

MINUTES OF THE SENATE UTILITIES COMMITTEE

The meeting was called to order by Vice Chairman Pat Apple at 9:30 A.M. on January 22, 2008 in Room 526-S of the Capitol.

Committee members absent: Senator Emler (excused)

Committee staff present: Raney Gilliland, Kansas Legislative Research Department

Cindy Lash, Kansas Legislative Research Department

Mike Corrigan, Revisor of Statutes

Ann McMorris, Committee Secretary

Conferees appearing before the committee:

Steve Gaw, The Wind Coalition

Mark Lawlor, Horizon Wind

Krista Gordon, Iberdrola Renewable Energies USA

Zeina El-Azzi, Clipper Windpower

Others in attendance: See attached list

Senator Petersen introduced his intern who attends Kansas State University.

Status of Wind Industry in Kansas

Whitney Damron, on behalf of the Wind Coalition, introduced the individuals making the presentations. (Attachment 1)

Steve Gaw, Southwest Power Pool (SPP) representative for The Wind Coalition, provided information on the composition of the Wind Coalition and an industry overview. He noted Kansas is among the top three states in wind energy potential. There is a tremendous economic development opportunity often in areas that are most in need. Wind is a clean energy source and provides a hedge against increasing fuel costs and carbon emission restrictions. The challenge is for Kansas to increase wind energy production. He noted the direct economic impacts to landowners, local property tax revenue, construction and operational phase. Consumers also enjoy benefits from the operation of wind farms. Wind generation with interconnection agreements are under study and require major transmission construction. Mr. Gaw discussed system stability, operating cost impacts, transmission constraints and cost allocation methodology. (Attachment 2)

Mark Lawlor, Horizon Wind Energy, discussed the economics, regulatory and legislative issues of the wind industry. His power point presentation illustrated the economic impacts in Kansas from 1000 MW of new wind development - this discussion covered direct impacts, indirect and induced impacts and totals. Regulatory issues included incentive return to utilities for new renewable energy sources and a return on power purchase agreements (PPA). He discussed efficiency standards for wind facilities and noted the Kansas legislature should adopt measures that promote new wind projects to ensure economic benefits serve Kansas and are not lost to neighboring states. (Attachment 3)

Krista Gordon, Iberdrola Renewable Energies USA, discussed wind development and siting issues. She reviewed the status of permitting in Kansas, existing wind projects, common issues, community wind projects and their key issues and transmission opportunities. (Attachment 4)

Zeina El-Azzi, regional development leader, South Clipper Windpower Development Company, Inc, presented economic development opportunities. She provided an overview of Clipper Windpower and their long term commitment to Kansas. Her presentation included information on (1) potential wind development in the Midwest; (2) Plentiful Wind; (3) Governmental Support for Wind; (4) market uncertainty effect; (5) component suppliers and the supply chain; (6) bringing wind turbine and component manufacturing to Kansas; (7) 20 years of wind technology development; (8) and the wind turbine supply chain. (Attachment 5)

Committee questioned the conferees regarding cost allocation and the KCC ruling. General consensus that Kansas needs more wind development.

Adjournment.

Respectfully submitted,

Ann McMorris, Secretary Attachments - 5

SENATE UTILITIES COMMITTEE GUEST LIST

DATE: JANUARY 22, 2008

Name	Representing
Joe Dick	KCBPU
Whitney Damron	PPM Energy
Tom Day	KCC
Mike Beam	Ks. Livestock Assn.
Margy Stewart	McDowell Creek Tourism Assoc.
Jamie Jones	Ks. Assoc. of Counties
Joe Montague	DofA
Tom Thompson	Sierra Club
Paul Johnson	Ks Catholic Conf.
Lon Stanton	NORTHERN NATURAL GAS Co
Zeina El-Azzi	Clipper Windpower
Steve Gaur	Wind Coalition
Ray H. Zimmerman	KCC
Nate Michel	Hein Law Firm
Sandy Brader	KCP
Dave Holthaus	KEC



TESTIMONY/INTRODUCTORY REMARKS

TO: The Honorable Pat Apple, Vice Chair
And Members of the Senate Committee on Utilities

FROM: Whitney Damron

RE: Wind Energy Presentation

DATE: January 22, 2008

Good morning Vice Chairman Apple and Members of the Senate Committee on Utilities. On behalf of The Wind Coalition, we appreciate the opportunity to make this presentation to you today on the state of the wind industry in Kansas and the Midwest Region.

Speaking to you today will be the following individuals:

1. Mr. Steve Gaw
(Industry Overview)

Steve is the Southwest Power Pool (SPP) representative for The Wind Coalition, which as Steve will describe in his presentation, is a non-profit association formed to encourage the development of wind energy resources in the south-central United States. The Coalition is composed of wind developers, wind turbine manufacturers, tower manufacturers, and consumer & industry representatives.

Steve was most recently a Commissioner with the Missouri Public Service Commission and former Chairman. He also served as a representative in the Missouri House, including five years as Speaker. Steve was a founding board member of the SPP Regional State Committee and the Organization of MISO States.

2. Mr. Mark Lawlor, Horizon Wind Energy
(Economics, Regulatory and Legislative Issues)
3. Ms. Krista Gordon, Iberdrola Renewable Energies USA
(Development and Siting Issues)
4. Ms. Zeina El-Azzi, Clipper Windpower Development Company, Inc.
(Economic Development Opportunities)

Senate Utilities Committee
January 22, 2008
Attachment 1-1

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Senate Committee on Utilities
Page Two of Two
January 22, 2008

Included with my cover sheet is a recent article from the Wall Street Journal entitled, Wind, Solar Power Gain Users. I thought this January 18, 2008 article was timely for our presentation today. Finally, of note, on Thursday, February 7 from 11:15 a.m. to 1:00 p.m., there will be a lunch presentation for all legislators on wind power featuring Mr. Larry Flowers and Mr. Mike Milligan, both recognized as experts on wind energy. The briefing event will be hosted by the Kansas Rural Center, the Kansas Farmers Union and perhaps other parties. I understand invitations will be sent to all legislators in the near future.

With that brief introduction, I would like to call upon Steve Gaw to begin the presentation to the Committee.

WBD
Attachment

January 18, 2008

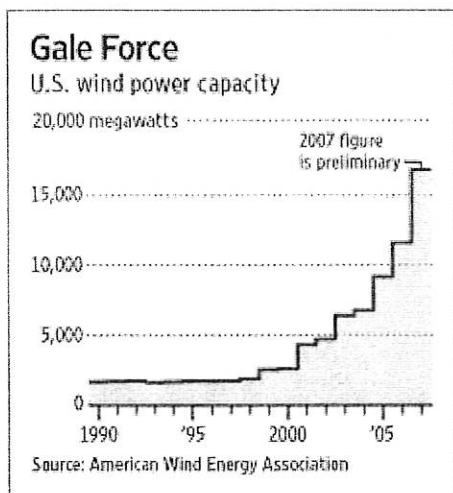
Wind, Solar Power Gain Users

Supportive Policies Aid Greener Energy Sources; New Jobs in Thousands

By **REBECCA SMITH**
 January 18, 2008; Page A6

Two forms of renewable energy -- wind and solar power -- enjoyed substantial growth last year, spurred by federal and state energy policies and incentives that support green energy sources.

The U.S. wind-power industry grew in size by 45% last year, adding a record 5,244 megawatts of capacity that amounted to a third of all new generating capacity built in the U.S. in 2007, according to the American Wind Energy Association. **General Electric Co.** led the pack as nation's largest supplier.



The solar industry grew at a similar clip, though from a much smaller base, adding more than 300 megawatts of capacity last year, according to the Solar Energy Industries Association. Additions are expected to roughly double this year. Large commercial solar installations now exceed home installations in California, reversing a long-term pattern and likely a bellwether for other states.

The bulking up in the solar industry will become more pronounced as utility-scale projects get built. More than 3,000 megawatts of giant concentrating solar projects have been announced for vast stretches of the desert Southwest, to be completed between 2009 and 2014 with utilities buying the electric output.

The wind-power trade group said seven new factories opened in 2007, and it believes there are close to 20,000 jobs now in wind energy in the U.S., with nearly half added in the past year. The renewable-energy sector expects to add tens of thousands of jobs in the next decade.

The wind and solar industries are being lifted by federal policies that encourage clean energy sources and are backed by state and federal tax credits and other incentives. In half of the states, utilities are required to increase their purchases of renewable energy to lessen dependence on fossil fuels that contribute to climate change.

One worry for the sector is the expiration, at the end of 2008, of certain federal tax credits that have spurred development.

Although much of the wind and solar generating equipment installed in the U.S. is imported, more

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1-3

firms are building manufacturing and assembly facilities in the U.S.. "People see the U.S. as the next strong market," said Lisa Frantzis, managing director for renewable energy at Navigant Consulting Inc.

Germany's **Schott** AG said this week it will build a solar factory in Albuquerque, N.M., that will employ 350 people by 2009 and increase to about 1,500 workers in future years, a \$500 million investment. The 200,000-square-foot plant will produce solar modules for giant, utility-scale solar installations. The company presently does production in Billerica, Mass.

New Mexico Gov. Bill Richardson said his state offered "close to \$20 million" in incentives to attract Schott. "The Southwest is going to become the laboratory for clean tech jobs in renewable energy and energy efficiency," he said.

New Mexico has offered incentives to firms paying above-average wages. Mark Finocchiaro, president of Schott's U.S. division, said the Albuquerque jobs would pay "at least the prevailing wage" and would include health benefits.

Write to Rebecca Smith at rebecca.smith@wsj.com¹

URL for this article:

<http://online.wsj.com/article/SB120062633529299857.html>

Hyperlinks in this Article:

(1) <mailto:rebecca.smith@wsj.com>

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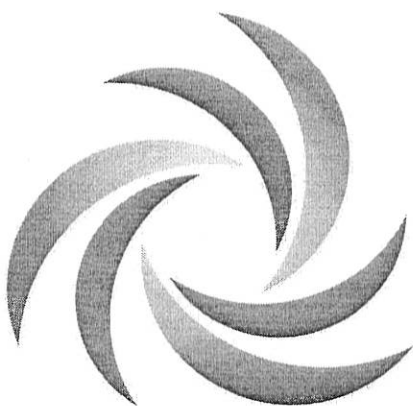
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The Wind Coalition

Senate Utilities Committee
January 22, 2008
Attachment 2-1

THE WIND COALITION

Steve Gaw / January 22, 2008

**KANSAS: ELECTRICITY
IS IN THE AIR**

Information About The Wind Coalition

2-2

- *The Wind Coalition is a non-profit association formed to encourage the development of the vast wind energy resources of the south central United States.*
- *The Wind Coalition is active in ERCOT and the SPP.*
- *Members include wind developers, wind turbine manufacturers, tower manufacturers, and consumer & industry interest groups.*

AES Wind Generation

Airtricity, Inc.

Babcock & Brown, LP

BP Alternative Energy

Clipper Windpower

Duke Energy

Edison Mission Group

Eurus Energy America Corp.

Gamesa Energy USA

Great Plains Windpower

Horizon Wind Energy

Invenergy LLC

John Deere Wind Energy

Noble Environmental Power

PPM Energy

Renewable Energy Systems (USA)

Shell WindEnergy Inc.

Third Planet Windpower

D.H. Blattner

GE Energy, LLC

Siemens

Stewart Title

Trinity Structural Towers, Inc.

Vestas-Americas, Inc.

