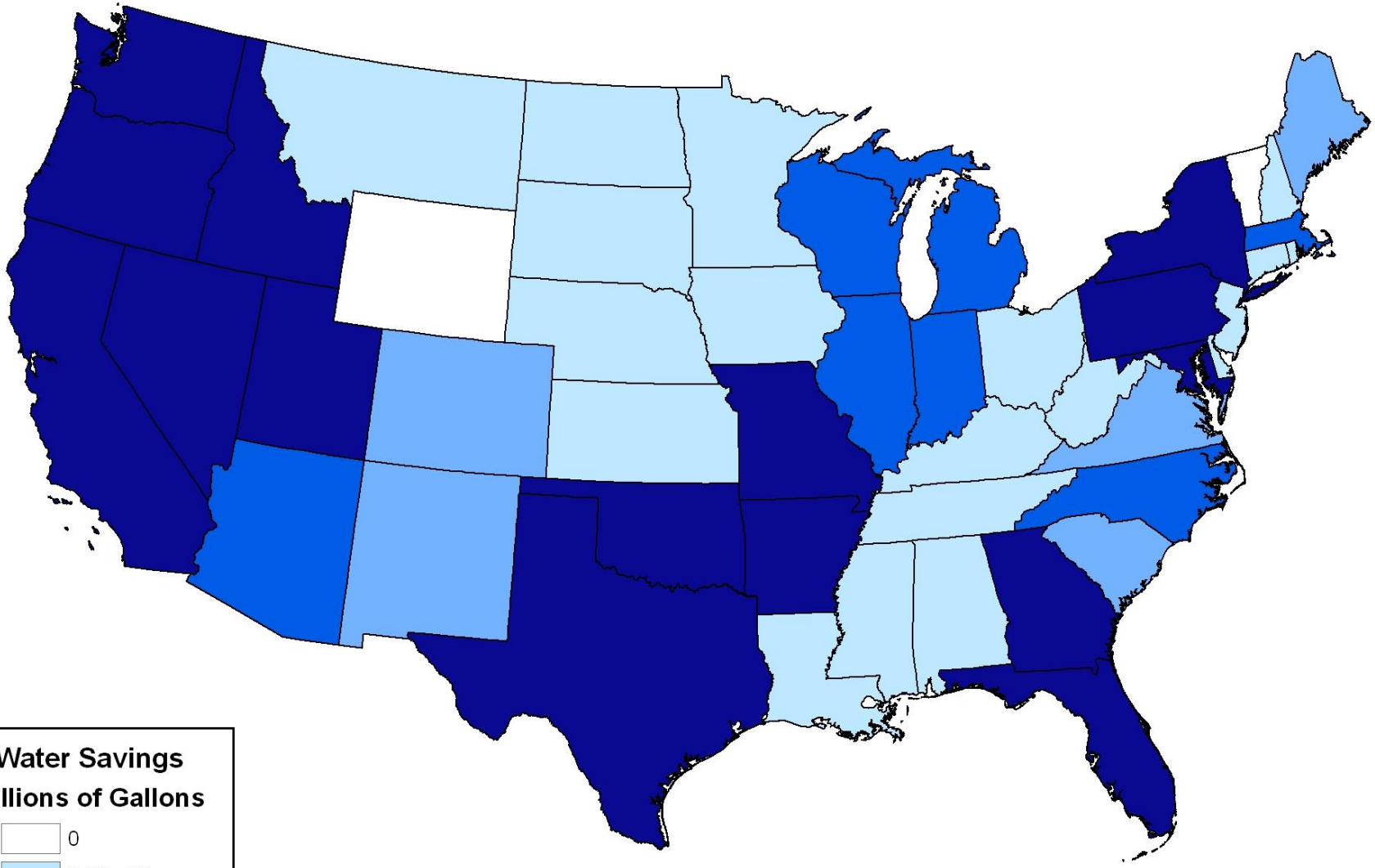


On average, water cooled thermoelectric power plants in the United States withdrew 60 billion to 170 billion gallons (180,000 to 530,000 acre-feet) of freshwater from rivers, lakes, streams and aquifers, **and consumed 2.8 billion to 5.9 billion gallons (8,600 to 18,100 acre-feed of that EVERY DAY.**

U.S. power plants withdrew enough fresh water each day in 2008 to supply 60 to 170 cities the size of New York City.

Water withdrawals per megawatt-hour (MWh) can range from almost zero for a solar, photovoltaic, wind , or dry-Cooled natural gas plant, to hundreds of gallons for an efficient plant using recirculating cooling, to tens of thousands of gallons for a nuclear of coal plant using once-through cooling

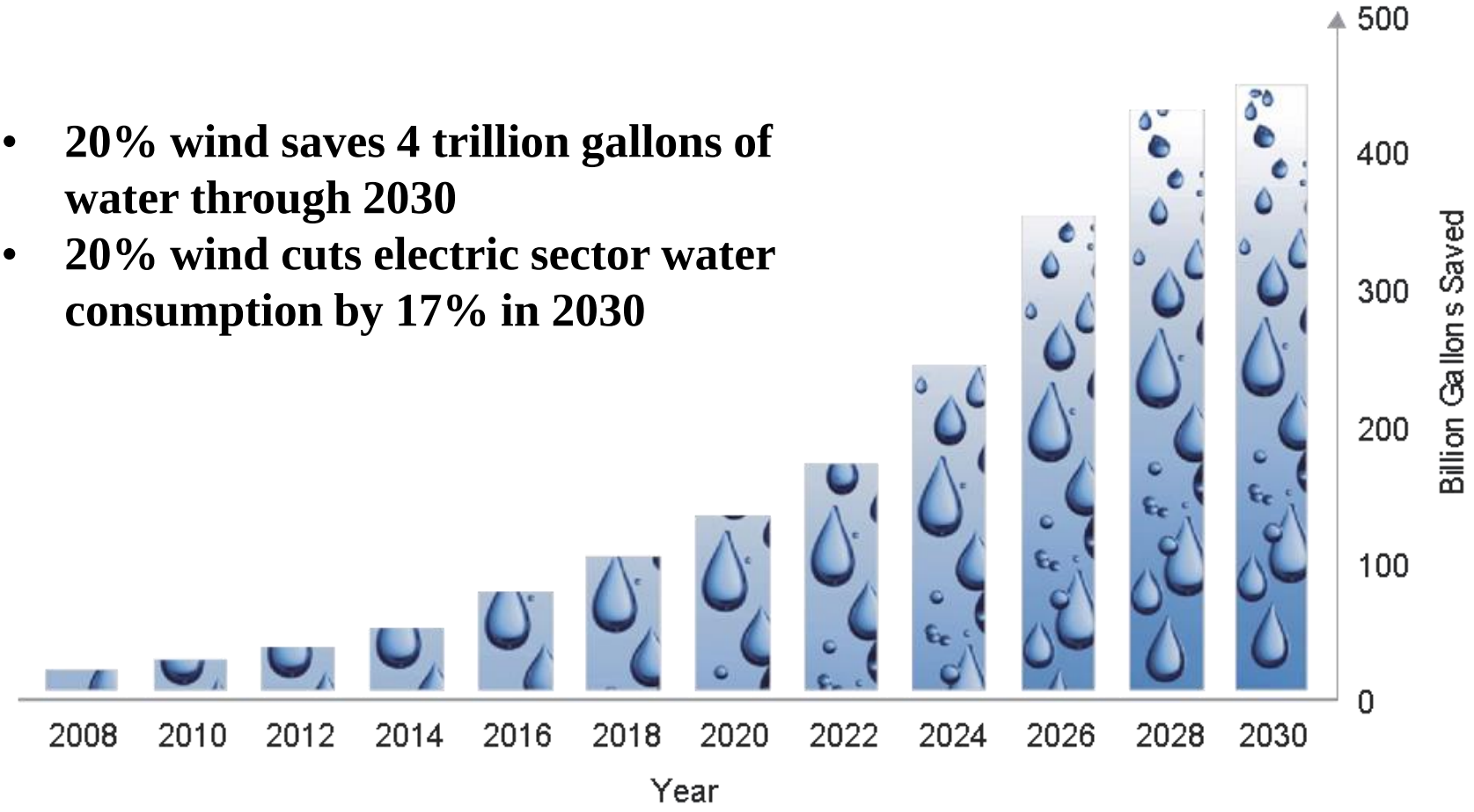
Cumulative Water Savings Due to Deployment of Wind Energy (2008 - 2030)



Wind_Vision_Water_06-19-2007 - DRAFT

Wind Power Uses Virtually No Water
Source: U.S. DOE, 20% Wind Energy by 2030, 2008

- **20% wind saves 4 trillion gallons of water through 2030**
- **20% wind cuts electric sector water consumption by 17% in 2030**



Zoning Regulations: An Example is Knox County, NE 2012-13

Section 8.08 Commercial/Utility Grade Wind Energy Systems

8.08.01 Purpose

It is the purpose of this regulation to promote the safe, effective and efficient use of commercial/utility grade wind energy systems within Knox County.

8.08.02 Definitions

The following are defined for the specific use of this section.

Aggregate Project shall mean projects that are developed and operated in a coordinated fashion, but which have multiple entities separately owning one or more of the individual WECS within the larger project. Associated infrastructure such as power lines and transformers that service the facility may be owned by a separate entity but are also part of the aggregated project.

Commercial WECS shall mean a wind energy conversion system of equal to or greater than 100 kW in total name plate generating capacity.

Fall Zone shall mean the area, defined as the furthest distance from the tower base, in which a guyed tower will collapse in the event of a structural failure. This area is less than the total height of the structure.

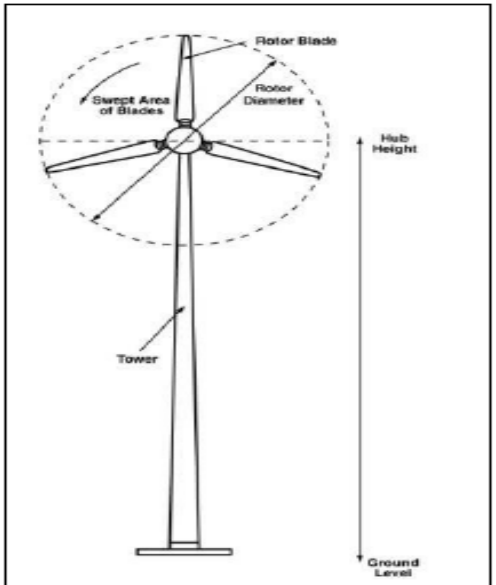


Figure 8.08.1

Meteorological Tower: A tower which is erected primarily to measure wind speed and directions plus other data relevant to siting a Wind Energy Conversion System. Meteorological towers do not include towers and equipment used by airports, the Nebraska Department of Roads, or other applications to monitor weather conditions.

Rotor Diameter shall mean the diameter of the circle described by the moving rotor blades as shown in Figure 2.

Total Height shall mean the highest point, above ground level, reached by a rotor tip or any other part of the Wind Energy Conversion System.

Tower shall mean the vertical structures that support the electrical, rotor blades, or meteorological equipment.

Tower Height shall mean the height above grade of the hub portion of the tower, excluding the wind turbine itself.

Wind Energy Conservation System: An electrical generating facility comprised of one or more wind turbines and accessory facilities, including but not limited to: power lines, transformers, substations and meteorological towers that operate by converting the kinetic energy of wind into electrical energy. The energy may be used on-site or distributed into the electrical grid

Wind Turbines: Any piece of electrical generating equipment that converts the kinetic energy of blowing wind into electrical energy using airfoils or similar devices to capture the wind.

Example: Knox County, NE 2012-13 Zoning Regs.-Setbacks for Wind Turbines (always check with the county you are working for rules)

8.08.05 Setbacks

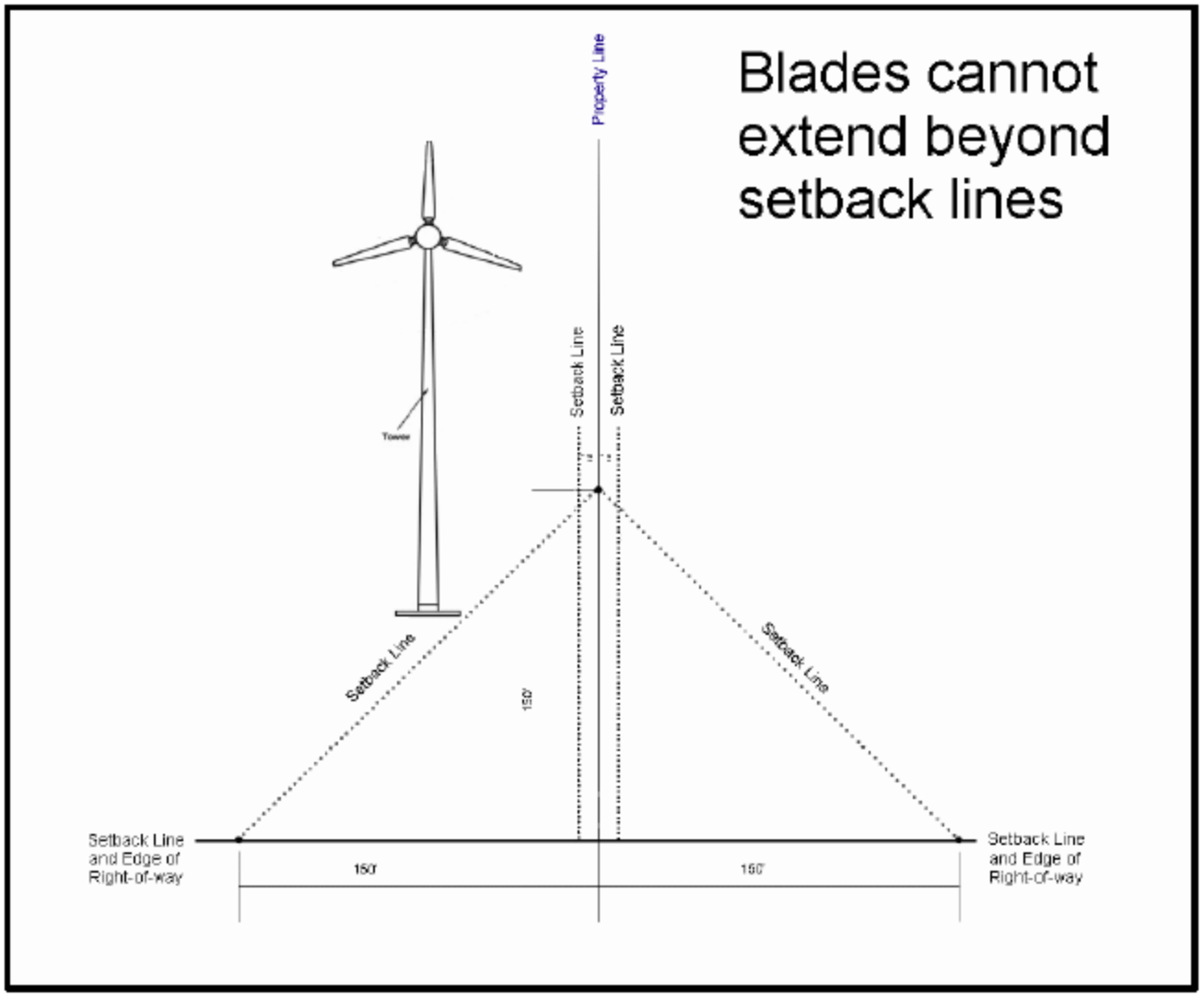
	Wind Turbine – Non Commercial	WECS Wind Turbine – Commercial/Utility WECS	Meteorological Towers
Property Lines (other than right angle corners)	Diameter plus applicable building setback	Diameter plus applicable building setback	1.1 times the total height
Right angle corner property lines	Diameter plus applicable building setback from both property lines	Behind a line on the property lines drawn between two points 150' from the property line intersection. Generator blades must not exceed the building setback lines on the non-road side, and shall not encroach on the right-of-way on the road side. (See Figure 2)	1.1 times the total height from both property lines
Neighboring Dwelling Units*	Diameter plus applicable building setback	1,500'	1.1 times the total height plus applicable building setback
Road Rights-of-Way**	Diameter plus applicable building setback	Generator blades shall not encroach on the right-of-way.	1.1 times the total height plus applicable building setback
Other Rights-of-Way	Diameter plus applicable building setback	Generator blades shall not encroach on the right-of-way.	1.1 times the total height plus applicable building setback
Public Conservation Lands including Wildlife Management Areas and State Recreation Areas	Applicable building setback	Diameter plus applicable building setback	1.1 times the total height plus applicable building setback
Wetlands, USFW Types III, IV, and V	NA	600'	1.1 times the total height
Other structures not on the applicant's site	NA	Diameter	1.1 times the total height
River Bluffs of over 15 feet		Diameter	

All towers shall adhere to the setbacks as measured from the hub established in the following table:

* The setback for dwelling units shall be reciprocal in that no dwelling unit shall be constructed within the same distance required for a commercial/utility Wind Energy Conversion System.

** The setback shall be measured from any future Rights-of-Way if a planned change or expanded right-of-way is known.

Knox County, NE 2012-13 Zoning Regulations for Wind Turbines and Setbacks



Examples of some of the Zoning Requirements from Knox County, Nebraska (there are many more examples so each county's zoning regulations should be looked at for specifics rules.)

8.08.03 Requirements

Commercial/Utility Grade wind energy systems shall be permitted as a Conditional Use within the AGP district. Permanent Meteorological towers shall be considered part of the system. Temporary meteorological towers may be permitted by a Zoning (Building) Permit and limited to two years or less. The following requirements and information shall be met and supplied:

1. The name(s) of project applicant.
2. The name of the project owner.
3. The legal description and address of the project.
4. A description of the project of the project including; Number, type, name plate generating capacity, tower height, rotor diameter, and total height of all wind turbines and means of interconnecting with the feeder lines.

5. Site layout, including the location of property lines, wind turbines, electrical grid, and all related accessory structures. This site layout shall include distances and be drawn to scale.
6. Engineer's certification.
7. Documentation of land ownership or legal control of the property.
8. The latitude and longitude of individual wind turbines.
9. A USGS topographical map, or map with similar data, of the property and surrounding area, including any other Wind Energy Conversion System not owned by the applicant, within 10 rotor distances of the proposed Wind Energy Conversion System.
10. Location of wetlands, scenic, and natural areas (including bluffs) within 1,320 feet of the proposed Wind Energy Conversion System.
11. An Acoustical Analysis that certifies that the noise requirements within this regulation can be met.
12. FAA permit
13. Location of all known Communication Towers within two miles of the proposed Wind Energy Conversion System.
14. Decommissioning Plan
15. Description of potential impacts on nearby Wind Energy Conversion Systems and wind resources on adjacent properties not owned by the applicant.

Examples of some of the Zoning Requirements from Knox County, Nebraska (these are examples from one county). Each county zoning regulations should be checked for rules.

8.08.06 Special Safety and Design Standards

All towers shall adhere to the following safety and design standards:

1. Clearance of rotor blades or airfoils must maintain a minimum of 12 feet of clearance between their lowest point and the ground.

2. All Commercial/Utility WECS shall have a sign or signs posted on the tower, transformer and substation, warning of high voltage. Other signs shall be posted at the entrance to the site with the 911 address and emergency contact information.

3. All wind turbines, which are a part of a commercial/utility WECS, shall be installed with a tubular, monopole type tower.

4. Consideration shall be given to painted aviation warnings on all towers less than 200 feet.

5. Color and finish
   All wind turbines and towers that are part of a commercial/utility WECS shall be white, grey, or another non-obtrusive color. Blades may be black in order to facilitate deicing; Finishes shall be matte or non-reflective.

6. Lighting
   Lighting, including lighting intensity and frequency of strobe, shall adhere to but not exceed requirements established by the FAA permits and regulations. Red strobe lights shall be used during nighttime illumination to reduce impacts on neighboring uses and migratory birds. Red pulsating incandescent lights should be avoided.

7. Other signage
   All other signage shall comply with the sign regulations found in these regulations.

8. Feeder Lines
   All communications and feeder lines installed as part of a WECS shall be buried, where feasible. Feeder lines installed as part of a WECS shall not be considered an essential service.

9. Waste Disposal
   Solid and Hazardous wastes, including but not limited to crates, packaging materials, damaged or worn parts, as well as used oils and lubricants, shall be removed from the site promptly and disposed of in accordance with all applicable local, state and federal rules and regulations.

10. Discontinuation and Decommissioning

A WECS shall be considered a discontinued use after one year without energy production, unless a plan is developed and submitted to the Zoning Administrator outlining the steps and schedule for returning the WECS to service. All WECS and accessory facilities shall be removed to four (4) feet below ground level within 180 days of the discontinuation of use. This period may be extended by the Zoning **Administrator** following a written request by an agent of the owner of the WECS.

