

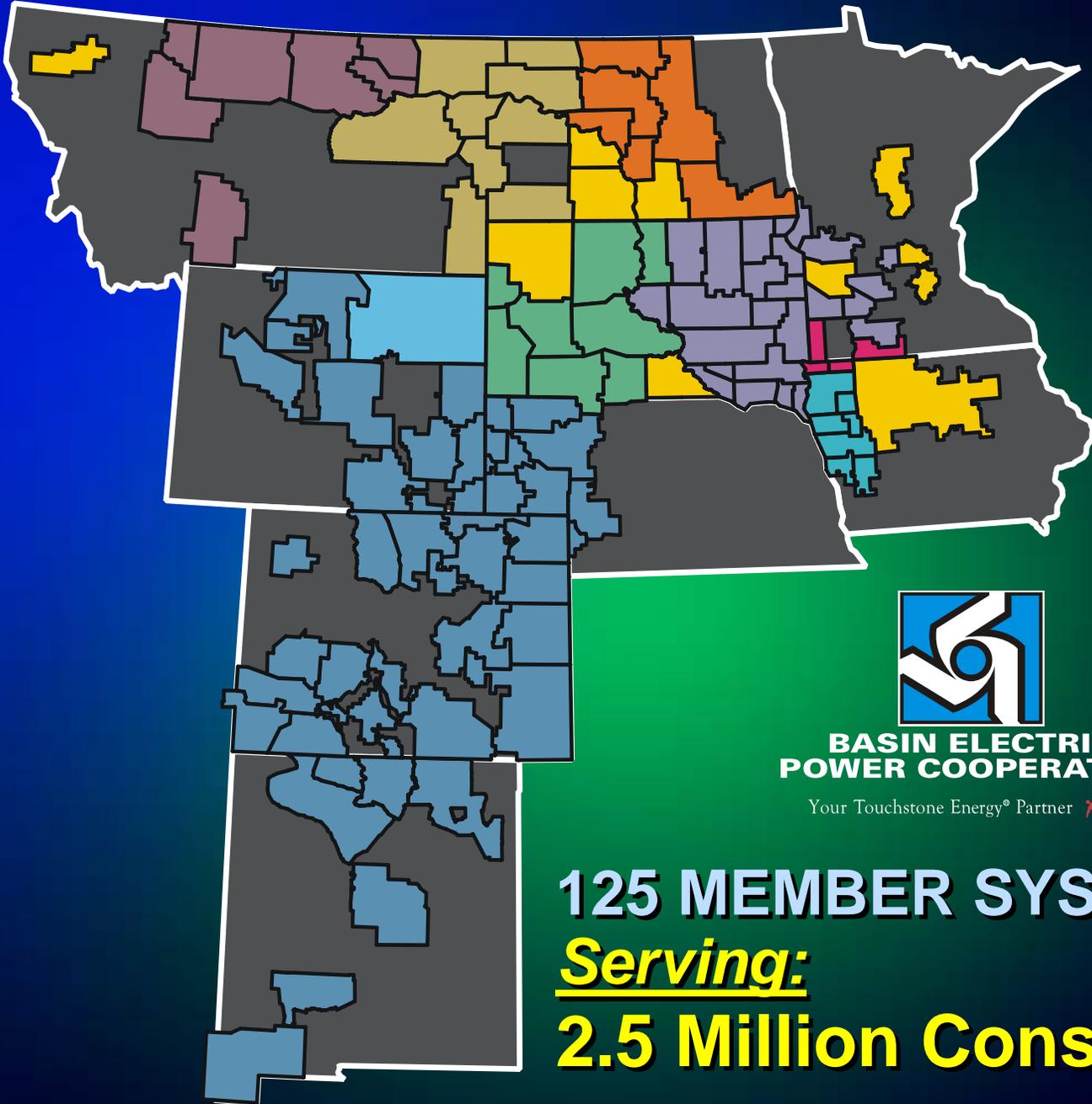
**BASIN ELECTRIC
POWER COOPERATIVE**

Your Touchstone Energy® Partner 

***USDA Ag
Outlook Forum***

February 22, 2008

Ron Rebenitsch, PE

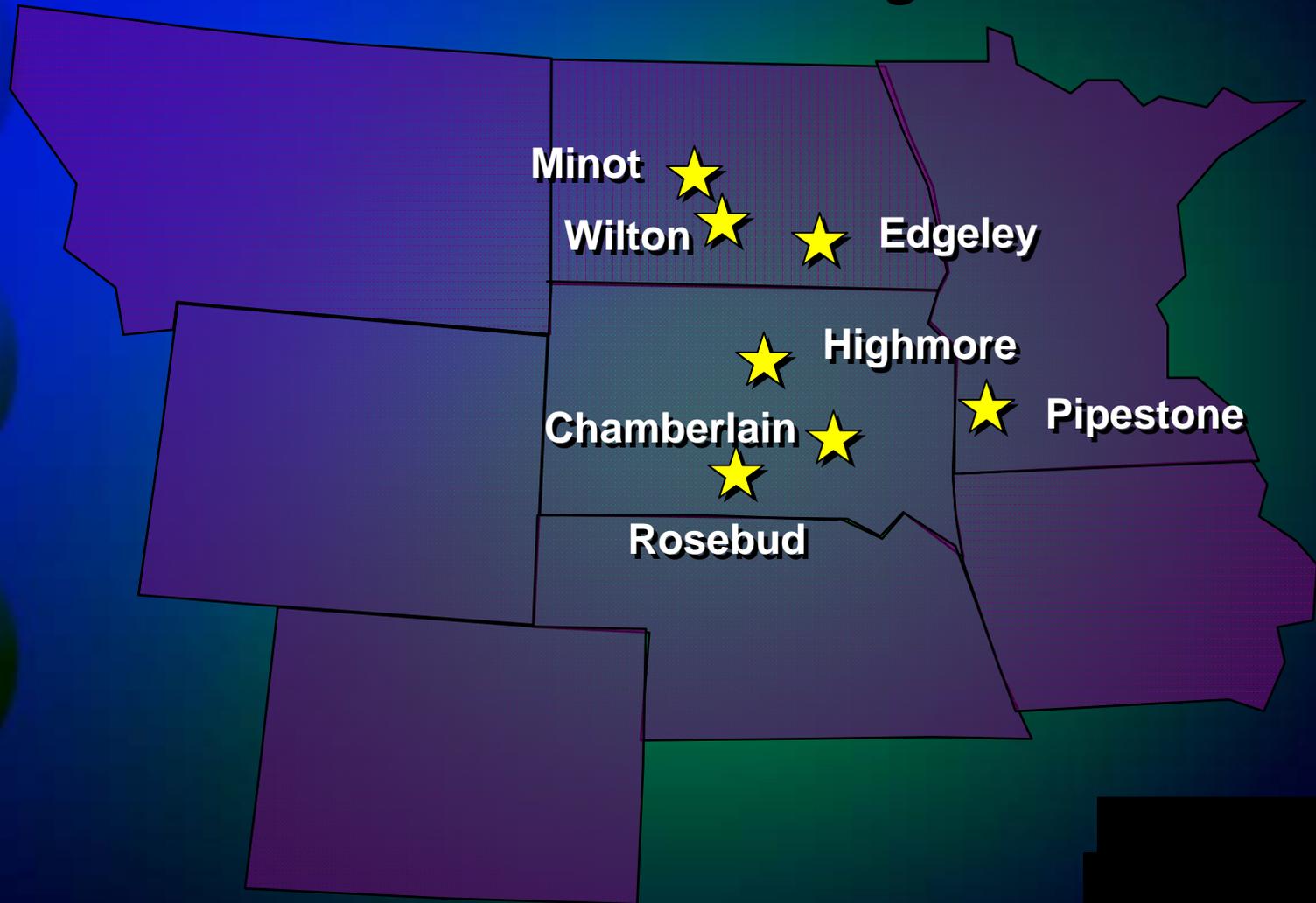


**BASIN ELECTRIC
POWER COOPERATIVE**

Your Touchstone Energy® Partner 

125 MEMBER SYSTEMS
Serving:
2.5 Million Consumers

Basin Electric's Wind *136 MW Existing*



Basin Electric is Planning for the Future...