American Wind Energy Association (AWEA)

Environmental Defense

Public Citizen Texas Office

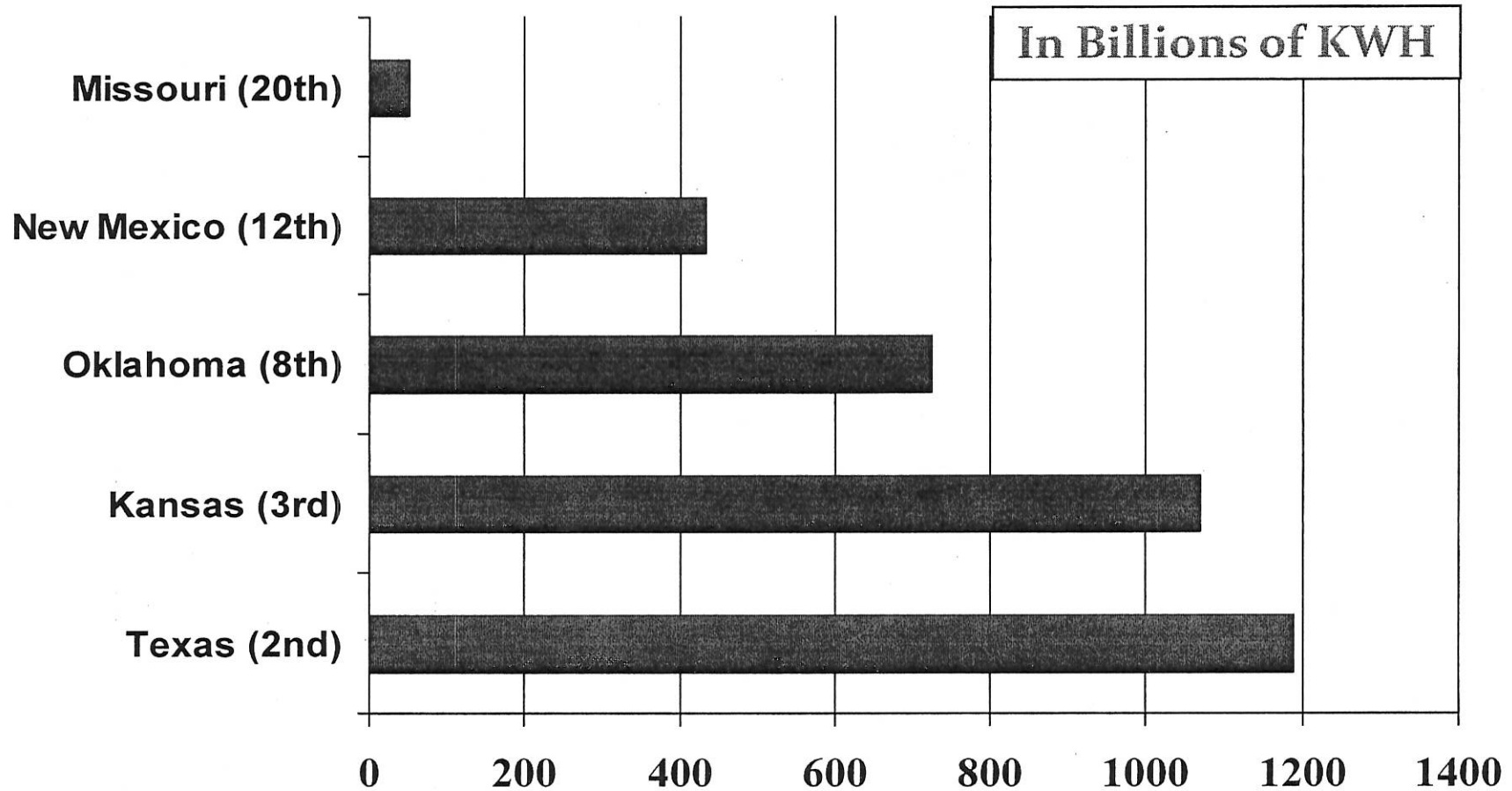
Texas Renewable Energy Industries Association

OPPORTUNITY

- KANSAS IS AMONG THE TOP THREE STATES IN WIND ENERGY POTENTIAL
- TREMENDOUS ECONOMIC DEVELOPMENT OPPORTUNITY OFTEN IN AREAS THAT ARE MOST IN NEED
- CLEAN ENERGY SOURCE
- HEDGE AGAINST INCREASING FUEL COSTS AND CARBON EMISSION RESTRICTIONS

Estimated Annual Wind Energy Potential in SPP States

2-4



Source: An Assessment of the Available Windy Land Area and Wind Energy Potential in the Contiguous United States, Pacific Northwest Laboratory, August 1991. PNL-7789

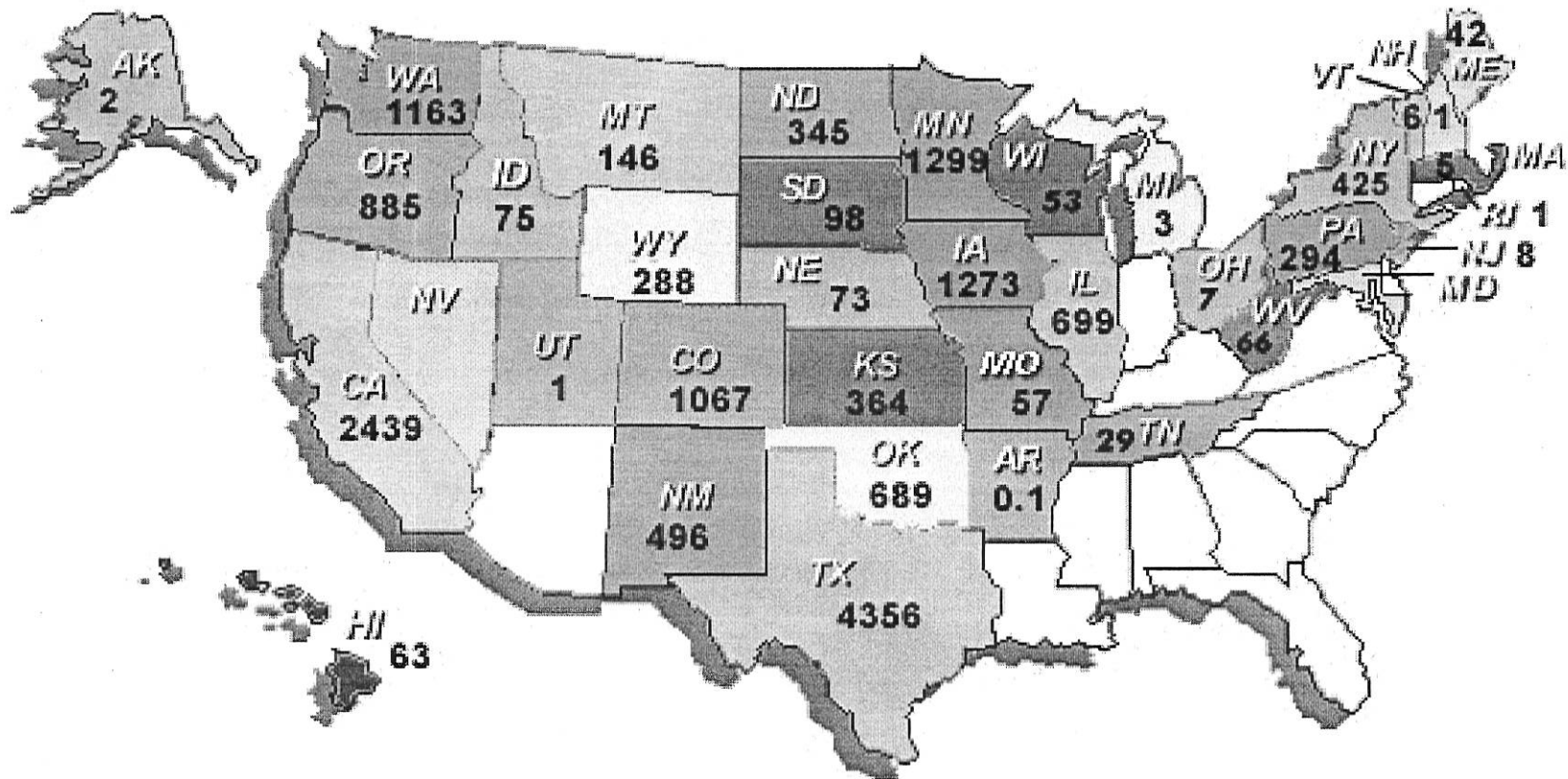
THE CHALLENGE

KANSAS CURRENTLY RANKS LOWER IN THE PRODUCTION OF ENERGY FROM WIND IN COMPARISON TO OTHER STATES WITH LESS CAPACITY

Total Installed Wind Power Capacity (MW)

2-6

Kansas lagging behind other states in the region



As of December 31, 2007

Estimated Statistics for Wind in Kansas

6-2
2-7

- 364 MW installed
- 1,724 MW of interconnection agreements in the SPP queue for Kansas
- 291 construction jobs
- 23 long term operations and maintenance jobs
- \$1.1 million annual landowner revenue
- \$1.2 million to local government through payments in lieu of taxes
- 98,280 homes powered by wind (equivalent amount of energy)
- 362 million gallons of water not used for electric generation from fossil fuels (annually)

Kansas – Economic Impacts

From the 20% Vision
(7,158 MW new Kansas development)

2-8

Wind energy's economic "ripple effect"

Direct Impacts

Payments to Landowners:

- \$19.01 million/year

Local Property Tax Revenue:

- \$20.76 million/year

Construction Phase:

- 11,471 new jobs
- \$1.3497 B to local economies

Operational Phase:

- 1,805 new long-term jobs
- \$151.9 M/yr to local economies



Indirect Impacts

Construction Phase:

- 4,989 new jobs
- \$424.4 M to local economies

Operational Phase:

- 438 local jobs
- \$42.9 M/yr to local economies

Induced Impacts

Construction Phase:

- 6,223 new jobs
- \$559.4 M to local economies

Operational Phase:

- 850 local jobs
- \$76.4 M/yr to local economies

Totals (construction + 20 yrs)

Total economic benefit = \$7.758 billion

New local jobs during construction = 22,683

New local long-term jobs = 3,093

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

CONSUMER BENEFITS

"Our customers have enjoyed the benefit of the Elk River wind farm since we began receiving test energy last October," said Brad Beecher, vice president-energy supply, The Empire District Electric Company. "During the two and one-half months of 2005 when energy was available, Elk River provided...power at a cost about 64 percent lower than we would have paid for purchased power from the market. That drove a reduction in costs of about \$3.3 million."

The energy generated by Elk River (Kansas) is sold to Empire District Electric Company (Joplin, MO).

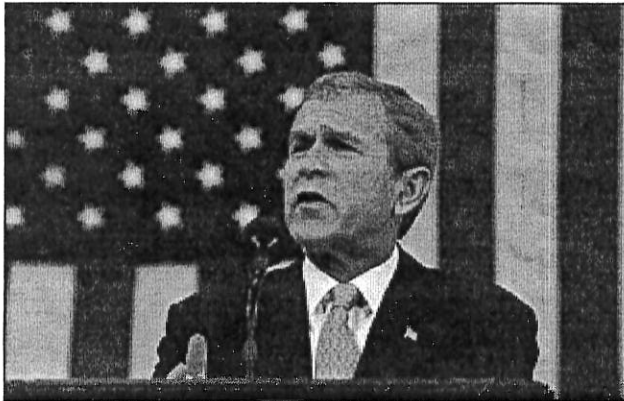
"In the first quarter of 2006, a period when the plant was fully commercial, Elk River...contributed an estimated savings of about \$4.2 million."

GROWING VALUE OF RENEWABLES

- THE NUMBER OF STATE RENEWABLE PORTFOLIO STANDARDS IS INCREASING
- A NATIONAL RPS IS A REAL POSSIBILITY
- CARBON RESTRICTIONS ARE SEEN BY MANY AS INEVITABLE
- MANY CONSUMERS ARE WANTING ACCESS TO RENEWABLE ENERGY

A NEW VISION FOR WIND ENERGY IN THE U.S.

2-13



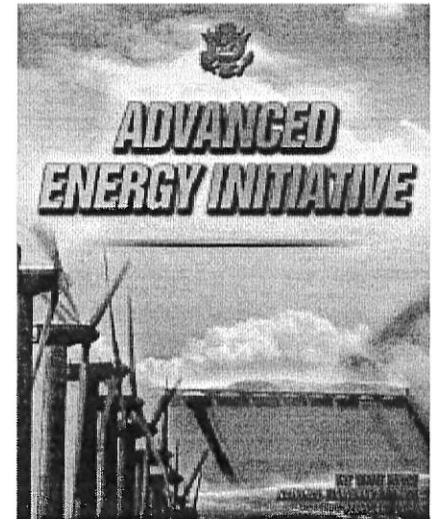
White House photo by Eric Draper

State of the Union Address

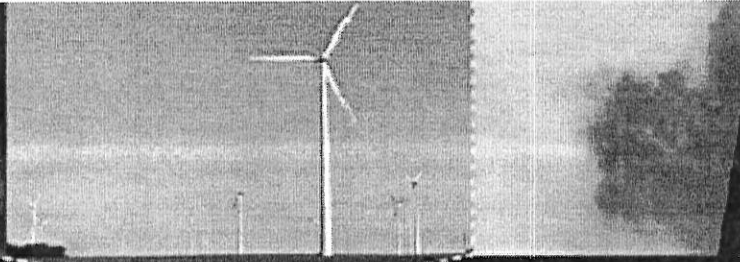
“...We will invest more in ...
revolutionary and...wind
technologies”

Advanced Energy Initiative

“Areas with good wind resources have
the potential to **supply up to 20% of
the electricity** consumption of the
United States.”