Each Commercial/Utility WECS shall have a Decommissioning plan outlining the anticipated means and cost of removing WECS at the end of their serviceable life or upon being discontinued use. The cost estimates shall be made by a competent party; such as a Professional Engineer, a contractor capable of decommissioning or a person with suitable expertise or experience with decommissioning. The plan shall also identify the financial resources that will be available to pay for decommissioning and removal of the WECS and accessory facilities.

11. Noise

No Commercial/Utility WECS shall exceed 50 dBA at the nearest structure occupied by humans. Exception: a Commercial/Utility WECS may exceed 50 dBA during periods of severe weather as defined by the US Weather Service.

12. Interference

The applicant shall minimize or mitigate interference with electromagnetic communications, such as radio, telephone, microwaves, or television signals caused by any WECS. The applicant shall notify all communication tower operators within five miles of the proposed WECS location upon application to the county for permits.

13. County Roads

In regard to roads applicants shall:

A. Identify all county, municipal or township roads to be used for the purpose of transporting WECS, substation parts, cement, and/or equipment for construction, operation or maintenance of the WECS and obtain applicable weight and size permits from the impacted jurisdictions prior to construction.
B. Conduct a pre-construction survey, in coordination with the appropriate jurisdictions to determine existing road conditions. The survey shall include photographs and a written agreement to document the condition of the public facility.
C. Be responsible for restoring the road(s) and bridges to preconstruction conditions.

14. Drainage System

The applicant shall be responsible for immediate repair of damage to public drainage systems stemming from construction, operation or maintenance of the WECS.

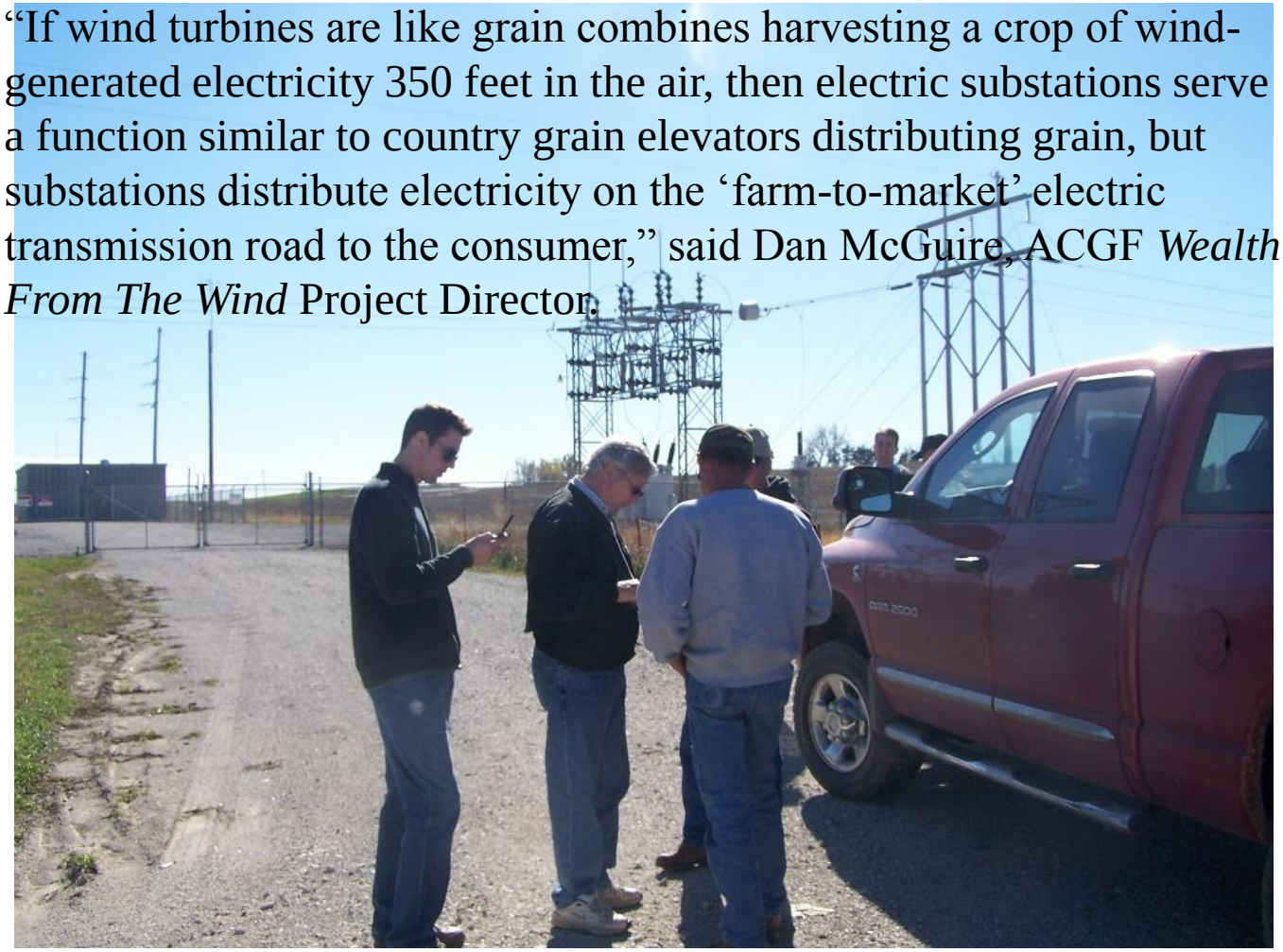
15. Permit Fees

Applicant shall remit an application fee set by the Board of Supervisors.

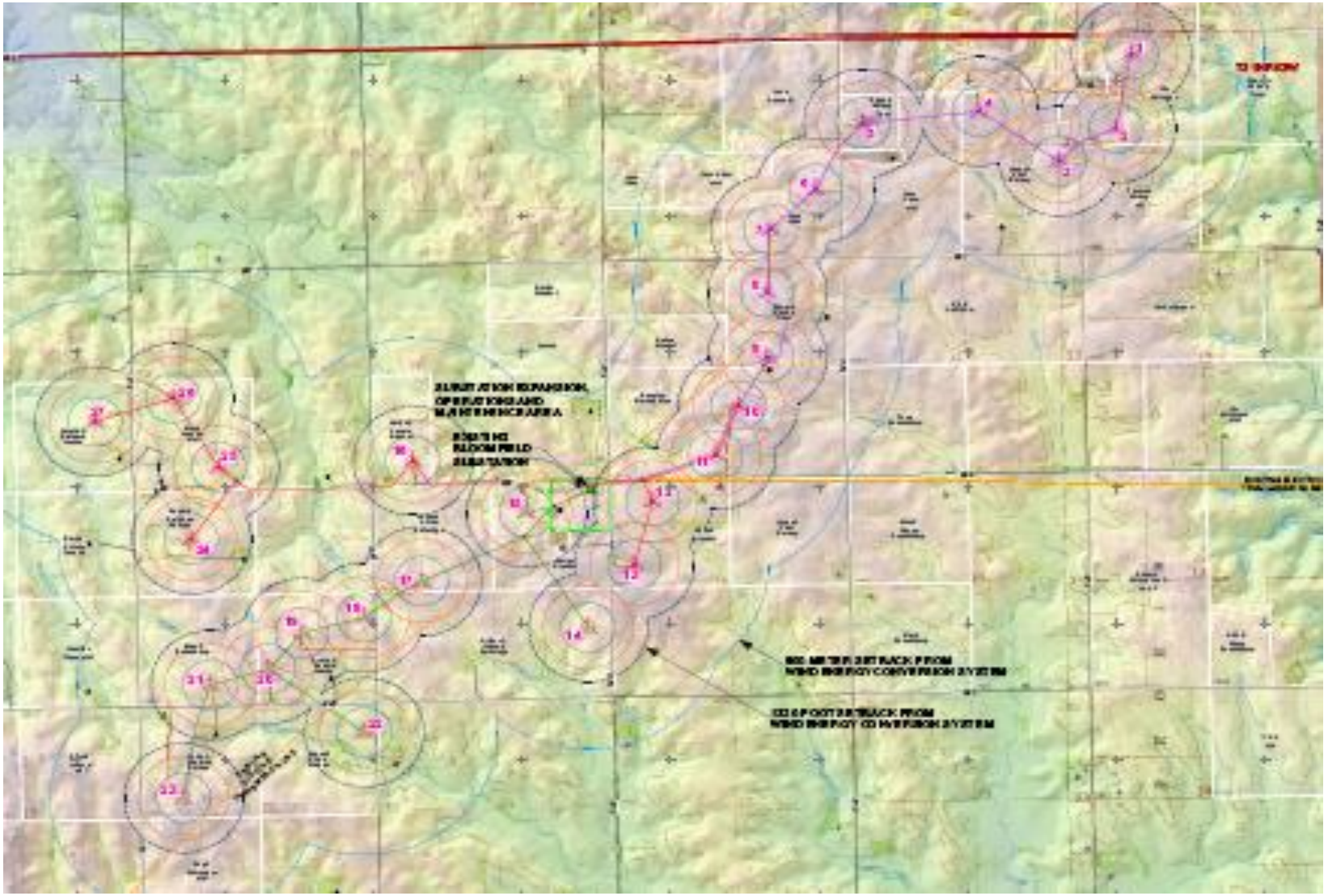
Pre-Construction: Wind project development involves many contractors, new substations and large construction equipment to deliver and erect the large and heavy structures and components

(Shown below are Dan Juhl and Corey Juhl of Juhl Energy with local officials evaluating location for the Crofton, NE wind project substation adjacent to the Bloomfield Elkhorn Ridge wind farm substation)

"If wind turbines are like grain combines harvesting a crop of wind-generated electricity 350 feet in the air, then electric substations serve a function similar to country grain elevators distributing grain, but substations distribute electricity on the 'farm-to-market' electric transmission road to the consumer," said Dan McGuire, ACGF *Wealth From The Wind* Project Director.



The Elkhorn Ridge 80 MW Wind Farm at Bloomfield, Nebraska covers approximately 4,000 acres (from Midwest Wind Energy 2008 Presentation to NE Wind Conference)



Elkhorn Ridge Development Time

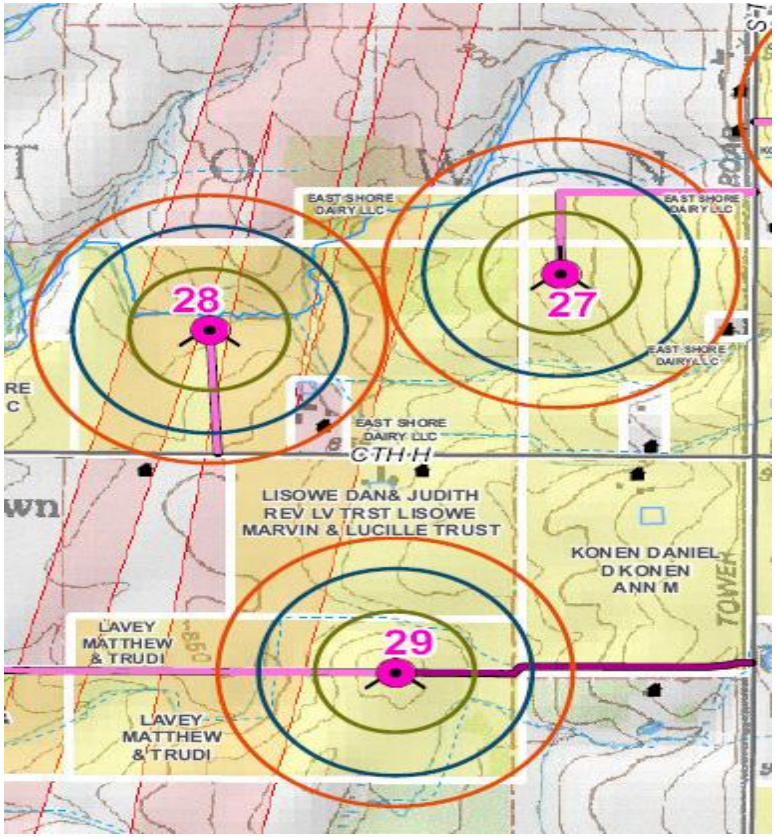
March 14, 2007	Initial meeting with Bloomfield civic leaders. Received favorable response.
April, 2007	Installed Met tower to collect on-site wind data.
July 16, 2007	NPPD releases RFP for up to 100MW.
August 20, 2007	MWE submits proposal for Elkhorn Ridge to NPPD.
October, 2007	MWE shortlisted by NPPD. Starts negotiating Power Purchase Agreement.
Nov/Dec, 2007	Obtain Knox County zoning approval.
Feb/Mar, 2008	Received agency permits. Finalized and signed PPA & IGA with NPPD.
	Work on substation expansion starts. Finalized lease negotiations.
April 29, 2008	Ground Breaking Ceremony.
May, 2008	Work on wind farm begins in earnest.
November, 2008	70 to 80% of turbines commissioned.
December, 2008	Elkhorn Ridge Wind Farm fully operational.

From Midwest Wind Energy Presentation to the 2010 Nebraska Wind Conference

- **What factors into a Turbine Layout Plan?**

1. Setbacks applied to project acreage to obtain buildable area.
2. Within buildable area, wind resource and constructability used to determine turbine sites.
3. Landowners approve locations of turbines and access roads.
4. Other factors include microwave beam paths, environmental issues, pipelines, etc.
5. Final plan used to submit for permits.

Laredo Ridge Project Layout of three turbines



You can't always avoid center pivots

(Midwest Wind Energy slide)

You Can't Always Avoid Center Pivots

1. Nebraska has more sprinkler irrigated land than any other state — 72% *
2. MWE looks to avoid pivots where economically feasible.
3. Laredo Ridge had a handful of parcels where turbines ended up inside pivot.
4. Prior to signing lease, MWE works with landowners to find a win-win solution for turbines inside pivot.

* **Source: http://cropwatch.unl.edu/web/cropswater/stategraph**

Large transportation and construction equipment is involved in building a wind farm…Juhl Energy Photo

During Construction of a 52-turbine wind farm (from Juhl Energy)

- There will be approximately 10 OS/OW trucks required for each turbine. Approximately 52 turbines are proposed for this project which will create a total 520 OS/OW vehicle trips along with multiple standard construction equipment trips which could include the following:
- Gravel trucks with capacity of approximately 10 cubic yards (cy) per truck and an estimated gross weight of 75,000 pounds (lbs), for access road construction (given the estimate of each access road being 1500 feet long and 32 feet wide with gravel 15 inches deep; total of approximately 11,000 to 12,000 trips).

Other Material Delivery Trucks (from Juhl Energy)

- Variety of conventional semi-trailers for delivery of reinforcing steel (two per turbine foundation) and small substation components and interconnection facility material (approximately 30 to 50 trucks).
- Pickup trucks for equipment and tools.
- Trucks and cars for transporting construction workers.

Preparing to lay turbine foundations

(Midwest Wind Energy Elkhorn Ridge Project at Bloomfield, NE

Concrete trucks for construction of turbine foundations and transformer pads with capacity of approximately 10 cy per truck and an estimated gross weight of 96,000 lbs (total of approximately 40 trips per foundation depending on final design).

Construction Vehicles

(Juhl Energy slide)

Construction traffic will consist of standard construction trucks to deliver the turbine components. Standard construction traffic consists of gravel/dump trucks, concrete trucks, excavation equipment, conventional semi-trailers, transport/tool vehicles and employee vehicles. These standard construction vehicles should not require physical modifications to the roadways to accommodate their presence. Delivery of the wind turbine components will utilize Over-Size/Over-Weight (OS/OW) trucks to bring the components from the manufacturer to the project area. The OS/OW trucks are special hauling vehicles with unique lengths, widths, heights, and weights depending on the component being transported. These trucks require particular clearances due to their size and turning radii. The actual vehicles used to deliver the turbines varies dependent on the transportation contractor. The following is a summary of wind turbine components with corresponding truck configurations:

Trucking Configurations:

Juhl Energy Information

Wind Turbine Part	Approx. Component Weight (lbs.)	Comp. Length (ft)	Comp. Height / Dia. (ft)	Comp. Width (ft)	Truck Description	Overall Length (ft)	Overall Height (ft.)	Overall Width (ft.)	Est. Gross Vehicle Wt. (lbs.)
Rotor Blade	14,800	139.4	10.4	7.2	5-Axle Double Drop Stretch	160*	14	11'-6"	45,000
Two Blade cage	33,100	141.4	9.7	12.8	5-Axle Double Drop Stretch	160*	14	13'-0"	45,000
Base Tower	#	#	#	#	6-Axle Stretch	108	16*	13'-6"	150,000
Lower Mid Tower	135,300	56.7	13.3 dia.	--	6-Axle Stretch	113	16*	13'-6"	165,000
Mid Tower	105,150	56.8	13.2 dia.	--	6-Axle Stretch	113	16*	13'-6"	135,000
Upper Mid Tower	87,000	64.7	13.2 dia.	--	6-Axle Stretch	113	16*	13'-6"	120,000
Top Tower	62,600	76.1	13.2 dia.	--	6-Axle Stretch	113	16*	13'-6"	95,000
Nacelle	165,400	30.8	13.3	13.1	11-Axle Low Profile	160*	16*	13'-6"	200,000*
Hub Assembly	33,250	9.6	10.3	9.6	8-Axle Stretch	102	15	14'-0"	75,000
Rotor Nose cone	2,500	12.8	7.6	14.8	#	#	#	#	#

Type A Road: Information provided by Corey Juhl of Juhl Energy, Woodstock MN

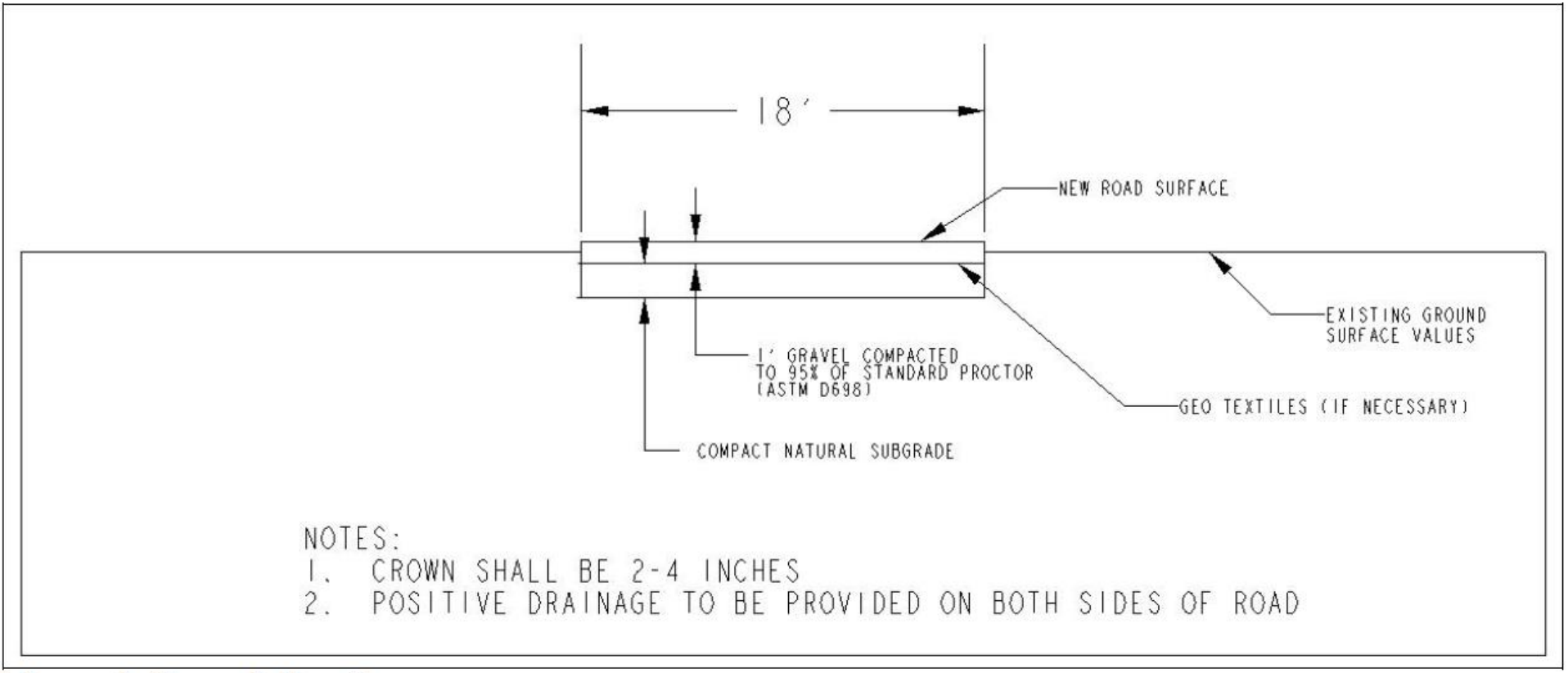
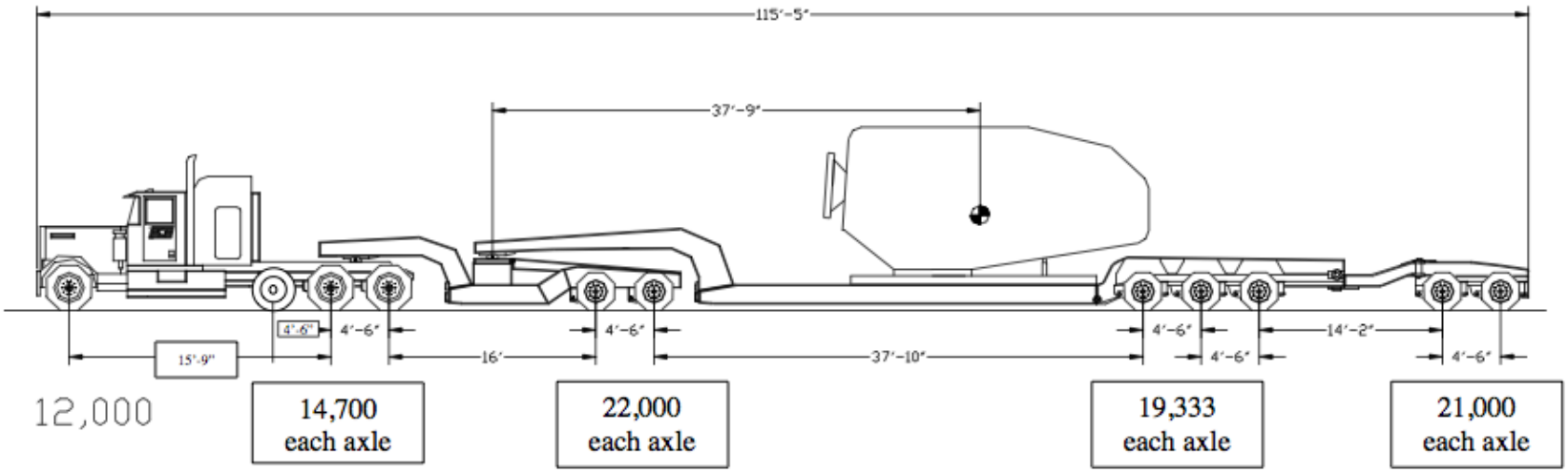


Figure 1: Type A Road

Oversize Truck Schematic: Hauling Wind Turbine Nacelle

Juhl Energy Info.