Developing 300 MW of Wind

***Additional green generation
Including waste heat...***

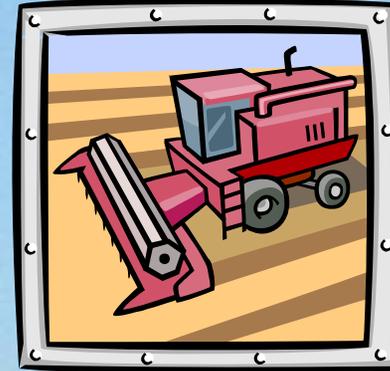
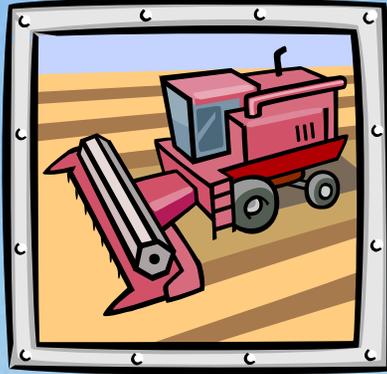
Strong support by RUS

Enabling Factors for Wind...

- **Excellent Wind Regime**
- **High cost of conventional resources**
- **Environmental Issues**
- **Load Growth**
- **Tax Appetite**
- **Economic Development**



Harvesting the wind is feasible, but...



Economics drives decisions!



Co-op Power Supply Cost Chain

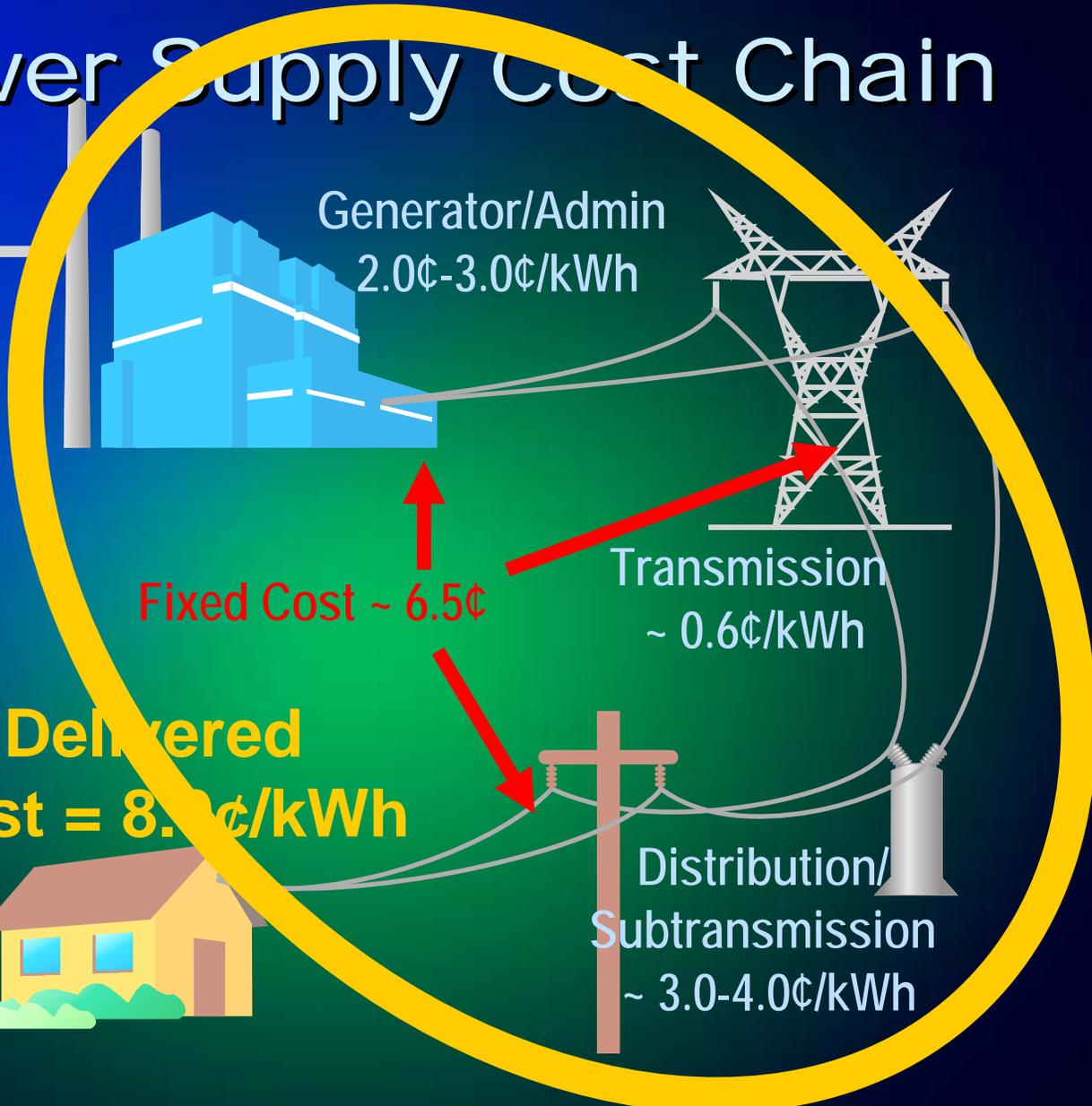
Fuel/O&M (1.27¢) + Local Losses (0.2¢) = 1.5¢ /kWh