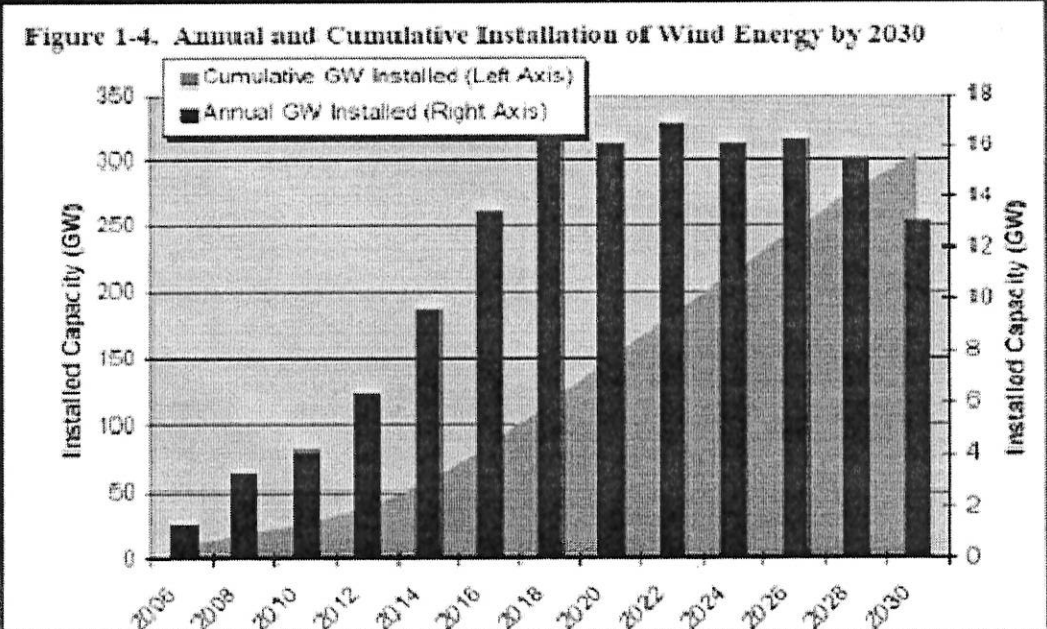
2-14



AWEA 20% Goal: 304 GW by 2030

20% wind will:

- reduce electric sector CO2 output by 25%
- reduce electric sector water use by 8%
- reduce natural gas consumption by 11%
- support nearly 500,000 jobs, often in rural areas
- generate >\$500million/year to landowners
- generate >1 billion/year in local property taxes



“Areas with good wind resources can provide up to 20 percent of U.S. electricity.”
- George Bush, Spring '06

Source: The National Wind Energy Initiative

More than 7,000 MW in Kansas would contribute to the 20% wind scenario in a near-complete report by the U.S. Department of Energy, American Wind Energy Association, Black and Veatch and the National Renewable Energy Laboratory. The draft report shows wind in Kansas as bringing an estimated:

- **\$19 million per year to landowners,**
- **\$1.3 billion to local economies** during the construction phase, and
- **1,805 new long term jobs.**

Wind Generation with Interconnection Agreements and Under Study

2-16

Kansas: 6,653 MW

Missouri: 700 MW

New Mexico: 650 MW

Oklahoma: 3,449 MW

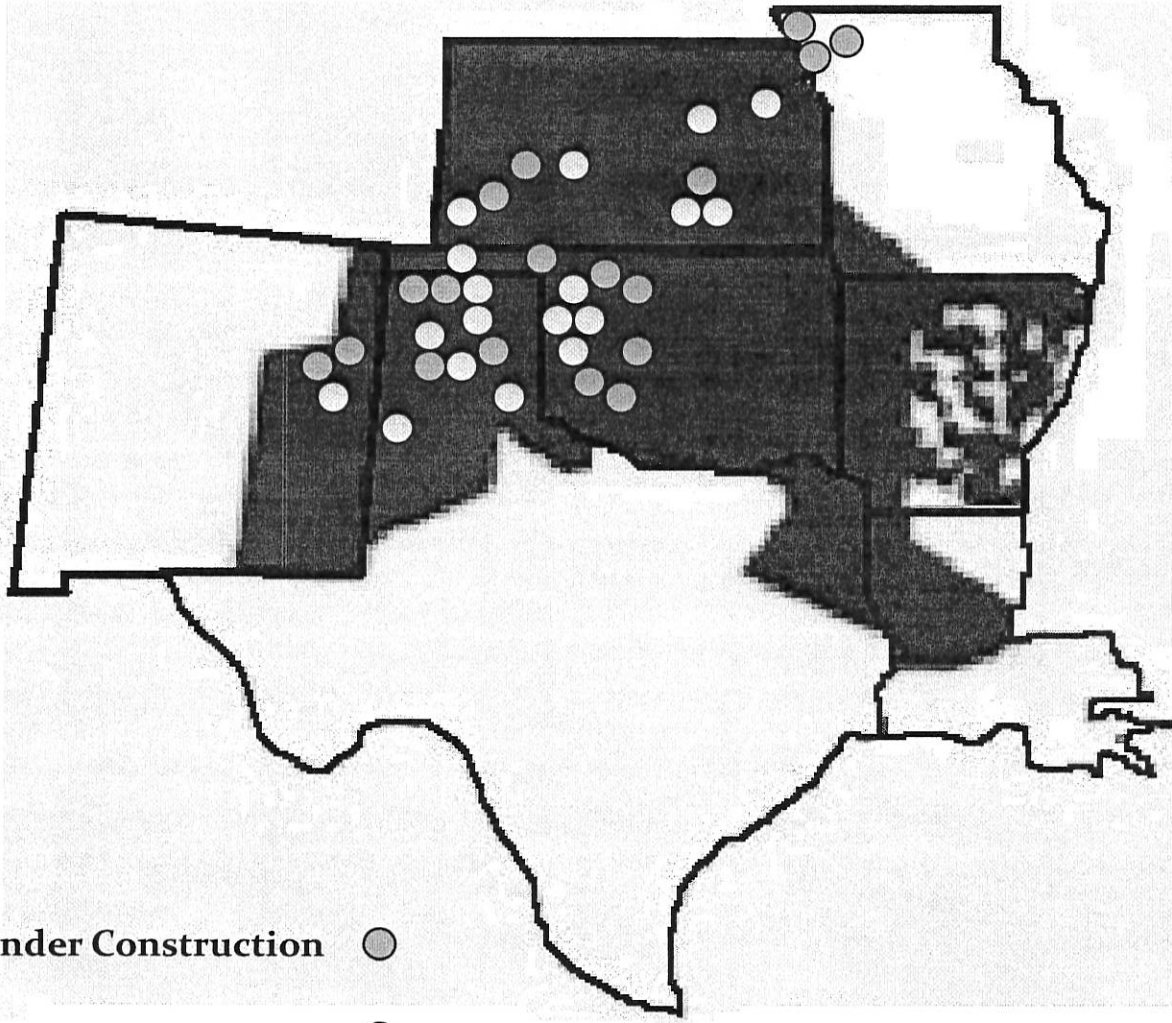
Texas: 4,786 MW

Total: 16,238 MW

Requires major transmission construction

Wind Project Locations in the SPP

2-17



Existing or Under Construction ●

Signed IA's ○

More transmission in Western SPP grid or it may approach the limit of wind power it can support as soon as this year.

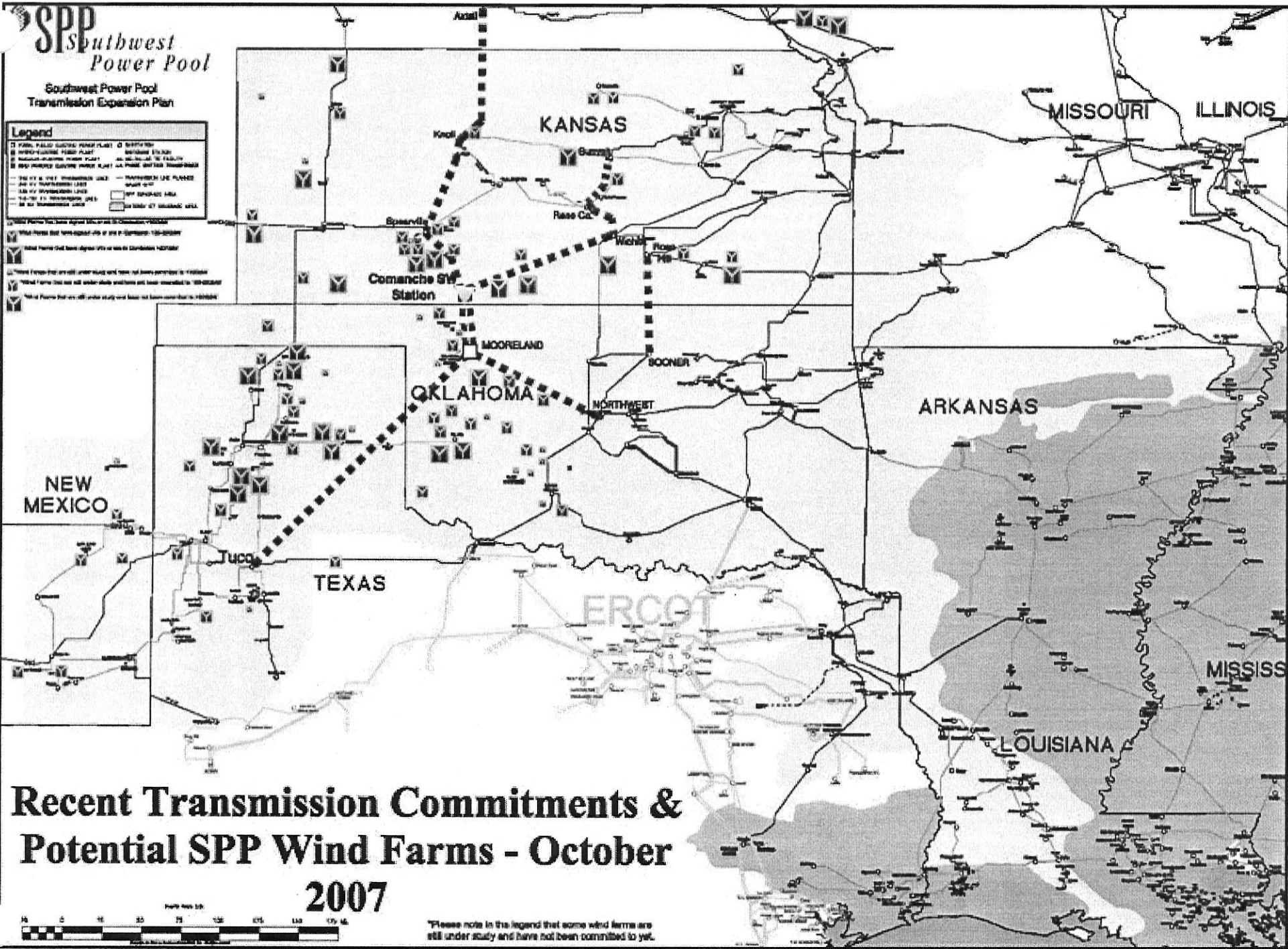
SPP Southwest Power Pool

Southwest Power Pool
Transmission Expansion Plan

Legend

- FARM FIELD LOCATED POWER PLANT
- WIND-FARMING POWER PLANT
- HYDRO-ELECTRIC POWER PLANT
- 500 KV POWER LOCATED POWER PLANT
- 765 KV HVDC TRANSMISSION LINE
- 500 KV TRANSMISSION LINE
- 345 KV TRANSMISSION LINE
- 230 KV TRANSMISSION LINE
- 138 KV TRANSMISSION LINE
- 69 KV TRANSMISSION LINE
- TRANSMISSION LINE PLANNED
- 500 KV TRANSMISSION LINE
- 345 KV TRANSMISSION LINE
- 230 KV TRANSMISSION LINE
- 138 KV TRANSMISSION LINE
- 69 KV TRANSMISSION LINE
- SPP SERVICE AREA
- STATE OF OKLAHOMA

Wind farms that have signed contracts to SPP are shown in green.
 Wind farms that have signed contracts to ERCOT are shown in yellow.
 Wind farms that have signed contracts to other utilities are shown in grey.
 Wind farms that are still under study and have not been committed to yet are shown in white.



Recent Transmission Commitments & Potential SPP Wind Farms - October 2007



*Please note in the legend that some wind farms are still under study and have not been committed to yet.

