American Corn Growers Foundation

Dan McGuire, Stakeholder Outreach/Project Director

Co-Chairman, Nebraska Wind Conference

Wind Farms and the Highway Superintendent

Presentation to:

Nebraska Association of County Engineers, Highway Superintendents And Surveyors

December 12, 2013, Omaha, NE

"If you want to farm the wind, you should have…knowledge of how it all works."

There's a very good reason we have Privately-Owned Wind Farms In A 100% Public Power State

- 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)

Why are the American Corn Growers Interested in Wind Energy?

How did wind energy get going in Nebraska?

AMERICAN CORN GROWERS FOUNDATION
AMERICAN CORN GROWERS ASSOCIATION

ACGF Officers: Chairman Gale Lush front left; Dennis Mitchell, front right; Mark Lounsbery, upper right and ACGF consultant Dan McGuire reviewing ACGF-ACGA ethanol and wind energy outreach and policy successes in Watertown, SD, April, 2013

It's all about rural economic development & energy independence

<u>Bringing The Minnesota Wind Model to Nebraska</u>

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 above right 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

ACGF and ACGA are national leaders, creating new, renewable energy income streams for farmers and rural America. ACGA led the key corn demand initiative via ethanol by conceiving of the Renewable Fuels Standard (RFS) policy concept. ACGF led the farm and rural sector since 2000-2001 with our *Wealth From The Wind* stakeholder *engagement and* outreach program by providing information to farmers, land owners and policy makers in Nebraska, regionally and nationally, and by advocating stronger wind project lease payments and policies that enhance wind farm ownership potential. The *WFTW* program is all about rural economic development.

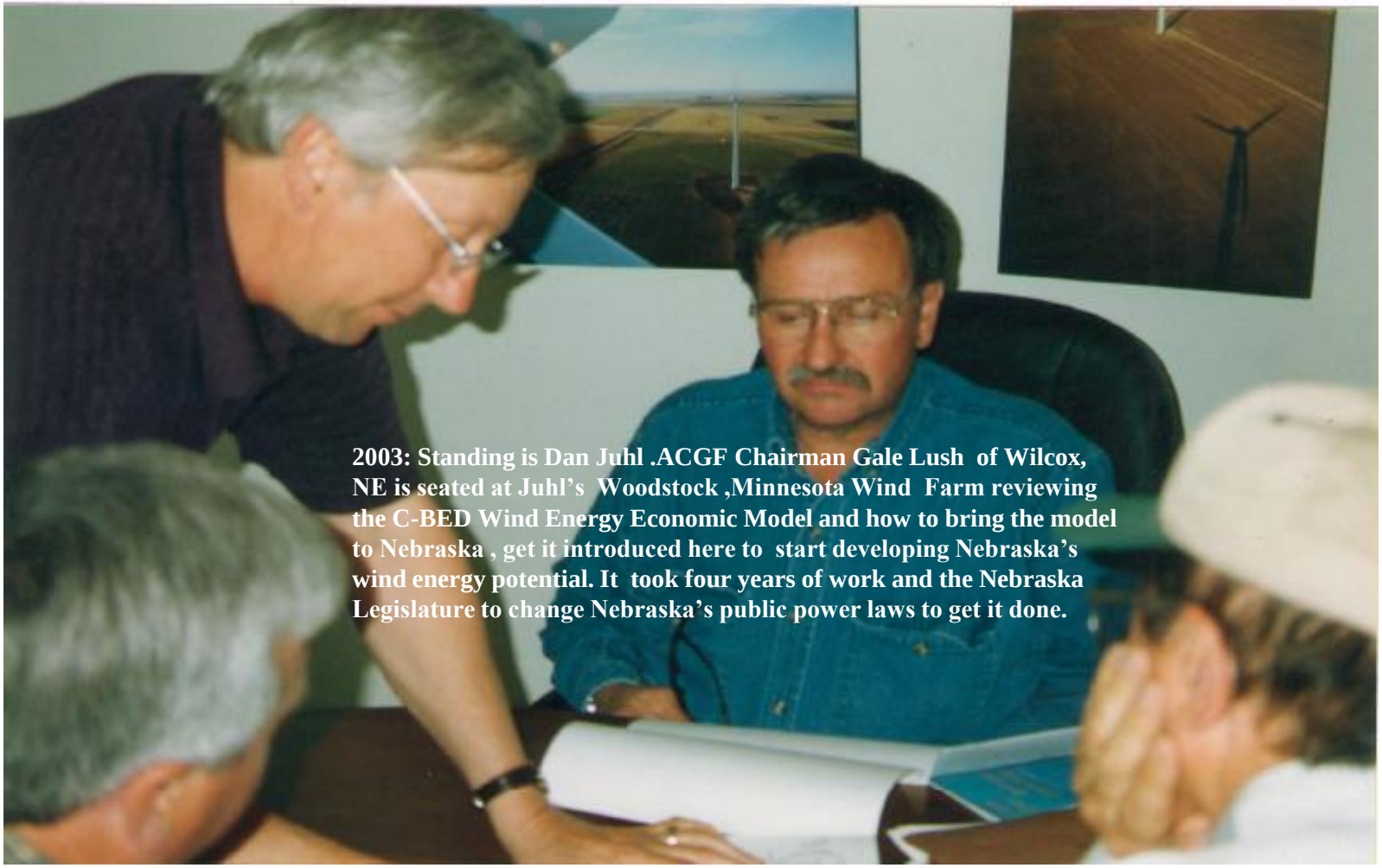
AMERICAN CORN GROWERS FOUNDATION
WEALTH FROM THE WIND

ACGF leaders saw how to create Wind Energy Opportunity in Nebraska

by learning from a Minnesota wind development leader

A Little History on Getting Nebraska Moving on Wind Energy:

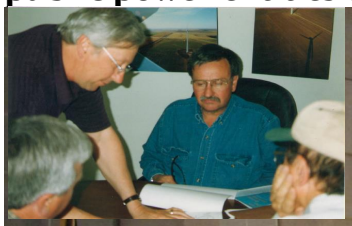
ACGF's McGuire met community wind development pioneer Dan Juhl in 2000 at his Woodstock, MN wind farm and arranged for ACGF leaders to see and tour the wind farm to learn the potential for wind energy in Nebraska. ACGF arranged and sponsored Mr. Juhl to Nebraska beginning in 2003 to inform policy and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

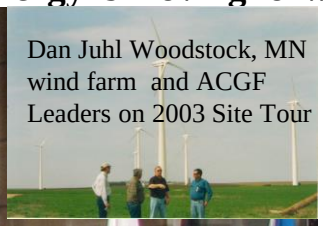


2003: Standing is Dan Juhl .ACGF Chairman Gale Lush of Wilcox, NE is seated at Juhl's Woodstock ,Minnesota Wind Farm reviewing the C-BED Wind Energy Economic Model and how to bring the model to Nebraska , get it introduced here to start developing Nebraska's wind energy potential. It took four years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

ACGF & MN Wind Policy Leader Dan Juhl, C-BED Pioneer, brought the Privately-Owned Utility Scale Wind Energy Project Model to Nebraska via ACGF's *Wealth From The Wind* Stakeholder Outreach Program in 2003-04. ACGA and NEFU leaders then worked with Senator Cap Dierks who sponsored LB 629 (C-BED).

Shown Below is Governor Heineman in April 2007 signing Senator Cap Dierk's LB 629 C-BED Wind Energy Bill with ACGA, NEFU and the coalition representatives that worked on wind energy policy. Prior to that policy change only public power entities could build/own wind energy generation projects. Now wind energy is moving forward.

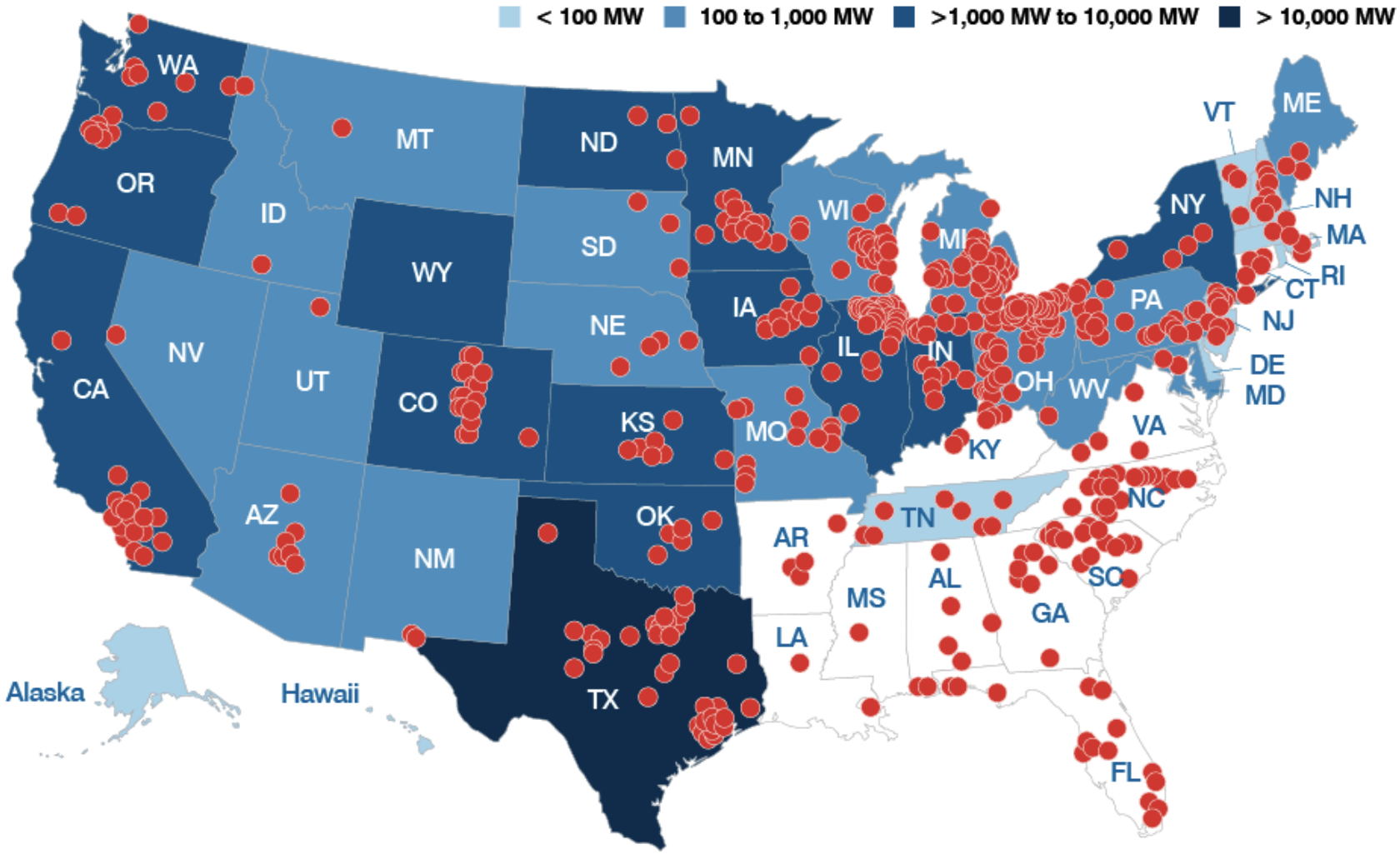




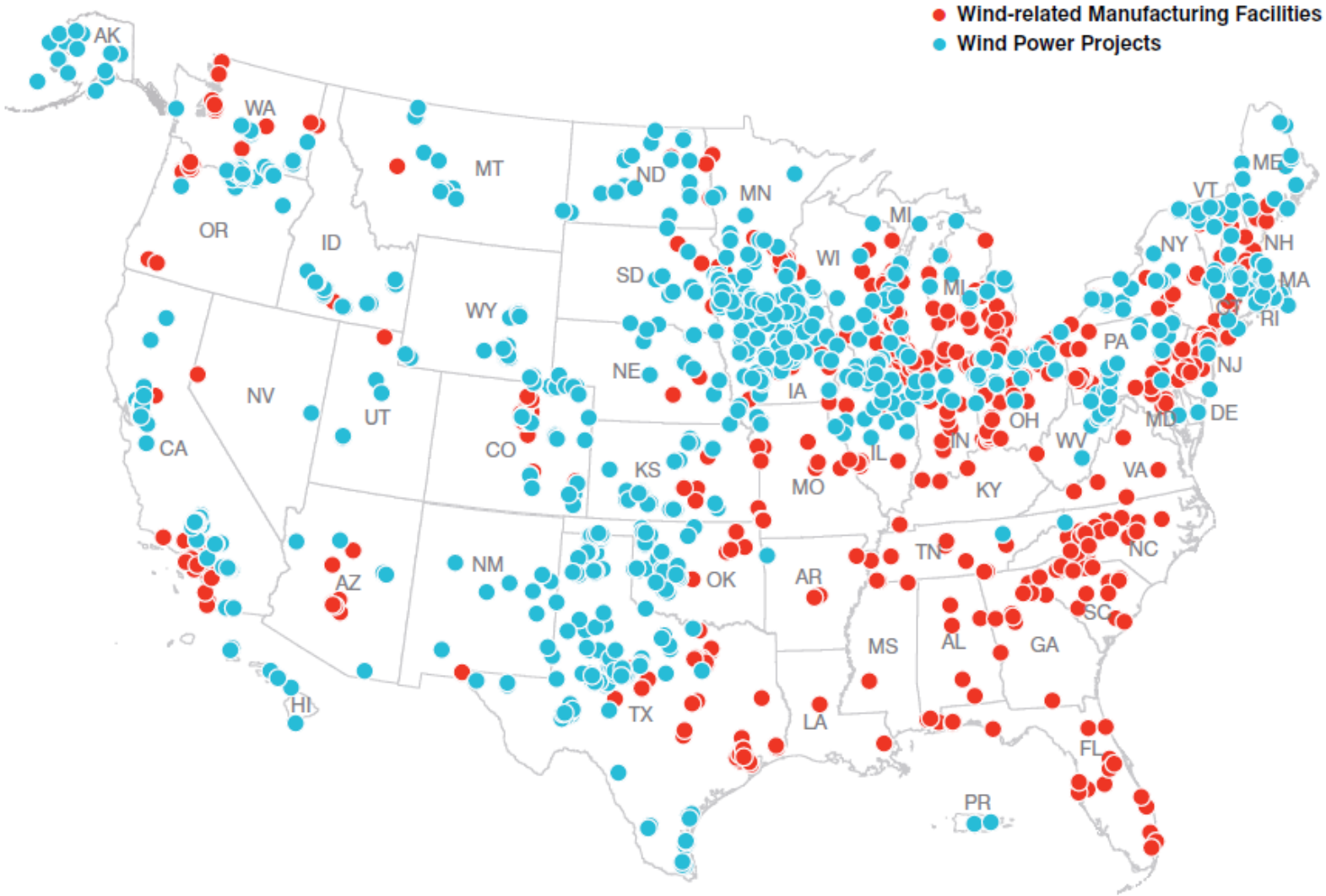
Dan Juhl Woodstock, MN wind farm and ACGF Leaders on 2003 Site Tour