Typical Site Component Layout

Juhl Energy Information

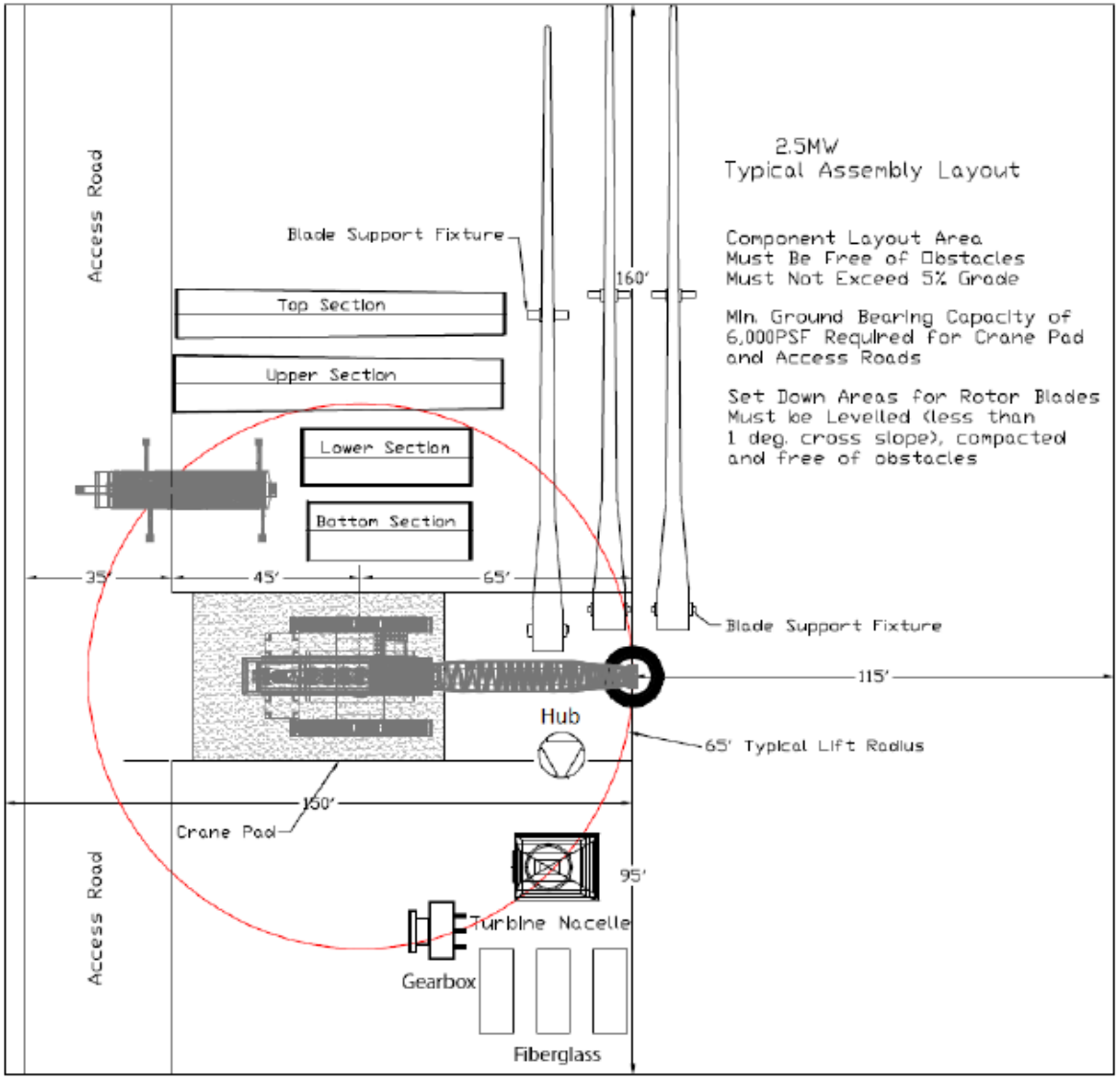


Figure 10: Typical Site Component Layout before Rotor Assembly. Grade area shown in figure is absolute minimum.

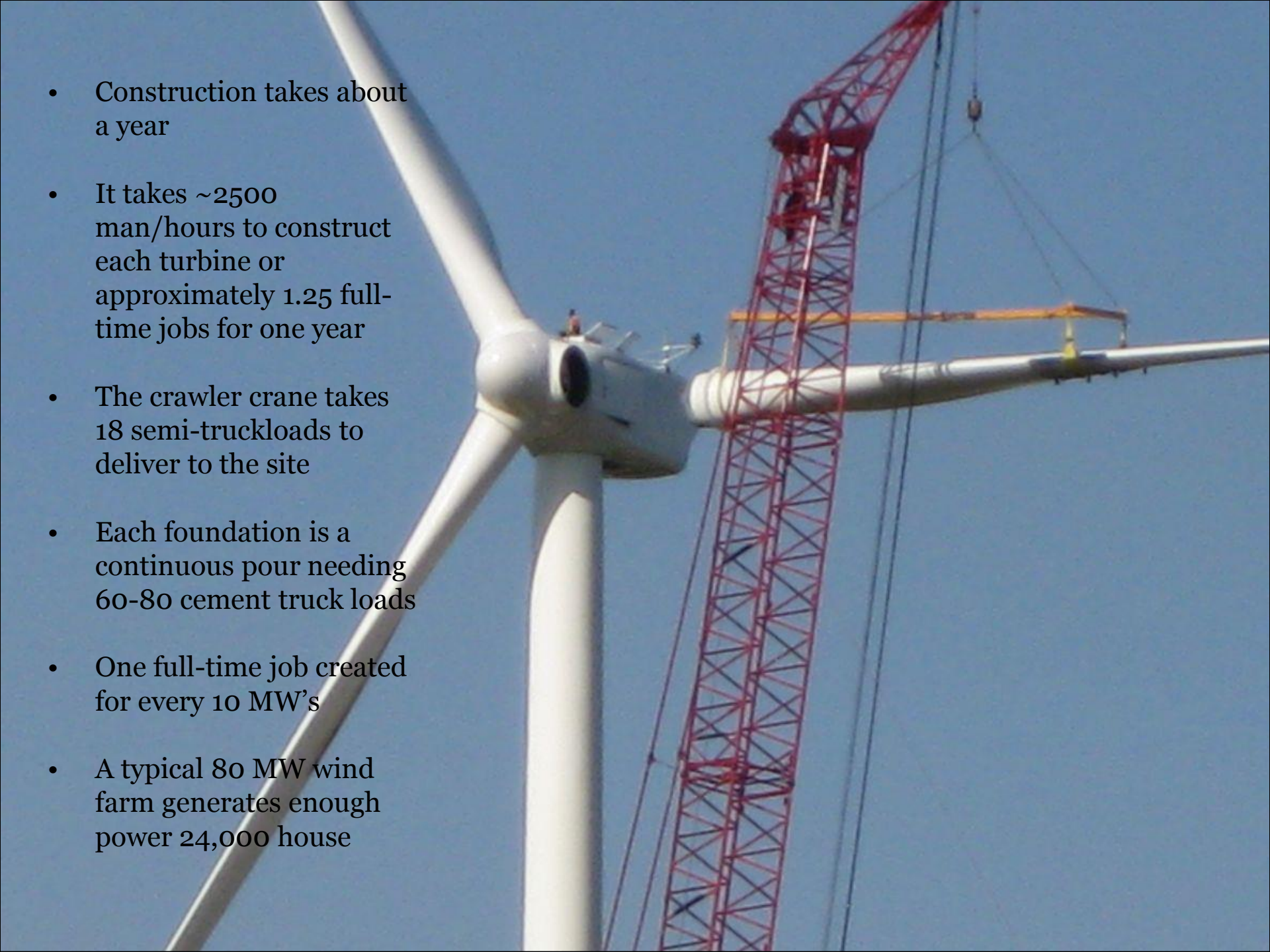
Approximately 40 Trips Per Foundation

(Midwest Wind Energy slide from 2008 NE Wind Conference)


KOMATSU WA500


Vestas
LoneStar
LoneStar

Crane being used to attach the first section of the turbine tower to the the concrete foundation base bolt ring

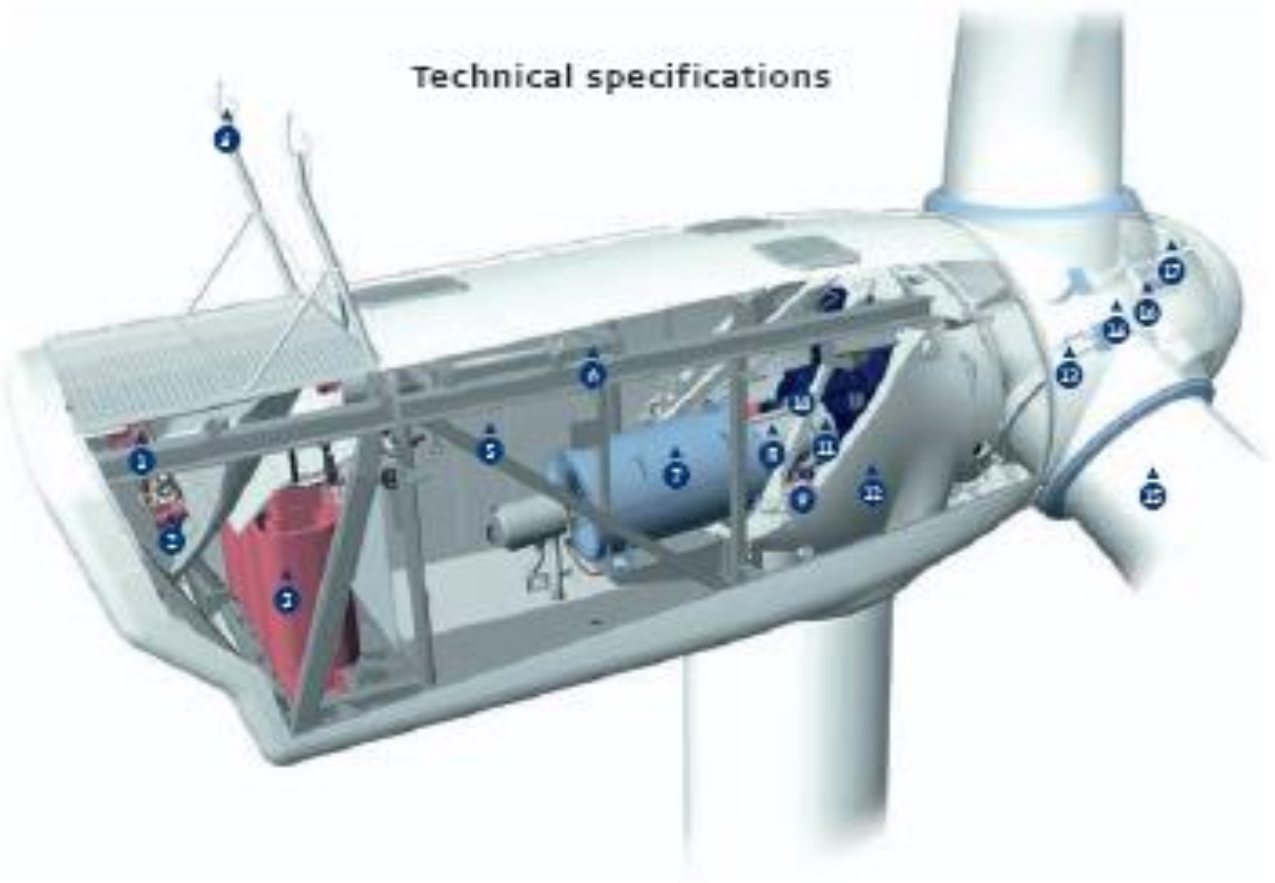


- Construction takes about a year
- It takes ~2500 man/hours to construct each turbine or approximately 1.25 full-time jobs for one year
- The crawler crane takes 18 semi-truckloads to deliver to the site
- Each foundation is a continuous pour needing 60-80 cement truck loads
- One full-time job created for every 10 MW's
- A typical 80 MW wind farm generates enough power 24,000 house

Vestas V90 Wind Turbine (3.0MW)

- Hub Height 80m (262 feet)
- Blade Length 45m (147 feet)
- Total height 125m (410 Feet)

(Midwest Wind Energy Slide)

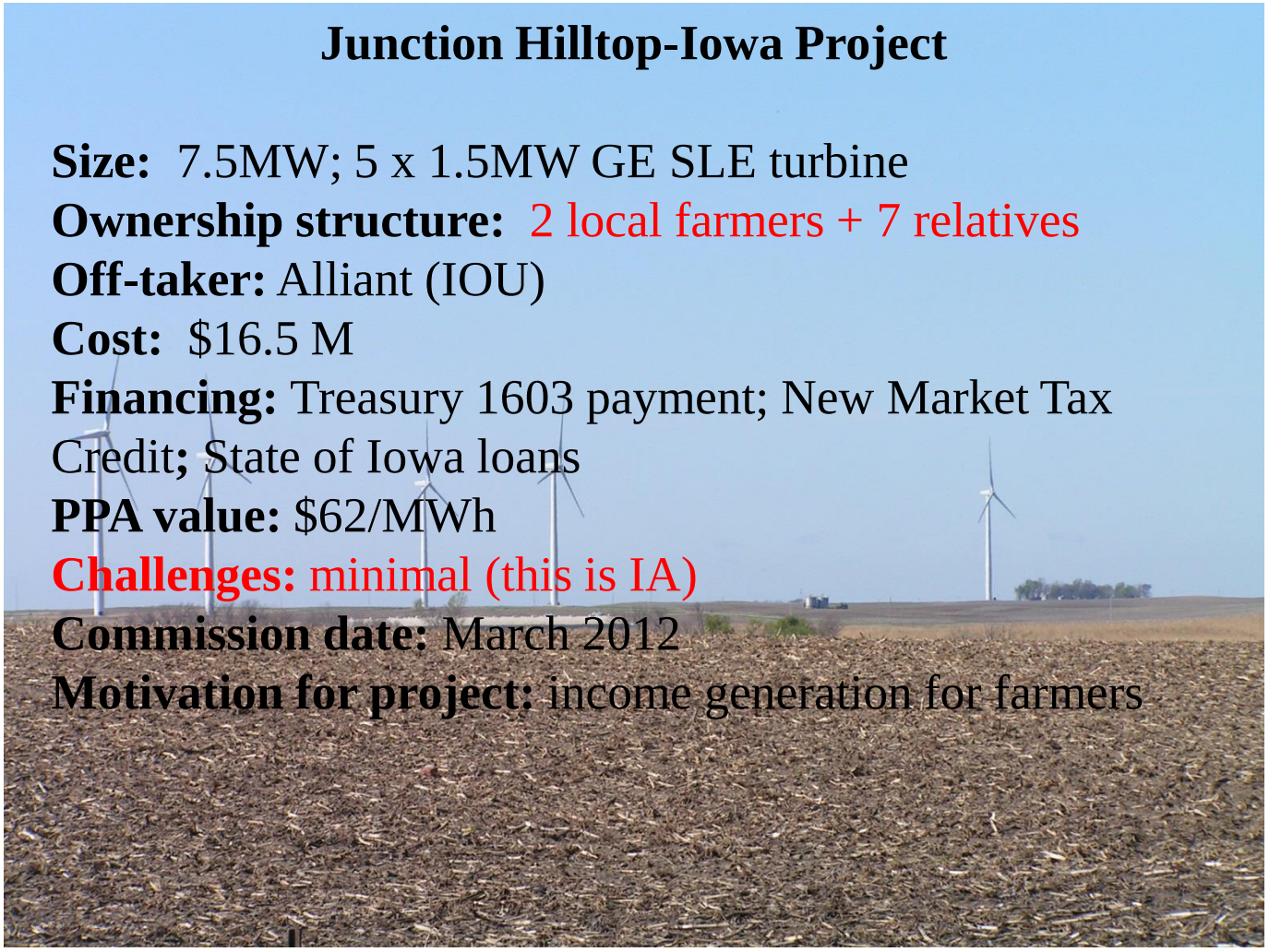


Elkhorn Ridge Project Facts as Reported to the NE Wind Conf. by Midwest Wind Energy in 2008

- Project cost = $135,000,000
- Property Taxes = $5,200,000
- Local investment opportunities
  Materials – concrete, steel, electric cable
  Services – legal, engineering, construction, excavating
- 135 construction jobs
- 8 permanent full-time jobs

Why Do Farmers, Rural Business Leaders and Educators Support Wind Development?