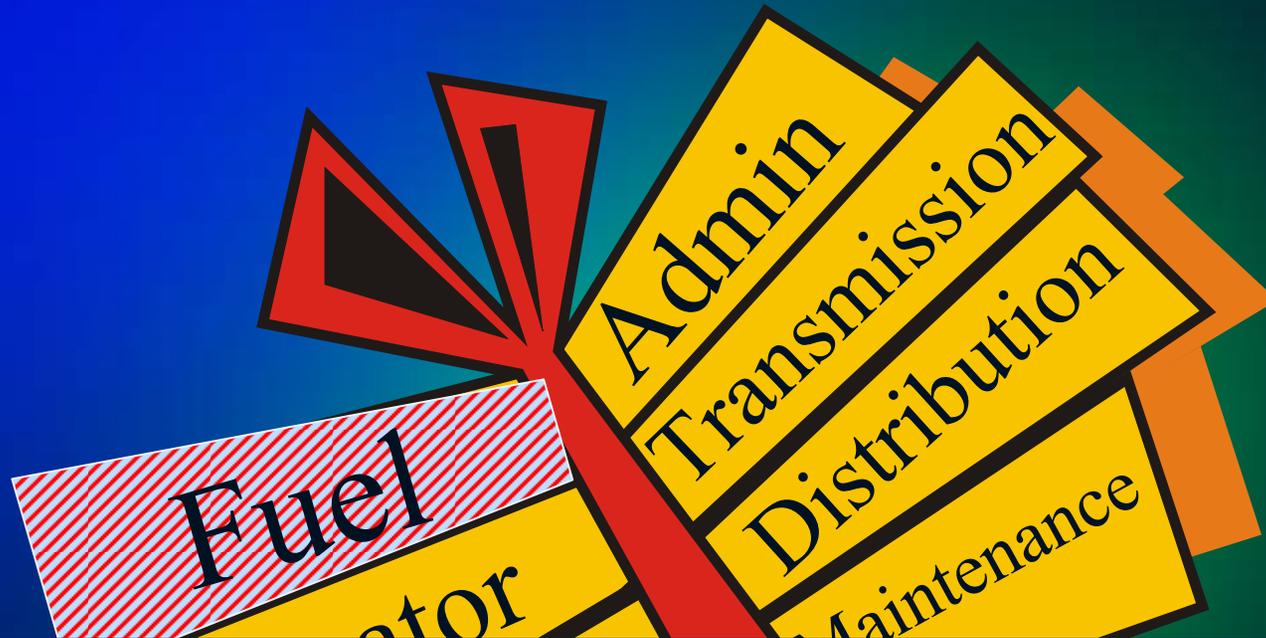
Fixed Cost ~ 6.5¢



Delivered Cost = 8.0¢/kWh



Net Metering Concern: Rates are "*Bundled*"

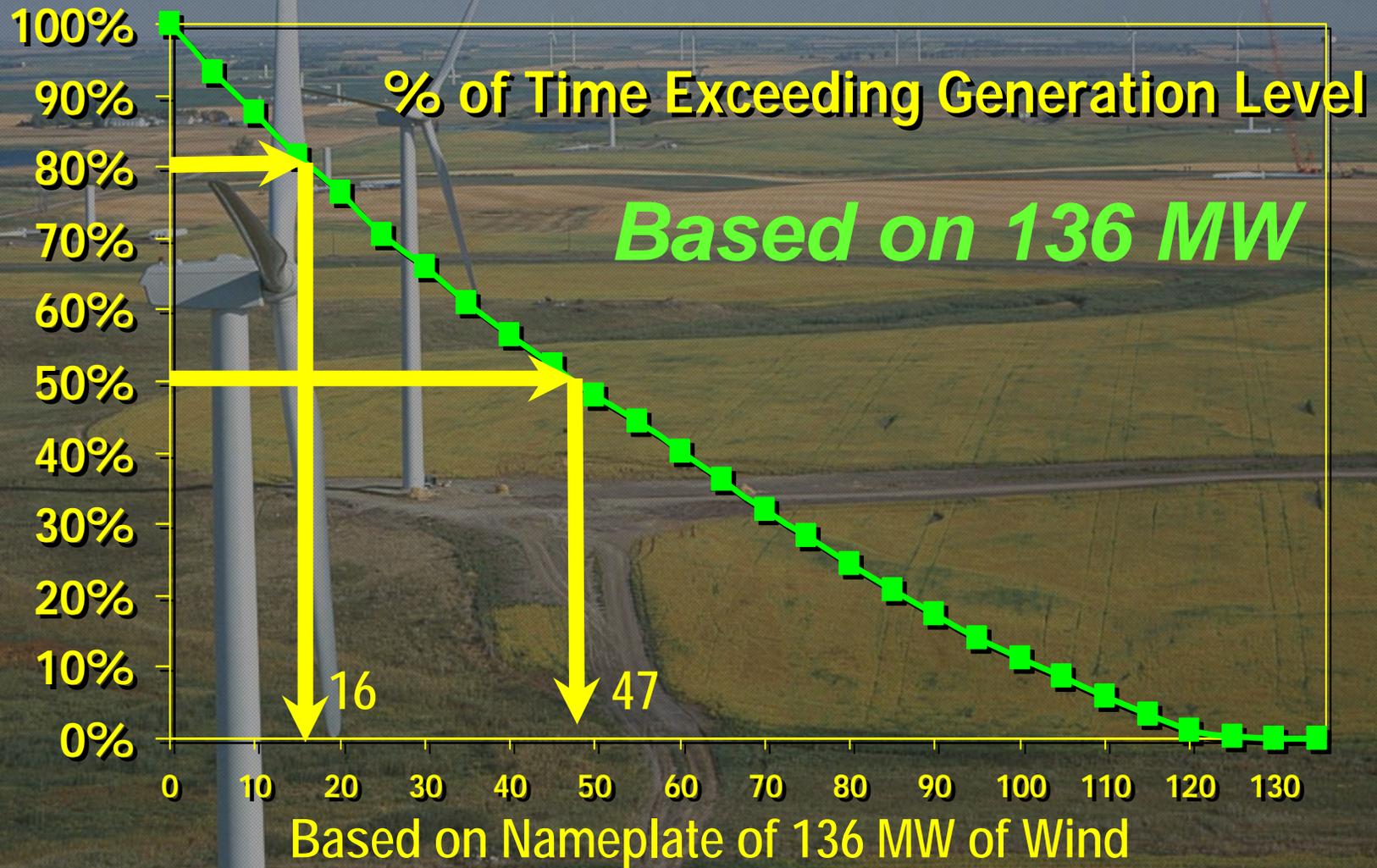


Over ½ the cost of power supply is "wires"...