April 2007 LB 629 C-BED Signing at the Nebraska State Capitol. LB 629 has been modified multiple times since 2007 and various other wind project-related legislation has been passed in Nebraska

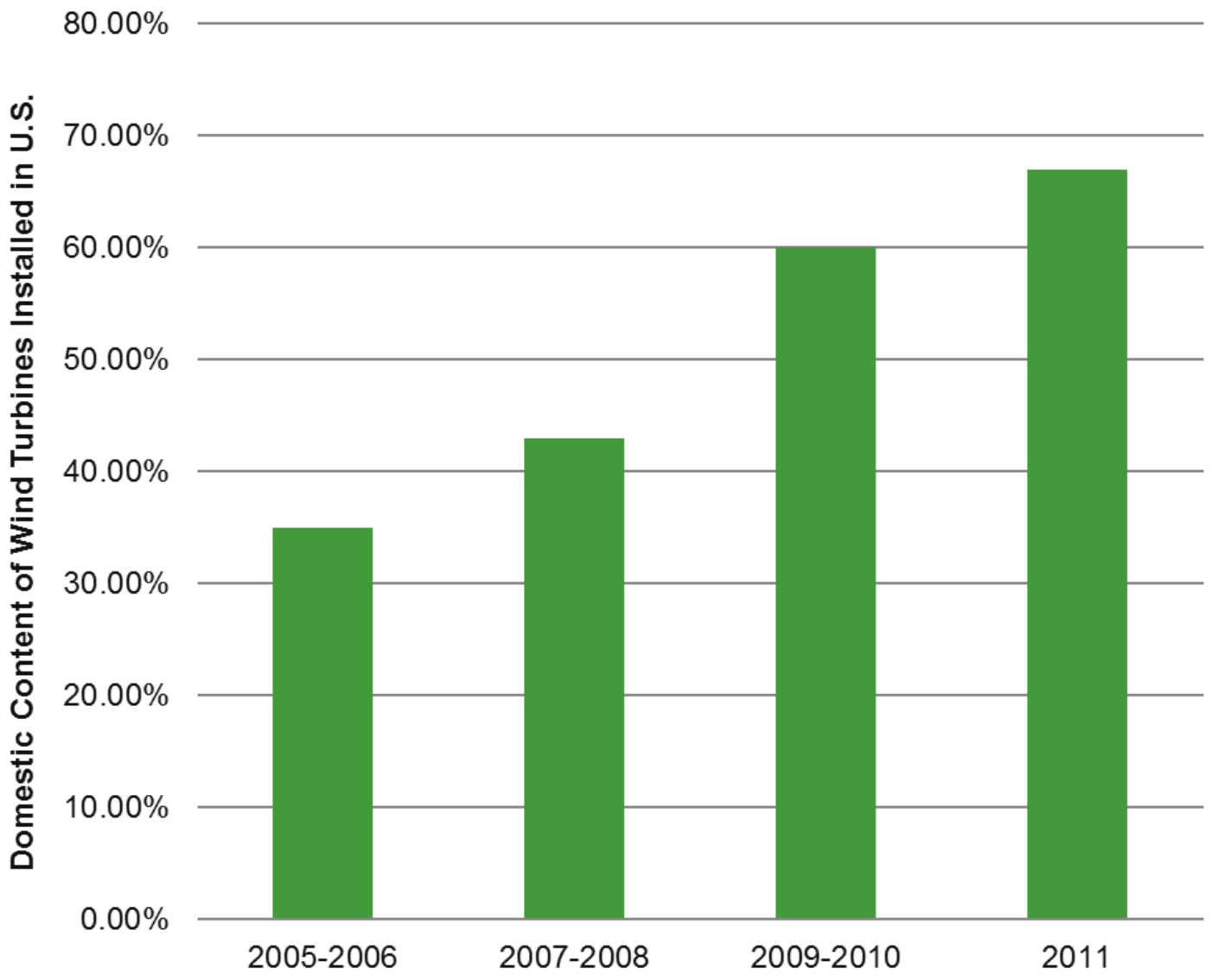
It's Not Just About Rural Economic Development:
At the end of 2012 there were 559 manufacturing facilities building wind components. Wind is One of the Fastest Growing Sources of U.S. Manufacturing Jobs



Wind-related jobs and projects by state

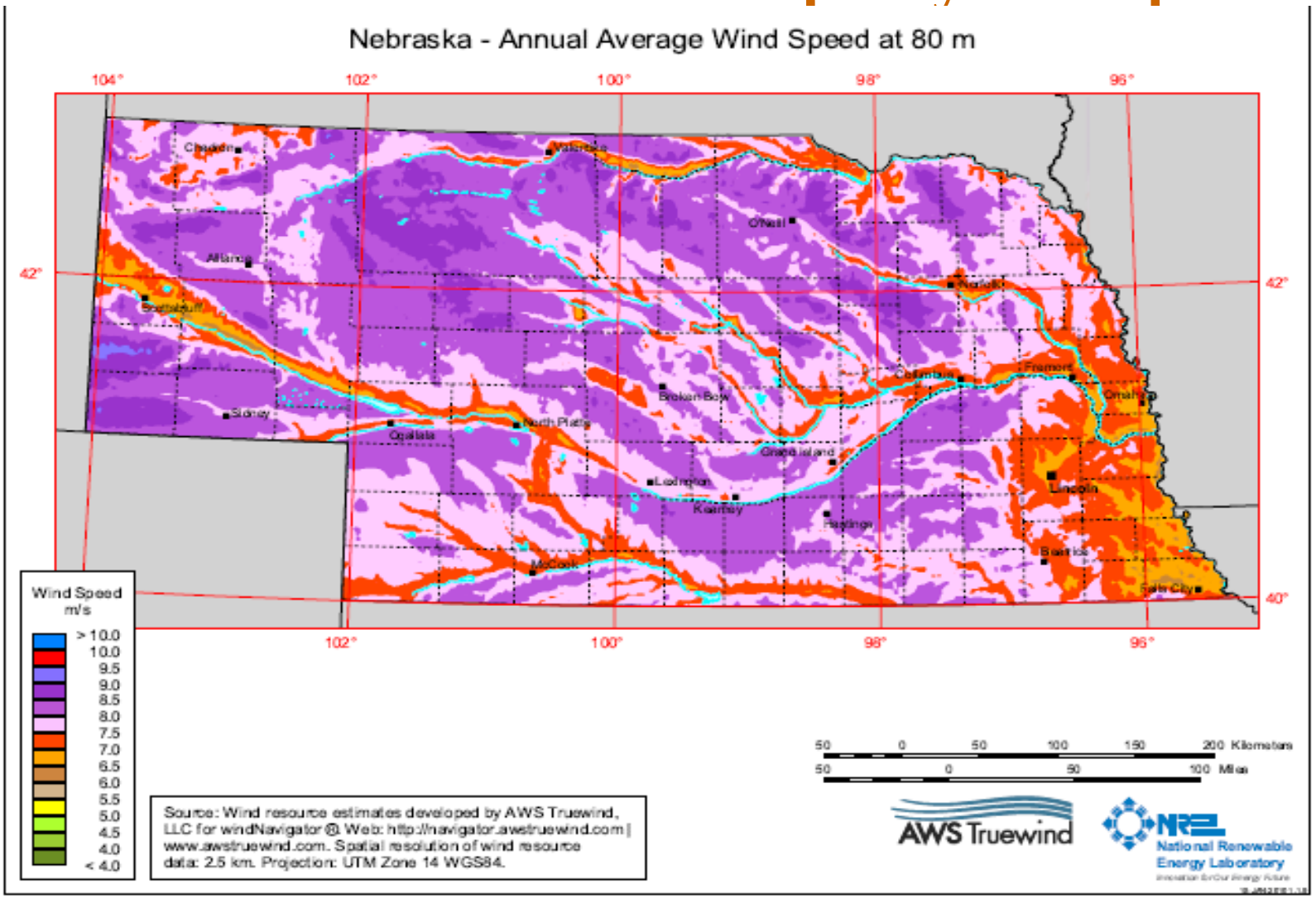


Domestic U.S. Content of U.S. Installed Wind Turbines…A Good Trend!

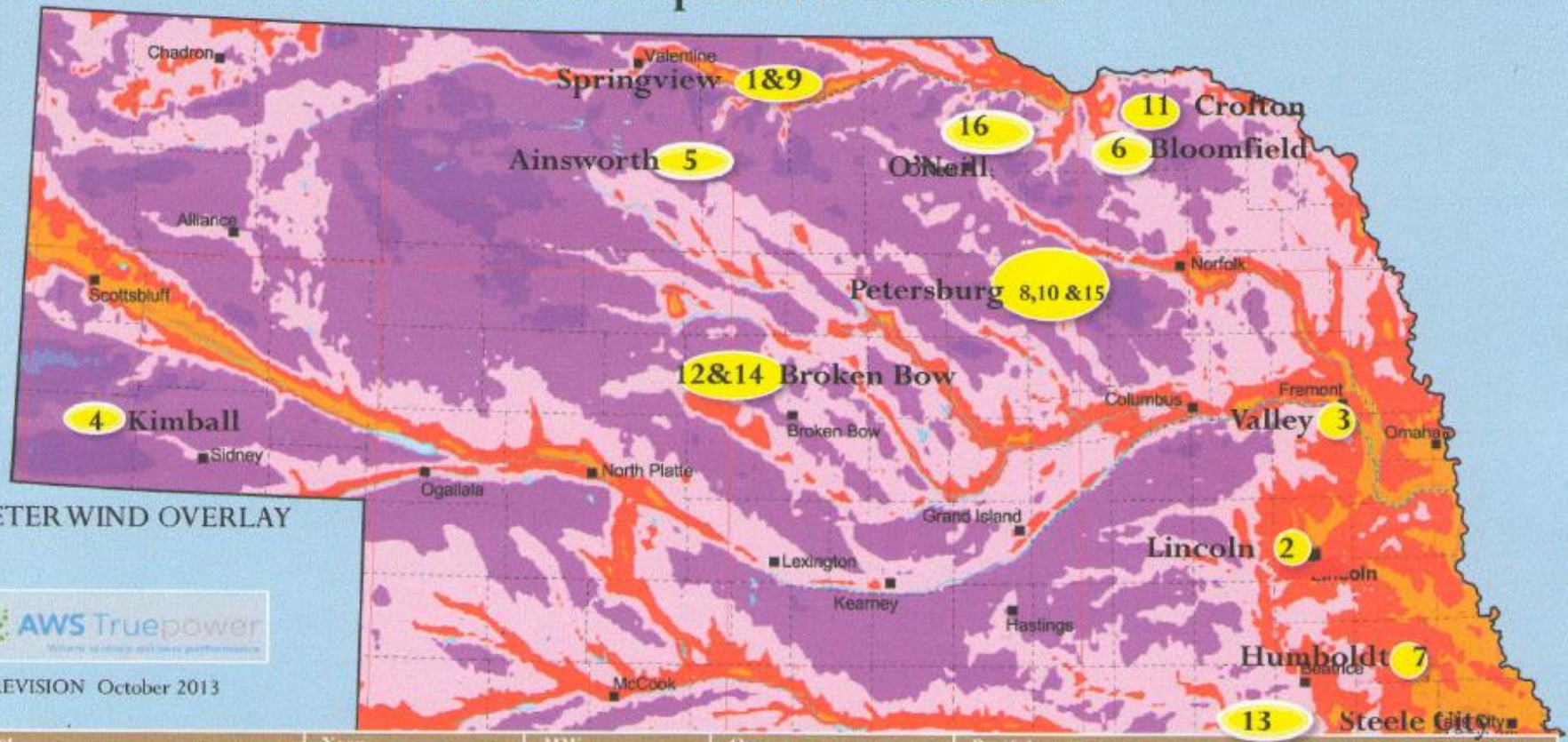


Nebraska has world class wind

…rated No. 3 wind resource in the U.S…but only No. 25 in actual wind capacity development