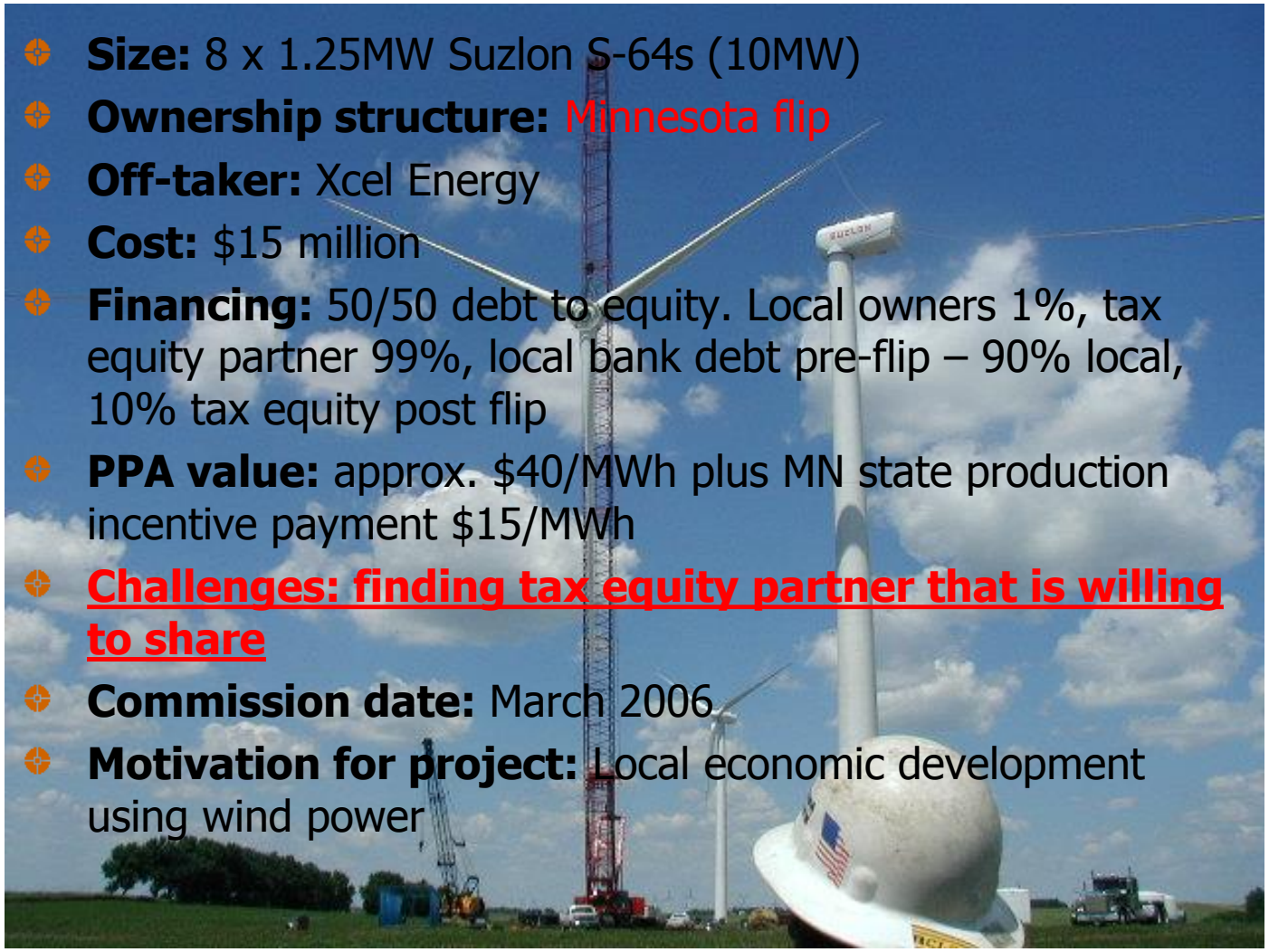
A Look at Some Wind Projects in Nearby States



Junction Hilltop-Iowa Project

Size: 7.5MW; 5 x 1.5MW GE SLE turbine
Ownership structure: 2 local farmers + 7 relatives
Off-taker: Alliant (IOU)
Cost: $16.5 M
Financing: Treasury 1603 payment; New Market Tax Credit; State of Iowa loans
PPA value: $62/MWh
Challenges: minimal (this is IA)
Commission date: March 2012
Motivation for project: income generation for farmers

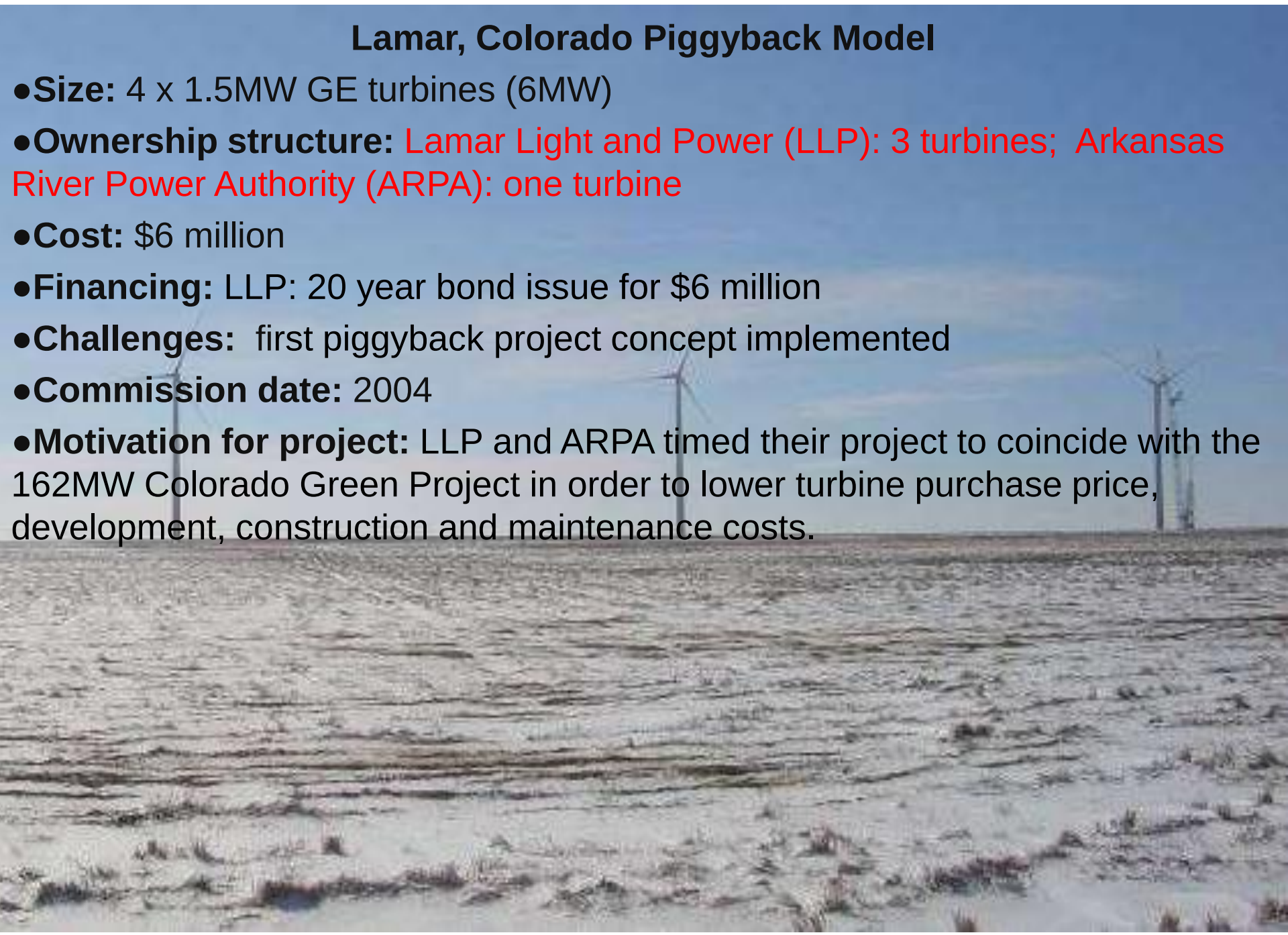
Eastridge, Minnesota Project



- **Size:** 8 x 1.25MW Suzlon S-64s (10MW)
- **Ownership structure:** Minnesota flip
- **Off-taker:** Xcel Energy
- **Cost:** $15 million
- **Financing:** 50/50 debt to equity. Local owners 1%, tax equity partner 99%, local bank debt pre-flip – 90% local, 10% tax equity post flip
- **PPA value:** approx. $40/MWh plus MN state production incentive payment $15/MWh
- **Challenges: finding tax equity partner that is willing to share**
- **Commission date:** March 2006
- **Motivation for project:** Local economic development using wind power

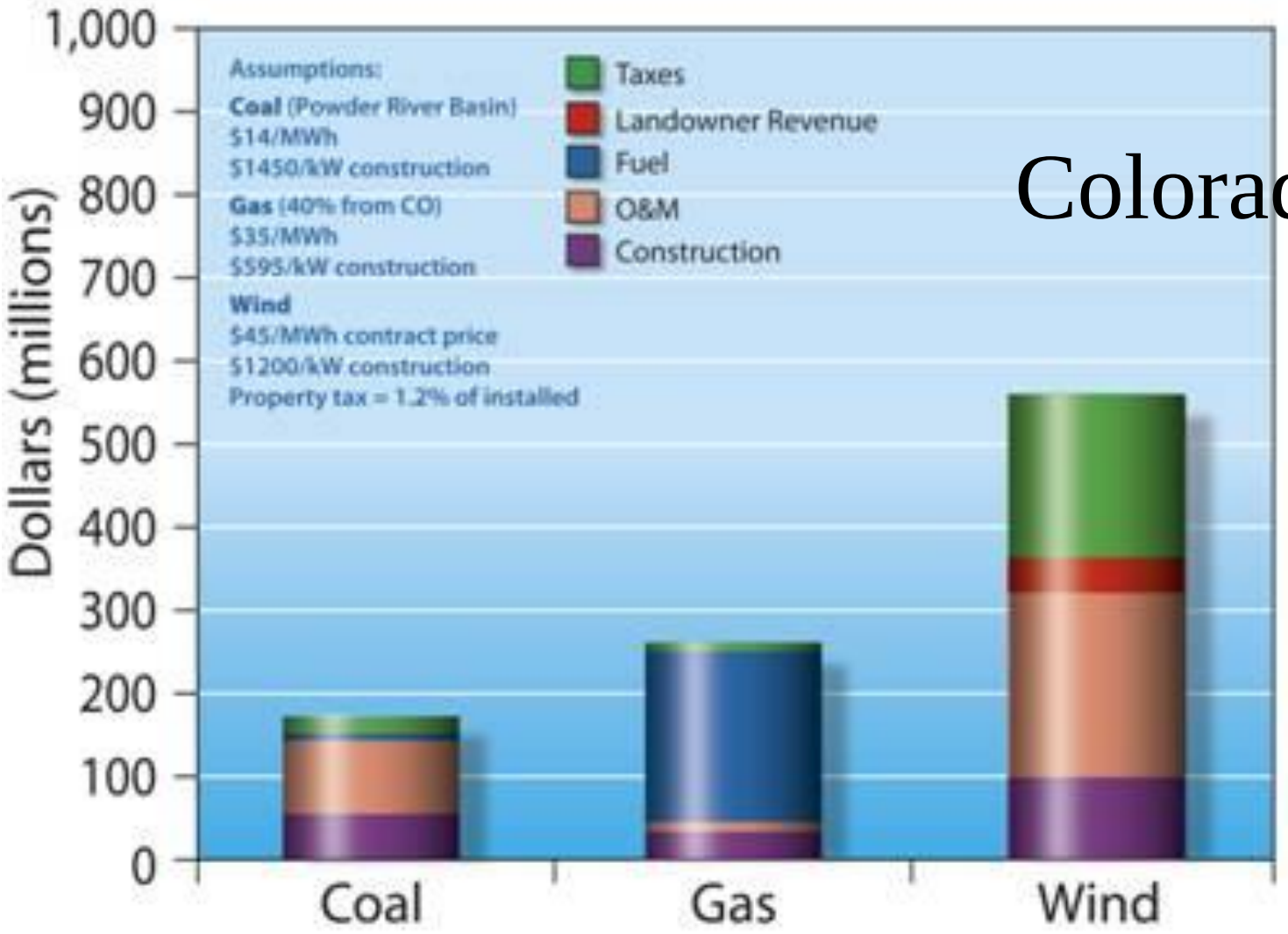
Lamar, Colorado Piggyback Model

- **Size:** 4 x 1.5MW GE turbines (6MW)
- **Ownership structure:** Lamar Light and Power (LLP): 3 turbines; Arkansas River Power Authority (ARPA): one turbine
- **Cost:** $6 million
- **Financing:** LLP: 20 year bond issue for $6 million
- **Challenges:** first piggyback project concept implemented
- **Commission date:** 2004
- **Motivation for project:** LLP and ARPA timed their project to coincide with the 162MW Colorado Green Project in order to lower turbine purchase price, development, construction and maintenance costs.



Economic Impacts of Alternative Generation

from 1/22/07 NREL-WPA Update by Larry Flowers



Colorado

The JEDI Model estimates jobs and other economic impacts from new wind development www.nrel.gov/analysis/jedi

NREL's JEDI Confirms Local Ownership Would Generate The Most Economic Development Benefits in Nebraska

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Dave Michael, Nebraska Energy Office/PIX15299

This fact sheet summarizes a recent report by the National Renewable Energy Laboratory (NREL), Economic Development Benefits from Wind Power in Nebraska: A Report for the Nebraska Energy Office, which focuses on the estimated economic development impacts in Nebraska from development and operation of wind power in the state as envisioned in the U.S. Department of Energy's (DOE's) report, 20% Wind Energy by 2030.

Wind power is one of the fastest-growing sources of new electricity generation in the country. It constituted more than 35% of new U.S. electric generating capacity in 2007. In 2008, the United States became the world leader in energy generated from wind power. At the national level, common wind power drivers include Renewable Portfolio Standards (RPS), the federal production tax credit (PTC), and economic development impacts.

A recent report by the U.S. Department of Energy concludes that it is feasible for the United States to derive as much as 20% of its electricity from wind power by 2030 (http://20percentwind.org/). This groundbreaking analysis details how the country could achieve this ambitious goal and shows where wind energy is expected to be deployed based on demand for electricity, the distribution of wind resources across the country, and the cost and availability of transmission. Under this national 20% wind scenario, 7,800 megawatts (MW) of new wind power is added in Nebraska.

Explaining the Range of Impacts from Four Scenarios

This analysis uses four scenarios — 1,000 MW, 7,800 MW, community-based project, or non-community-based project — to represent two different amounts of wind energy development and two different estimates of how much local investment will occur under Nebraska's Community-Based Energy Development (C-BED) policy. This policy is expected to have a significant impact on economic development.

Economic Development Impacts Under Four Scenarios

Direct Impacts*	1000 MW Low C-BED	1000 MW High C-BED	7,800 MW Low C-BED	7,800 MW High C-BED
Construction-period employment (short-term jobs)	1,228	2,177	10,301	17,795
Construction-period economic output (millions)	$150	$308	$1,724	$3,238
Operations-period employment (long-term jobs)**	141	290	1,166	2,269
Operations-period economic output (million $/yr)**	$18	$33	$144	$255
Total Impacts (Direct, Indirect, and Induced)				
Construction-period employment (short-term jobs)	2,316	4,199	20,626	36,508
Operations-period employment (long-term jobs)**	264	515	2,171	4,038
Average annual employment impacts (jobs supported on average over the facility's lifetime)***	345	659	1,600	2,925
Average property tax revenue (million $/yr)***	$3.3	$3.3	$14	$14
Lifetime economic output (millions)****	$868	$1,640	$7,800	$14,100

*Low results represent the traditional development low scenario. High results represent the C-BED high scenario. All dollar values are millions of constant 2008 dollars.

**When the total capacity is operating.

***Average annual impacts for 7,800 MW assume a 20-year construction period and 20 years of operations for a total lifetime impact spread over 40 years. Average annual impacts for 1,000 MW assume a 2-year construction period and 20 years of operations for a total impact spread over 22 years.

****Lifetime includes construction and 20 years of operations.

Wind Powering America Fact Sheet Series

Economic Development Impacts Under Four Scenarios

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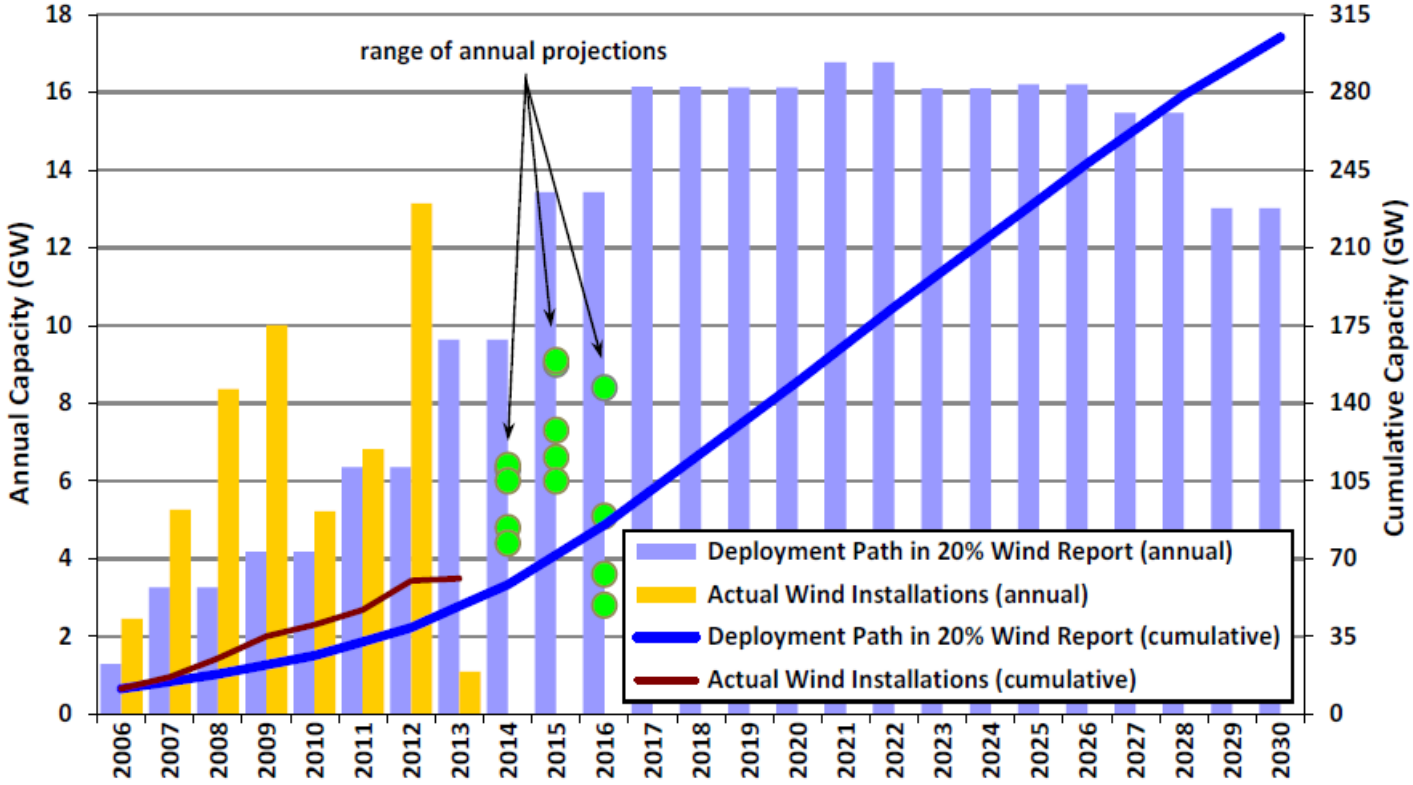
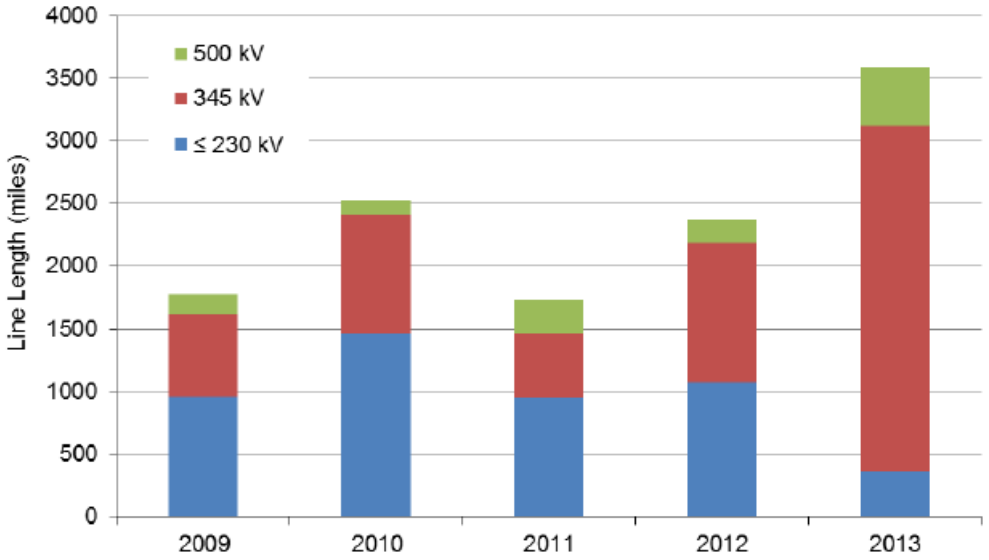
U.S. Is on Early Trajectory that May Lead to 20% Wind; Projections for 2014-2016, However, Fall Short of Annual Growth Envisioned in 2008 20% Wind Report