System Stability

2-19

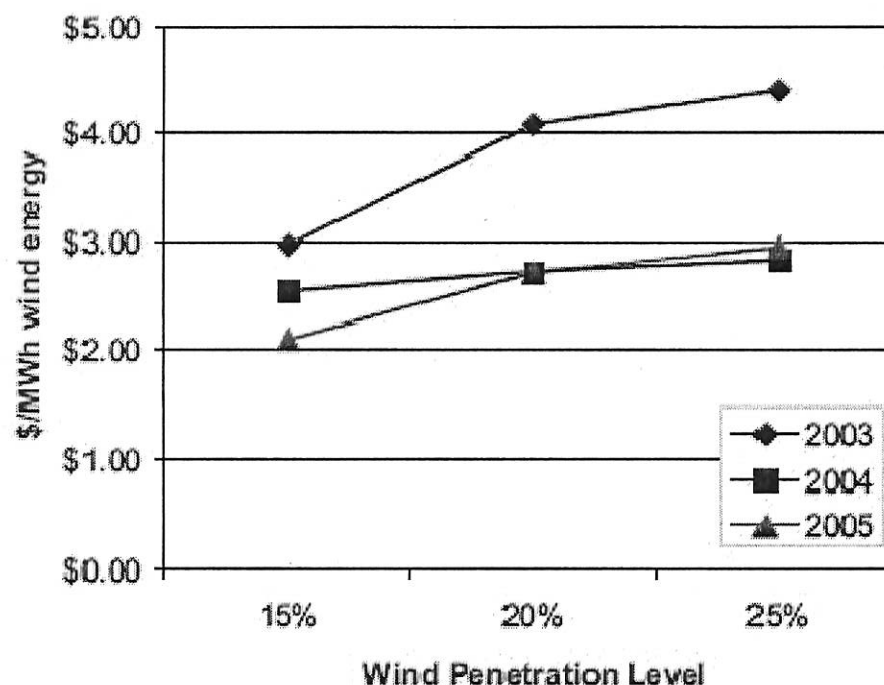
Wind energy is playing an increasingly important role in enhancing electric system stability and reliability. For example, in Colorado, Xcel Energy reports that its northern Colorado wind resources are adding great value by providing substantial production during winter nights, when Xcel would otherwise be challenged to keep gas deliveries balanced at reasonable cost for heating customers and electric projection, given the company's (and the West's) tight gas storage situation.

2-20

Operating Cost Impacts

The total wind integration operating cost ranges from a low of \$2.11 to a high of \$4.41 per MWh of wind generation delivered to Minnesota utilities

All-in operating cost (includes regulation, load following, unit commitment, uncertainty & variability)



TRANSMISSION CONSTRAINTS

- **If SPP adopts the right policies for construction of new transmission, Kansas can take advantage of its economic opportunity in wind development – and have energy to export – but needs transmission to access the best resources. The cost for transmission is relatively small, representing about 6% of the average residential electric bill. New transmission is critical to allowing for a balanced portfolio of electric options including wind – competitively priced among all new energy choices.**
- **Of the 1,725 MW of wind in the SPP interconnection queue for Kansas, 775 MW are on suspension due to lack of access to the market. More than 5,000 MW are in the study process.**

Cost Allocation

- **The current Cost Allocation Methodology (CAM) used in SPP is detrimental to wind development**
- **The CAM for reliability upgrades adopted previously by SPP often disqualifies new wind generation facilities from cost sharing making construction unlikely**
- **There is currently no cost allocation method in SPP for economic upgrades. Discussions are underway that would improve this situation. Help is needed!**

Cost Allocation

- **The Regional State Committee (RSC) will be presented with a white paper on cost allocation for economic upgrades at this month's meeting in Austin, Texas. The proposal allocates costs for projects that qualify on a postage stamp basis. The RSC has the authority to decide the CAM to be filed by SPP. Commissioner Michael Moffitt is the board member from Kansas on the RSC.**
- **It is very important that the determination of what projects qualify not be too narrowly defined**

Cost Allocation

- **Larry Holloway the Kansas Staff Representative to the CAWG proposed that the current method of determining the reliability projects that qualify for cost allocation be re-examined for wind**
- **Cost allocation for backbone transmission projects such as those found in the SPP EHV study that are important to the development of wind resources need to be addressed**

2-25

**THE WIND COALITION
THANKS YOU**

Steve Gaw

RSGAW1@cs.com

573-896-6888

Promoting Wind for Kansans

Mark Lawlor
Horizon Wind Energy

Kansas Senate Committee on Utilities

Jan. 22, 2008



Horizon Wind Energy

Who We Are

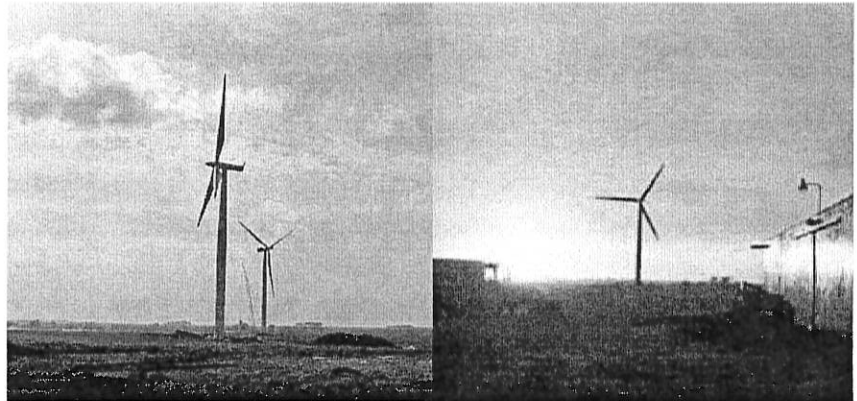
- Horizon Wind Energy develops, constructs, owns and operates wind farms throughout the U.S. Acquired by Energias de Portugal (EDP) in 2007.
- Headquartered in Houston with regional offices in New York, Oregon, California, Oklahoma, Kansas, Colorado, Minnesota and Illinois
- Over 200 employees
- Have developed over 2000 MW of operating wind farms and own over 1300 MW
- Constructing Meridian Way Wind Farm in Cloud County, Kansas in 2008. The project will be a 201MW wind farm providing renewable energy to Westar Energy and Empire District Elec. Co.

Key Projects We've Done



Blue Canyon Wind Farm
225 MW, near Lawton OK

Maple Ridge Wind Farm
322 MW, Lewis County NY



Prairie Star
101 MW, Mower County MN

Twin Groves
396 MW, McLean IL

Kansas – Economic Impacts ³⁻³

from 1000 MW of new wind development

Wind energy's economic "ripple effect"

Direct Impacts

Payments to Landowners:

- \$2.7 million/year

Local Property Tax Revenue:

- \$2.9 million/year

Construction Phase:

- 1602 new construction jobs
- \$188.5 M to local economies

Operational Phase:

- 252 new long-term jobs
- \$21.2 M/yr to local economies



Indirect & Induced Impacts

Construction Phase:

- 1566 new jobs
- \$137.5 M to local economies

Operational Phase:

- 180 local jobs
- \$16.7 M/yr to local economies

Totals

(construction + 20yrs)

Total economic benefit =

\$1.08 billion

New local jobs during

construction = 3168

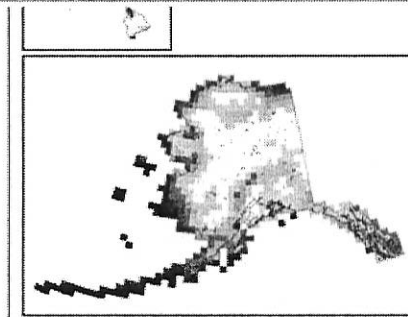
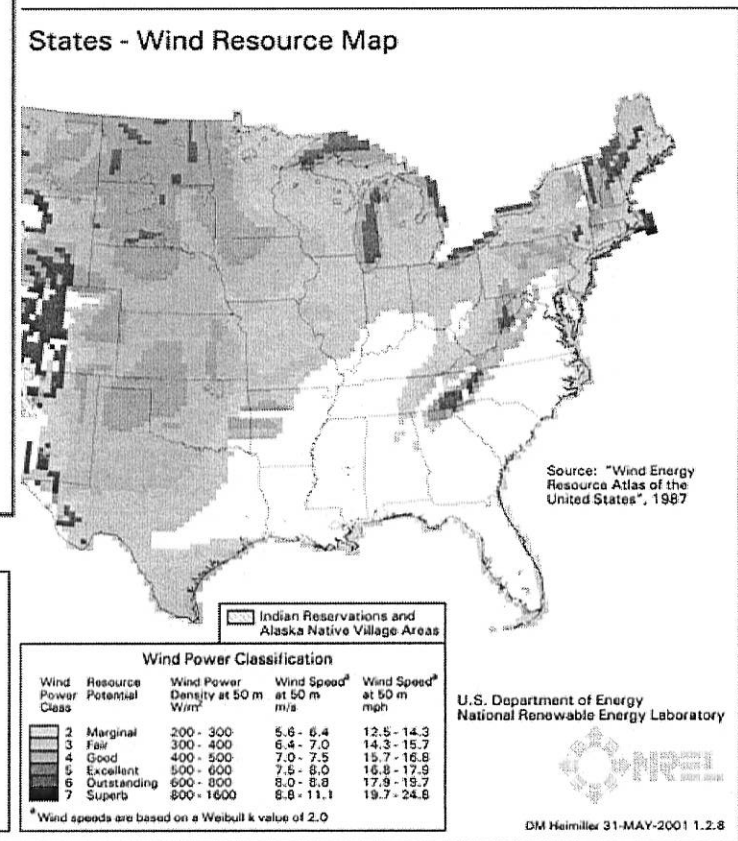
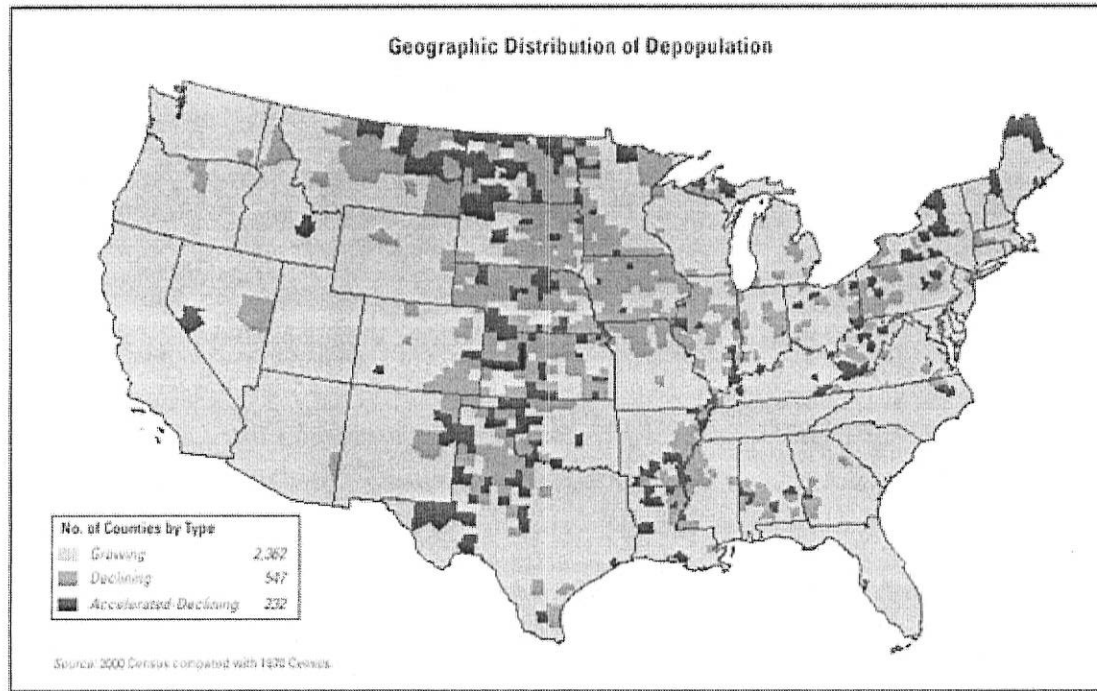
New local long-term jobs

= 432

Construction Phase = 1-2 years

Operational Phase = 20+ years

Windy Rural Areas Need Economic Development ³⁻⁴



Regulatory Issues

3-5

- Incentive Return
 - Legislature should revisit KSA 66-117(e) and clarify the incentives provided to utilities for new renewable energy sources
 - Utilities should be allowed to earn a return on Power Purchase Agreements (PPA)

Regulatory Issues

- Efficiency Standards for Wind Facilities
 - Current KCC ruling results in significant regulatory uncertainty and burden
 - KCC can ensure certain facilities are properly managed without these additional requirements

Promotion of Wind

3-7

- KS Legislature should adopt measures that promote new wind projects to ensure economic benefits serve Kansas and are not lost to neighboring states:
 - Siting guidelines must encourage wind
 - Maintain property tax exemption
 - Provide regulatory certainty
 - Promote new transmission