Wind Development in Nebraska



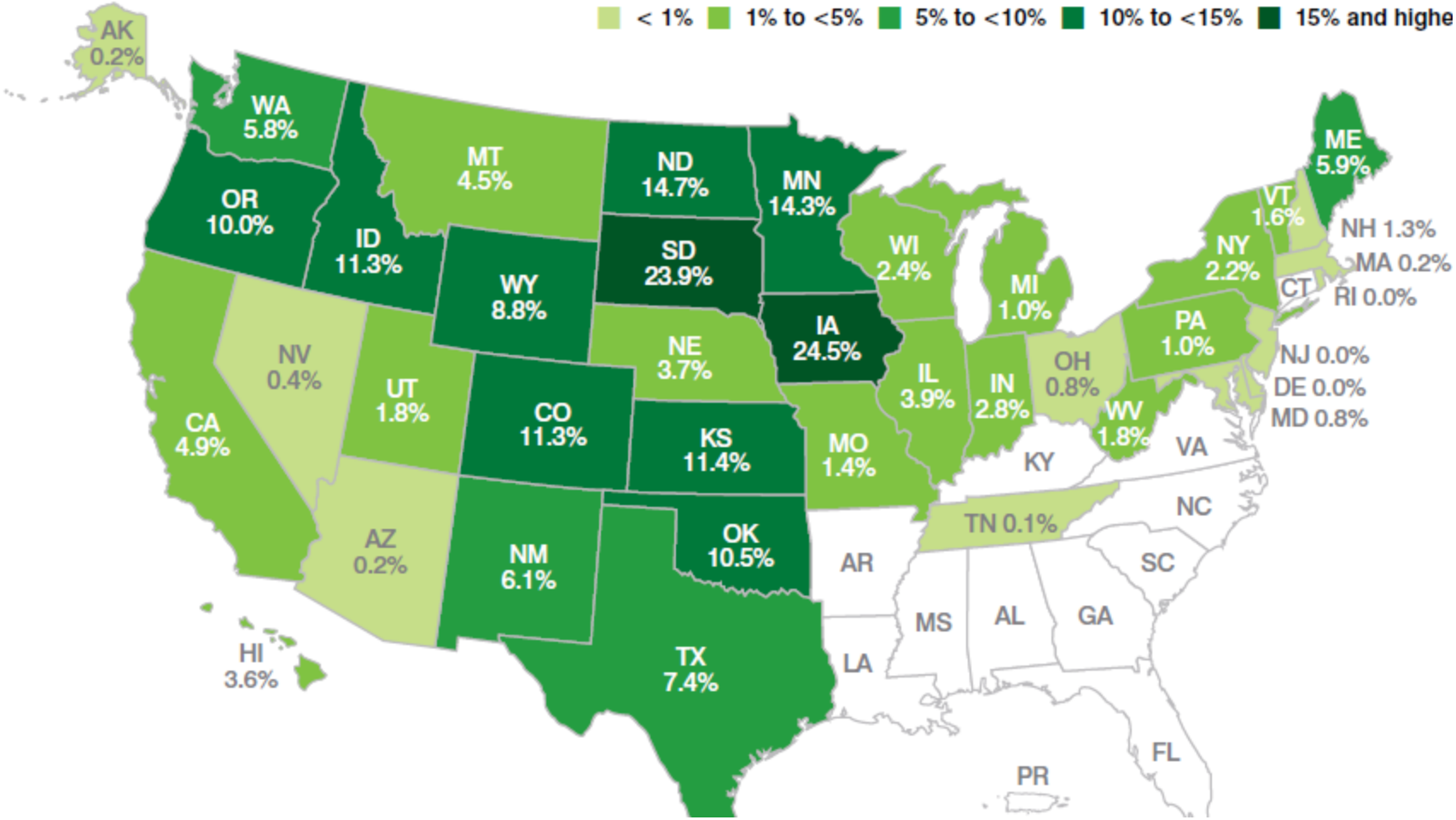
80 METER WIND OVERLAY

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 10% or more of their electricity supplied by wind power …some more than 20%



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.

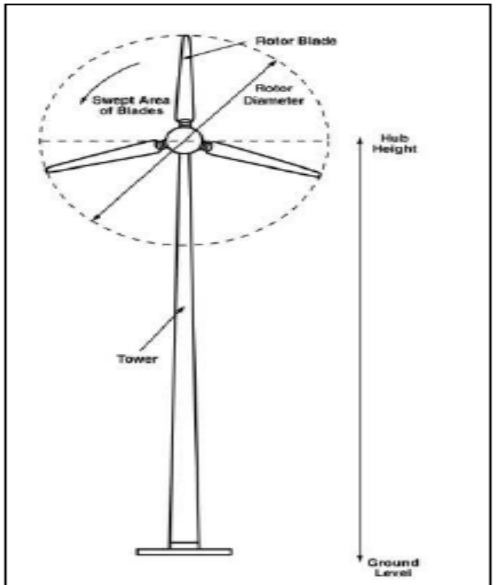


Figure 8.08.1

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

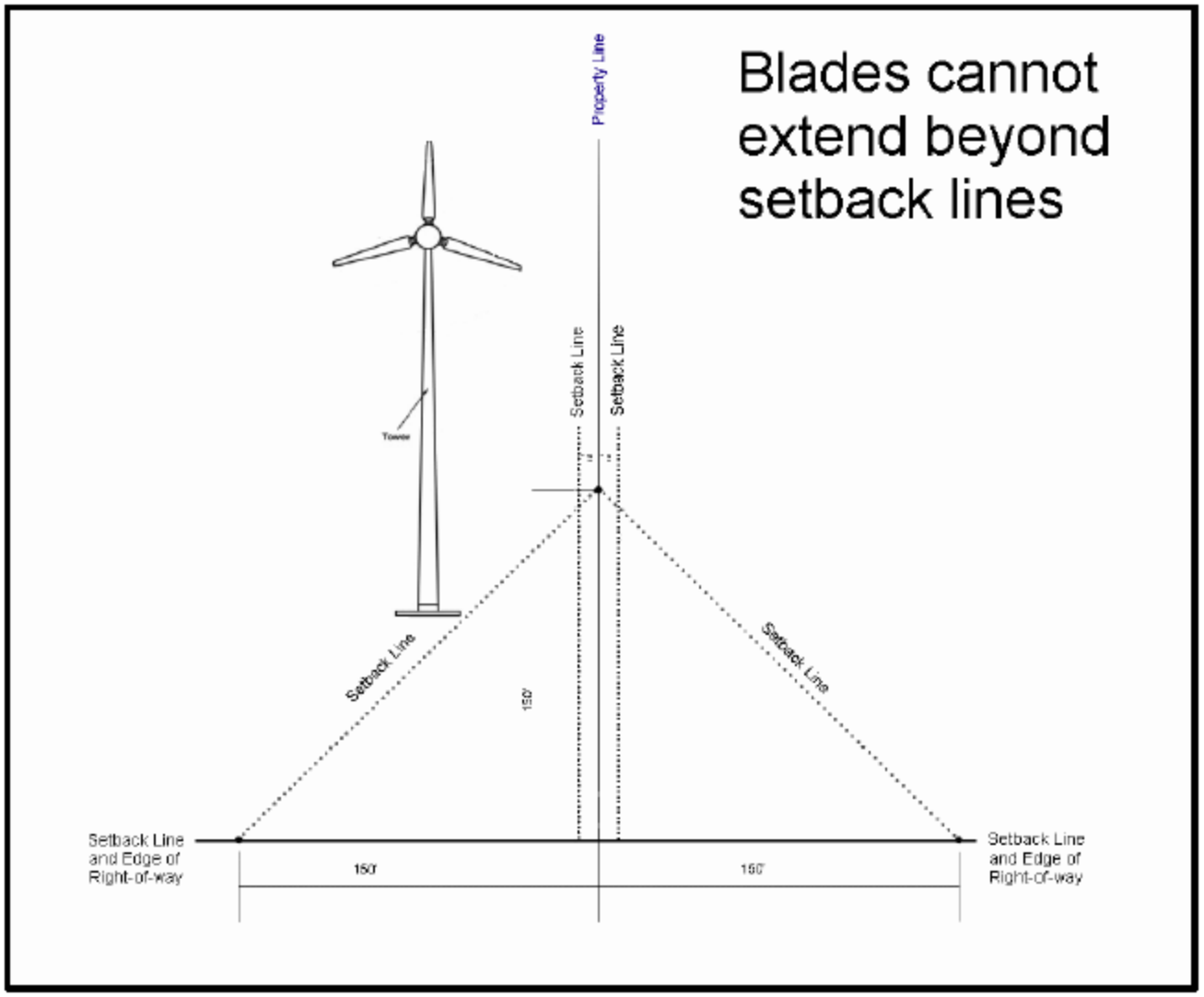
	Wind Turbine – Non Commercial	WECS Wind Turbine – Commercial/Utility WECS	Meteorological Towers
Property Lines (other than right angle corners)	Diameter plus applicable building setback	Diameter plus applicable building setback	1.1 times the total height
Right angle corner property lines	Diameter plus 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 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.

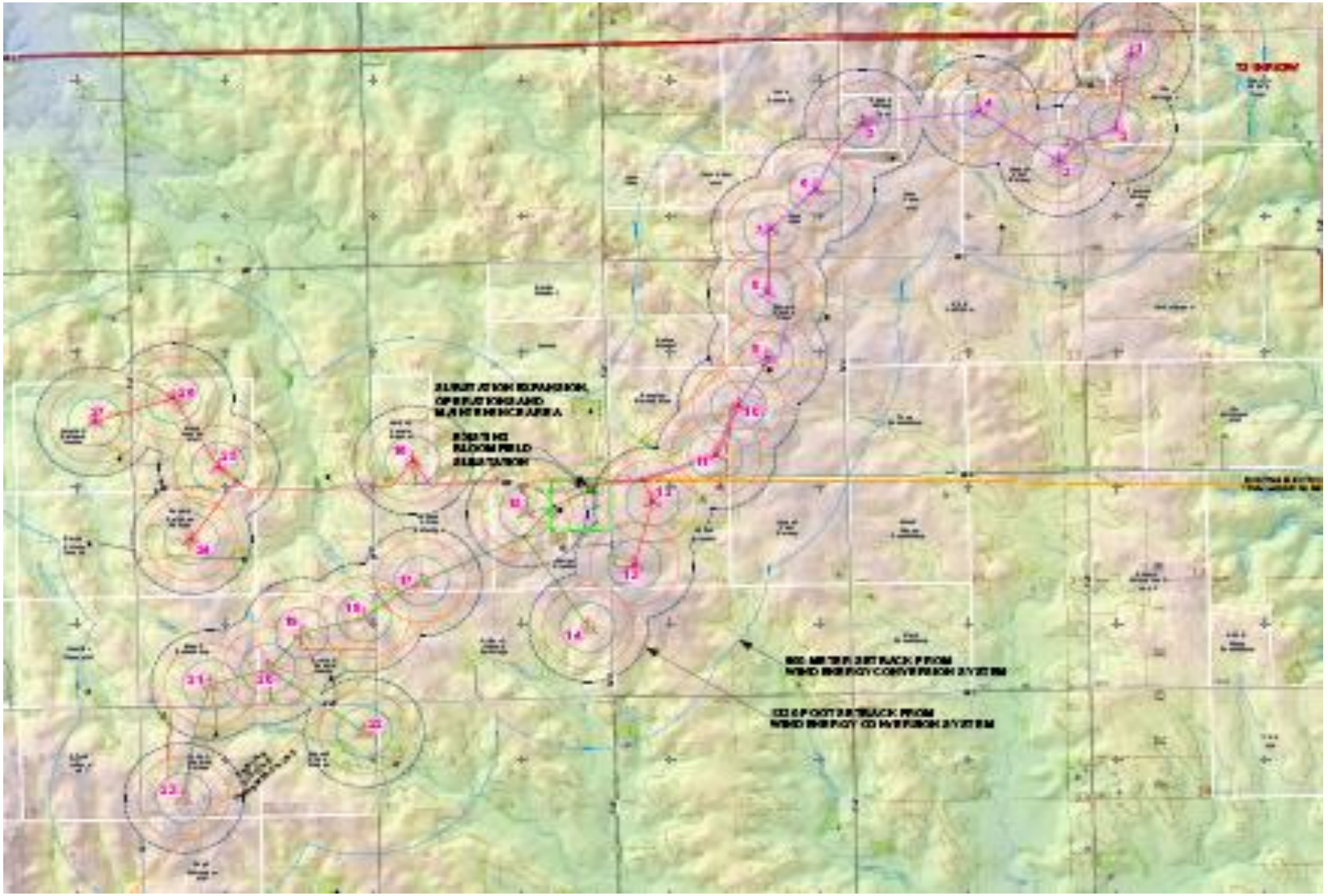
15. Permit Fees

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/components

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

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

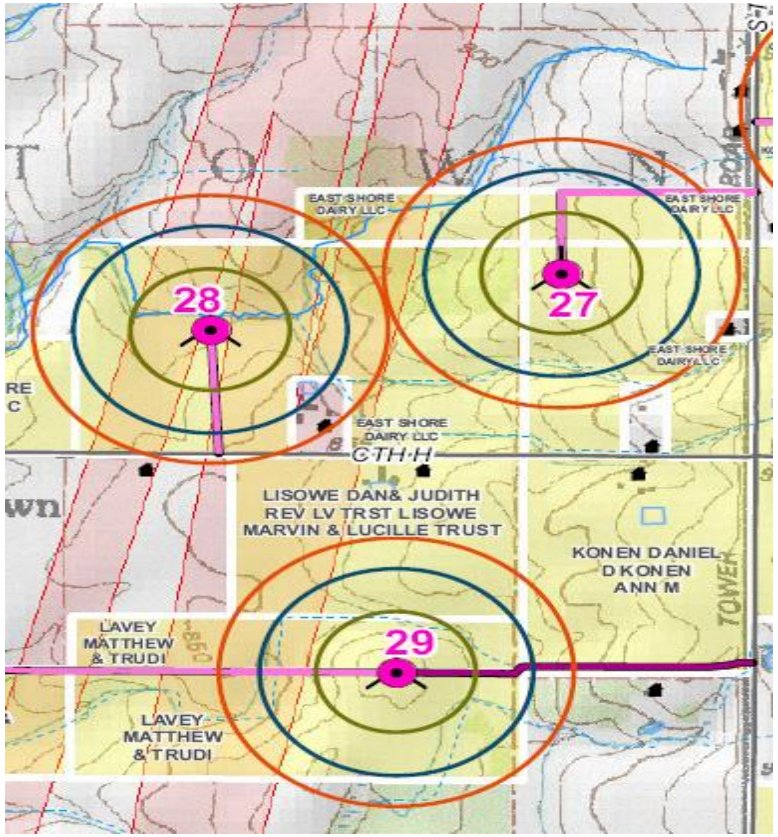
March 14, 2007	Initial meeting with Bloomfield civic leaders. Received favorable response.
April, 2007	Installed Met tower to collect on-site wind data.
July 16, 2007	NPPD releases RFP for up to 100MW.
August 20, 2007	MWE submits proposal for Elkhorn Ridge to NPPD.
October, 2007	MWE shortlisted by NPPD. 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