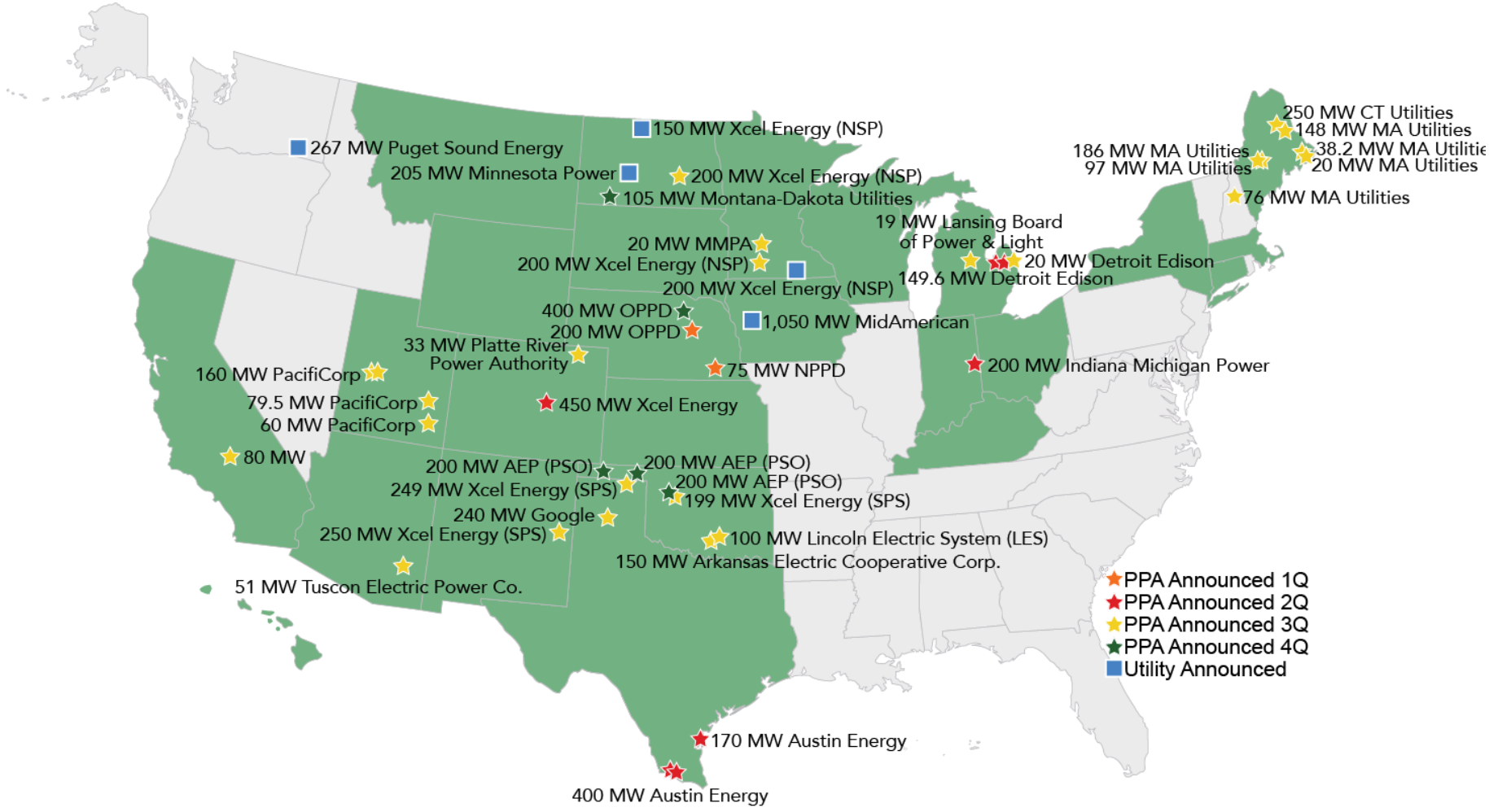


Solid Progress on Overcoming Transmission Barriers Continued

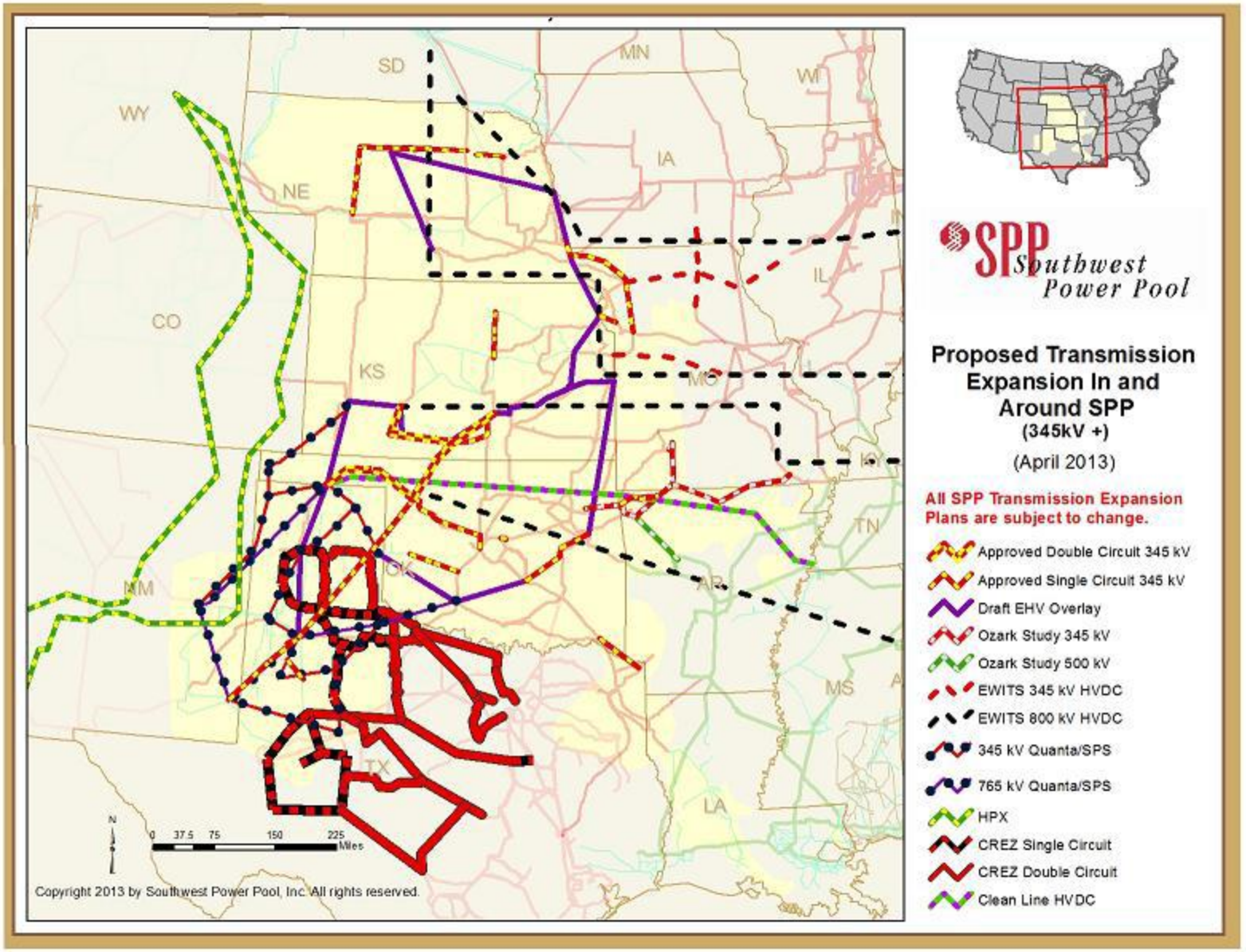
- 3,500 circuit miles of new transmission built in 2013; completion of the Competitive Renewable Energy Zones project in Texas
- EEI has identified over 170 transmission projects in development, 76% of which would – at least in part – support the integration of renewable energy
- AWEA has identified 15 near-term transmission projects that – if all were completed – could carry almost 60 GW of additional wind power capacity
- FERC continued to implement Order 1000, requiring public utility transmission providers to improve planning processes and determine a cost allocation methodology for new transmission investments



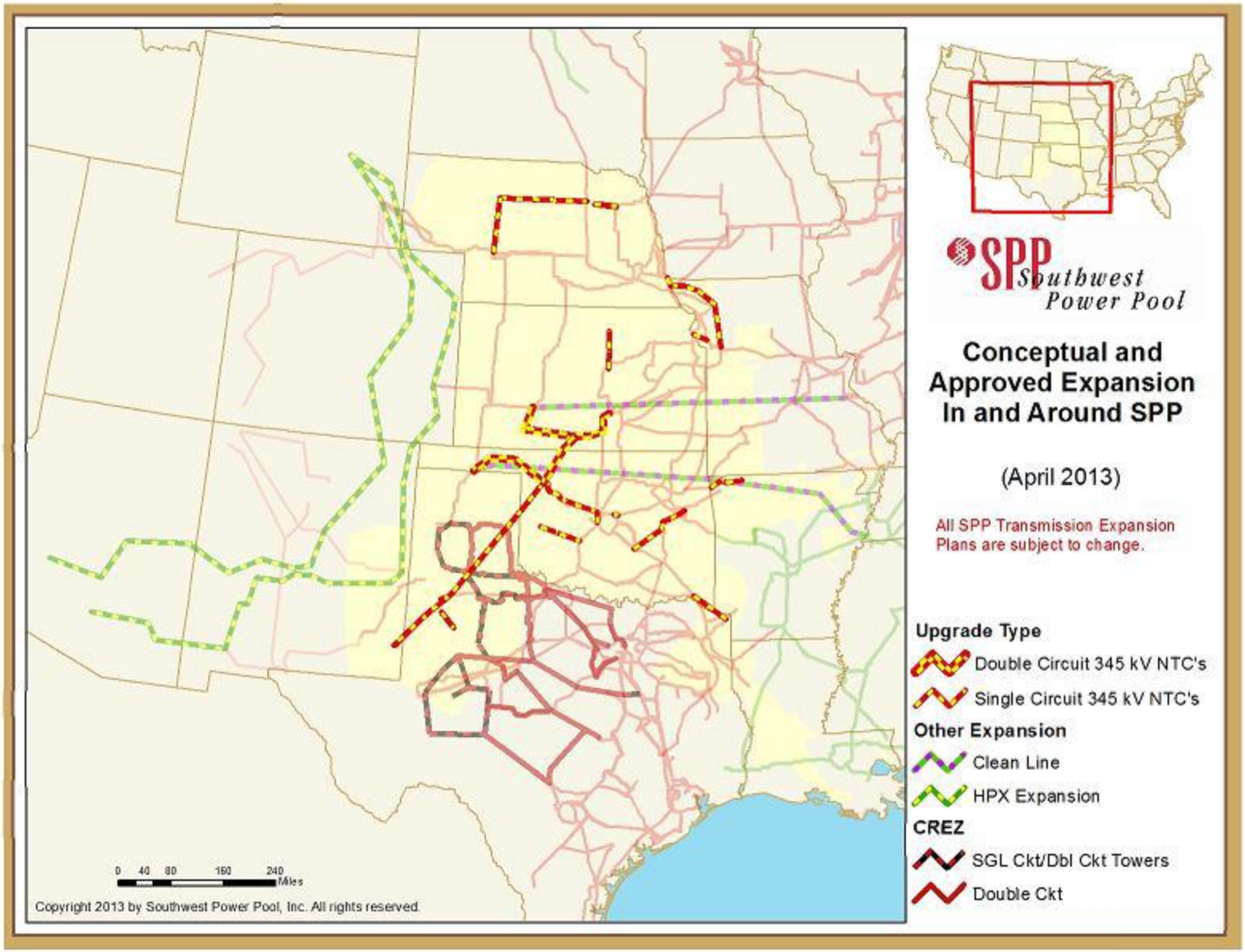
AWEA Market Update: 2013 PPA's-Over 5,670 MW of PPA's for new wind and 1,870 MW of Utility Announcements (Note 600 MW for OPPD, 75 MW for NPPD in NE and the LES 100 MW project in OK)



Conceptual & Approved SPP Plans



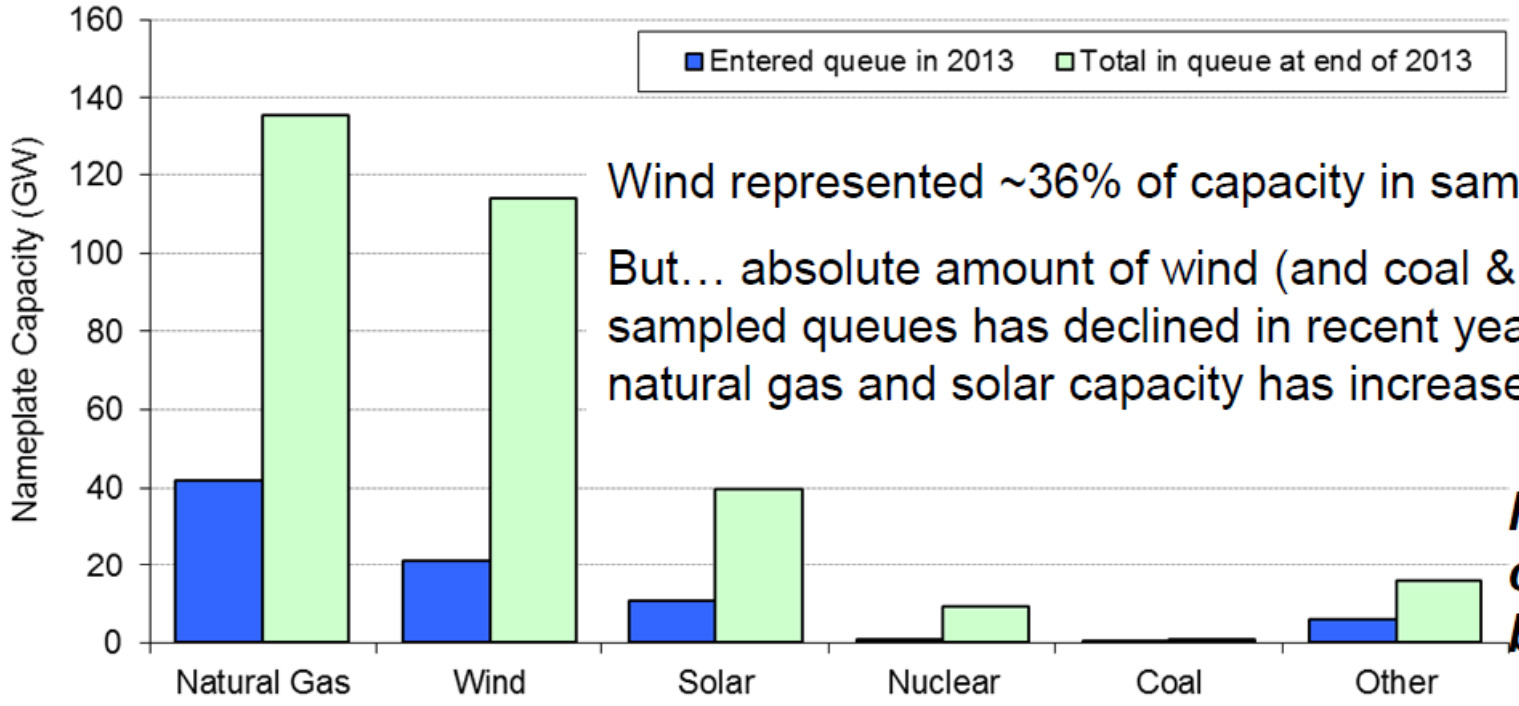
SPP Regional Plans Include The Clean Line



From Southwest Power Pool Slide

- Wind Energy Development
- •Wind Development Territory: Kansas, Oklahoma, Texas Panhandle, New Mexico, Nebraska
- –60,000-90,000 MW potential
- –More wind energy than SPP uses during peak demand
- •7,765 MW capacity of in-service wind
- •26,922 MW wind in-service and being developed
- –Includes wind in Generation Interconnection queue and with executed Interconnection Agreements

Interconnection Queues Demonstrate that a Substantial Amount of Wind Is Under Consideration



Wind represented ~36% of capacity in sampled 37 queues

But… absolute amount of wind (and coal & nuclear) in sampled queues has declined in recent years whereas natural gas and solar capacity has increased

Not all of this capacity will be built….

- AWEA reports >13 GW of capacity under construction after 1Q2014

2013 6th Annual Nebraska Wind Conference Held November 13-15 in Lincoln
Moderator: Ginger Willson, Nebraska Energy Office Director
Speaker: Larry Flowers, AWEA Director of Community Wind

Wind Energy's Economic Impacts

JEDI Model Version W1.09.03e

Wind energy's economic "ripple effect"

Project Development & Onsite Labor Impacts

- Construction workers
- Management
- Administrative support
- Cement truck drivers
- Road crews
- Maintenance workers
- Legal and siting

Local Revenue, Turbine, & Supply Chain Impacts

- Blades, towers, gear boxes
- Boom truck & management, gas and gas station workers;
- Supporting businesses, such as bankers financing the construction, contractor, manufacturers and equipment suppliers;
- Utilities;
- Hardware store purchases and workers, spare parts and their suppliers

Induced Impacts

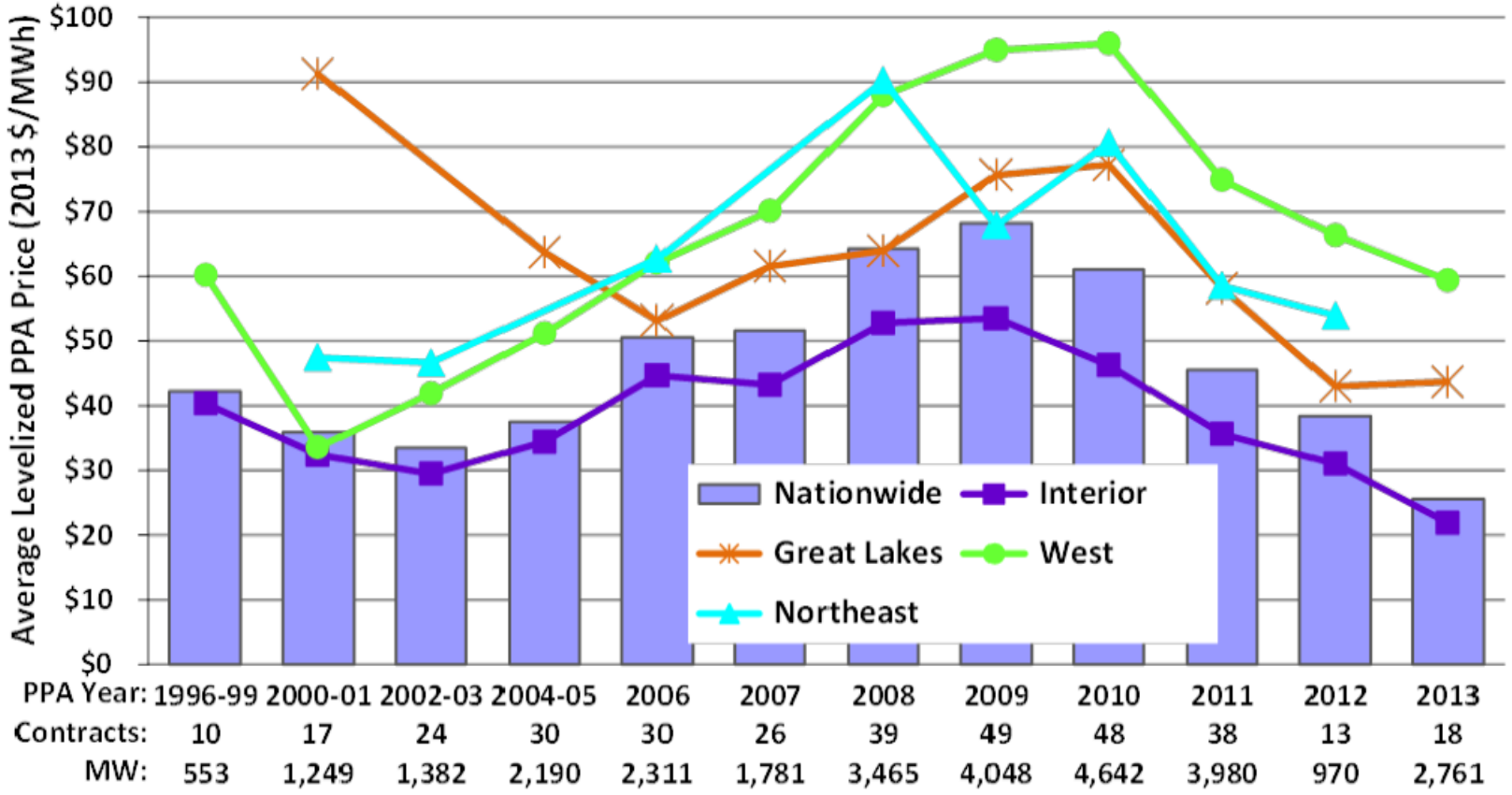
Jobs and earnings that result from the spending supported by the project, including benefits to grocery store clerks, retail salespeople, and child care providers