Not electricity

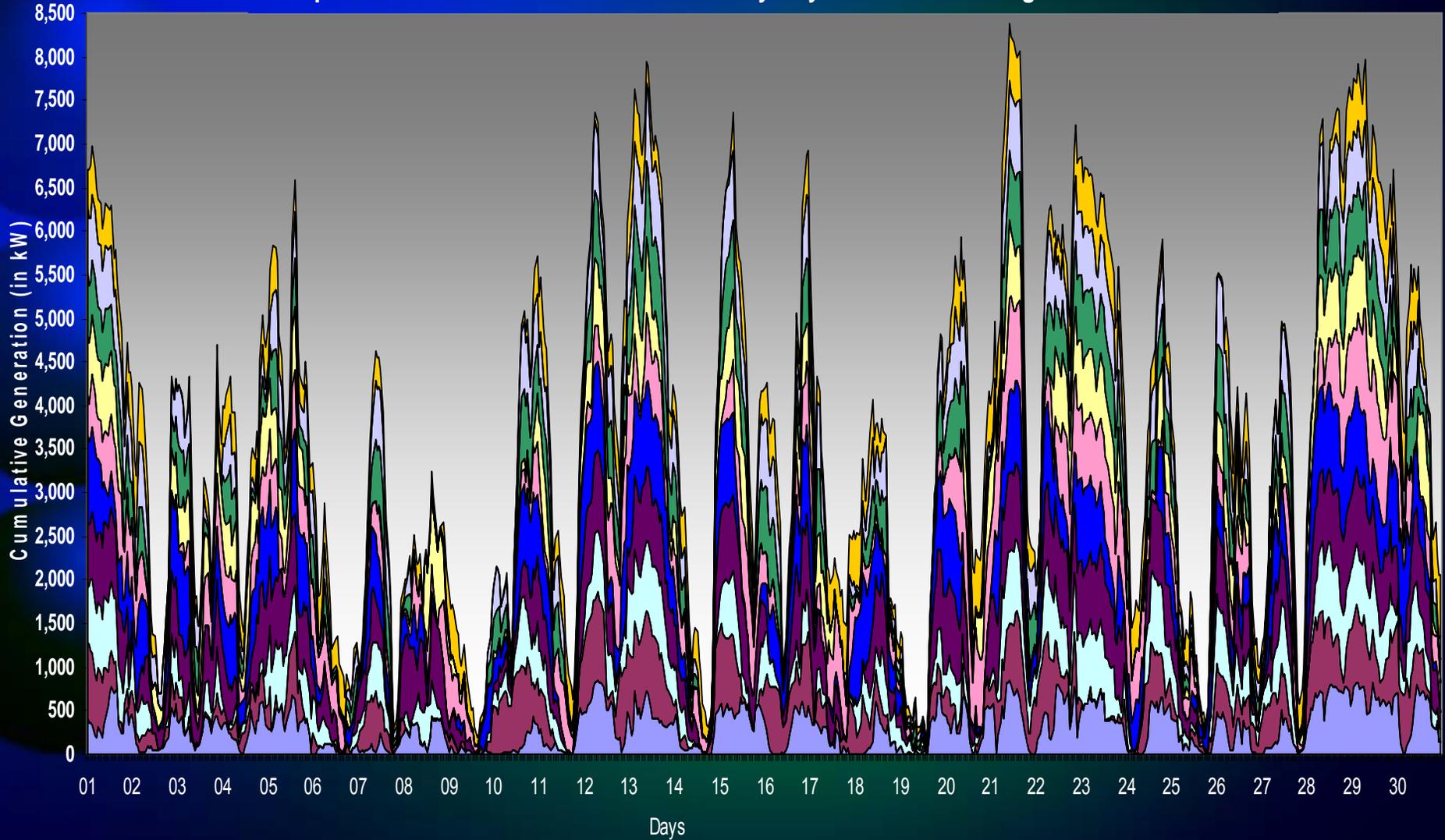


Wind Availability: 2006



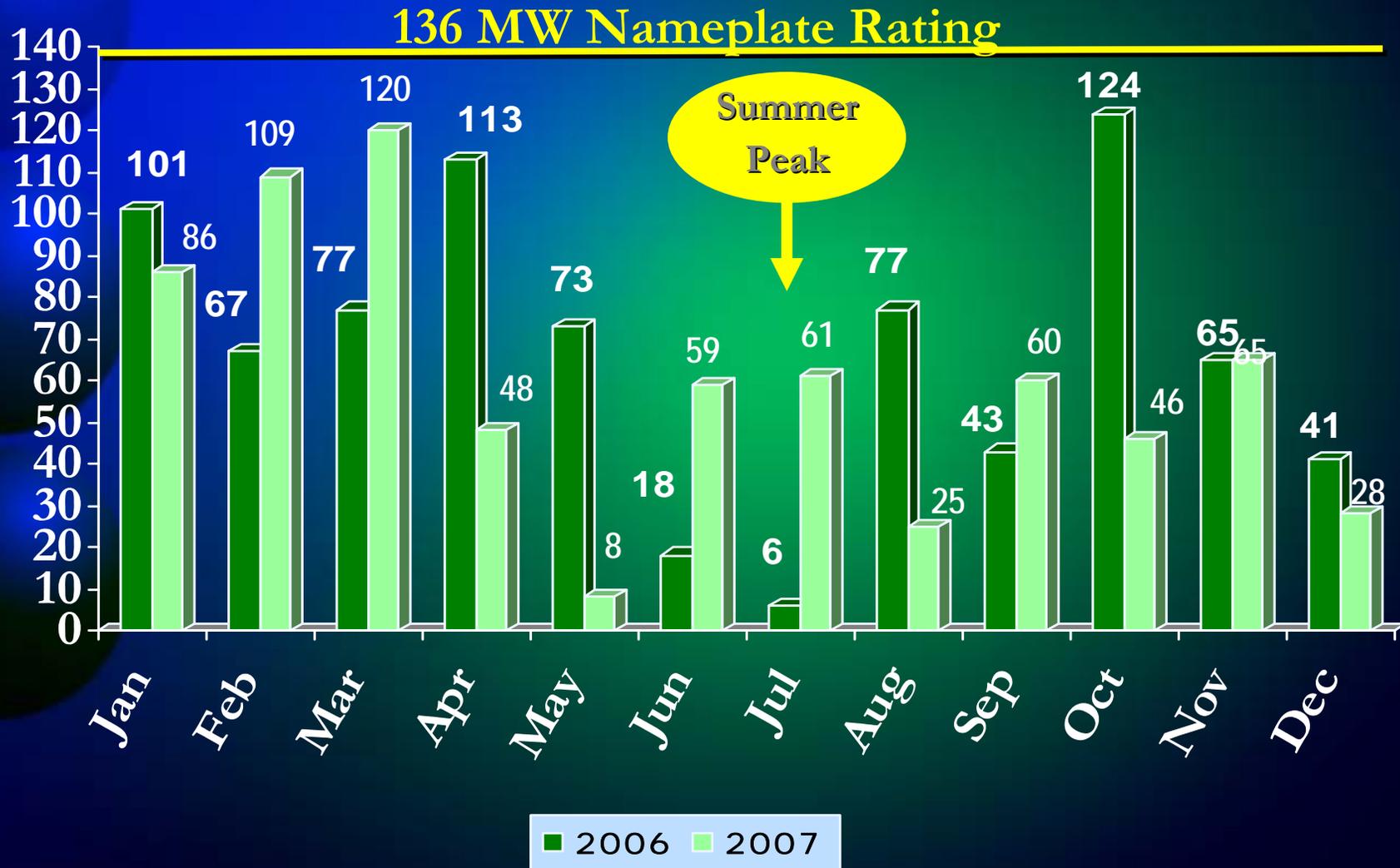
Wind Generation - Sept. 2007 (Each Site Normed to 1 MW)

Chamberlain Minot Edgeley Hyde Wilton
Pipestone Rosebud Valley City Petersburg MRES



2006 & 2007 Generation During Monthly Peak HR

MW



**Wind is non-dispatchable.
Its primary value is based on....**

**Fuel
Displacement**



What Kind of Fuel Is Wind Displacing???