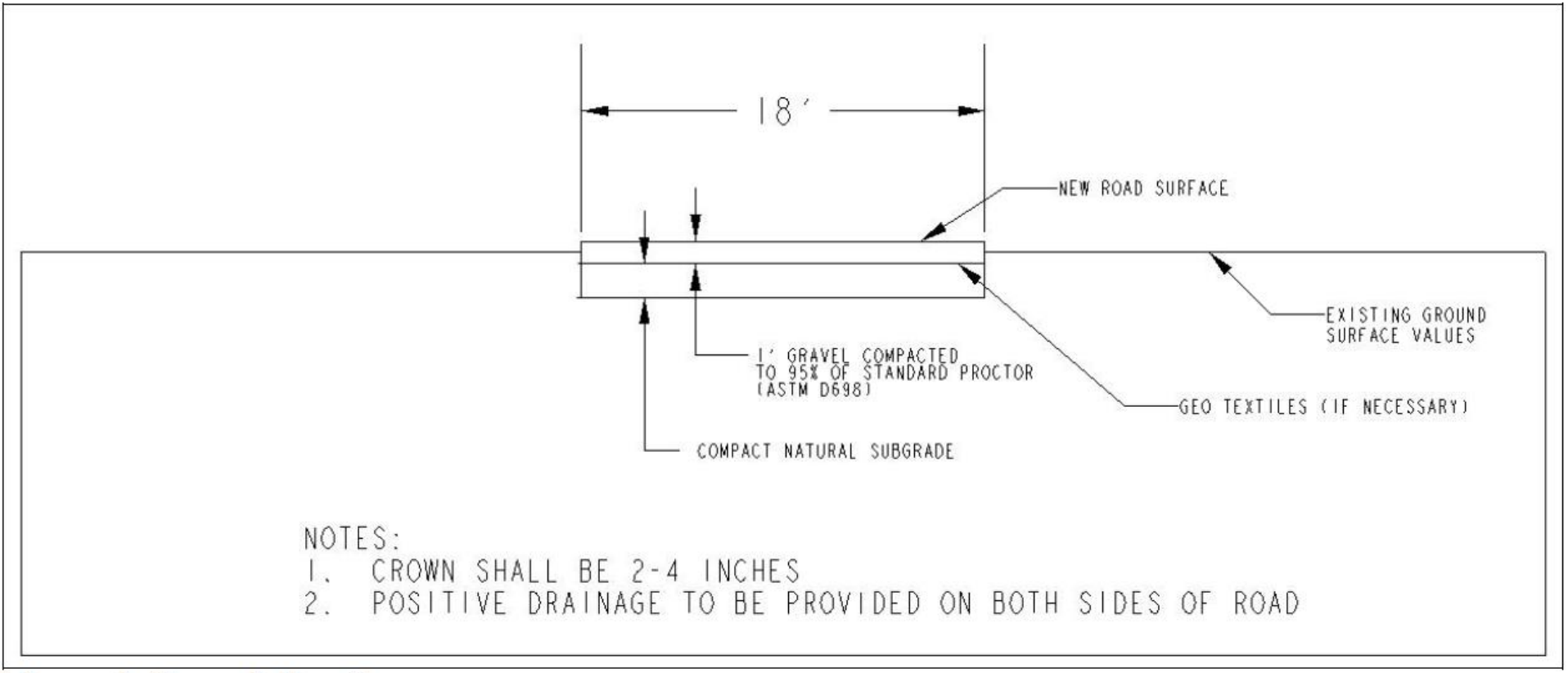
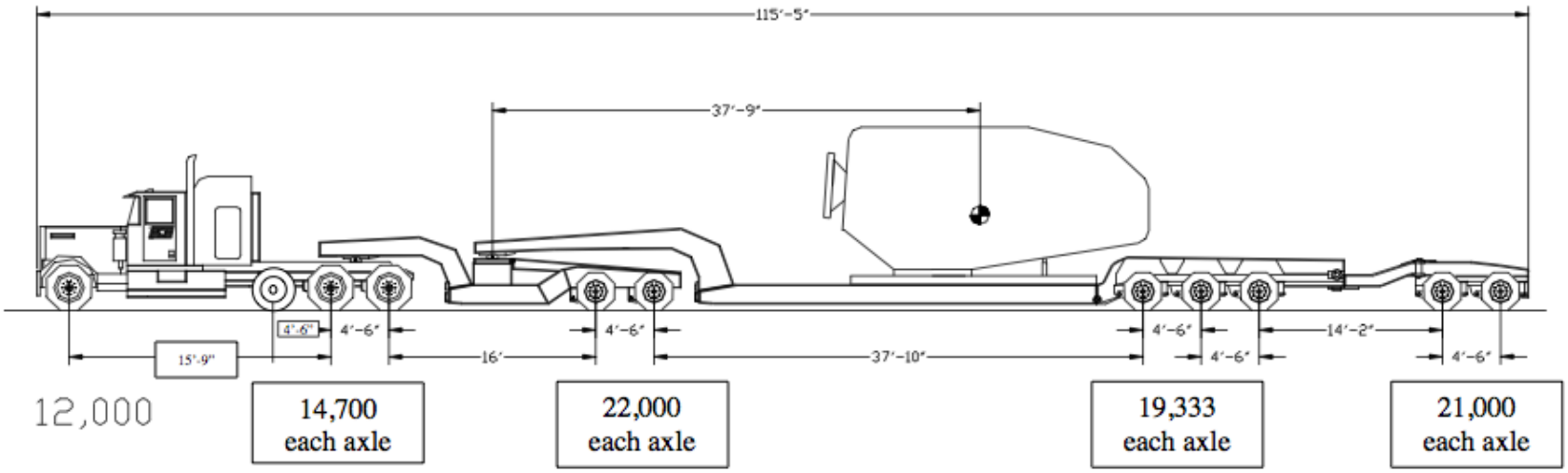


Figure 1: Type A Road

Oversize Truck Schematic: Hauling Wind Turbine Nacelle

Juhl Energy Info.



Typical Site Component Layout

Juhl Energy Information

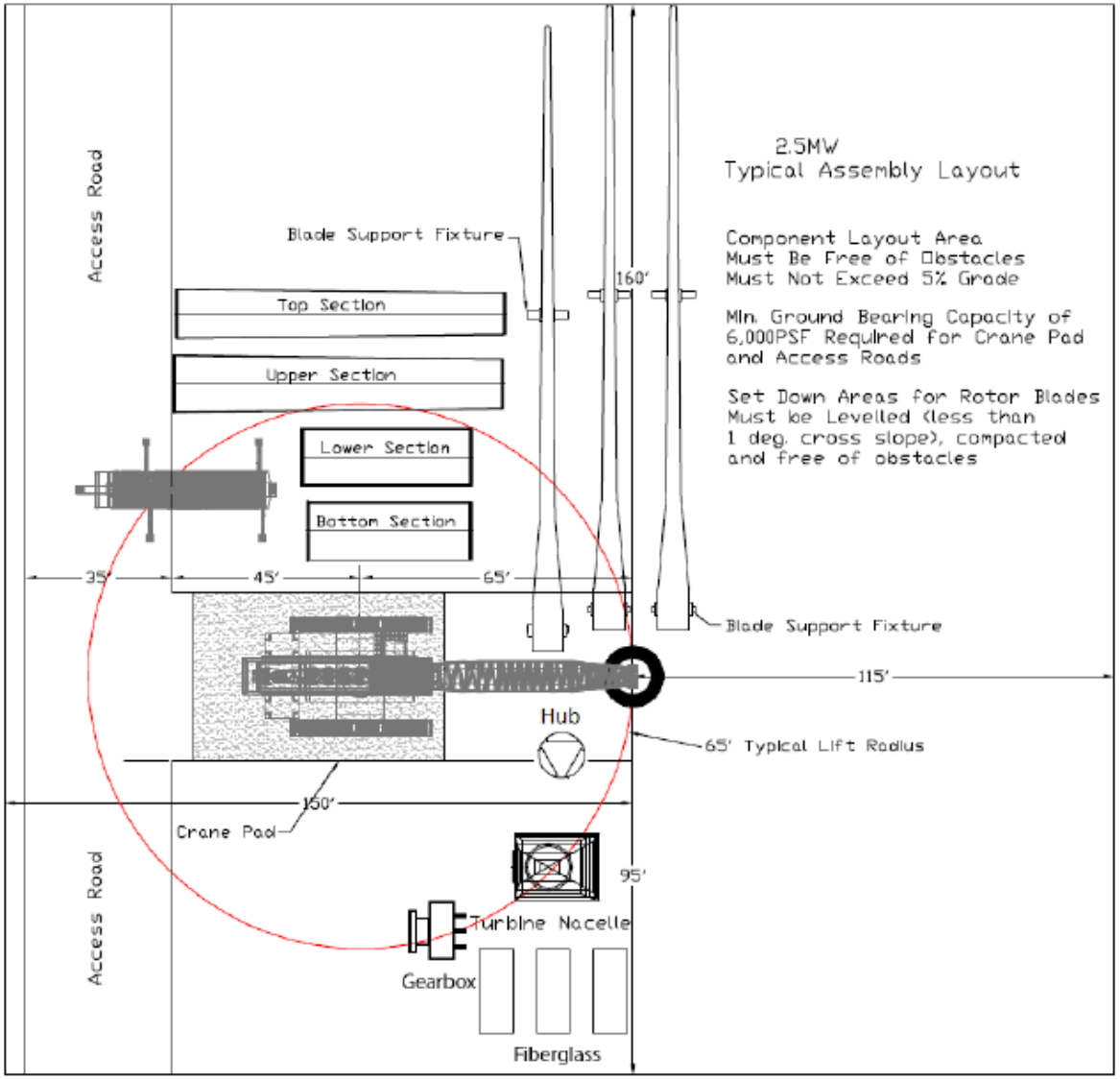


Figure 10: Typical Site Component Layout before Rotor Assembly. Grade area shown in figure is absolute minimum.

Approximately 40 Trips Per Foundation

(Midwest Wind Energy slide from 2008 NE Wind Conference)


OVERSIZE LOAD
Vestas


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

Reminder about Construction

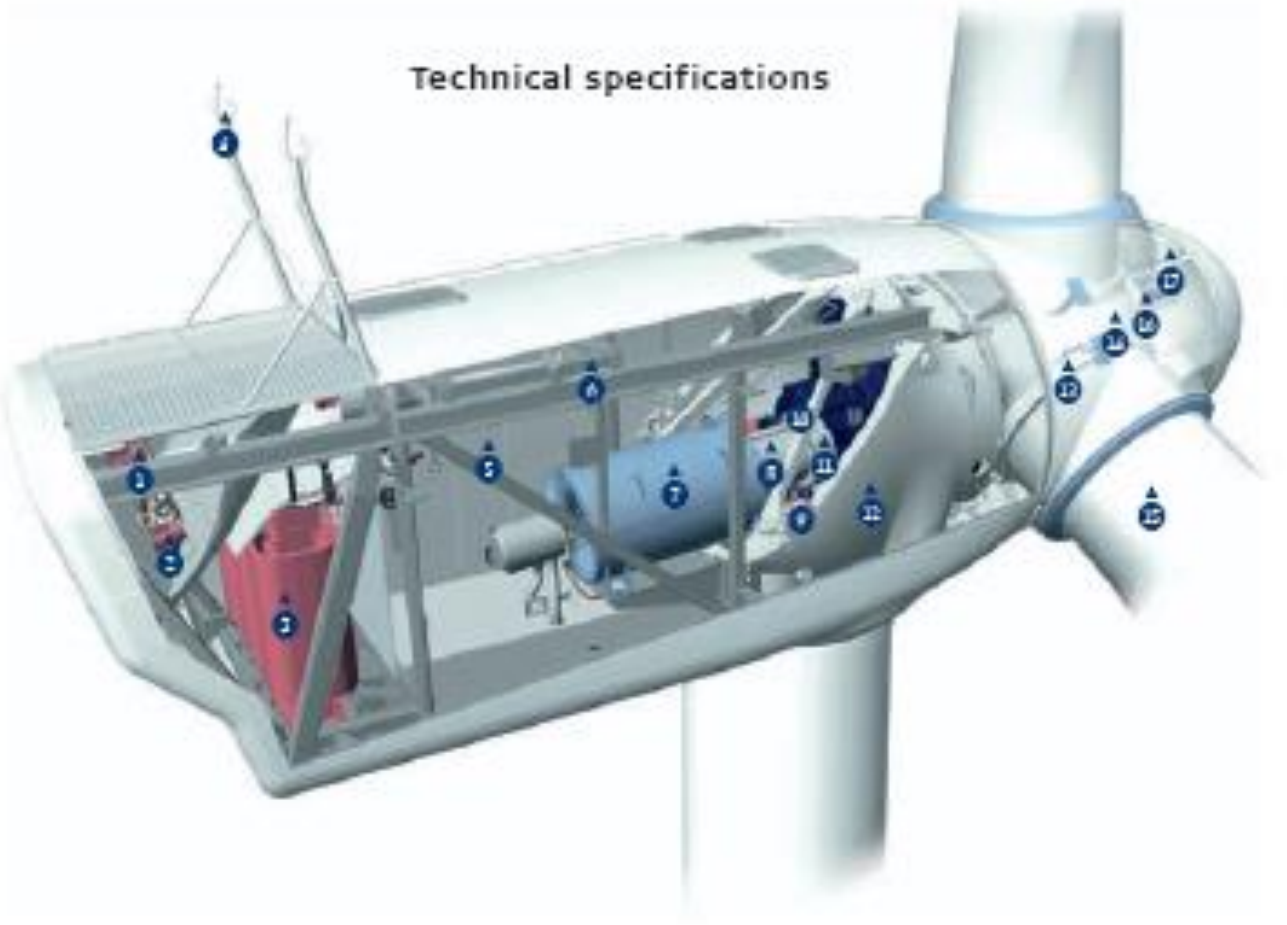
- Construction takes about a year
- It takes ~2500 man/hours to construct each turbine or approx 1.25 full-time jobs for one year
- The crawler crane takes 18 semi-truckloads to deliver to the site
- Each foundation is a continuous pour needing 60-80 cement truck loads
- One full-time job created for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

Ready To Install Blade Number 3

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

Additional Facts on Elkhorn Ridge as Reported by Midwest Wind Energy at 2008 NE Wind Conf.