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

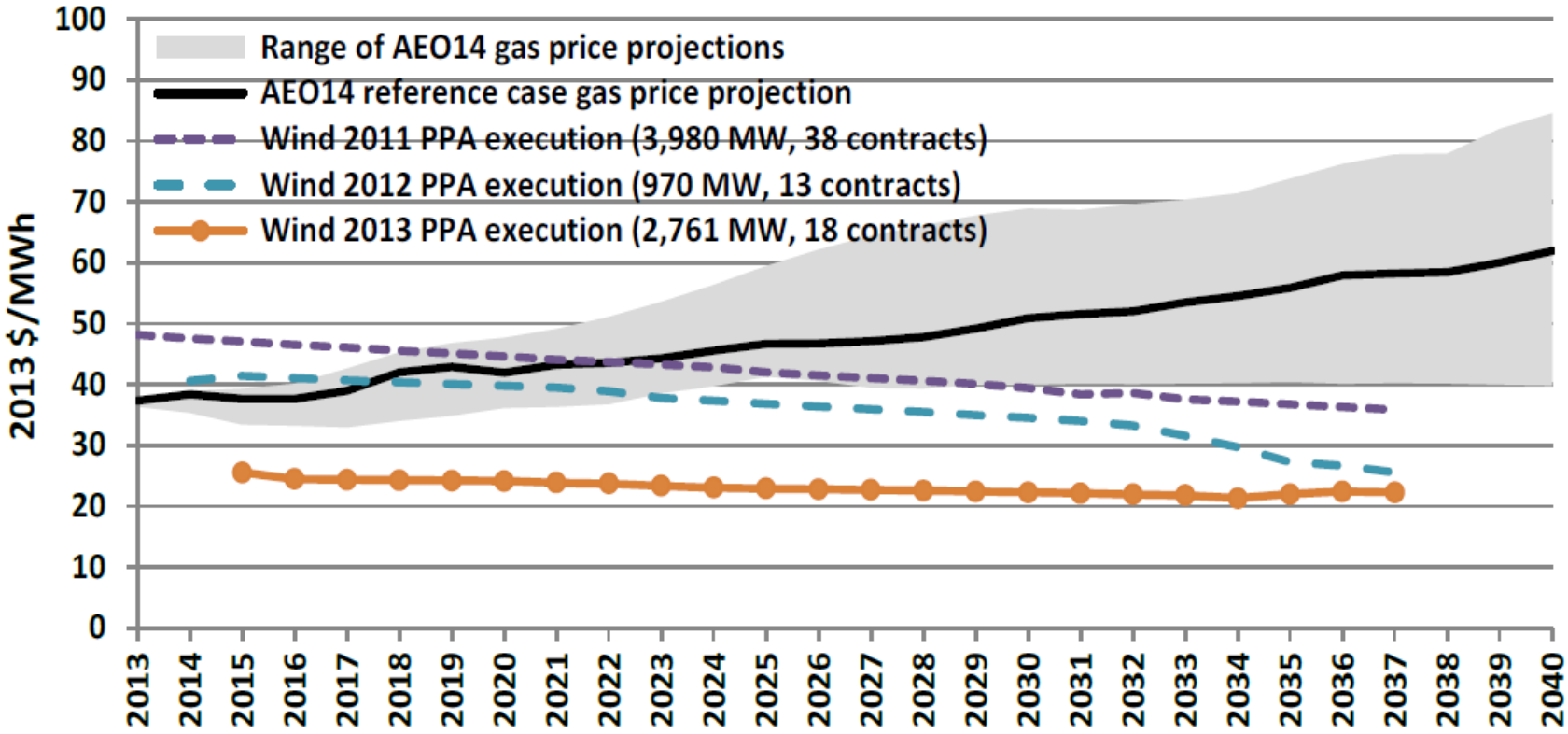
National Renewable Energy Laboratory Video

https://www.youtube.com/watch?v=KBLTIqM8v6U

A Smoother Look at the Time Trend Shows Steep Recent Decline in Pricing; Especially Low Pricing in Interior Region



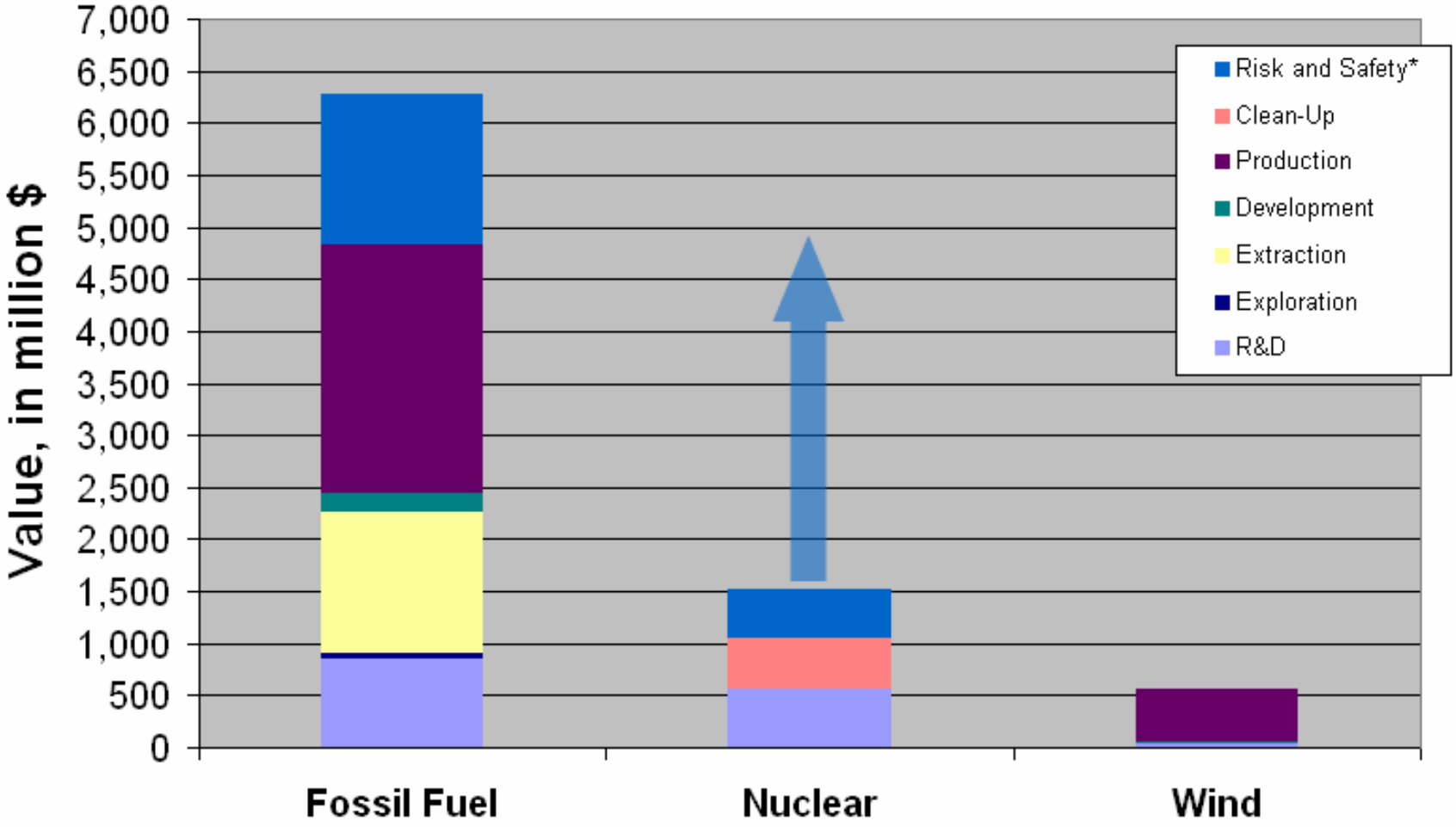
Recent Wind Prices Are Hard to Beat: Competitive with Expected Future Cost of Burning Fuel in Natural Gas Plants



Price comparison shown here is far from perfect – ***see full report for caveats***

There Has Been an Un-Level Playing Field for Various Energy Sources for Many Years. Subsidies Do Indeed Impact Prices. It's Time To Defend Wind Energy Incentives including the Federal PTC.

A Glance at Federal Energy Subsidies for Fiscal Year 2006

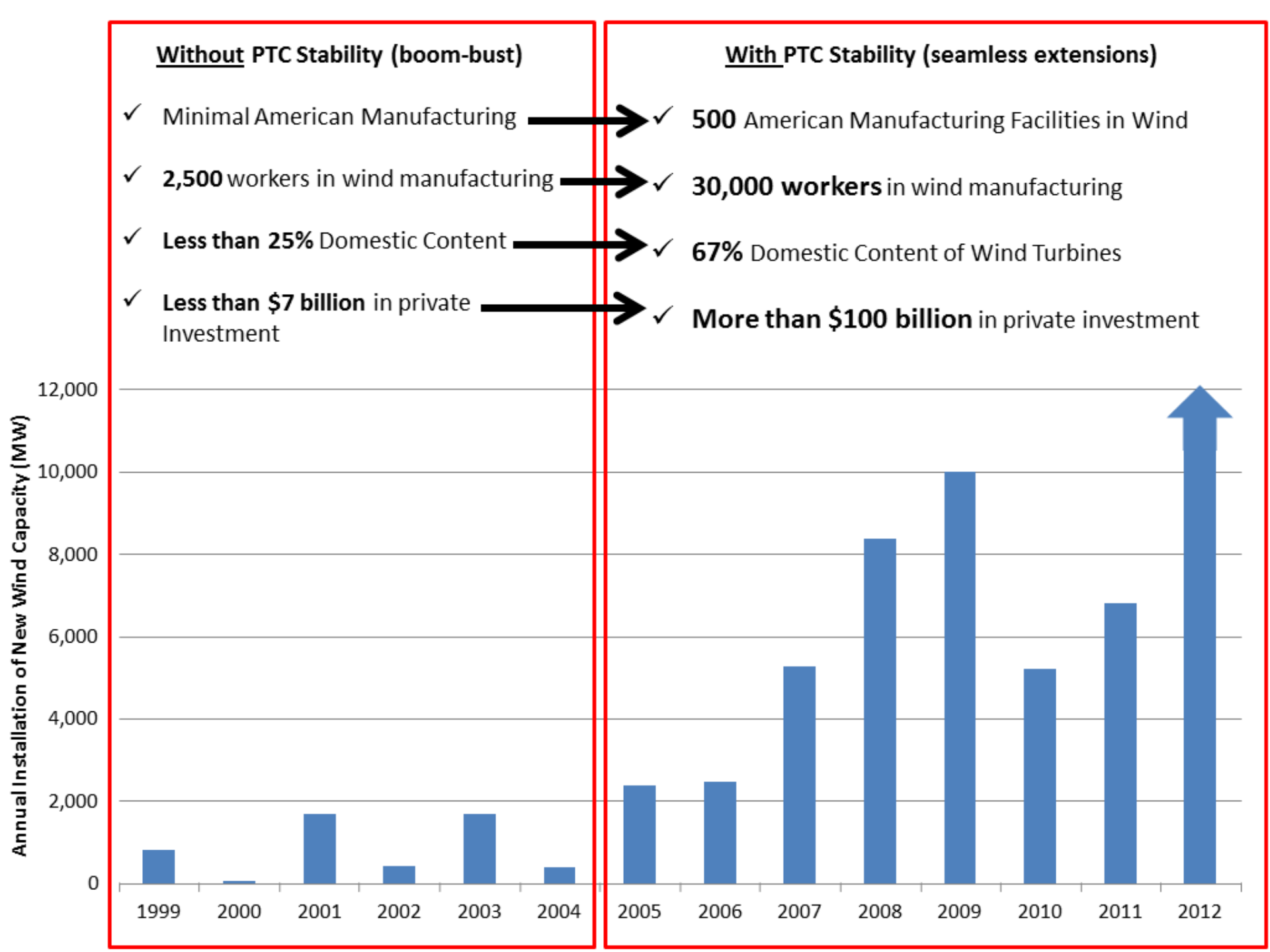


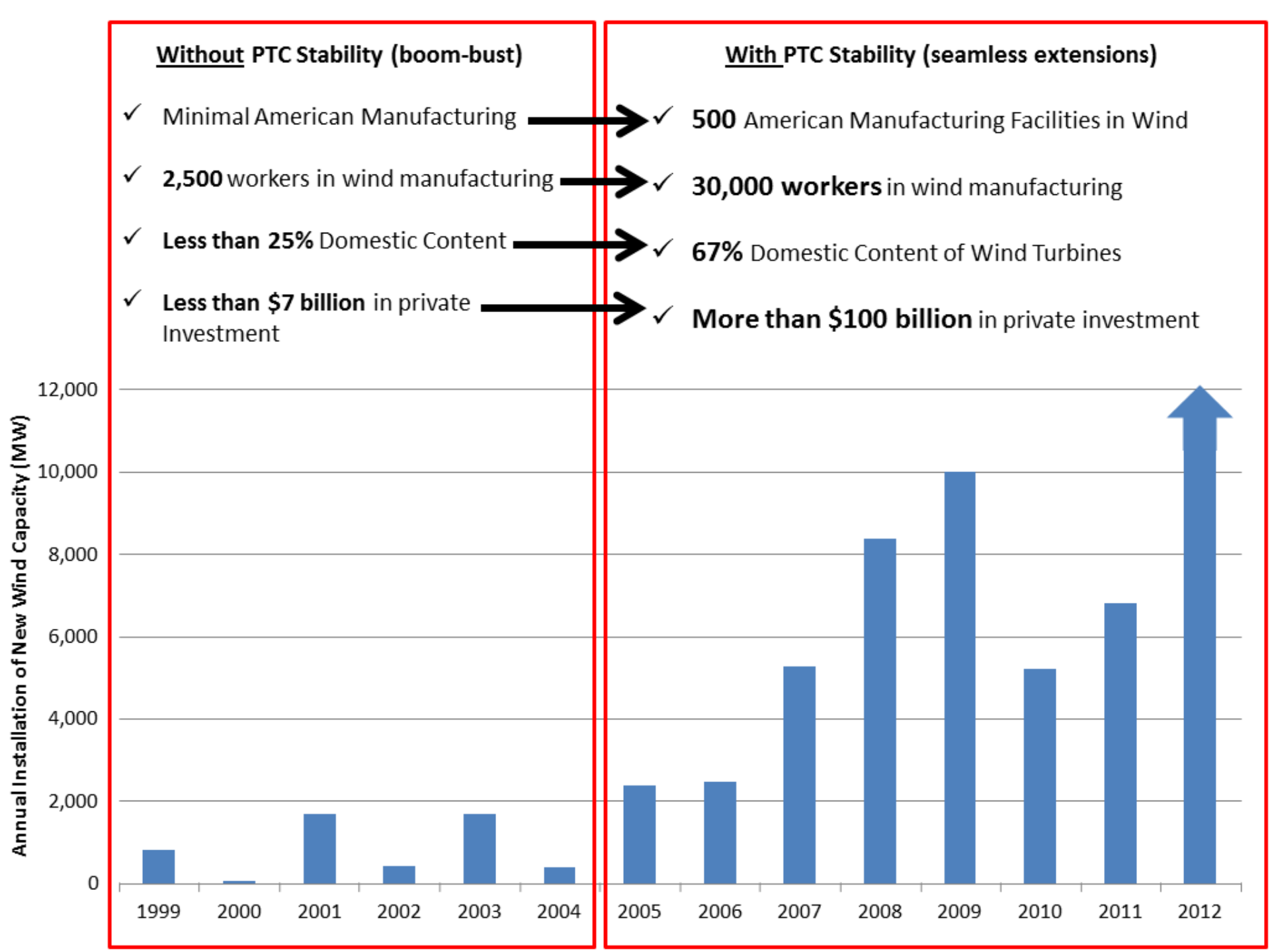
Sources for previous slide and graph are AWEA and these official sources shown below:

- **Sources:**
- 1. U.S. Department of Energy. Battelle Memorial Institute. Pacific Northwest Laboratory. An Analysis of Federal Incentives Used to Stimulate Energy Production. PNL-2410 REV.
- 2. National Commission on Energy Policy. Ending the Energy Stalemate, Technical Appendix, Chapter 6. http://www.energycommission.org/site/page.php?node=48
- 3. U.S. Department of Energy, FY 2007 Congressional Budget Request. Budget Highlights. February 2006. DOE/CF-009. http://www.cfo.doe.gov/budget/07budget/Content/Highlights/Highlights.pdf.
- 4. U.S. Office of Management and Budget. Analytical Perspectives, Budget of the United States Government, Fiscal Year 2007. Section 19. Tax Expenditures. p. 285-328. http://www.whitehouse.gov/omb/budget/fy2007/pdf/spec.pdf.
- 5. U.S. Department of the Interior. U.S. Geological Survey. FY 2007 President's Budget Request. February 2006. Geologic Resource Assessments, Energy Resources. http://www.usgs.gov/budget/2007/fy07_justification.html.
- 6. U.S. Department of Labor. Fiscal Year 2007 Budget. Employment Standards Administration Income Maintenance Programs. p. 19, 25-27, 31. http://www.dol.gov/_sec/budget2007/overview.pdf. *Black Lung Disability Trust Fund receipts do not cover the outlays, the fund is over $9 billion in debt*.
- 7. U.S. Department of Agriculture. FY 2007 Budget Summary and Actual Performance Plan. http://www.usda.gov/agency/obpa/Budget-Summary/2007/FY07budsum.pdf.
- 8. U.S. Nuclear Regulatory Commission. Performance Budget Fiscal Year 2007. NUREG-1100. Volume 22. February 2006. p.15. http://www.nrc.gov/reading-rm/doc collections/nuregs/staff/sr1100/v22/sr1100v22.pdf.
- 9. Heyes, Anthony, Liston-Heyes, Catherine. Subsidy to Nuclear through Price-Anderson liability limit: Comment. *Contemporary Economic Policy*. Vol. 16, No. 1. 1998. p. 122.
- U.S. Department of Energy. Energy Information Administration. Federal Energy Subsidies, Direct and Indirect Interventions in Energy Markets. P.78. http://tonto.eia.doe.gov/FTPROOT/service/emeu9202.pdf.
- * The value of the incentive of limited liability for the nuclear industry under the Price Anderson Act had a wide range of values in literature.
- More links on federal energy subsidies are available on www.ifnotwind.org.

Conclusions

- Annual wind additions were modest in 2013, but signals point to more-robust growth in 2014/15
- Notwithstanding 2013, wind has been a significant source of new generation in the U.S. since 2007
- Supply chain has been under duress, but domestic manufacturing content for nacelle assembly, blades, and towers is strong
- Turbine scaling is boosting expected wind project performance, while the installed cost of wind is on the decline
- Trends are enabling very aggressive wind power pricing and solid economics in many regions despite low natural gas prices
- Growth after 2015 remains uncertain, dictated in part by future natural gas prices, fossil plant retirements, and policy decisions, though technological advancements and recent declines in the price of wind energy have boosted future growth prospects


Without PTC Stability (boom-bust)
✓ Minimal American Manufacturing
✓ 2,500 workers in wind manufacturing
✓ Less than 25% Domestic Content
✓ Less than $7 billion in private Investment
With PTC Stability (seamless extensions)
✓ 500 American Manufacturing Facilities in Wind
✓ 30,000 workers in wind manufacturing
✓ 67% Domestic Content of Wind Turbines
✓ More than $100 billion in private investment
Annual Installation of New Wind Capacity (MW)
12,000
10,000
8,000
6,000
4,000
2,000
0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012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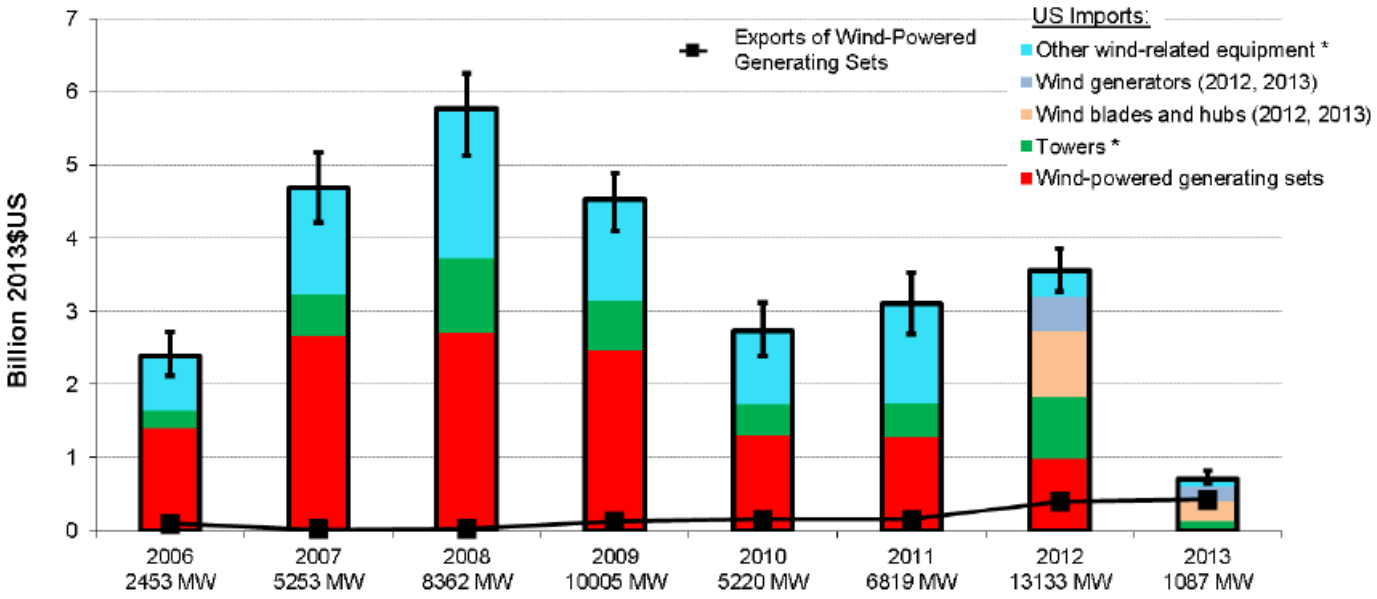
Annual Installation of New Wind Capacity (MW)
12,000
10,000
8,000
6,000
4,000
2,000
0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012

Sharp Decline in Wind-Related Imports and Stable Exports in 2013



* estimated imports

U.S. is a net importer of wind equipment

Exports of wind-powered generating sets increased modestly in 2013 to $421 billion; no ability to track other wind-specific exports, but total tower exports equalled $129 million

- *Figure only includes selected, tracked trade categories; misses other wind-related imports*
- *See full report for the many assumptions used to generate this figure*

Jobs, Jobs, Jobs: Project Development & Onsite Labor

Sample job types

- Truck driving
- Crane operation, hoisting, rigging
- Earth moving
- Pouring cement
- Management, support
- Siting.