**Coal: \$10.00/Ton
(~\$0.60/mmbtu)**

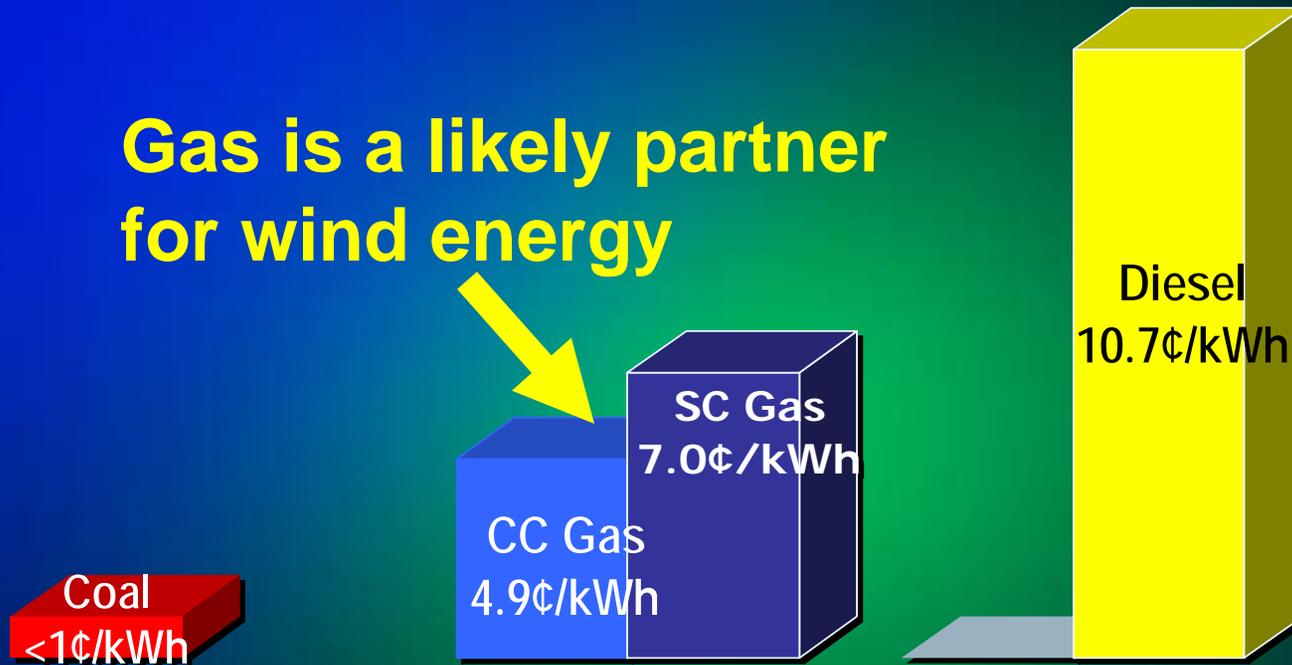
← 1 ton of Wyo. Coal will
produce over 1500 kWhs

Gas: \$7.00/mmbtu

**Diesel: \$2.05/gal
(\$15.00/mmbtu)**

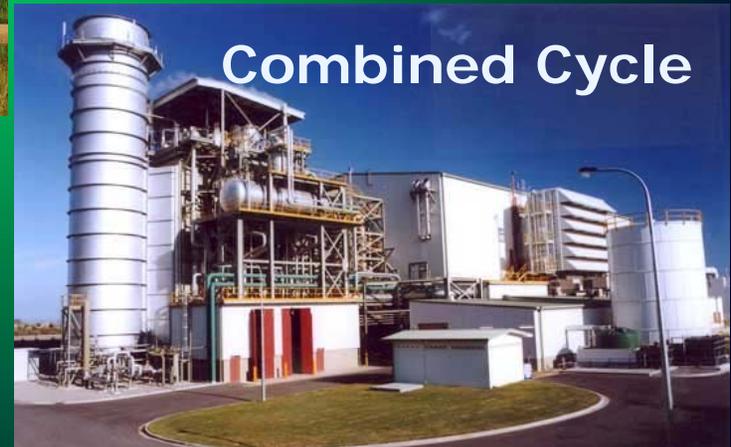
Wind will displace the system's highest cost fuel

Gas is a likely partner for wind energy



Fuel Cost of Electricity...

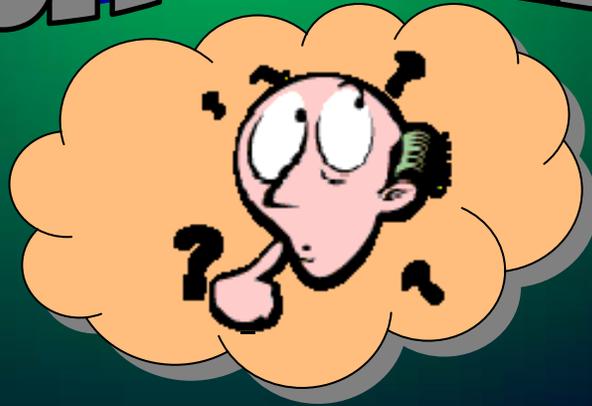
“Wind + Gas” is a viable option, with one concern



Gas Price Risk

Current US Utility Planning?

In Carbon Paralysis



What's needed for a 100 MW Wind Project

\$200-\$210 Million

Transmission

Wind (2-3 years of data)

Plus Permits, Turbines, Market, etc

Some "Back-of-the-Envelope" Numbers

Costs @39% Capacity Factor: \$/MWH

- Capital Cost (\$2,000, 5.25%, 20 yrs): \$50/MWH
 - Land Lease: \$1/MWH
 - O & M: \$10/MWH
 - Property Taxes: \$3/MWH
-

Total Costs: \$64/MWH

Less Offsets...

- Production Tax Credit of \$20/MWH
- Accelerated Depreciation
- Green Tag Sales

For Large Projects...



*Great Plains region
can produce wind
power around
3-5¢/kWh*

(After Tax Benefits)

Taxes are main driver for Wind
*Over 1/2 of a Wind Project's
cash flow is tax-related*

**Prod Tax Credit
>\$60,000/MW-yr**

**5 yr Accel. Depr.
~ \$1 Million/MW
(First 18 Months)**



**The developer needs
a large “tax appetite”**

Real Value of \$20/MWH Production Tax Credit

Pre-Tax Income: **\$31**

Income Taxes @35.5% Tax Rate: **(\$11)**

Net Income after Tax **\$20**

Value of PTC After Tax = **\$20**

Assumption: *Other Taxable
Income to be Sheltered*

Wind Turbine Supply Situation...