Total Turbine Weight 303 Tons
- Tower 176 Tons
- Nacelle 86 Tons
- Blades 25.5 Tons
- Rotor 15.5 Tons

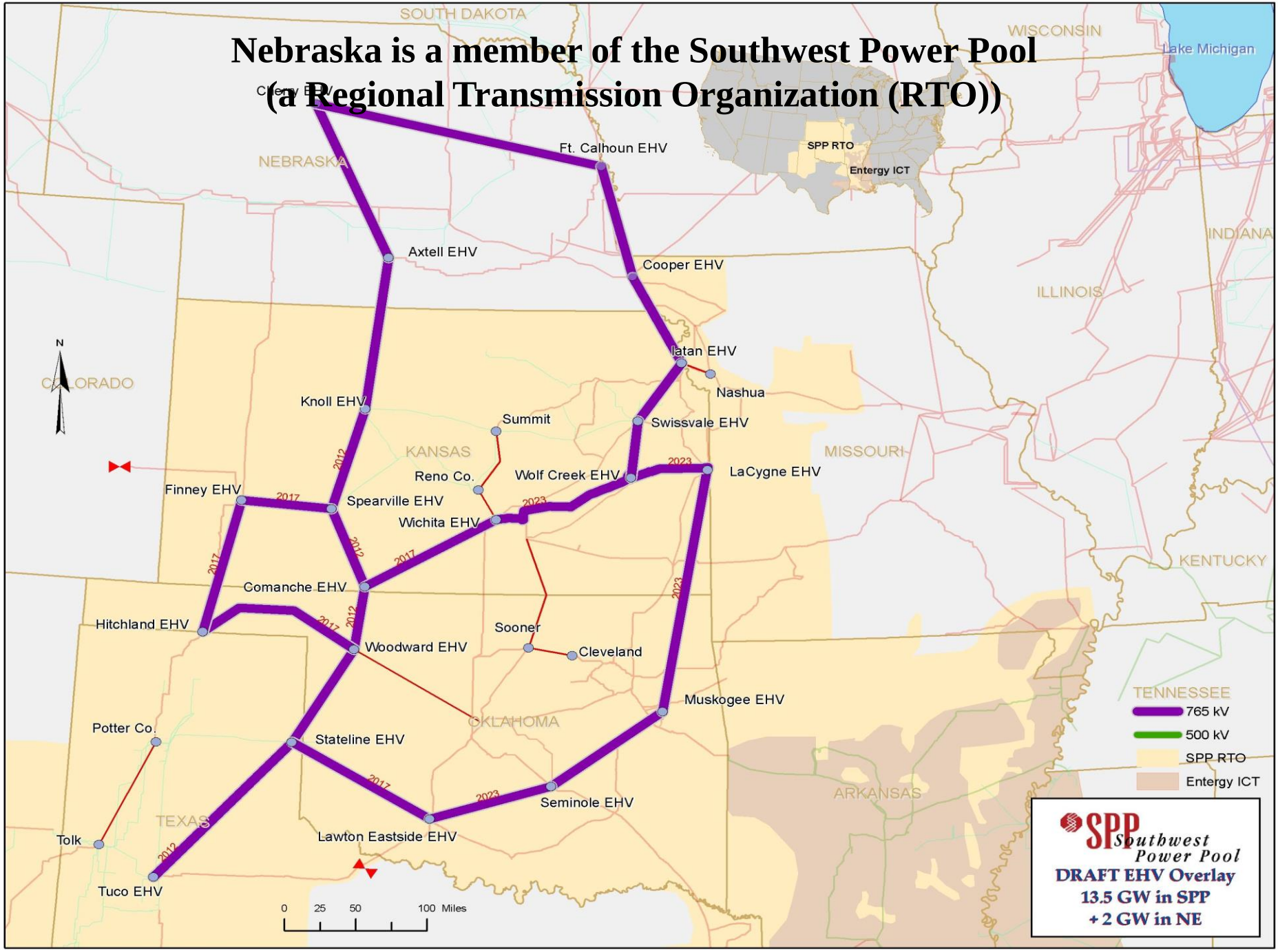
Foundations
- 48 Tons of rebar
- 495 cu. yds of concrete (x27 =13,365 cu. yds)

243 Turbine truck loads

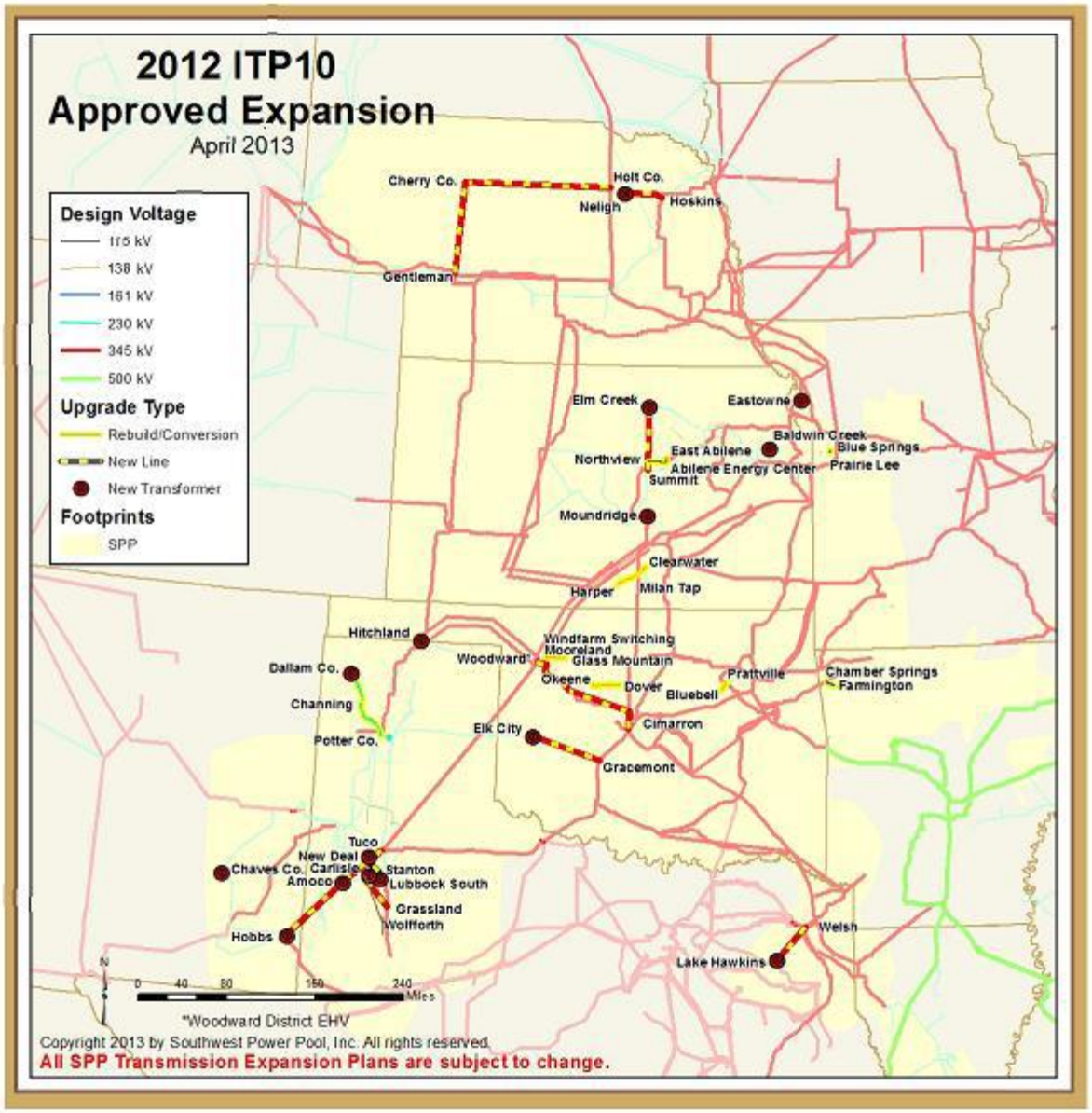
95,000 tons of rock hauled to project

13 miles of collection cable trenched.

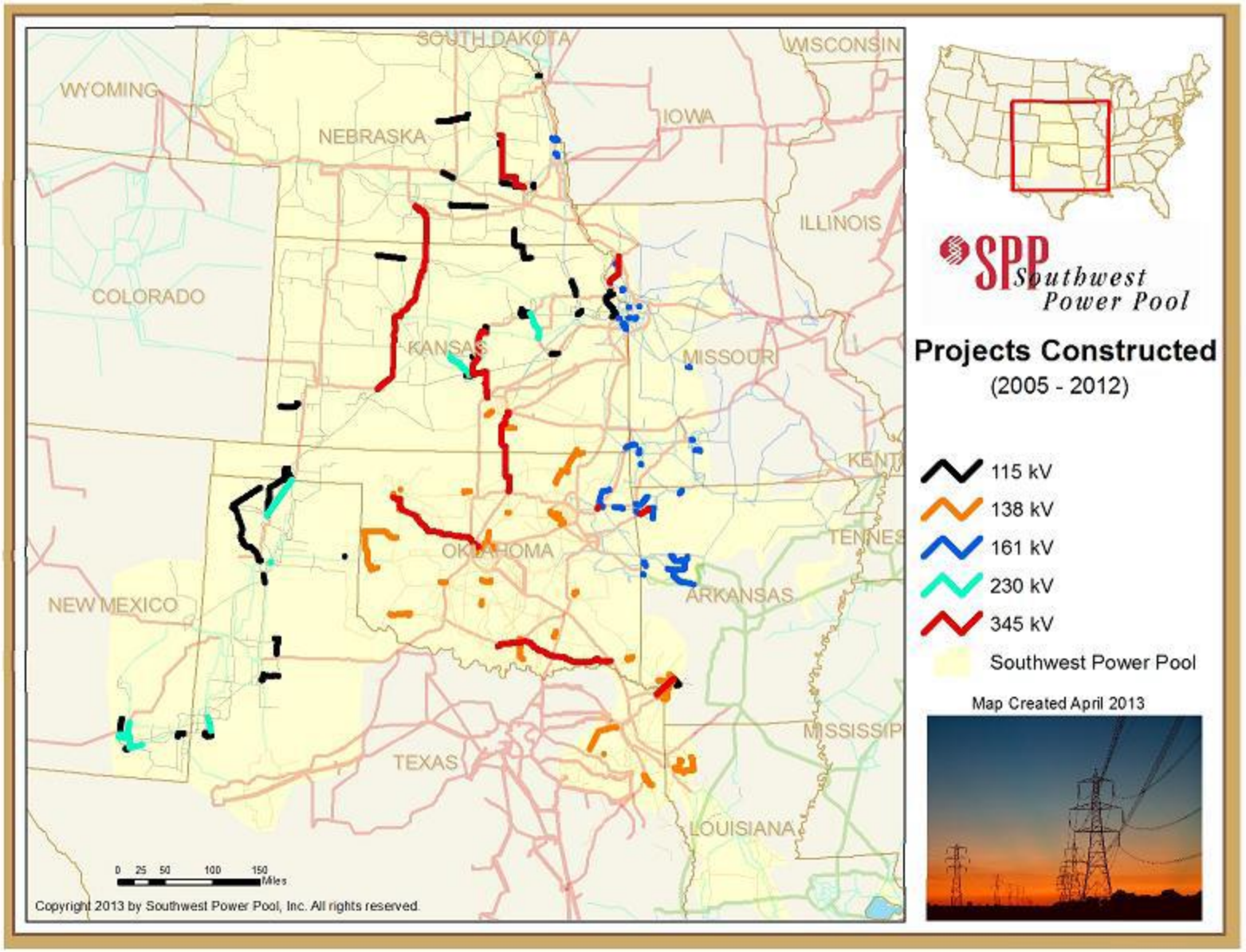
Nebraska is a member of the Southwest Power Pool (a Regional Transmission Organization (RTO))