Senate Committee on Utilities

22 January, 2008

Krista Gordon
Iberdrola Renewable Energies USA



Status of Permitting in Kansas



- State Siting Guidelines adopted in 2005
 - Local control is key
- Regulations differ from county to county



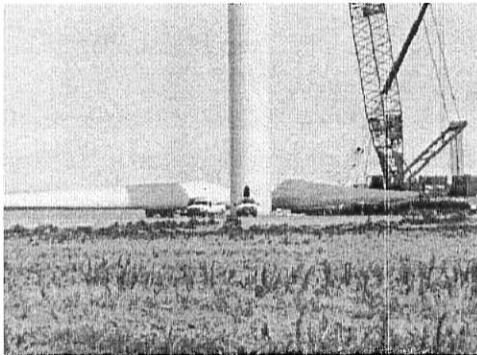
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Common Issues



Road agreement

- Maintenance
- Drainage control
- Snow removal
- Improvements



Decommissioning

- Removal of structures
- Financial security

PILOT

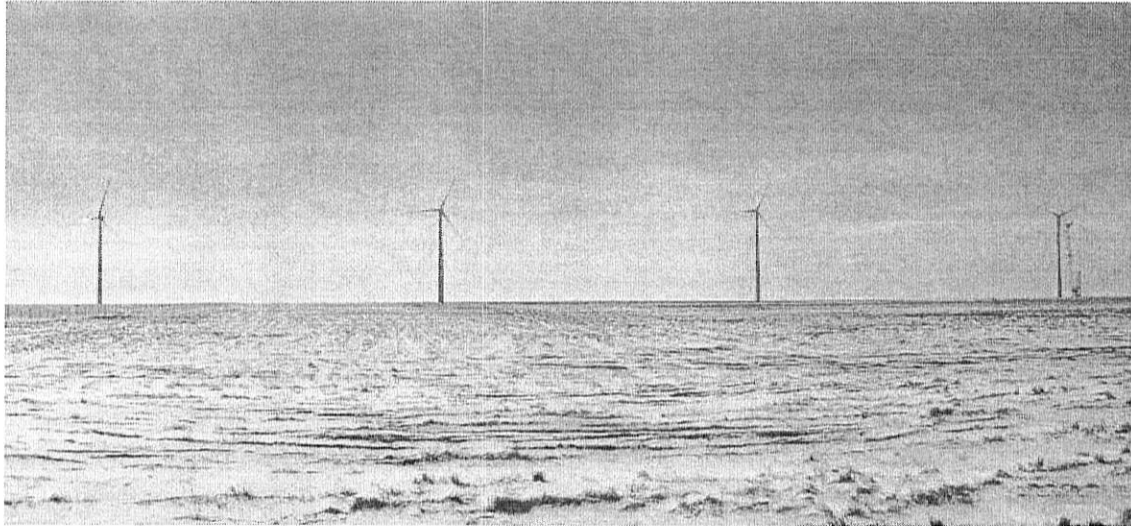
- County and/or school funds
- Determination of amount and # of years





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Community Wind



“It’s the greatest thing that has happened to this area, and it’s a blessing to Prowers County and Southeast Colorado.”

- Leroy Mauch,
Prowers County
Commissioner

Colorado Green Success Story

- Large project enabled the small project
- 6MW for Lamar, CO and 1.5MW for Springfield, CO
- Vast community support

Photo from Lamar Light & Power

Community Wind – Key Issues

- Local wind resource
- Ownership structure
- Financing
- Turbine purchase
- Offtake
- State / federal support
- www.dsireusa.org



Rosebud Sioux Wind Turbine

Upcoming event:
Windustry's "Community Wind Energy 2008"
April 14-16 in Albany, NY

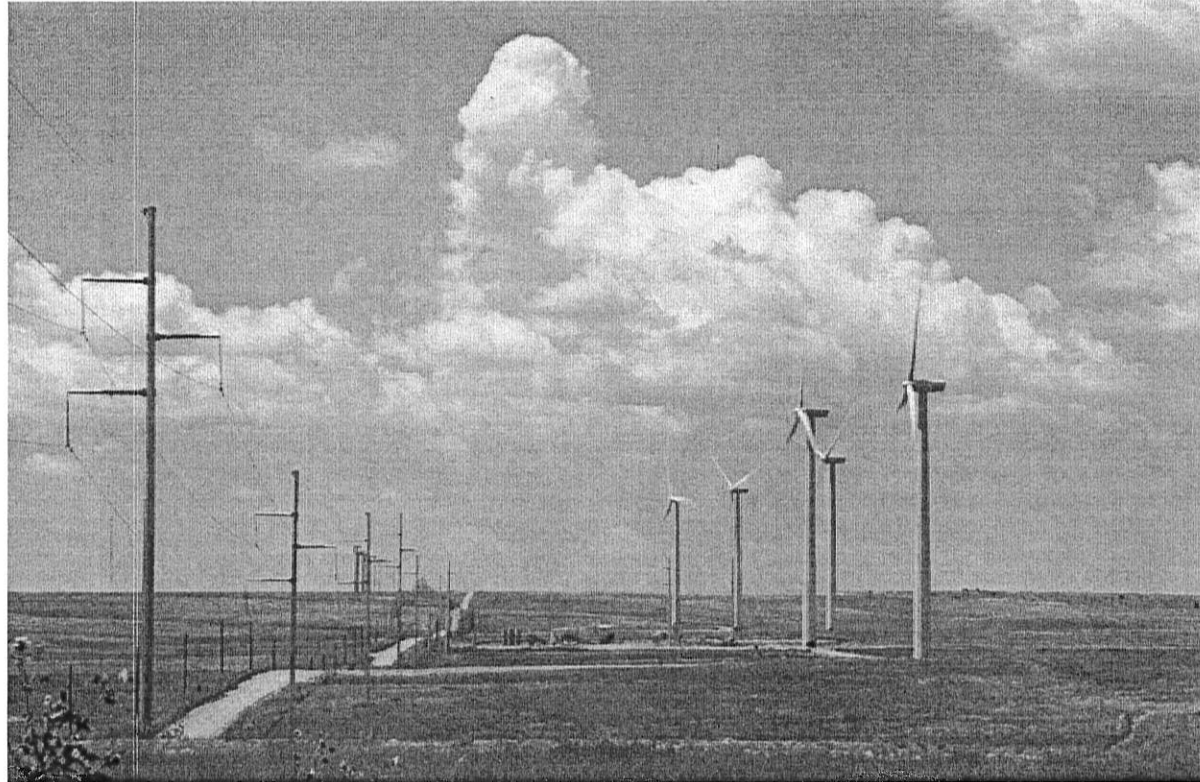


Photo from Native Energy



Transmission Opportunities

- KETA
- SPP
- X-Plan





IBERDROLA



Contact Info

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Email: kgordon@iberdrolausa.com

Clipper Windpower

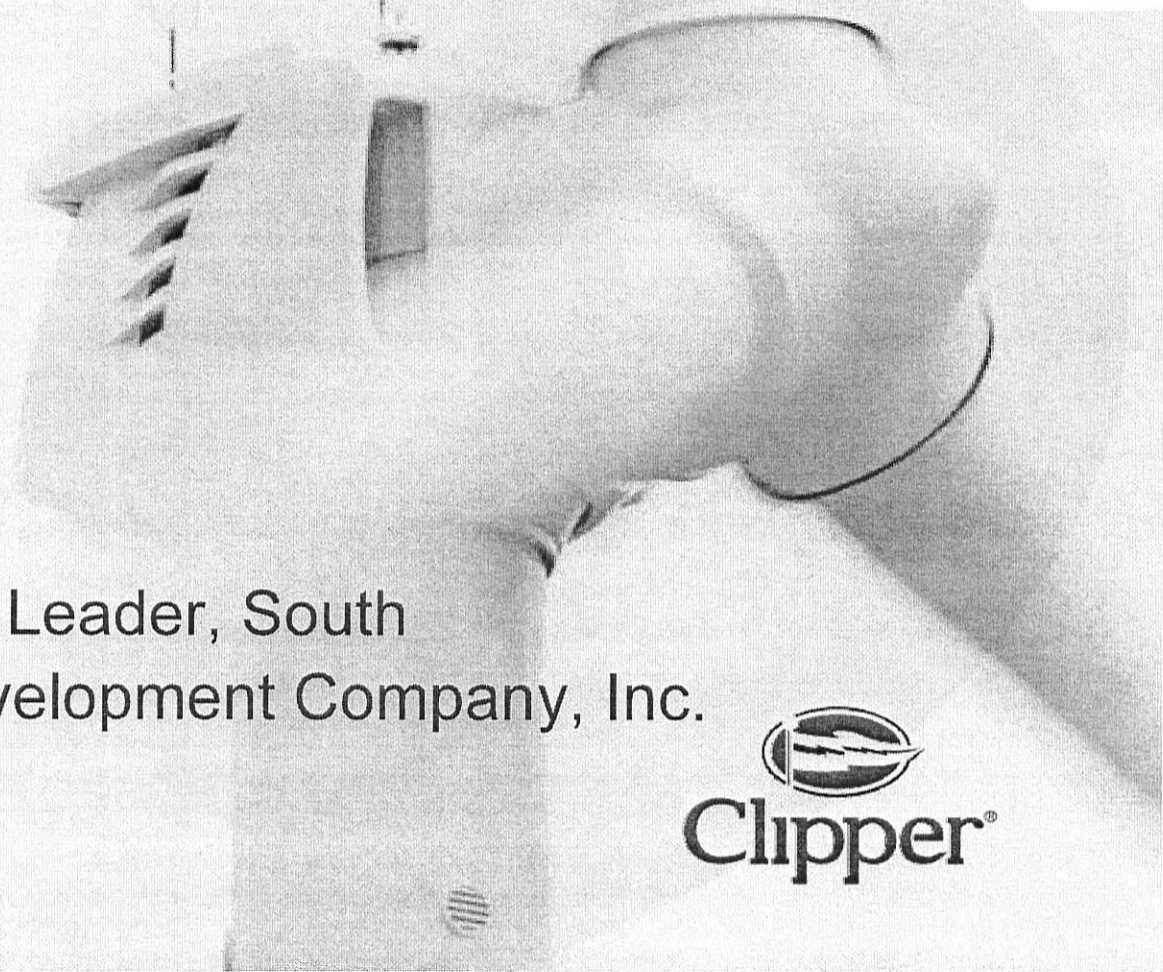
Presentation to the Kansas Senate Committee on Utilities

January 22, 2008

Zeina El-Azzi

Regional Development Leader, South

Clipper Windpower Development Company, Inc.



Clipper Overview



- Formed in 2000
- Headquarters:
 - Carpinteria, California, USA
 - Denver, Colorado, USA
 - London, United Kingdom (Europe)
- Wind Turbine Assembly: Cedar Rapids, Iowa, USA
- Publicly traded on the London AIM market
- Liberty 2.5 MW turbine series
 - C-89
 - C-93
 - C-96
 - C-99

Clipper's Long Term Commitment to Kansas

- Developing the Greensburg Wind Farm for 6 ½ years.
- Have been working with Westar to build the Greensburg Wind Farm, and were within days of resuming negotiations with Westar when the KCC ruling came down.
- The impact of the ruling has caused Westar to rethink its plans to move forward with the Greensburg Wind Farm.