Photo from istock 947687

Photo by David Parsons, NREL 05572

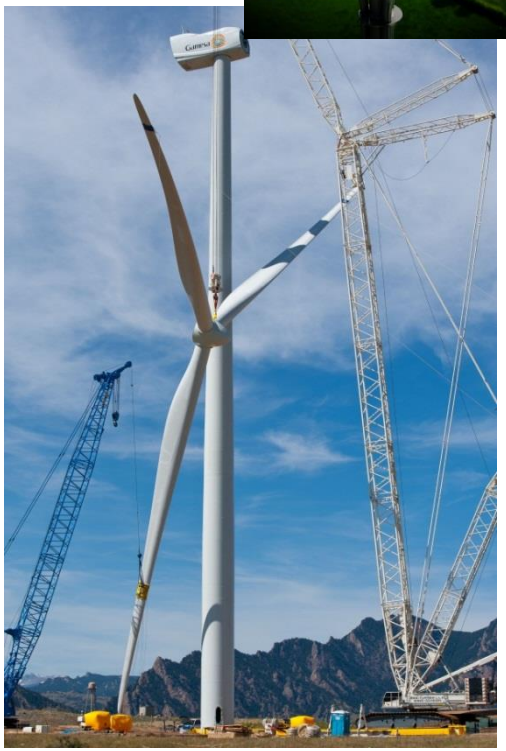


Photo from Northern Power Systems, NREL 13853

Photo from Dennis Schroeder NREL 20873

Local Revenues, Turbine, & Supply Chain

NREL 11074

Photo from iStock/5676592

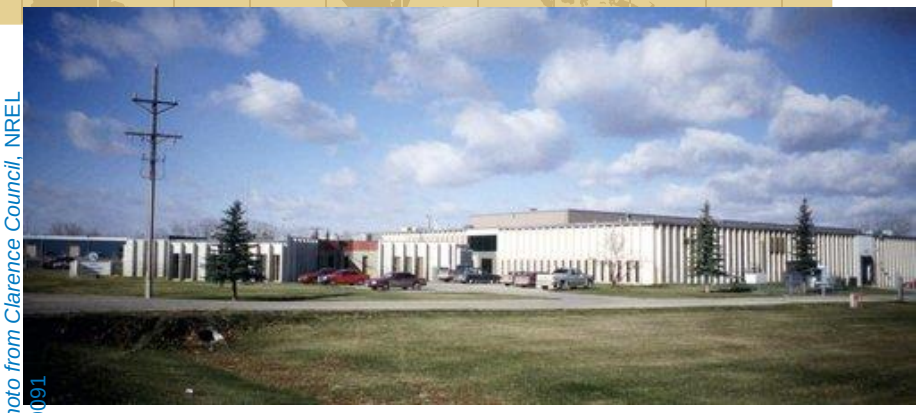


Photo from Clarence Council, NREL 09091

- Steel mill jobs, parts, services
- Equipment manufacturing & sales
- Blade & tower manufacturers
- Property taxes, financing, banking, accounting.

Photo from iStock/4088468

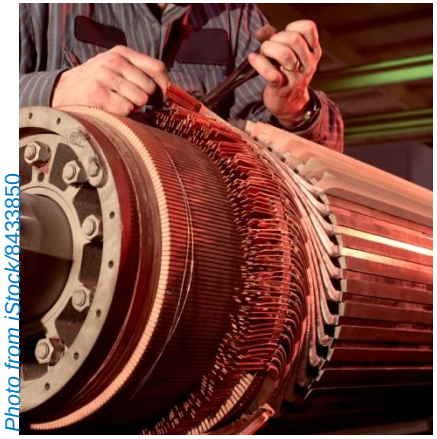


Photo from iStock/8433850

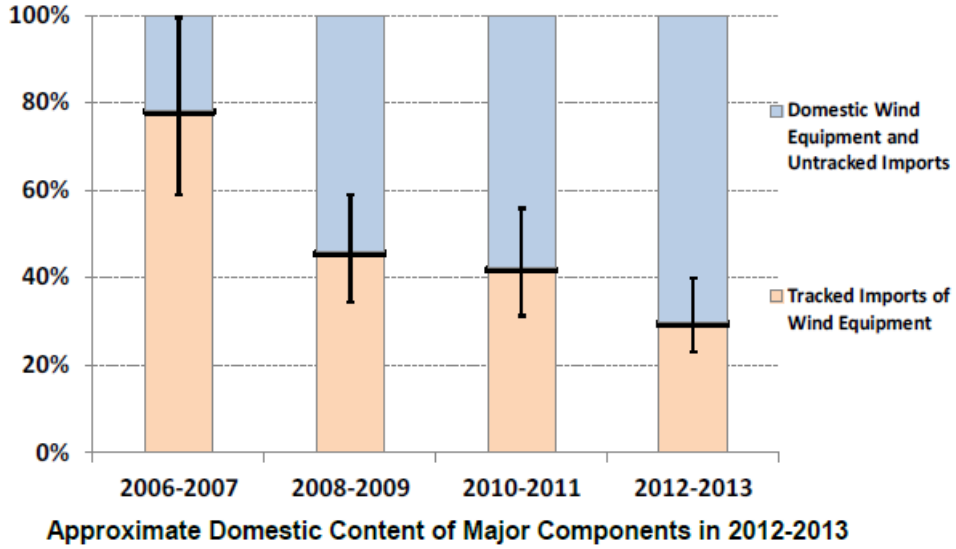
Photo from iStock/7792082

Photo from iStock/8384987

U.S. Manufacturing Facilities Are Installing Wind Turbines for Power

1/9/2014: Honda said the Russell's Point plant will then become "the first major automotive manufacturing facility in the United States to obtain a substantial amount of its electricity directly from wind turbines located on its property." Honda noted that the two wind turbines will provide approximately 10 percent of the plant's electricity. "We appreciate the support we have received from the township and neighbors throughout all phases of the project that will help Honda work toward our goal of reducing CO2 emissions," Gary Hand, Vice President of Honda Transmission. "This is just one of many ways that Honda is seeking to reduce our environmental footprint."

Despite Supply Chain Challenges, a Growing Amount of the Equipment Used in U.S. Wind Projects Has Been Sourced Domestically since 2006-07



Approximate Domestic Content of Major Components in 2012-2013

Generators	Towers	Blades	Wind-Powered Generating Sets
< 10%	50-70%	60-80%	> 80% of nacelle assembly

When presented as a fraction of equipment-related turbine costs, the combined import share of *tracked* wind equipment (i.e., blades, towers, generators, gearboxes, and wind-powered generating sets) has declined from nearly 80% in 2006-2007 to ~30% in 2012-2013.

See report for the assumptions used to generate these figures

Because imports occur in untracked trade categories, including many nacelle internals, overall import (domestic) content is higher (lower) than suggested here: in 2012, overall domestic content estimated at ~40%

Impact of Wind Energy on Property Taxes in Nebraska

Bluestem
ENERGY SOLUTIONS

BAIRD HOLM LLP
ATTORNEYS AT LAW

Executive Summary

Nebraska suffers from a declining rural population and, as a result, an increasing property tax burden on landowners. As the population and tax base decrease in rural Nebraska, counties increase their property tax rate in order to produce enough revenue to cover necessary services, which, in turn, increases the burden on landowners.

Wind energy development provides significant property tax revenue by substantially increasing the property tax base, without increasing the current tax rate levied on landowners. As wind developers invest in rural Nebraska, they supplement county revenue by paying tax on their wind facilities, related improvements, and the real property upon which these structures sit.

> *A 200 MW wind farm generates approximately* ***$1,325,200*** *in property tax revenue annually. In some of Nebraska's rural counties, the addition of a wind farm of this size could increase property tax revenue by approximately* ***39 percent.***

In a typical rural Nebraska county, a 200 megawatt (MW) wind farm generates approximately $1,325,200 in property tax revenue annually.[1] In Nebraska's rural counties, the new revenue would mean an approximately 39 percent increase in property tax revenue.[2] This is equivalent to approximately $6,626 per MW per year to the county, of which approximately $4,770 will be distributed to the local public schools.[3]

In this white paper, we examine Nebraska's current property tax problem and how wind energy development can help solve it. We specifically explain Nebraska's wind energy potential and how that potential means a substantial solution to Nebraska's property tax woes. Finally, we summarize how areas across the country are already benefitting from wind energy development and the numerous advantages to be obtained. Through commercial wind energy development, Nebraska can increase its overall property tax revenue and solve its mounting property tax problem.

Nebraska Can Continue to Grow With Renewable, Sustainable Energy

“As a readily expandable, domestic source of clean, renewable energy, wind power is paving the way to a low-carbon future that protects our air and water while providing affordable, renewable electricity to American families and businesses,” said Energy Secretary Ernest Moniz. “However, the continued success of the U.S. wind industry highlights the importance of policies like the Production Tax Credit that provide a solid framework for America to lead the world in clean energy innovation while also keeping wind manufacturing and jobs in the U.S.” LBNL-DOE 2013 Wind Technologies Market Report

DOE-NREL Wind for Schools

Nebraska was a Priority State

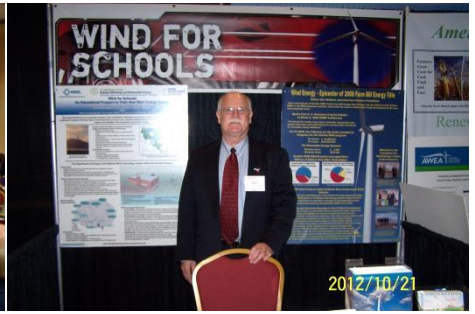
PURPOSE

- Engage rural school teachers and students in wind energy education
- Equip college students in wind energy applications and education to provide interested and equipped engineers for the growing U.S. wind industry
- Introduce wind energy to rural communities, initiating a discussion of wind energy's benefits and challenges

NREL and I got the WFS word out to Nebraska rural schools through many venues

National Association of Farm Broadcasting

Husker Harvest Days Beginning in 2006



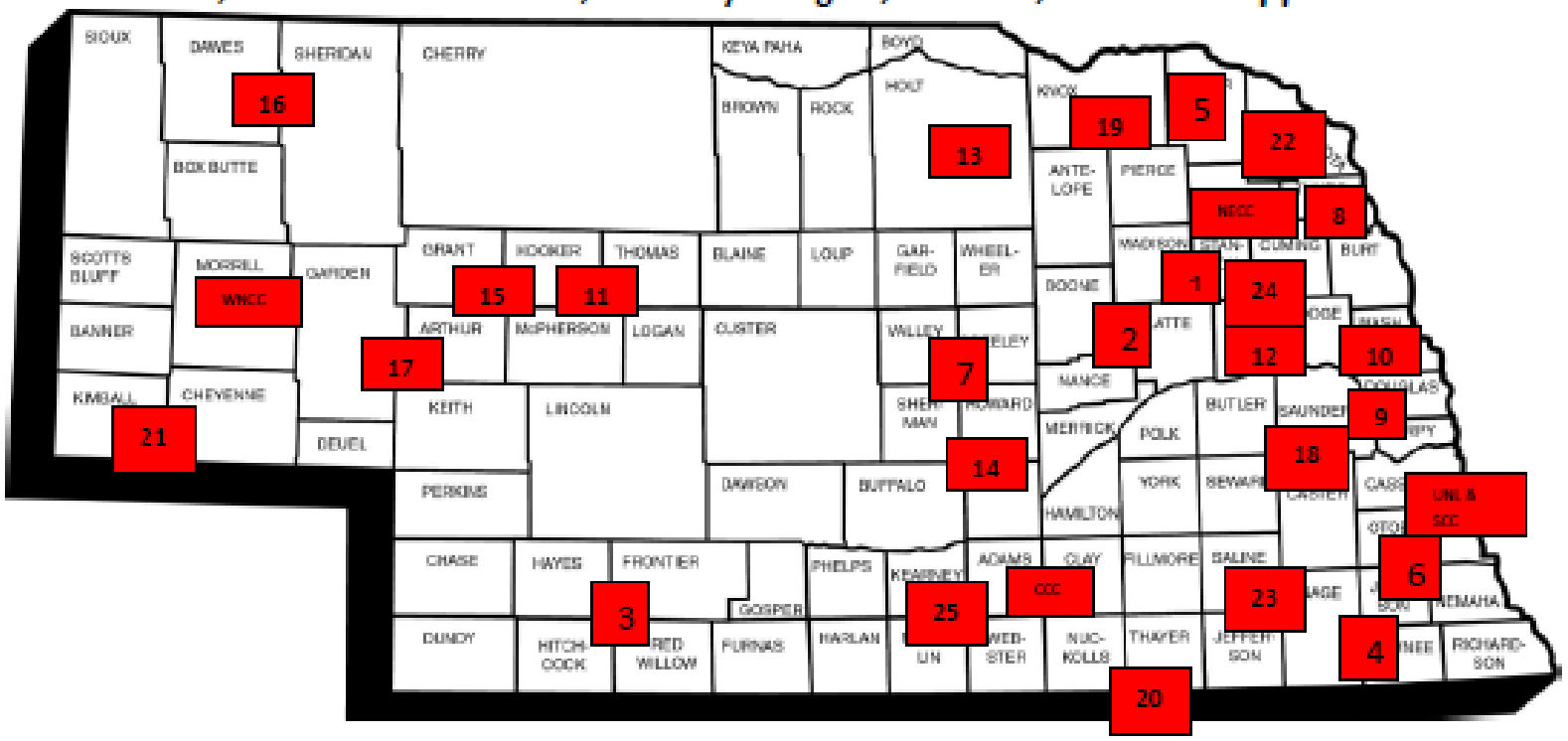
Annual Nebraska Wind Conferences from 2008-2013

The Future Is Primarily About Nebraska's Young People
Nebraska Leads The Nation With The Most (25) Partner Schools

Wind for Schools is K-12 curricula and career development program aimed at inspiring student interest in becoming engineers or considering other wind energy careers

Nebraska Wind for Schools Program Results as of November 2013

Dan McGuire, NREL WFS Facilitator; Dr. Jerry Hudgins, Director, UNL-Wind Applications Center

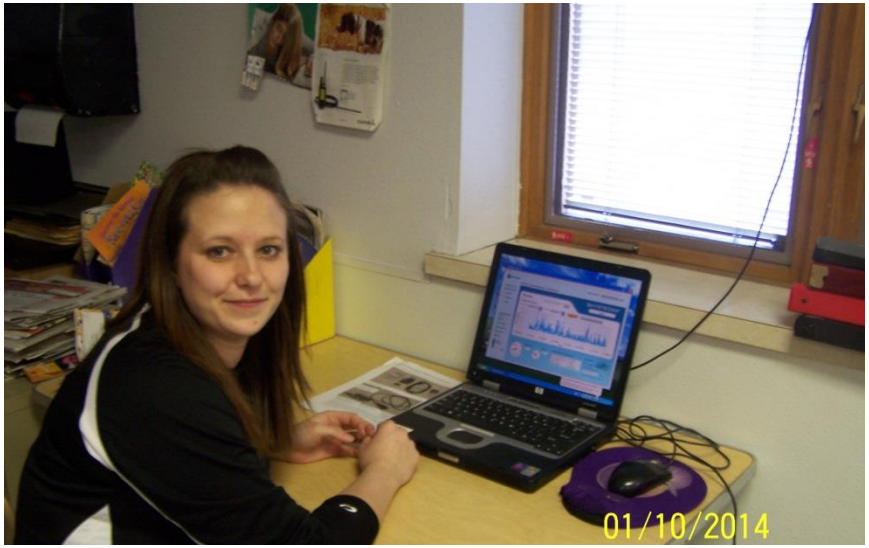


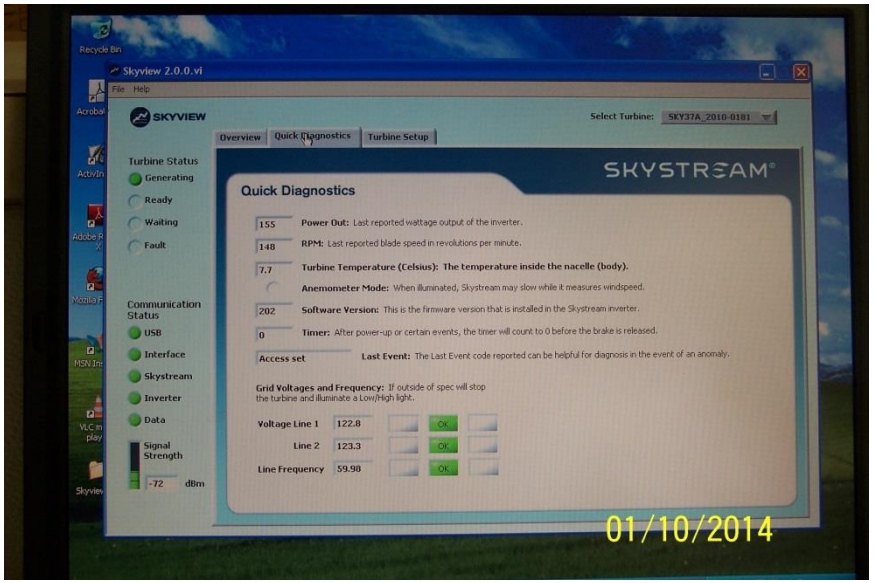
Wind Energy Can Create New Jobs For Nebraska's Future

Hastings Public Schools-Technology and Operations Director Trent Kelly

Hayes Center Public Schools, Superintendent Ron Howard
One of the First Four WFS Partner Schools in 2008

Garden County Public Schools, Oshkosh: Science Teacher Sarah Paisley. Skystream helps power the school green house





Kimball Public Schools, Kimball, NE: Skystream installed December 2012

Crawford Public Schools. Science class and instructors. Solar panels are interconnected with Skystream. The solar trailer provided by Northwestern Rural Public Power

Hyannis Public Schools: Science Instructor Joy Brown and assistant with the science class at the Skystream turbine.

Mullen Public Schools: Science Teacher Sara Hardin with the science class and Skstream wind turbine north of the school

West Holt Junior-Senior High School: Atkinson. The Skystream is visible over the roof line below the lights.

Pleasanton High School: Industrial Arts Instructor Randy Bauer (upper right); Attorney General Jon Bruning shown in lower photo with students presenting SEP WFS grant check.

Cedar Rapids Public Schools: One of Nebraska's first four WFS partner schools to become part of the program in 2008. Left photo below showing Science Instructor and Science Class

Above photo shows a commercial wind farm north of Cedar Rapids and near Petersburg. Such projects provide job opportunities as well as funding for schools via the infusion of property tax dollars.

Elkhorn Valley District Schools at Tilden. The first of the first four schools to become a WFS partner in 2008. Lower left is Supt. Leckron, Dan McGuire and Science Teacher Jeff Meyer. Right-Installation in 2008

Loup City Public Schools: Left photos show then Supt. Caroline Winchester, UNL-WAC's Prof. Jerry Hudgins and Asst. Joel Jacobs evaluating site. Right photos show Joel Jacobs during Skystream installation.

Creighton Community School. Bottom two photos show the Crofton Bluffs commercial wind farm just to the south.

Bloomfield Community Schools: Photos show Skystream dedication with the students making the presentations. Top left is the school board, NPPD official, UNL-WAC & I. Lower right-UNL installs data logging skyview.

Laurel-Concord-Coleridge Public Schools. Left photo showing installation by local contractor. Right photo shows Skystream north of Laurel school.

Norfolk Public Schools: Left photo showing installation and right photo showing Skystream west of the high school Bldg.

The photo to the left is taken on the south side of Norfolk at the NPPD energy center. Three Skystream wind turbines on different heights of towers are shown in the photo. NPPD also has solar and other energy educational information available at the energy center.