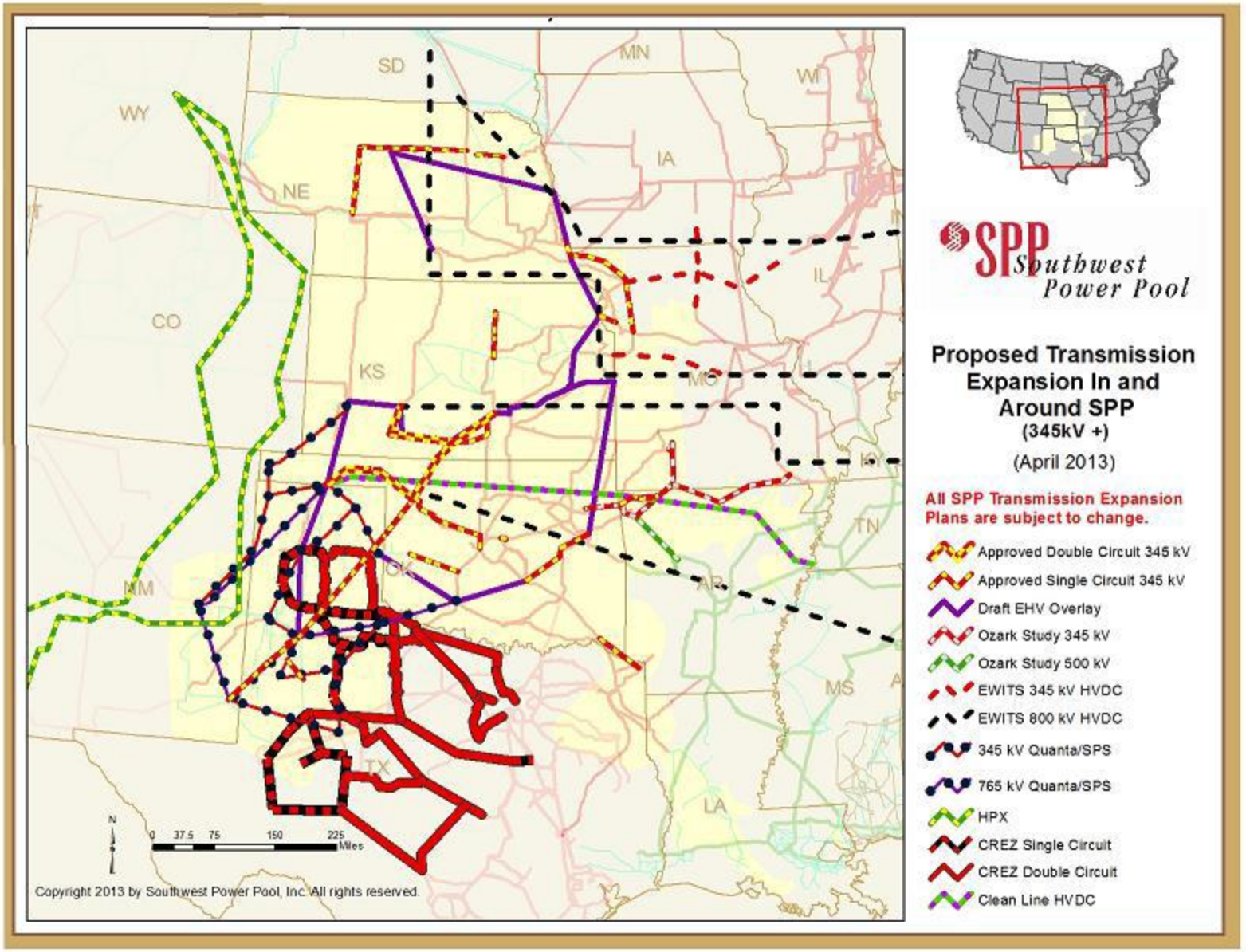
Electric Transmission Is The Farm-to-Market Road For Wind Energy



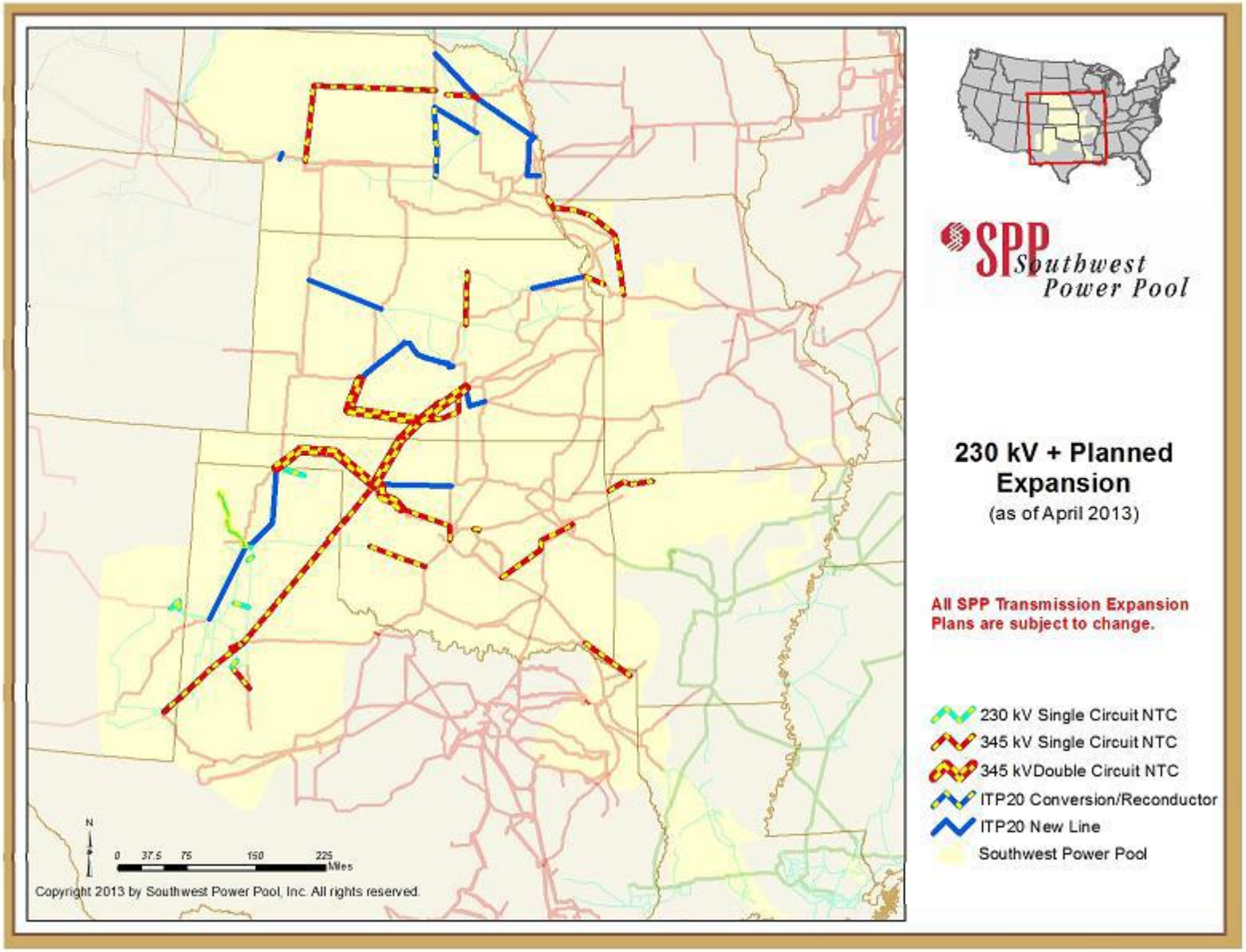
SPP Projects Under Construction 2005-2012



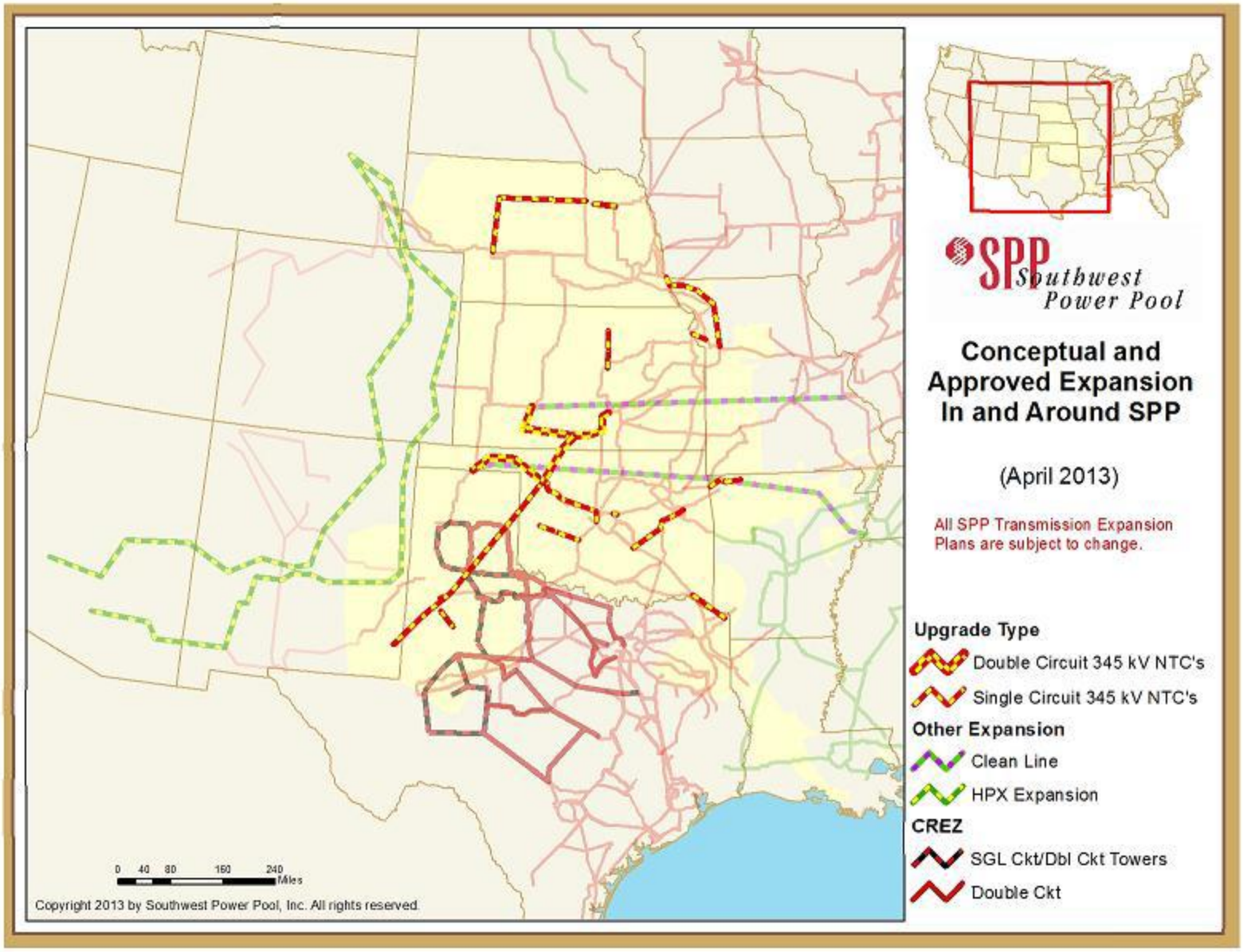
Conceptual & Approved SPP Plans



All High Voltage Planned Expansion



SPP Regional Plans



Southwest Power Pool Slide

- Wind Energy Development
- •Wind "Saudi Arabia": 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

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

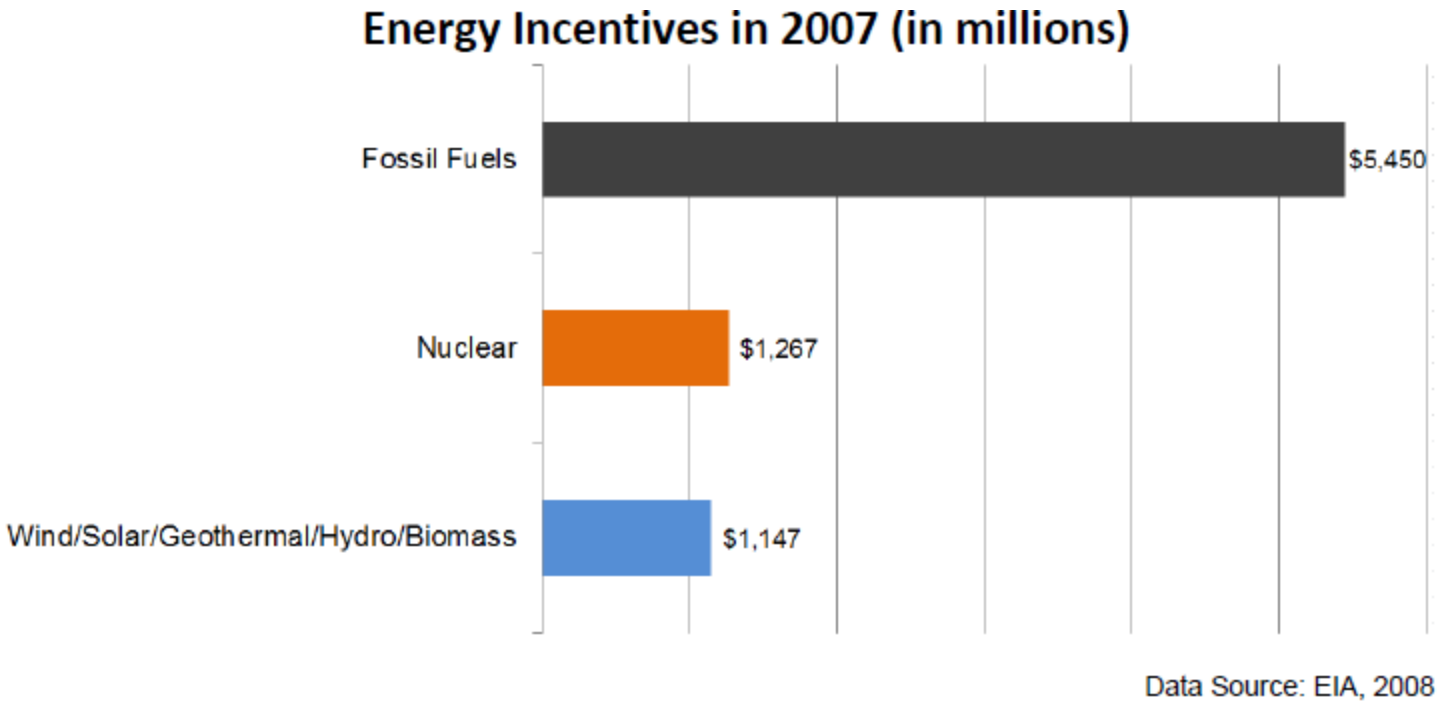
Jobs and earnings that result from the spending supported by the project, including benefits to grocery store clerks, retail salespeople, and child care providers

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

Will there be more wind development in Nebraska?
Will Congress Extend the Wind PTC?