5-4

Potential Wind Development in Midwest

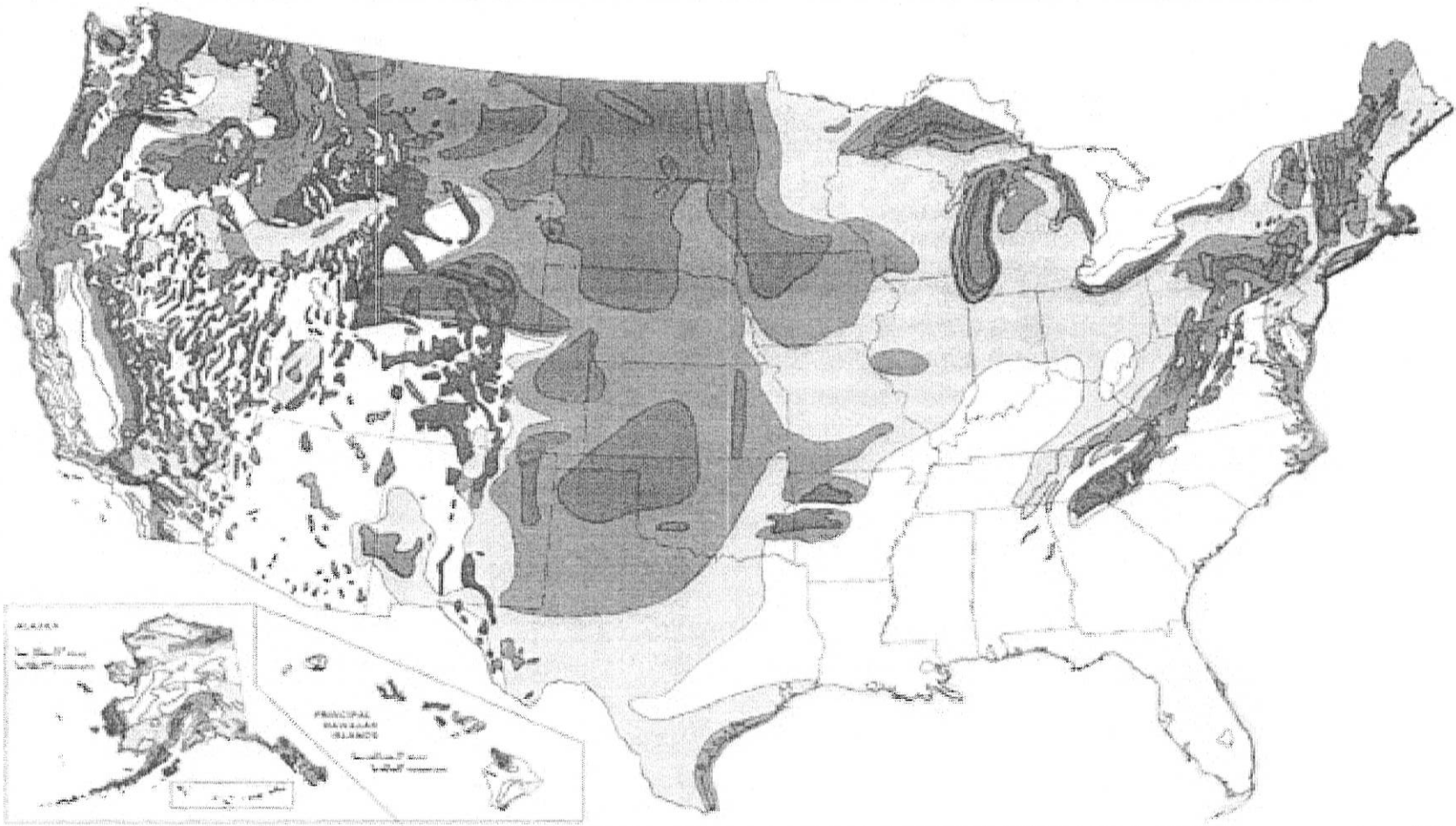
	10% in 2010	20% in 2020	25% in 2525
Illinois*	2,538	6,499	9,191
Indiana	3,725	9,535	13,486
Iowa	1,681	4,303	6,085
Kansas	1,037	2,656	3,756
Minnesota	2,410	6,171	8,727
Missouri	3,335	8,538	12,075
Nebraska	904	2,316	3,275
North Dakota	273	698	987
South Dakota	202	517	731
Wisconsin	<u>2,592</u>	<u>6,635</u>	<u>9,384</u>
Total	18,697	47,868	67,697

Assumes total retail sales and 2.5% annual load growth

* Assumes 50% bundled sales

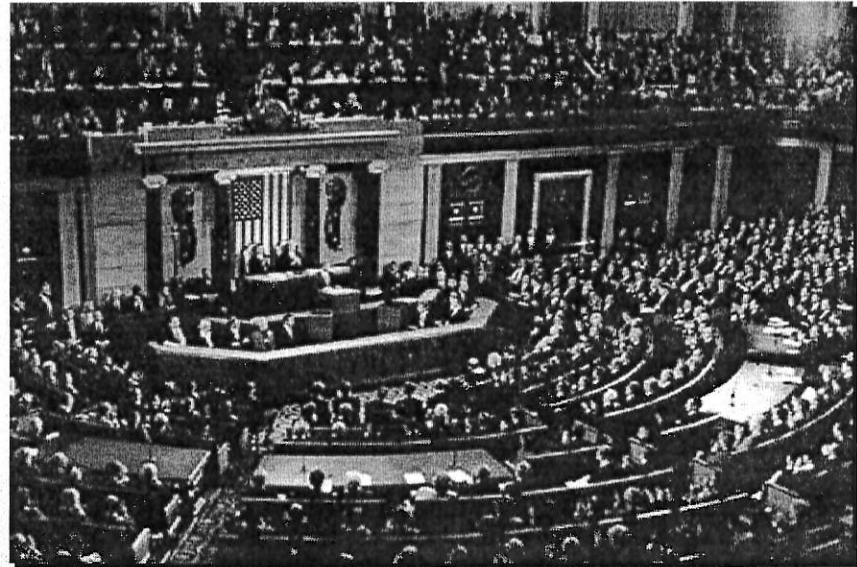


Plentiful Wind



Governmental Support for Wind

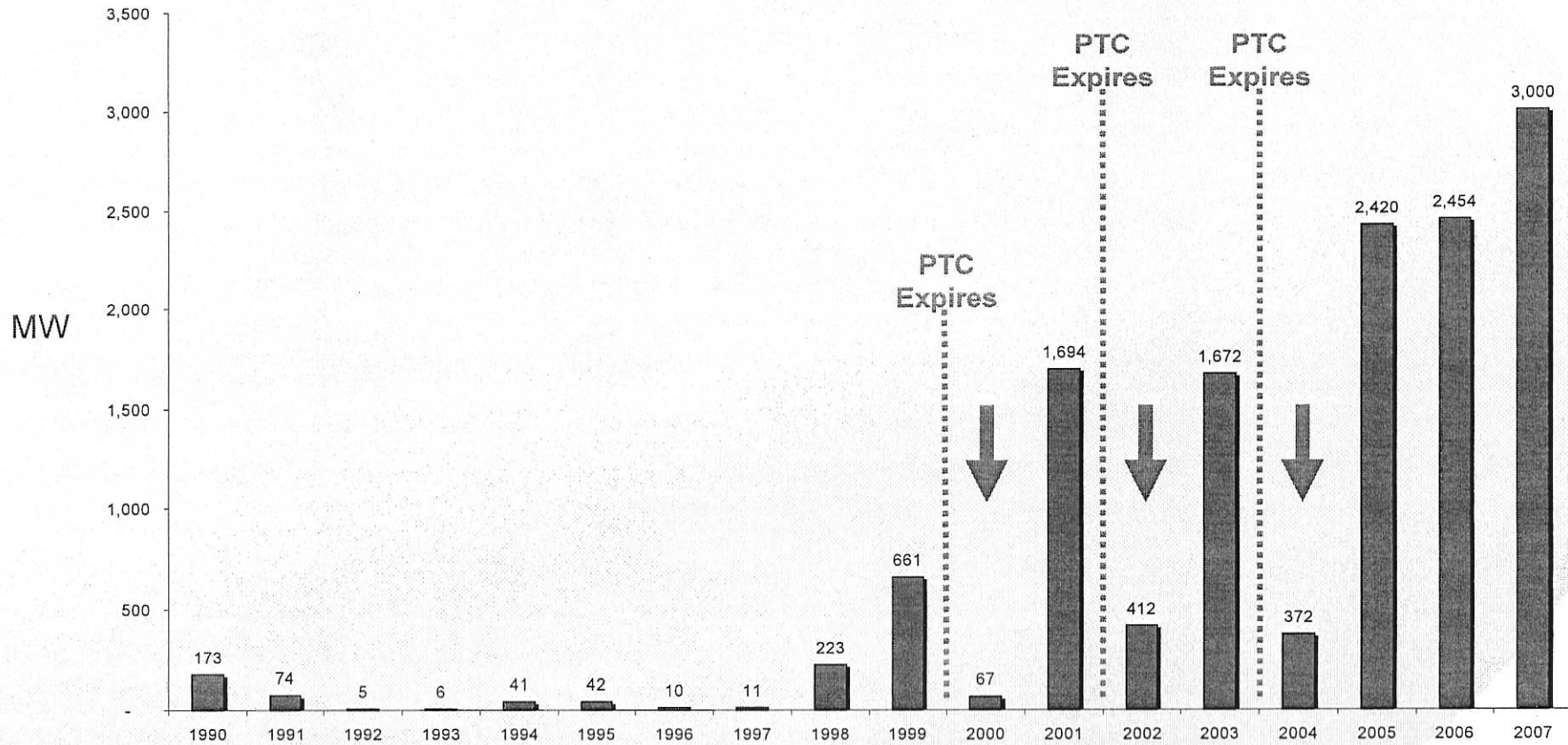
- Federal Tax Incentives (PTC)
- Renewable Electricity Standards (State Level)
- Transmission!
Transmission!
Transmission!
- Removing Barriers to Entry



1-5

If the policies are unstable... then the market is uncertain

U.S. Annual Wind Energy Installations

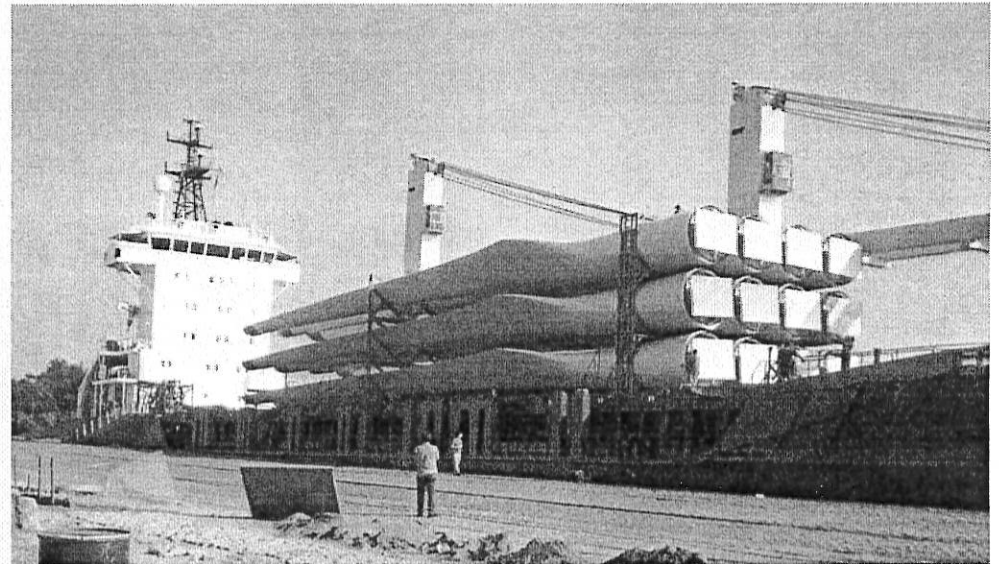


U.S. – PTC Boom & Bust

Uncertainty limits new capital investment...

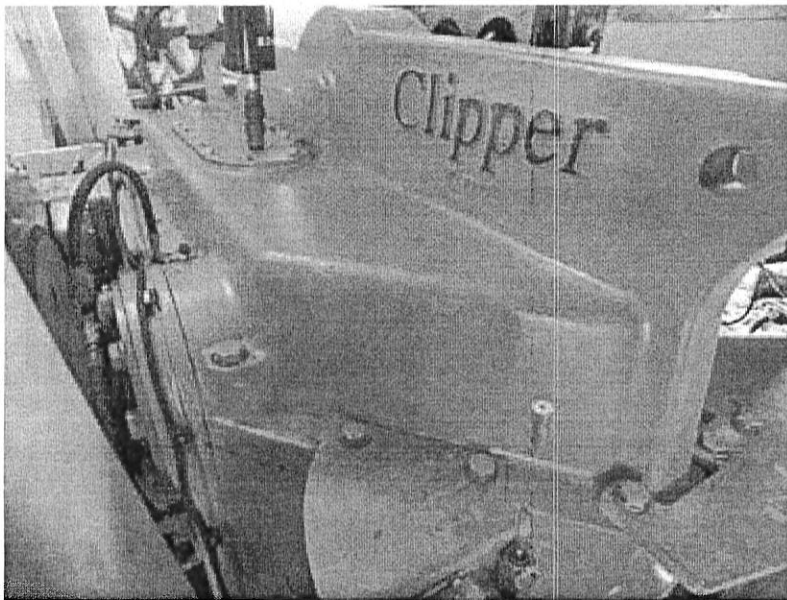
Component suppliers difficult situation:

- Boom and bust US market
 - Ramp up, ramp down
 - Hire and lay off
- Investment in plant and equipment is artificially limited
- Foreign suppliers with stable home markets are advantaged



Wind Turbine Supply Chain

Limitations on Key Components...