Most Turbine manufacturers are sold out through 2009

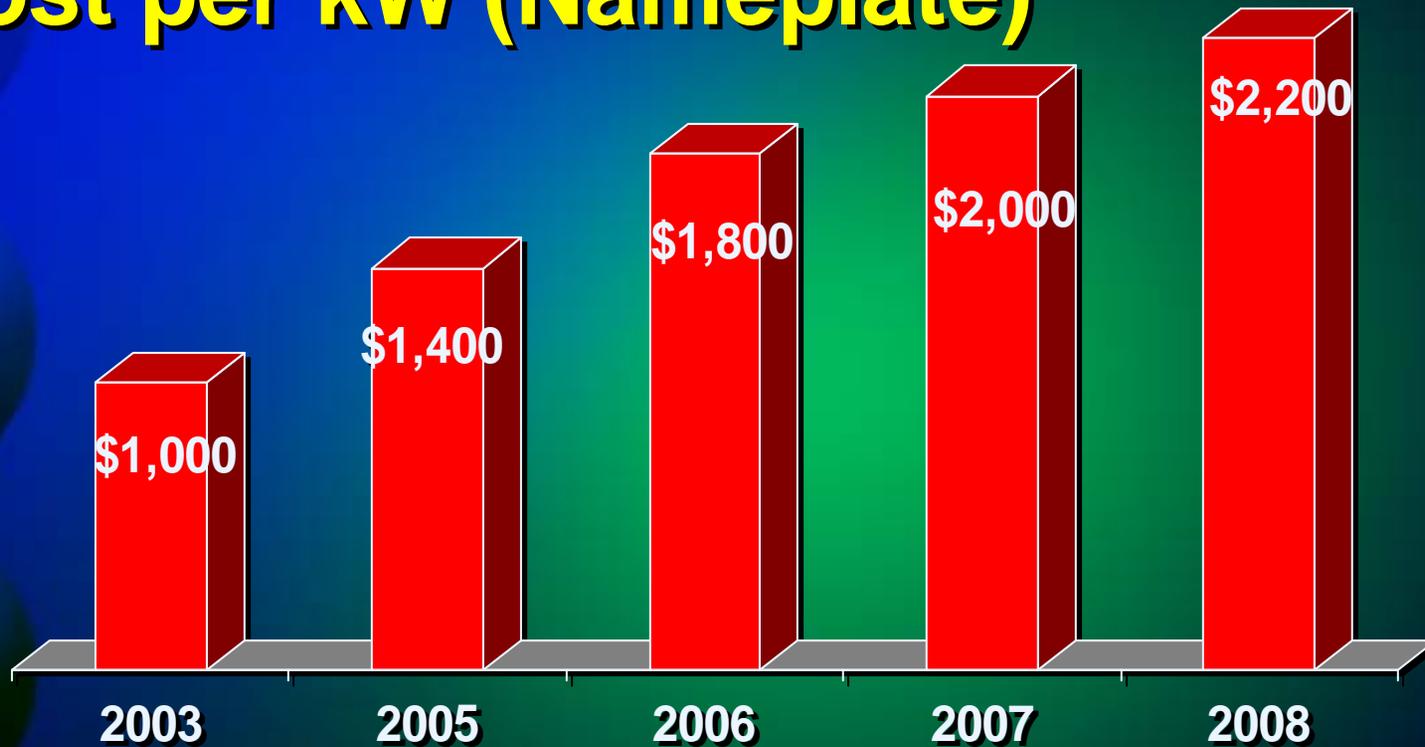
Strong Global Demand for Turbines



US 2008 Growth was 45%

Wind Project Costs Are Rising!

Cost per kW (Nameplate)



US Wind Capacity: 16,800 MW

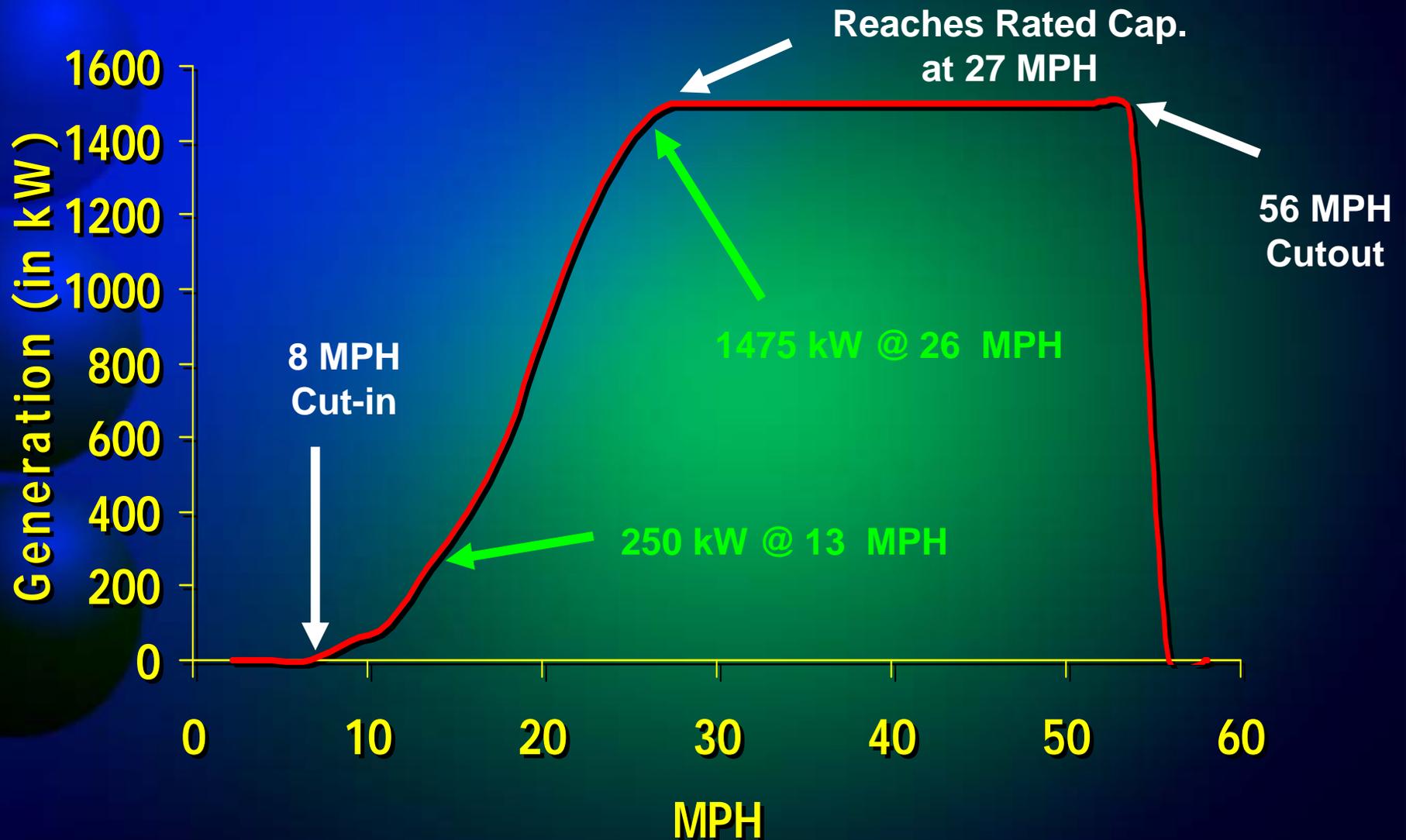
Siting is Critical!

*Generation increases with
the cube of wind speed*

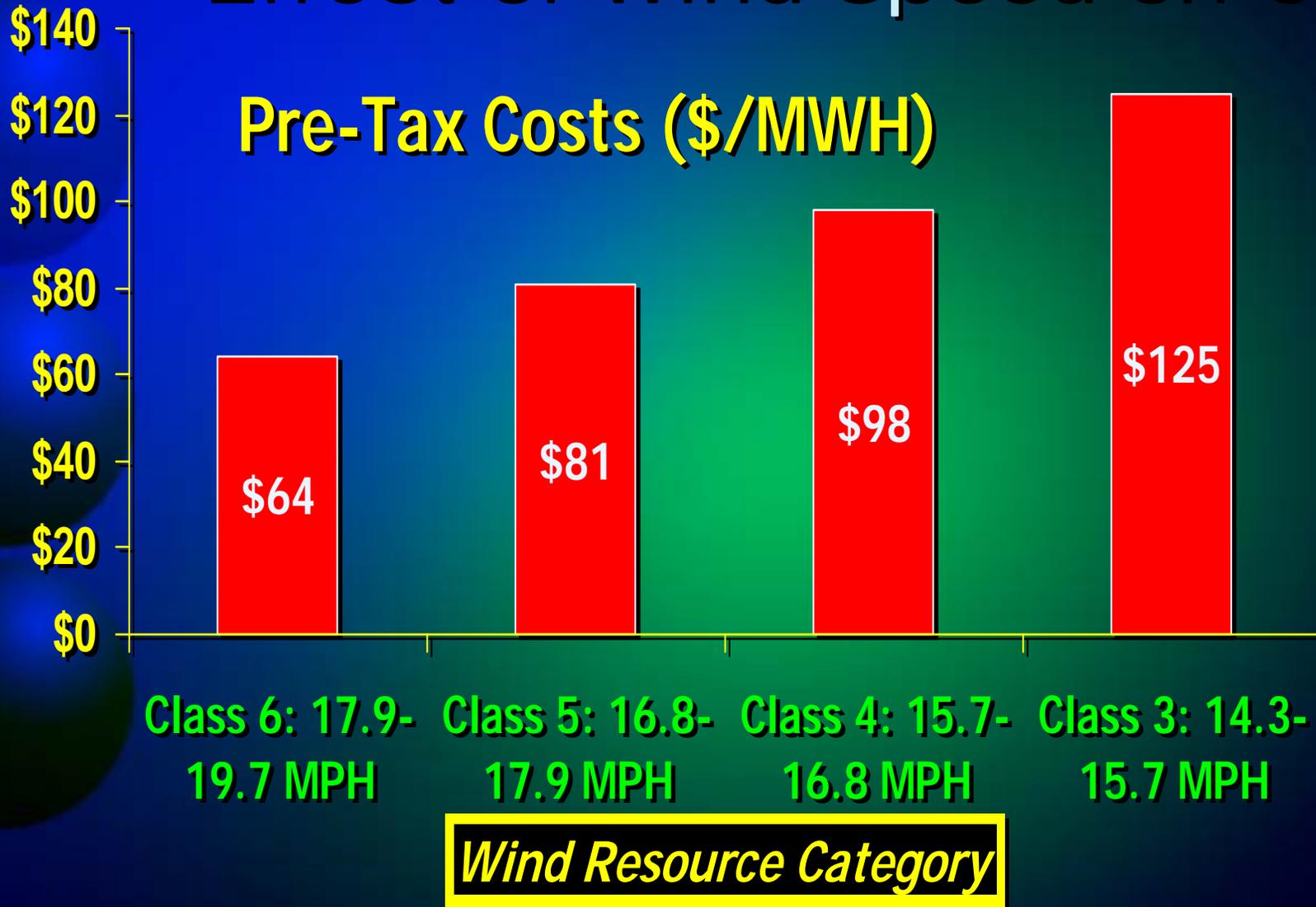
A 15% increase in wind
speed yields a 50%
increase in production