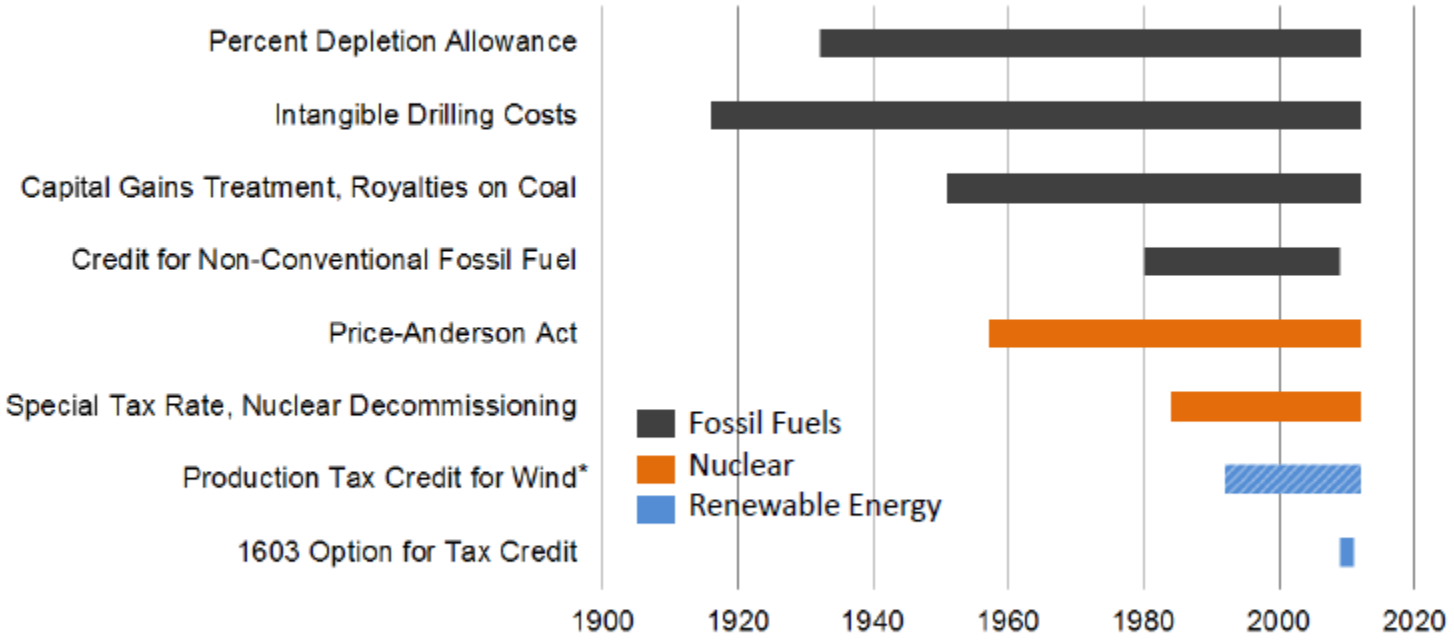
Federal Policy Is A Major Driver of Wind Energy Development

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 expires 12/31/13 if not renewed by Congress.



Fossil Fuels Have Been Subsidized for Nearly 100 Years
Renewable Energy Is Playing Catch-Up

Timeline of Selected Energy Incentives for Fossil Fuels, Nuclear and Renewable Energy



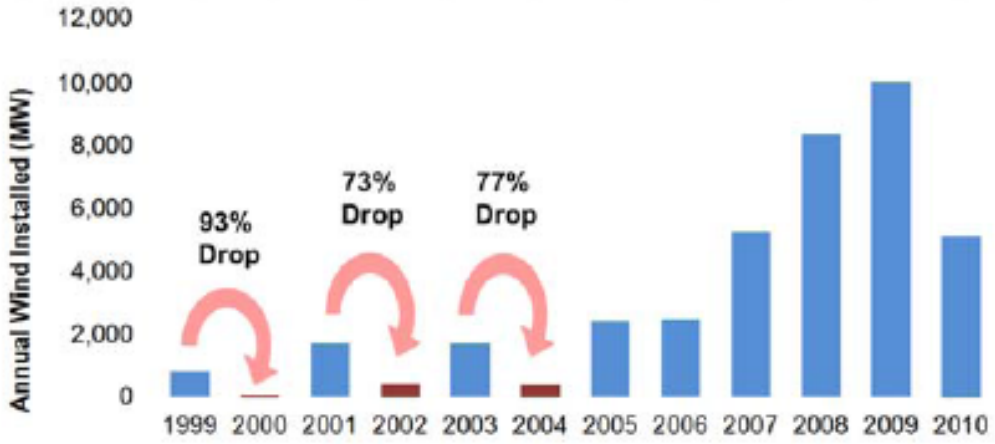
* PTC for wind and renewables expired in 1999, 2001, 2003

Data Source: Internal Revenue Code, Congressional Research Service, Joint Committee on Taxation

The Federal Wind PTC is set to expire on 12/31/13 unless extended by Congress.

- **Un-level Playing Field:** Some energy incentives, like the depletion allowance for oil and gas, are permanent in the tax code and have been in place since the 1920s. As a matter of fact, U.S. government subsidies for oil, natural gas and coal have totaled over **$500 billion** from 1950 to 2006 according to MISI. Wind energy's primary incentive, the PTC, has been allowed to expire multiple times, including in 1999, 2001 and 2003, causing a market drop of 73 to 93%; and has been consistently reinstated for only one- or two-year terms. In effect, many subsidies for new, clean energy technologies are temporary, while many for older, polluting energy technologies are permanent.

Historical Impact of Expiring Tax Credits on Annual Wind Market



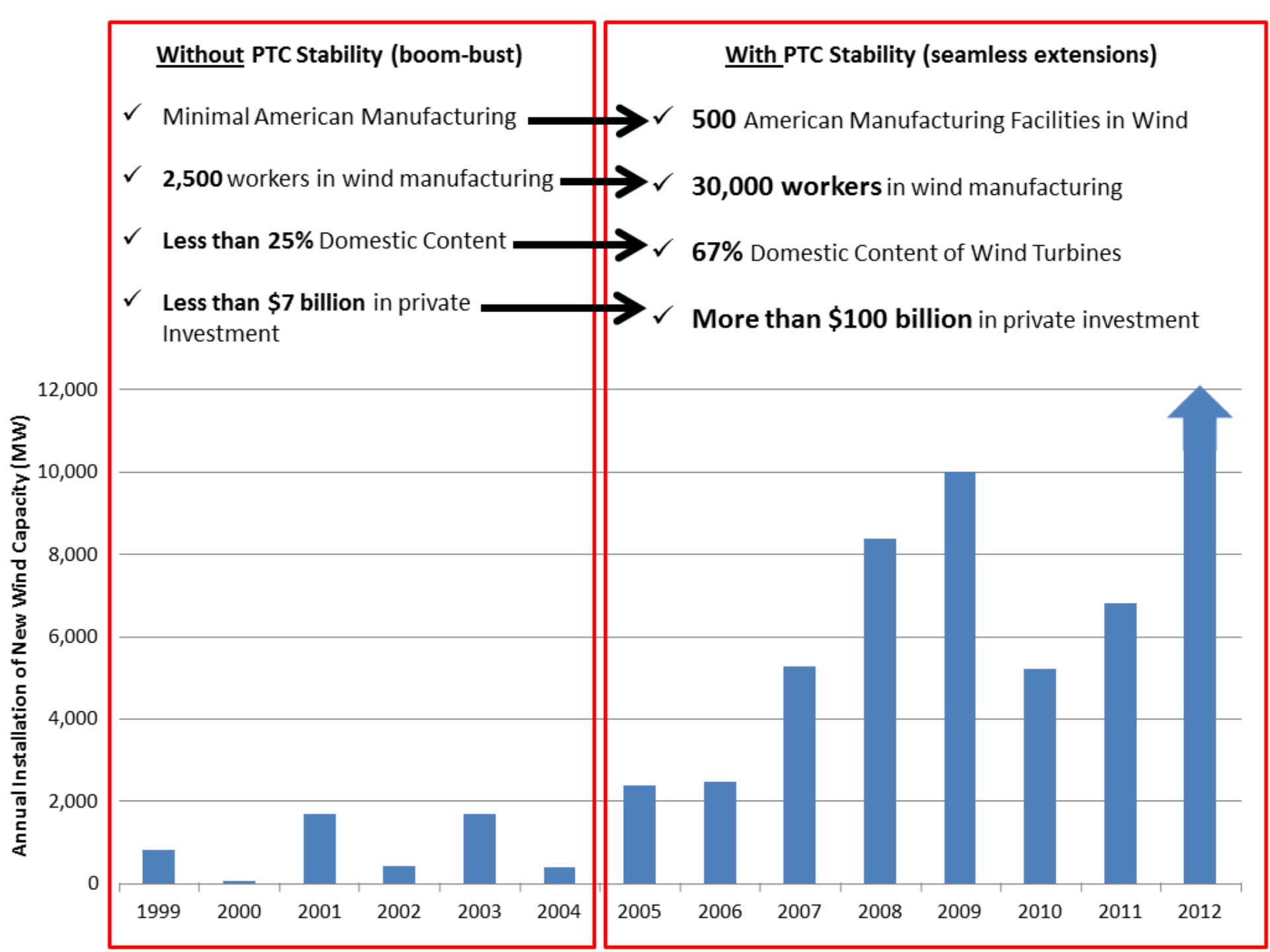
- **Long-Term Policy Signal Needed:** To create a real market for wind and manufacturing in the U.S. to compete globally, the U.S. needs to provide a long-term, clear and consistent policy signal.

Wind power is a mainstream source of American electricity. Diversifying federal incentives to include cleaner, affordable, homegrown renewable energy technologies like wind is smart energy policy.

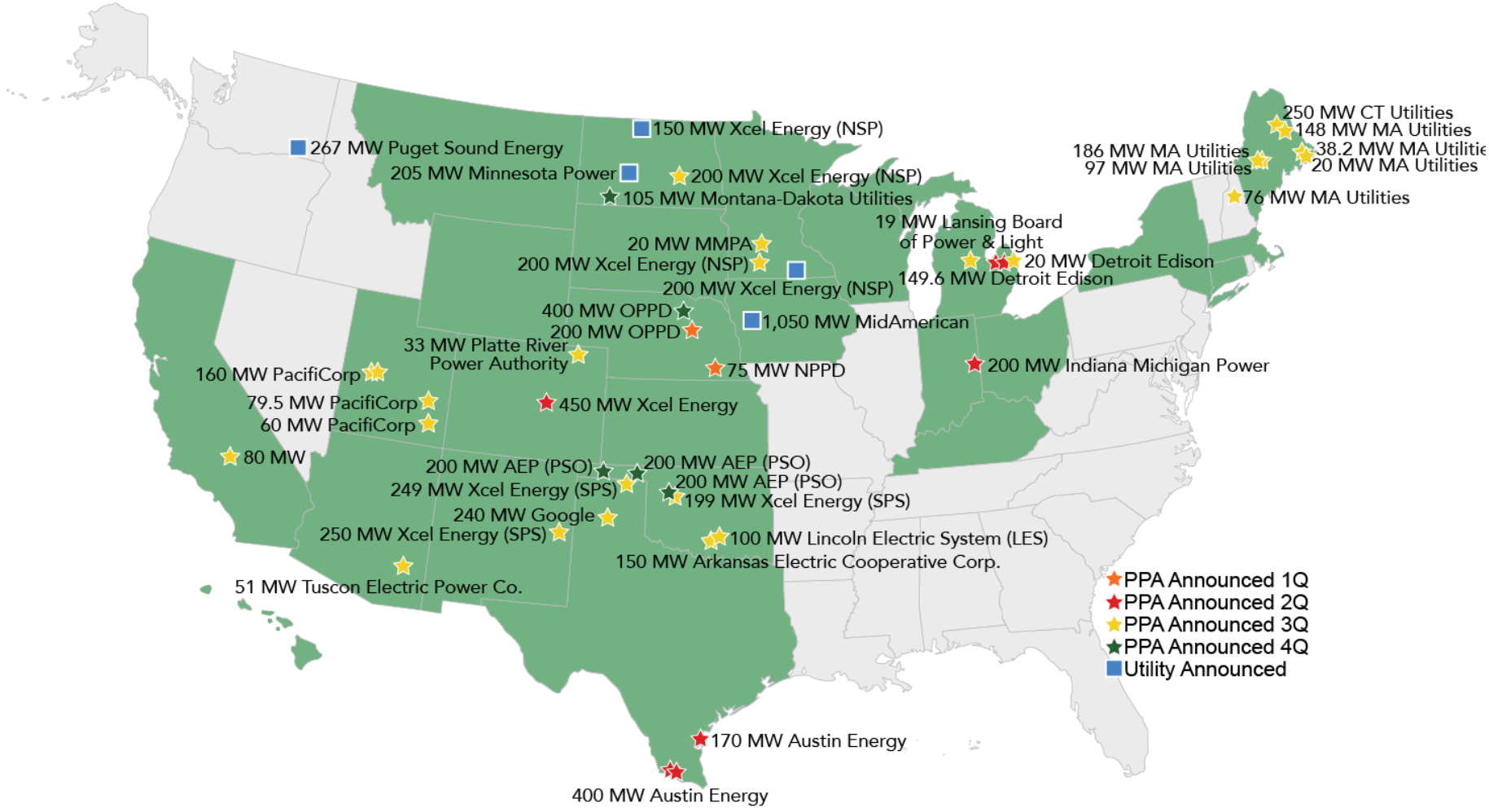
- Every energy technology is supported by the federal government. Wind energy is no exception, nor should it be.
- The Government Accountability Office (GAO) estimated federal incentives for electricity between Fiscal Year 2002 and 2007, concluding that:

  "Tax expenditures largely go to fossil fuels: about $13.7 billion was provided to fossil fuels and $2.8 billion to renewables."