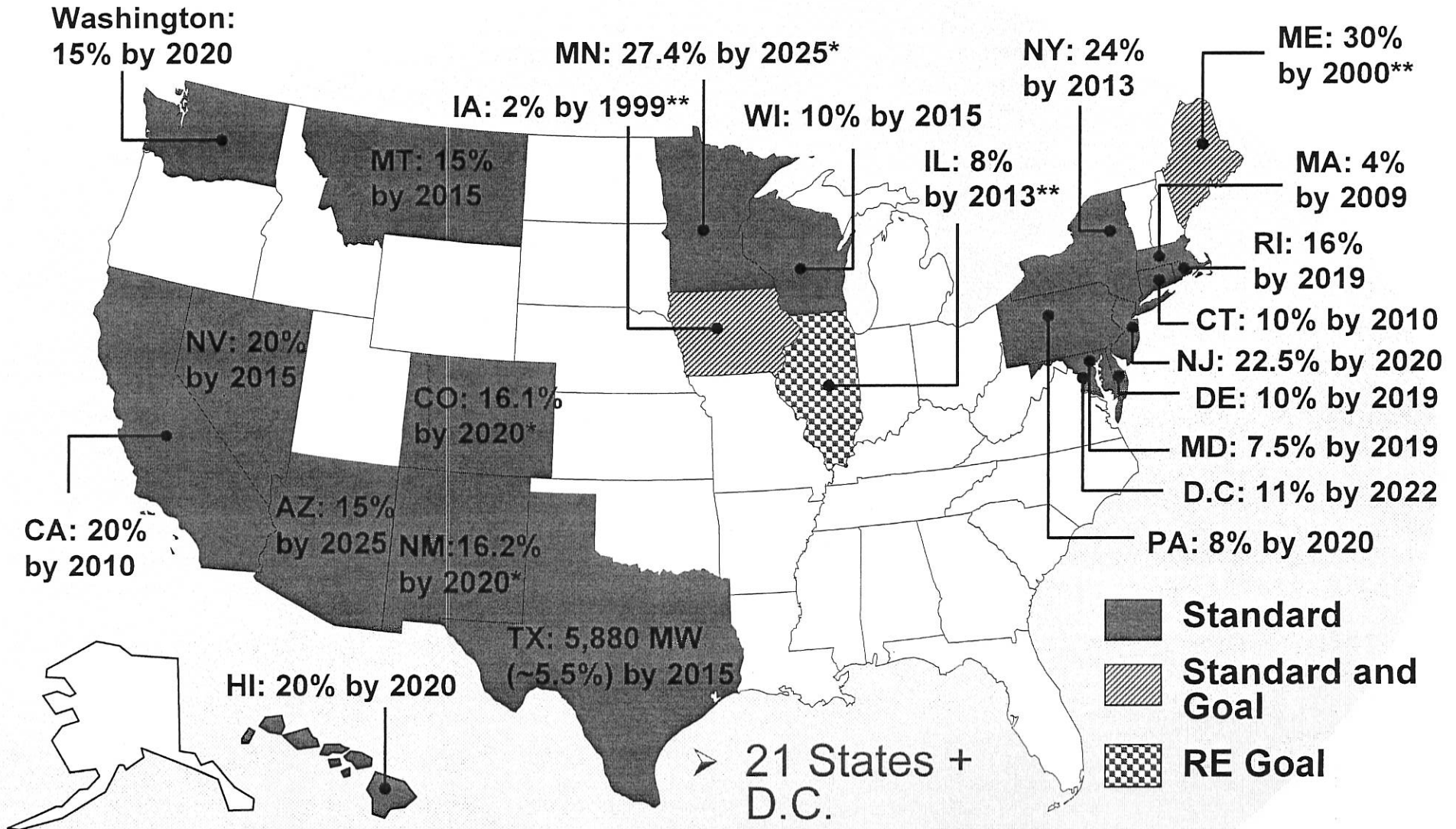
- Large steel castings
 - Bedplate, hub, gearbox housing
- Specialized steel parts
 - Large speed increasing gears
 - Large forged drive shaft
 - Large bearings
- Blades and towers
 - Very large, costly to move
 - Transport costs up
- World wide supply capacity has limits
 - Increasing supply is capital intensive / long lead time cycle

Bringing Wind Turbine and Component Manufacturing to Kansas

How does Kansas attract wind turbine and wind component manufacturers?

- 1) Markets!
- 2) Legislative Support and Leadership
- 3) Utility Leadership

Renewable Electricity Standards



*MN has a 30% by 2020 standard for Xcel Energy, and a 25% by 2025 standard for all other utilities. CO and NM have a 20% by 2020 standard for investor-owned utilities, and a 10% by 2020 standard for other utilities.

**In addition to their requirements, IA has a 1,000 MW (~10%) by 2010 goal, and ME has a 10% new resources by 2017 goal. IL has a Renewable Energy goal, with no specific enforcement measures.



Union of
Concerned
Scientists

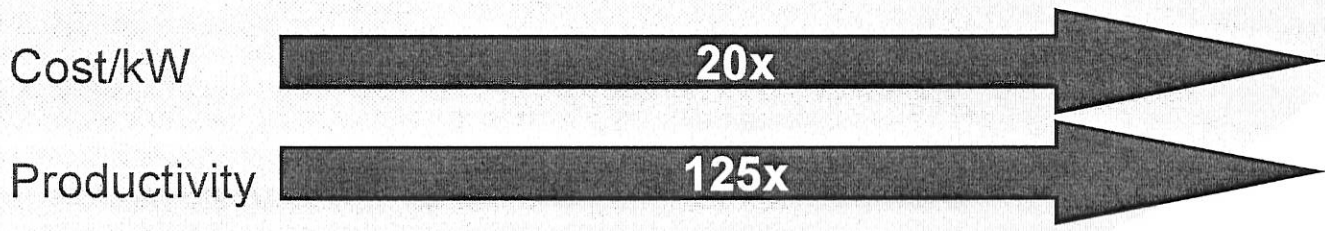
5-12

20 Years of Wind Technology Development

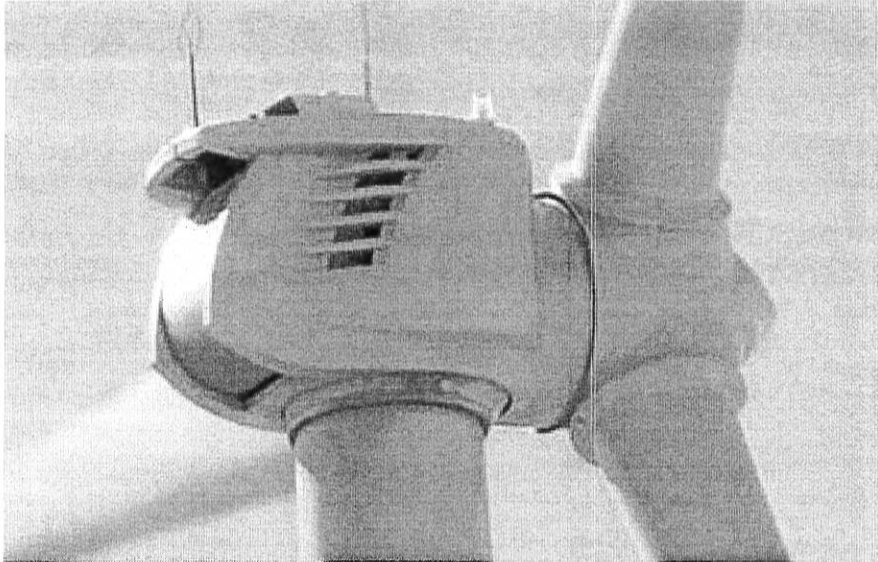
Rotor Diameter Drives Down Wind Cost



	<u>1981</u>	<u>1985</u>	<u>1990</u>	<u>1996</u>	<u>1999</u>	<u>2002</u>	<u>2006</u>
Rotor (feet)	33	55	88	130	163	250	312
kW	25	100	225	550	750	1,500	2,500
MWh	45	220	550	1,480	2,200	5,600	8,760