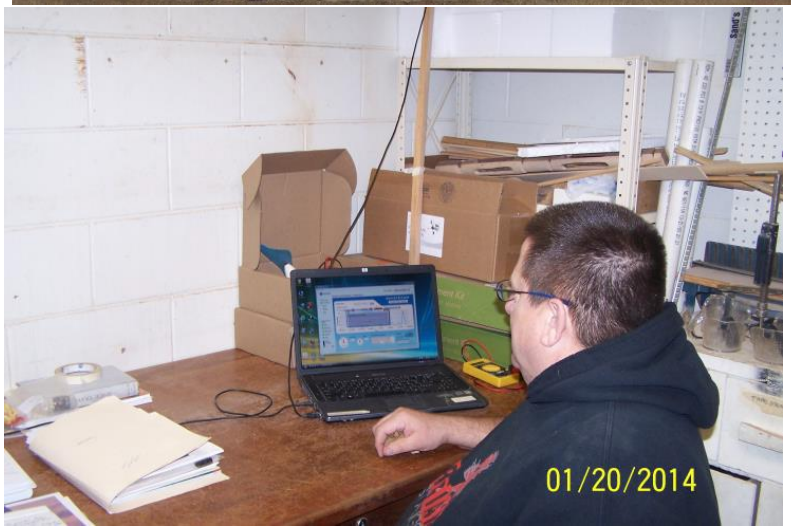
Bancroft-Rosalie Community Schools. The left photo below shows the Skystream installed east of the school building

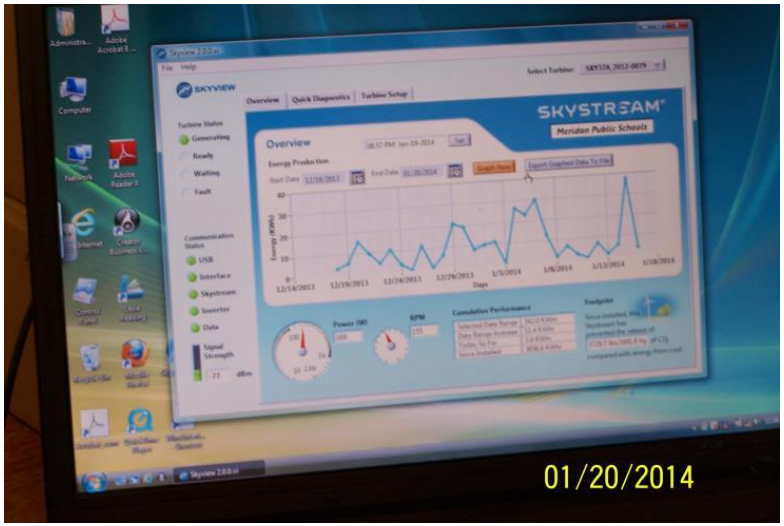
West Point Public Schools: Note Skystream shown and the Alternative Energy Learning Center Bldg. to the right with solar panels. School officials Andy Boell and David Hughes are shown in lower left. Monitor in lower right shows real time and YTD energy used and costs. This is a very impressive facility where the school board holds there meetings.

Logan View Jr./Sr. High School at Hooper, Nebraska. The Skystream is located to the southwest of the school as shown in the distance in the left photo and closer up in the right

Diller-Odell Public School: One of first four WFS partners. Upper Right is Supt. Mike Meyerle, Physical Science Instructor Terry Arnold with Physical Science class and at Skystream. Lower R- Steele Flats 75 MW commercial, utility-scale wind farm located just to the west of Odell.

Meridian Public Schools at Daykin: Shown in the lower left is Information Technology Instructor Terry Smith showing the Skystream performance. Mr. Smith is a “Wind Senator” having attended that national KidWind Conf.





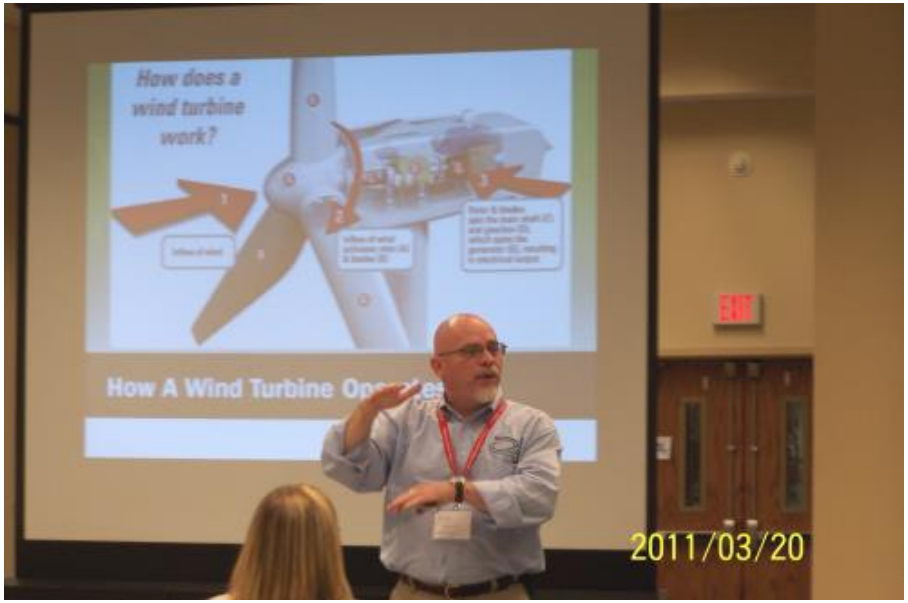
Superior Public Schools at Superior, NE: Left photo below showing Skystream installation and right installed near track

Papillion-LaVista Public Schools. This project resulted from leadership and action by the Civics/Government class.

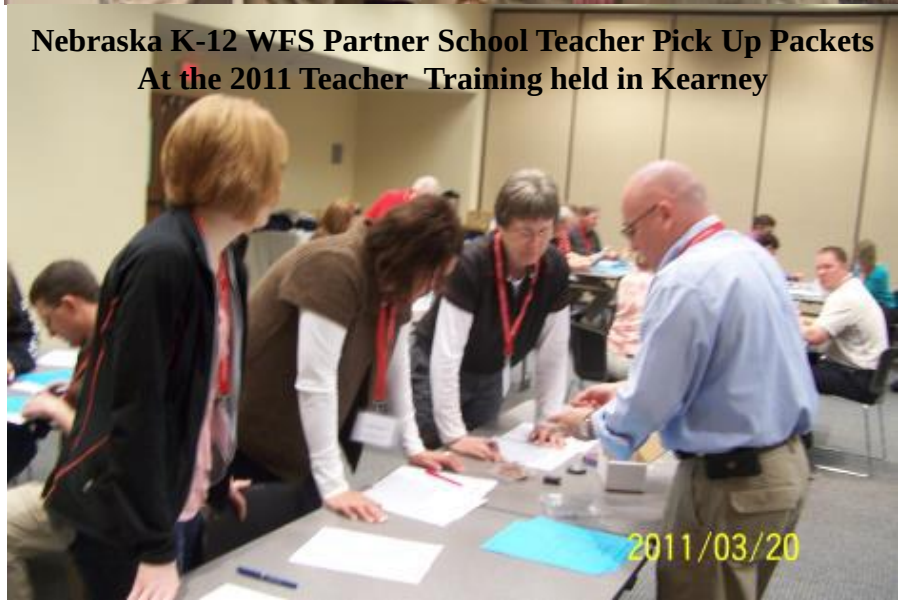
Norris Public Schools at Firth, NE south of Lincoln

Raymond Central Public School: Right photos show Supt. Paul Hull and UNL-WAC Director Jerry Hudgins identifying site location. Left is Supt. Hull and Science Teacher Pam Rasmussen shown with WFS's McGuire.

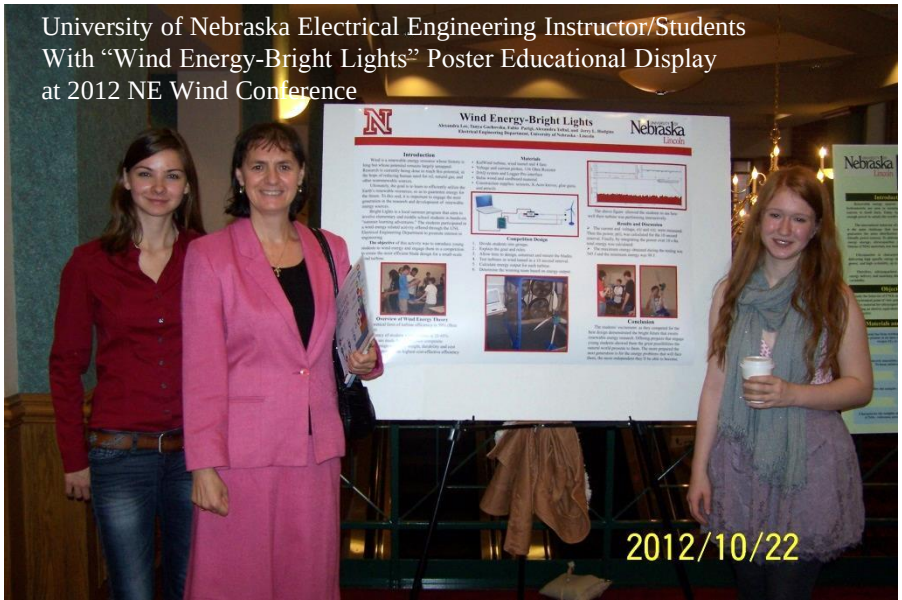
Wind for Schools, UNL-Wind Applications Center, NEED and NPPD provided training to WFS K-12 partner teachers at Kearney in 2011. UNL Engineering students presented new concepts at NE wind conferences



Nebraska K-12 WFS Partner School Teacher Pick Up Packets At the 2011 Teacher Training held in Kearney



University of Nebraska Electrical Engineering Instructor/Students With "Wind Energy-Bright Lights" Poster Educational Display at 2012 NE Wind Conference



Owens Community College Wind Turbine Installation

https://www.youtube.com/watch?v=wQWnBbBhvoA

Central Community College, Hastings Campus: Skstream photos below.

Wind turbine added to Hastings Campus skyline-Summer 2011

The newest structure at the Hastings Campus doesn't have any classrooms but it will help students learn about alternate energy.

A 1.7 kilowatt wind turbine that went up on the campus in August will support new curriculum the college is developing in alternate energy sources. Alan Hartley, CCC dean for trade and industry programs, said the college also plans to add a 1.5 kilowatt solar-electric installation and a geothermal heat pump.

"These demonstration projects are the size that could be put on homes, used on farms and provide more efficient heating and air conditioning," Hartley said.

CCC is developing an alternate energy certificate that will include a general alternate energy course and courses in wind, solar and geothermal energy. Students in CCC's electrical, electronics, industrial technology and heating and air conditioning programs can earn the certificate
The courses will be offered at CCC's campuses **at Columbus and Grand Island in addition to the Hastings Campus** and will be available online, Hartley said. Students at all locations will have access to data from the Hastings Campus alternate energy installations.

Data acquisition will be available on the Web so all students will be able to look at data logs, check efficiency data and compare solar to wind generation on any given day," Hartley said. Local high schools also will be able to use the data in physics, science and math classes.

Hartley said that although the CCC alternate energy equipment is sized for residential applications, the students completing the certificate will have job skills that apply to large-scale commercial operations. The new certificate should be available in fall 2010, Hartley said.

Northeast Community College

Northeast Community College Wind Energy Course/Program Options

Program Information

Wind Energy 2013-2014

Wind energy is a rapidly growing industry in Nebraska and throughout the nation.
Learn the necessary skills and knowledge needed to work in positions in the wind energy field. You will acquire knowledge and skills through concentrated classroom and hands-on learning.
Career Information
Wind Energy 2013-2014
Educated workers will find numerous opportunities in the wind energy industry right here in rural Nebraska, but demand is high throughout the state and nation.

Salary Information

Salaries range from $18 to $26 per hour depending on experience
Courses and Program Options
Wind Energy 2013-2014
You can choose from these two available options when enrolling in this program of study.
 Associate of Applied Science Degree
 Diploma

 Wind Energy
 Associate of Applied Science Degree
 2013-2014 academic year
 You can earn an associate of applied science degree in wind energy technology. Note that not all courses for each program can be offered every semester.
 Note to Current Students 2013 College Catalog

 You will need to successfully complete a minimum of 79 Credit Hours.

Southeast Community College; Lincoln and Milford Campus

Mission

The mission of the Energy Generation Operations program is to prepare individuals for high-quality entry-level positions in various energy generation fields, including nuclear, coal, natural gas, biofuels, and **wind.**

Employment Outlook

These occupations provide good earning potential for graduates as evidenced by wages reported by recent SCC program graduates. According to statistics provided by 2012-2013 program graduates, the average hourly wage was $20.85, or $43,368 per year. The high salary was $31 per hour, or $64,480 annually.

Starting Terms

Summer Quarter, Winter Quarter.

o Curriculum

o Program Requirements

o Costs

Program Classes

Take the following ENER-1100 ENER-1110 ENER-1115 ENER-1210 ENER-1220 ENER-1230 ENER-1235 ENER-1900 ENER-1250 ENER-1255 ENER-2100 ENER-2110 ENER-2115 ENER-2120 MFGT-1413 ENER-2105 ENER-2130 HVAC-1131 ACFS-2020

PSA. 1505 Wind Energy Technician

Description

This Professional Skill Award is designed to provide students with entry-level technical skills to operate, maintain, and repair wind turbines. The curriculum will address training in the areas of basic wind power, basic electricity, industry tools, tower climbing, and safety.

Metropolitan Community College

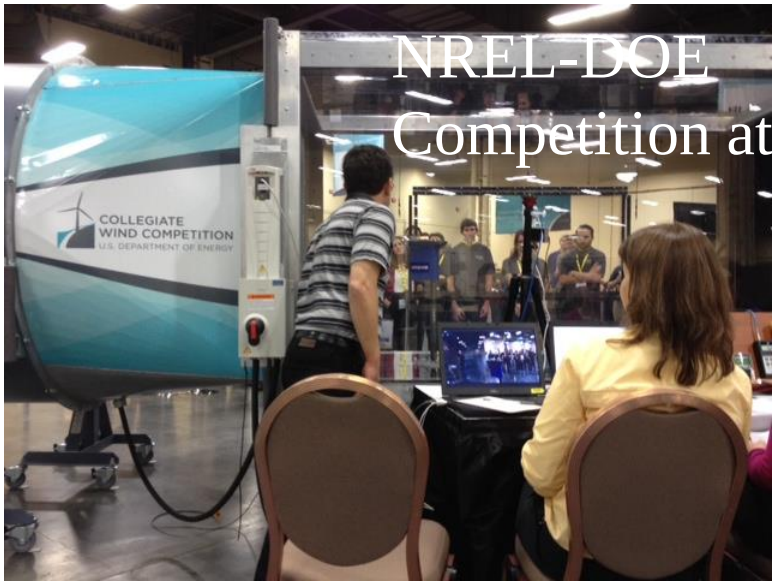
Sustainable Energy Technology

If you're not afraid to work with your hands, want to be a leader in the region's green economy, while also protecting the environment and our resources, the Sustainable Energy Technology Program can help you succeed!

The green economy is growing throughout the nation, you can train to be at the forefront of this new sector in the region! Thanks to the ReEnergize program in Omaha and Lincoln, weather installers and auditors are in high demand. The solar industry will continue to grow as technology advances, making this an incredibly exciting field! Depending on your career path you could:

- Conduct household energy audits
- Consult with clients on energy efficiency measures
- Installing ducts, repair windows, perform Heating Ventilation and Air Conditioning (HVAC)
- Install and maintain Solar Panels
- Configure and install Solar Hot Water Systems

Careers in the wind energy industry



NREL-DOE Competition at

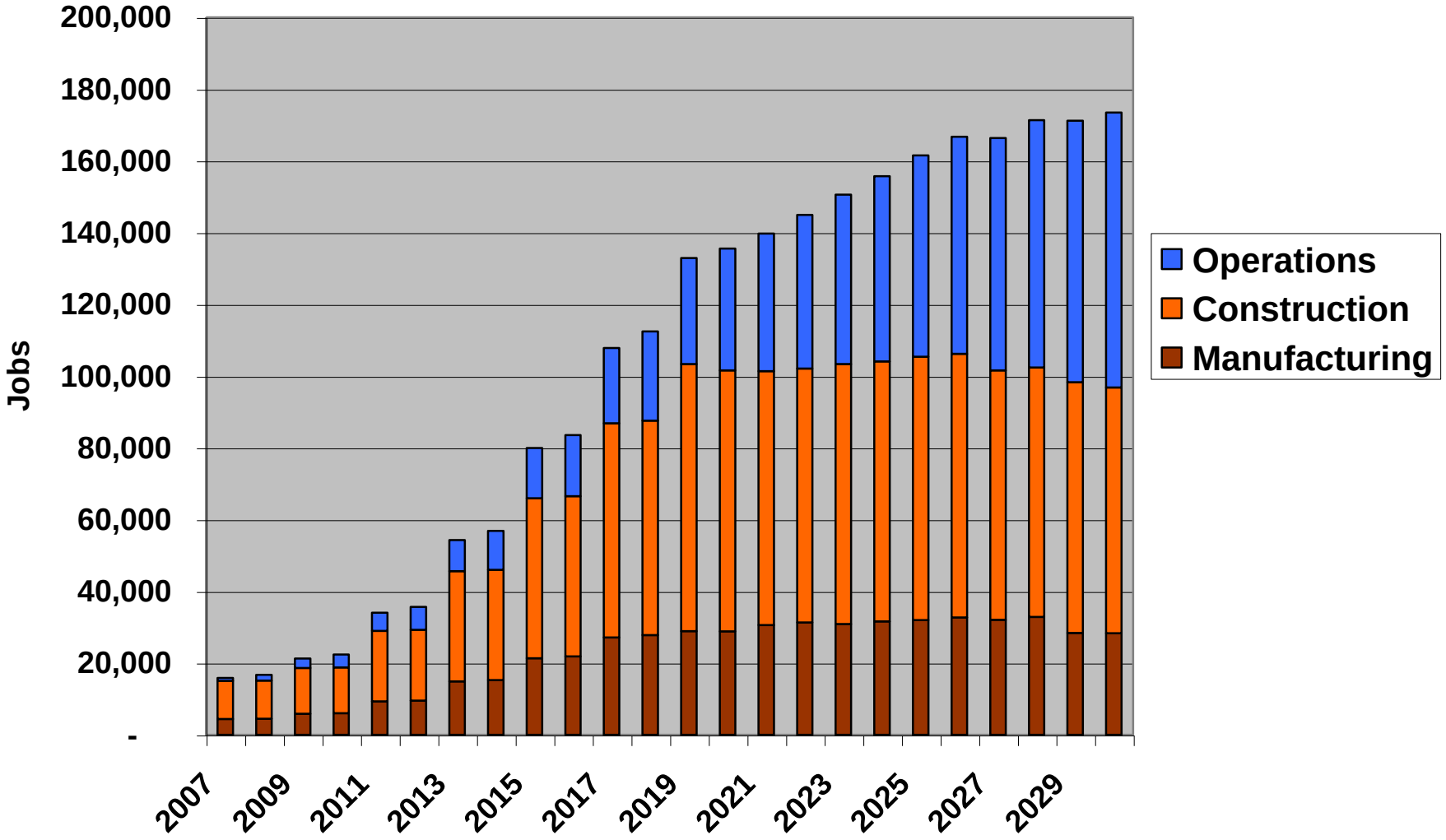

Collegiate Wind WINDPOWER 2014

Sectors of the wind industry include: •

- **Analyzing wind resources (environmental and consulting services), •**
- Operating wind energy **plants (manufacturing and engineering),** and •selling wind energy output **(marketing).**
- The majority of new jobs are expected to fall in the **development, construction and operation sector.**
- **Manufacturing Engineers**, **Plant Managers** and **Quality Assurance Personnel** working **on blade production, tower production, or gearbox production**. **Electrical Engineers** design machine control systems.
- **Field Technicians**, **Installation Technicians**, and **Operational Maintenance Experts**. These jobs require a range of education and experience, ranging from 2-year degrees to bachelor's degrees in science or other fields.
- Environmental assessment to determine whether drinking water, plants, or animals will be affected by a wind project
- **Wind-Resource Assessors** characterize the wind resource to predict how much electricity a wind farm will produce
- **Utilities** and **Grid Operation Managers** need to know how much power it's going to be producing at each hour of the day
- **Meteorology** can find a career in wind energy, too.
- **Degrees in computer science, aerodynamics, atmospheric science, or mathematics are likely to find wind energy jobs.**

Source: Robin Arnette, "Careers in the wind energy industry" and www.awea.org

DOE-NREL Wind Powering America
2008 20% Wind Vision - Employment



Important Sources of Wind Energy Information

- American Wind Energy Association www.awea.org
- Distributed Wind Energy Association www.dwea.org
- National Renewable Energy Laboratory http://www.nrel.gov/
- http://energy.gov/eere/wind/wind-program
- http://energy.gov/eere/renewables/wind U.S Dept. of Energy
- http://www.neo.ne.gov/ Nebraska Energy Office
- Database of Renewable Energy Incentives: http://dsireusa.org/incentives/incentive.cfm?Incentive_Code=NE01F&re=0&ee=0
- www.NebraskaWindandSolarConference.com

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Dan McGuire, Consultant
American Corn Growers Foundation

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