- **Proven results:** The main incentive for wind, the federal renewable energy production tax credit (PTC), is an effective policy tool for encouraging wind power development, as evidenced by the rapid growth in U.S. wind power when the PTC was in place.


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

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



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

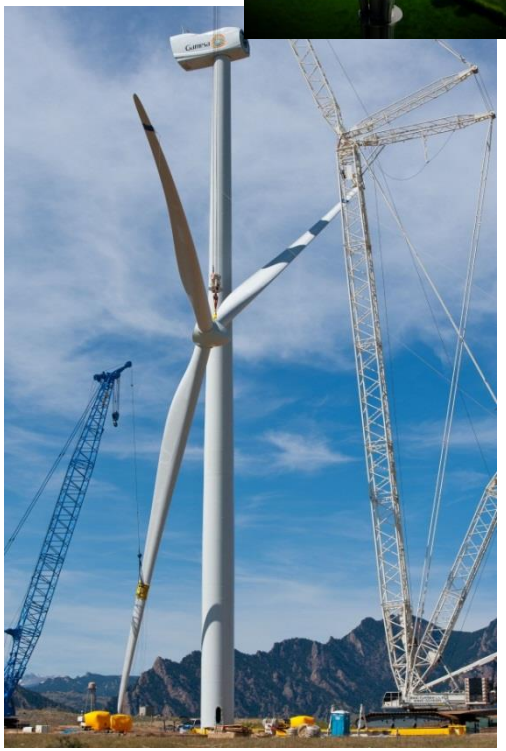


Photo from Dennis Schroeder NREL 20873

Photo from Northern Power Systems, NREL 13853

Local Revenues, Turbine, & Supply Chain

NREL 11074

Photo from iStock/5676592

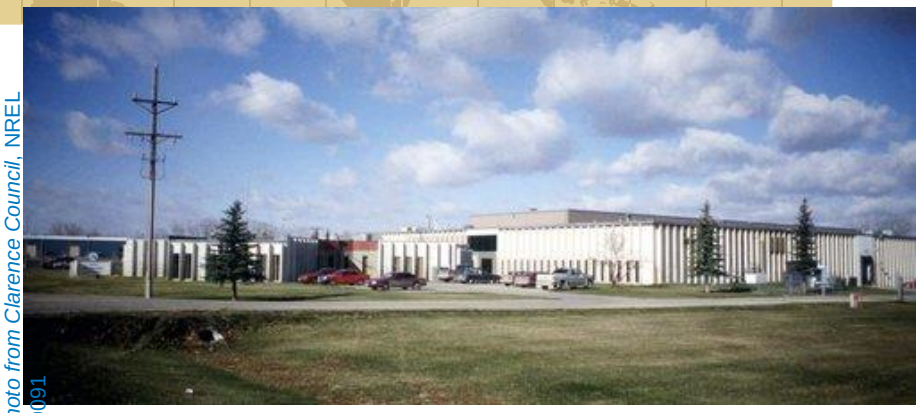


Photo from Clarence Council, NREL 09091

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

Photo from iStock/4088468

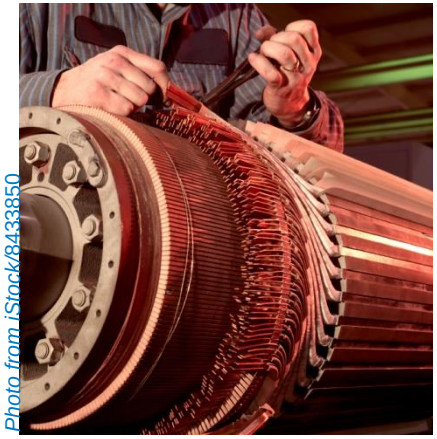


Photo from iStock/8433850

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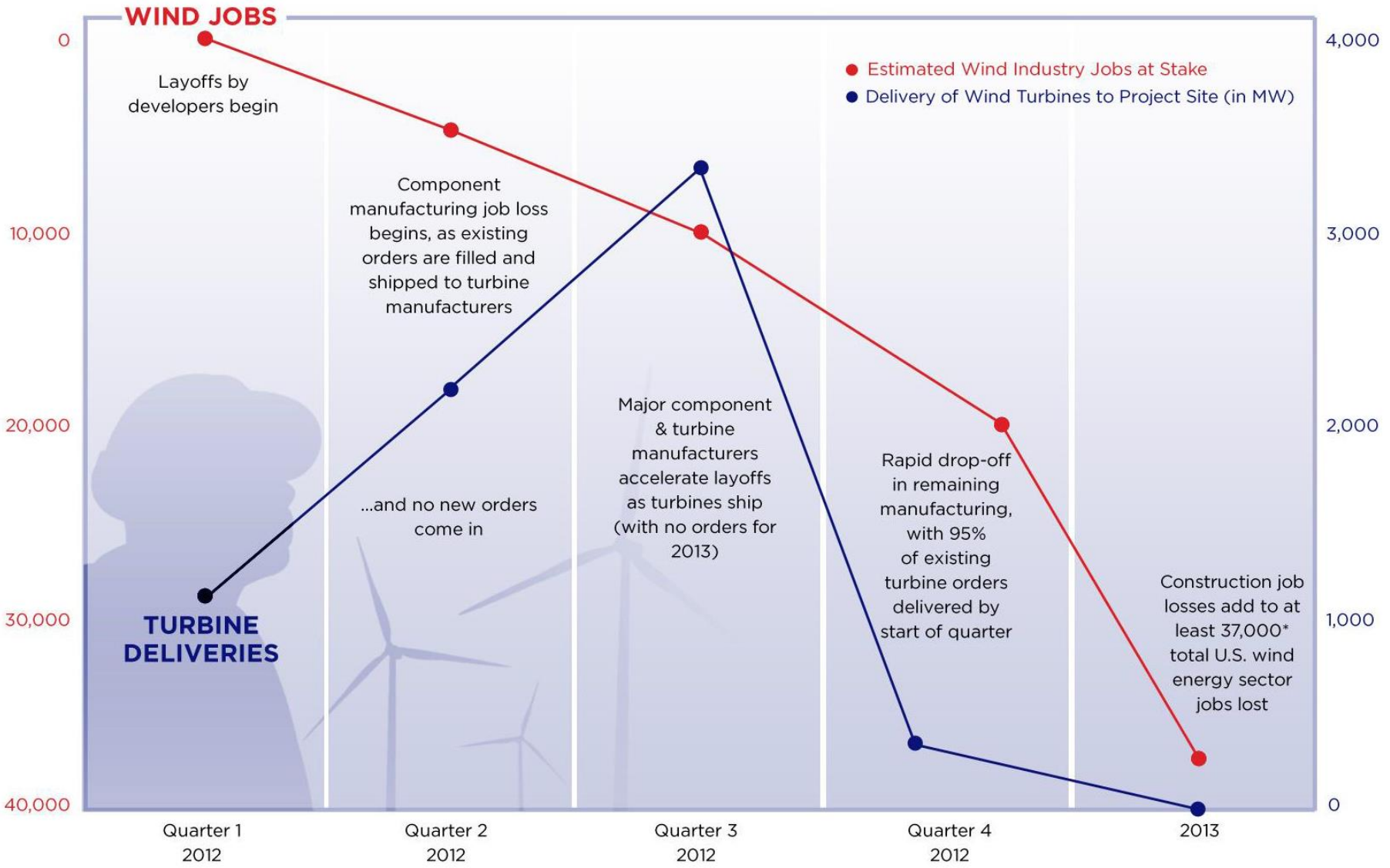
Photo from iStock/8384987

PROJECTED JOB LOSSES IN U.S. WIND ENERGY AS PTC EXPIRES



Estimated Wind Industry Jobs at Stake

Delivery of Wind Turbines to Project Site (in MW)

*Source for 37,000 Job Loss: Navigant Consulting

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 Be A National Leader In Ethanol & Wind Energy

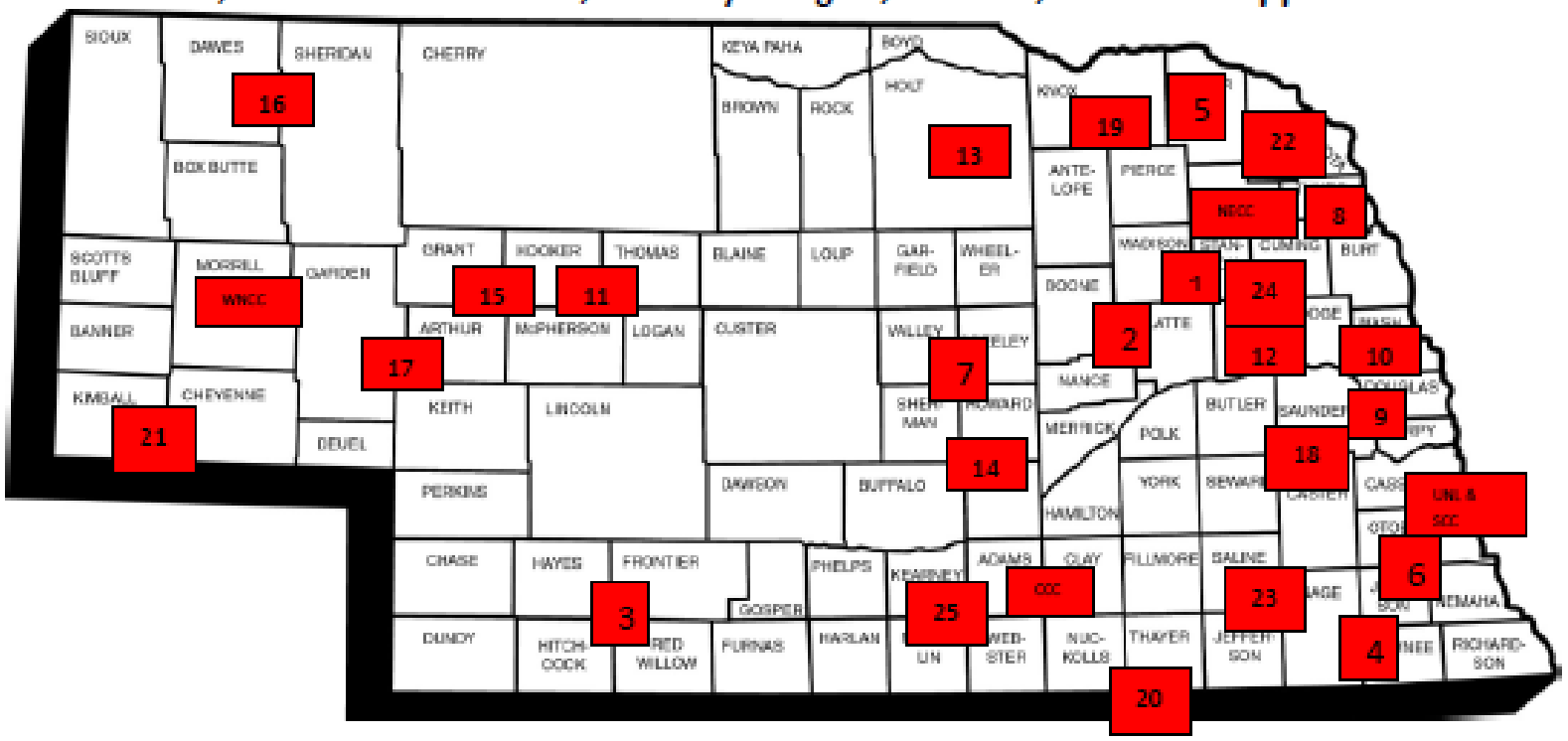
Wind Energy Can Help Create A Positive Future for Rural Nebraska

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

American Corn Growers Foundation

Wealth from the Wind

Thank you for your interest, and…
Let's Think Renewable Energy…
and U.S. Energy Independence…

Carpe Ventem