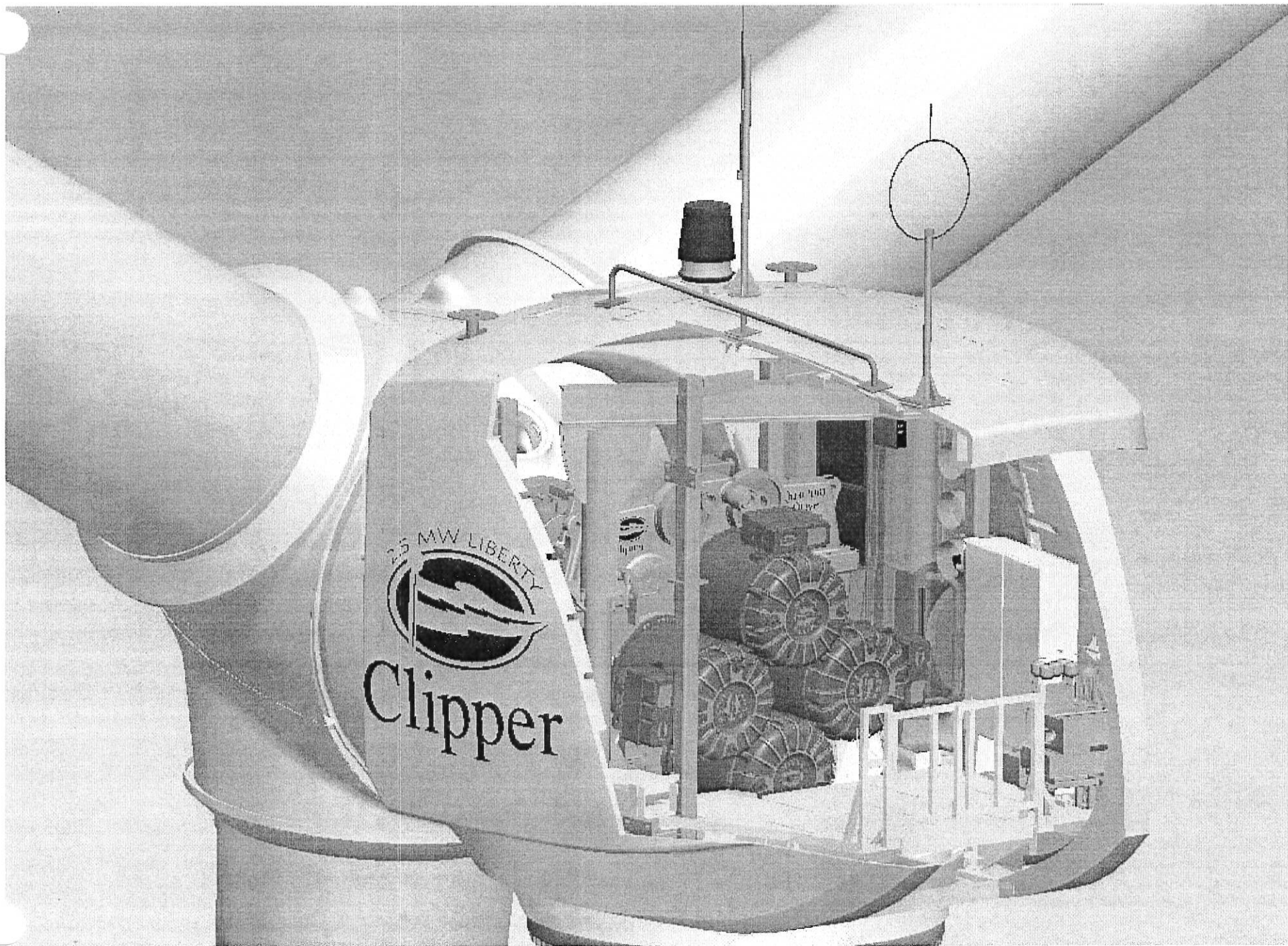
The Liberty 2.5 MW Series Wind Turbine



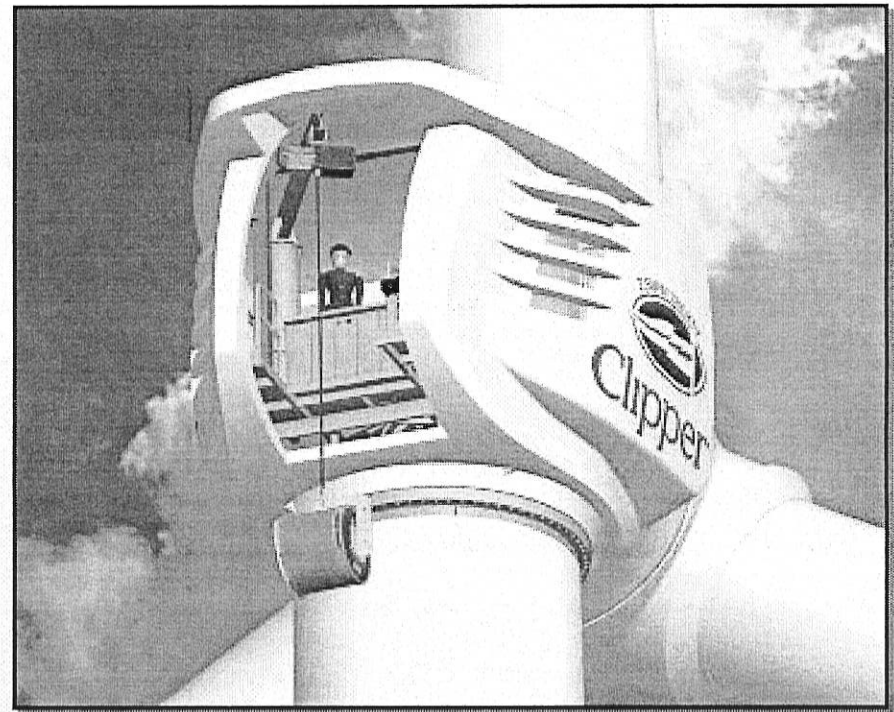
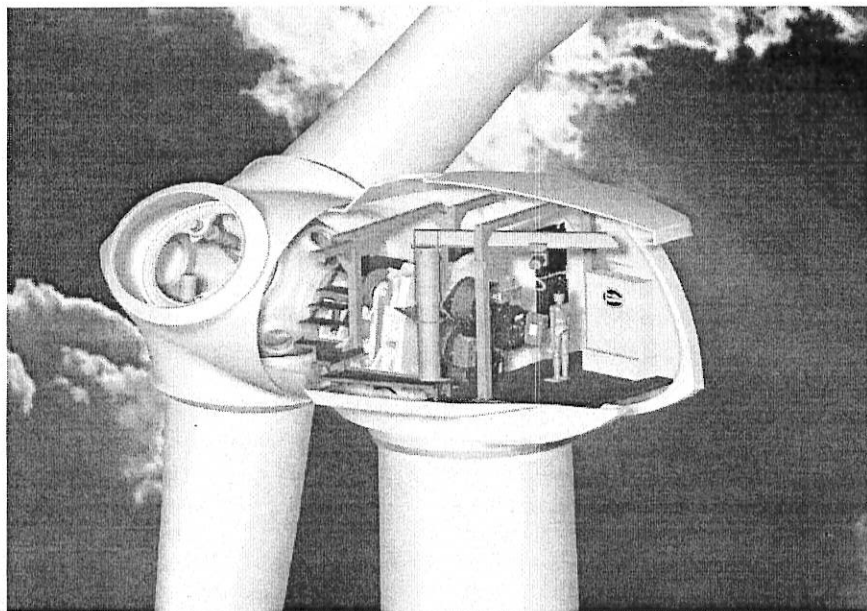
Based on the average U.S. Energy mix, 1 Liberty turbine can...

- Serve the annual needs of over 800 homes
- Provide the yearly benefit of planting 1800+ acres of forest
- Offset 10.8 million pounds of carbon dioxide yearly

If oil were burned to produce the same amount of fuel each year, 14,000 barrels would be needed.



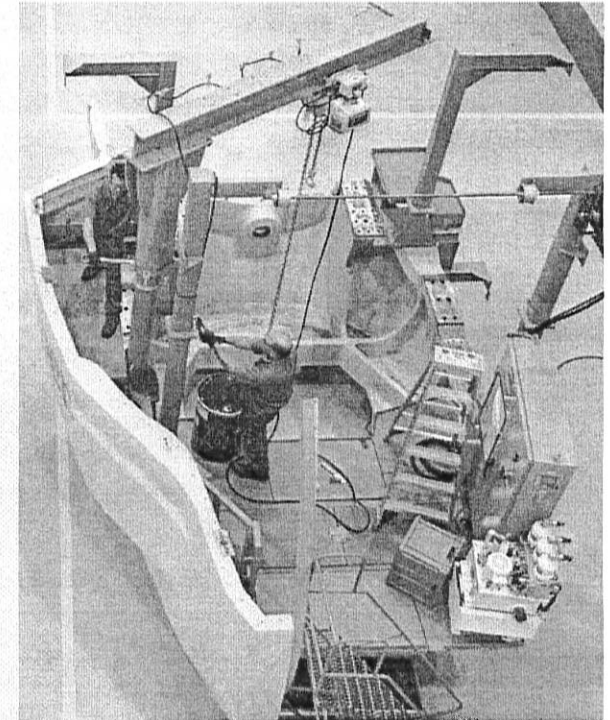
Rolldown Hatch and 2-Ton Jib Crane



Wind Turbine Supply Chain

Strong supply chain, but not adequate for current demand

- Turbine supply growth is constrained due to the architecture of current wind turbines
 - Very large steel castings
 - Large forged shafts and gears
 - Highly loaded gearbox designs
- World wide supply capacity has limits
 - Increasing supply is capital intensive / long lead time cycle

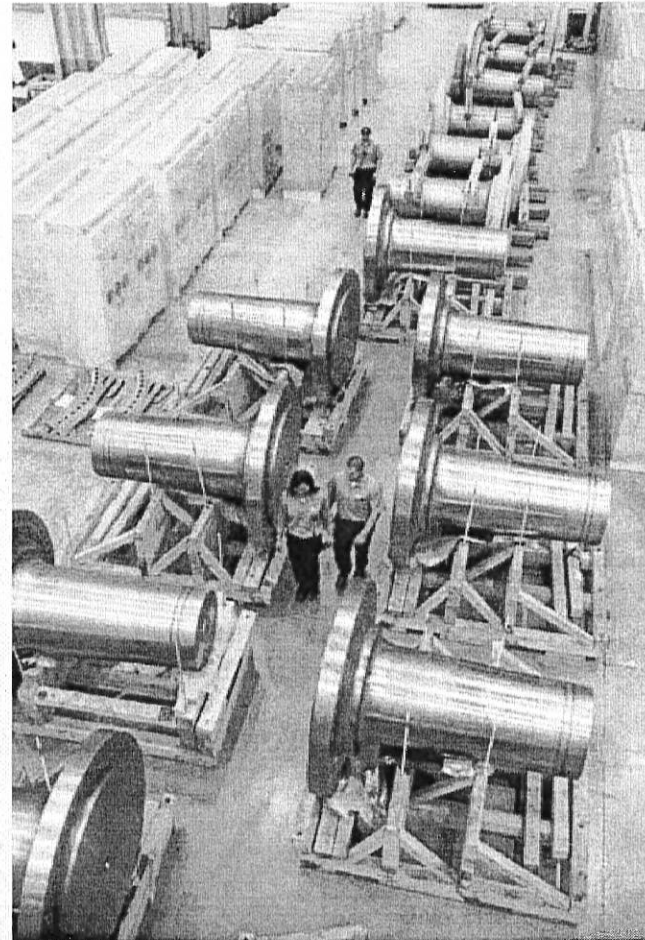
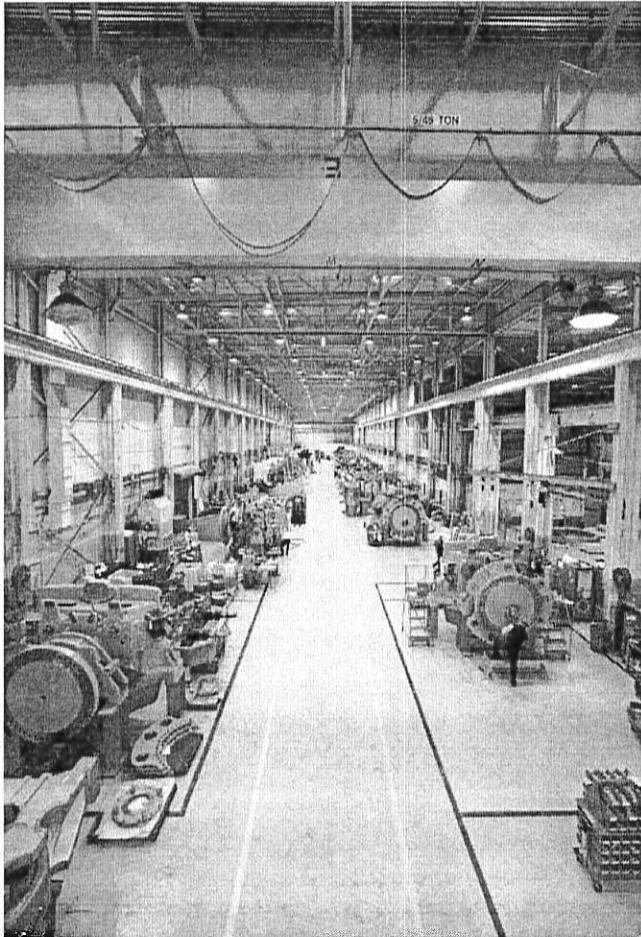


Clipper Manufacturing Cedar Rapids, Iowa

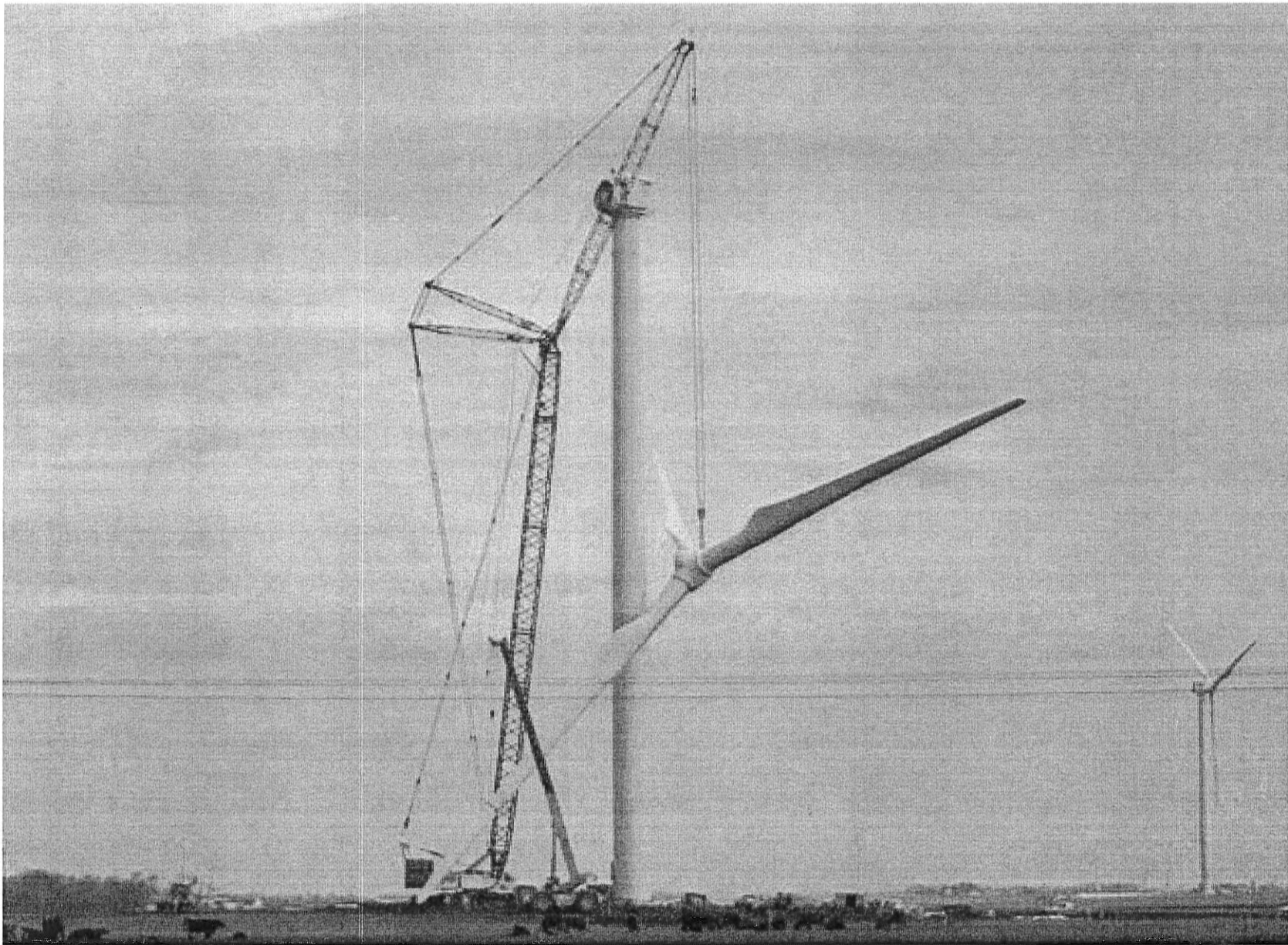
5-17



Clipper Manufacturing Cedar Rapids, Iowa



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Clipper Windpower, Inc.

 Clipper®