Power Curve: Generation vs Wind Speed

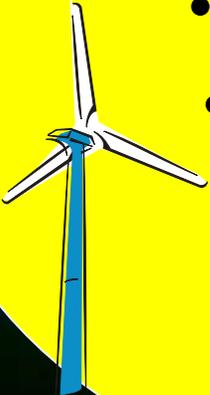


Effect of Wind Speed on Cost



Investment & Risk Comparison

Project Developer

- 
- **Transmission Risk**
 - **2-3 years wind studies**
 - **Engineering \$\$\$**
 - **Permitting Risk**
 - **Operating Risk**
 - **Market Risk**
 - **Tax Risk**

Cost: \$3-5 Million/turbine

Landowner

1/4 to 1/2 acre of
land per turbine

Revenue:
\$4-\$6000/turbine/yr

Wind Project Schedule...

Siting/Leasing

Resource Assessment: 2 yrs Data Collection

Environmental Studies/Permitting

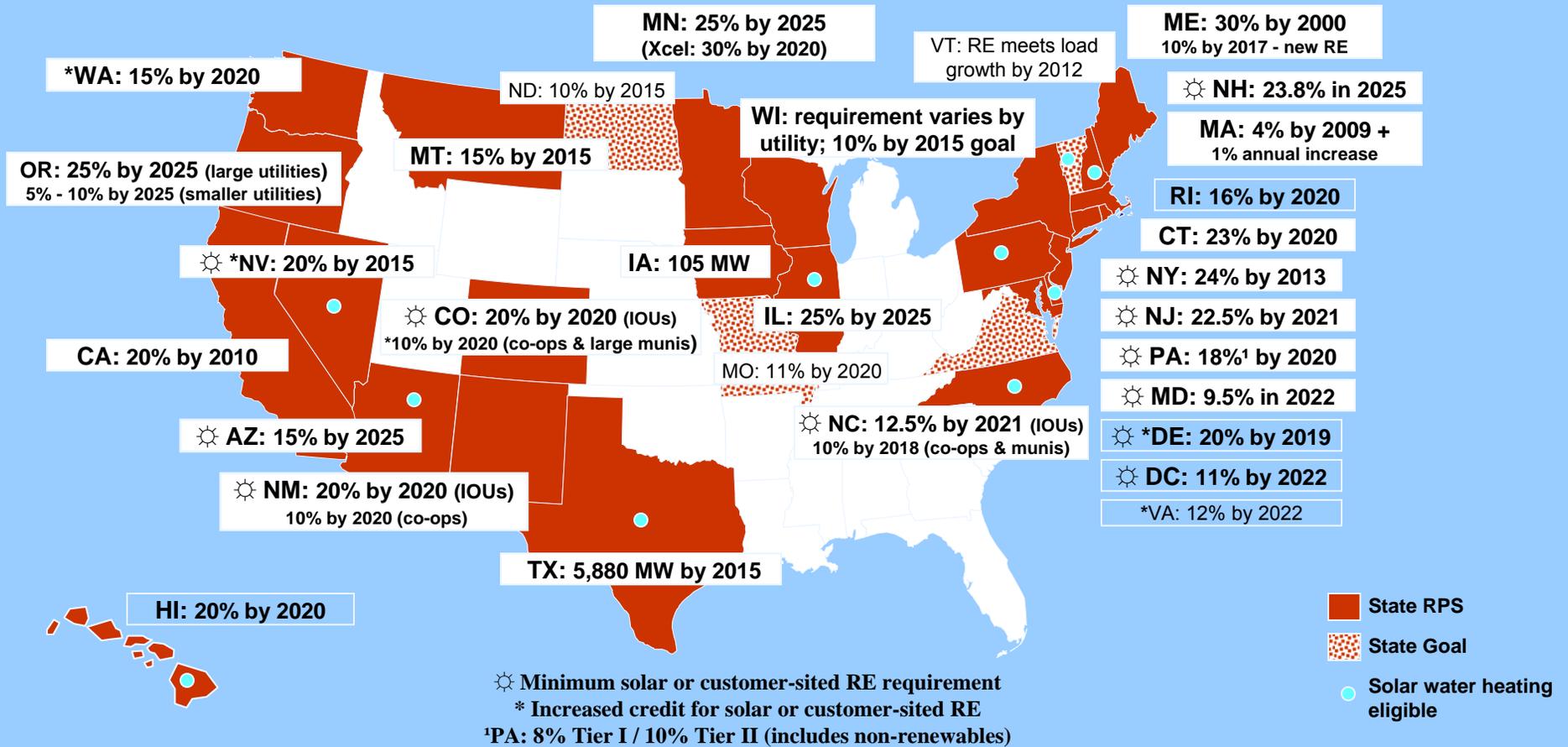
Order Turbines

Construction

Commissioning

Start to Finish: Roughly 2 1/2 years

Renewable Portfolio Standards



2007 US Electricity Consumption

Over
4,000,000,000 MWh/yr

**A 15% by 2020 RPS would
require ~250,000 MW of Wind**

Will require building one 1.5 MW
turbine every 45 minutes

To move the product to market:

UNITED STATES ANNUAL AVERAGE WIND POWER

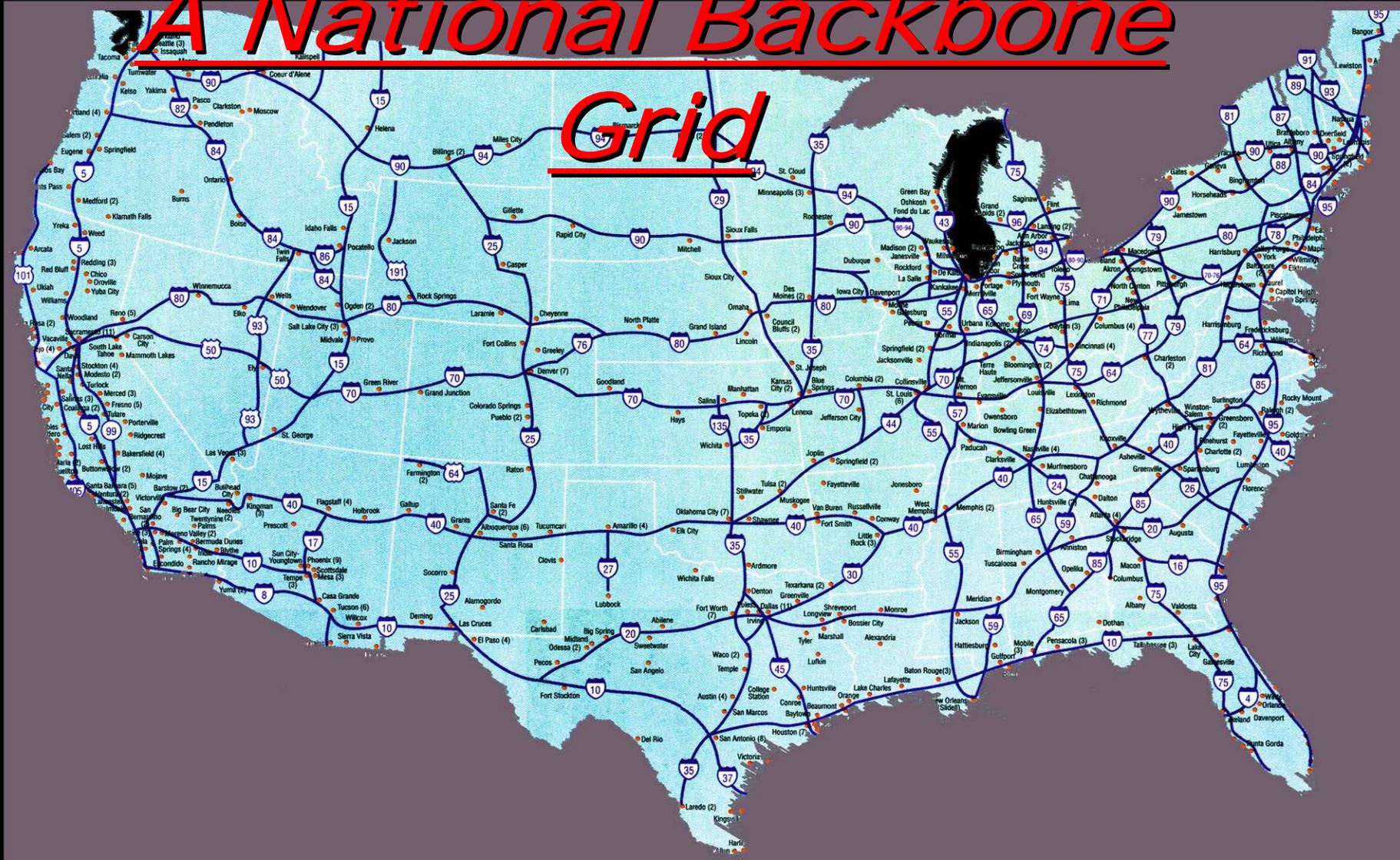


We need "Wires"!

A Long Term Vision...

A National Backbone

Grid

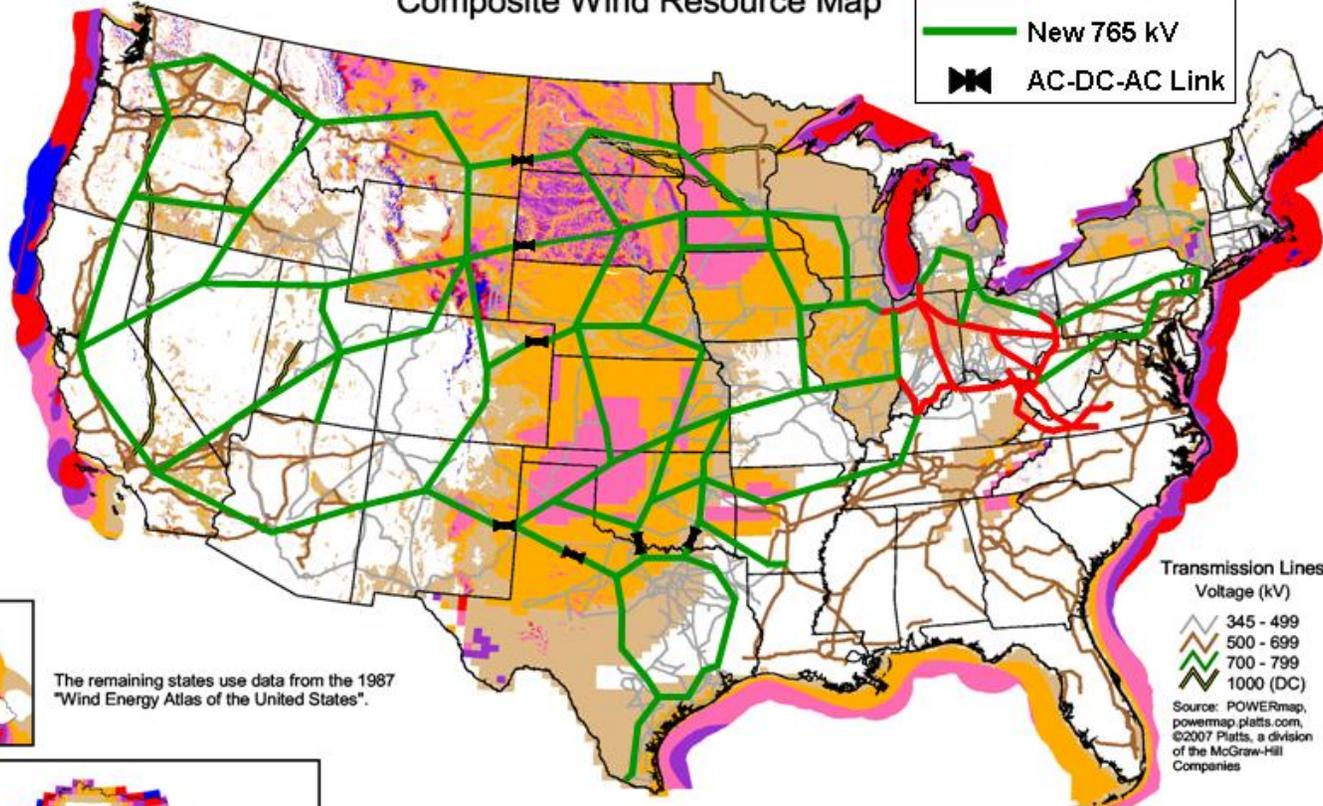


One Draft Concept... (AEP)

NREL Updated Maps:
 Arizona (2003)
 California (2002)
 Colorado (2004)
 Connecticut (2001)
 Delaware (2002)
 Hawaii (2004)
 Idaho (2002)
 Illinois (2001)
 Indiana (2004)
 Maine (2001)
 Maryland (2002)
 Massachusetts (2001)
 Michigan (2004)
 Missouri (2005)
 Montana (2002)
 Nebraska (2005)
 Nevada (2003)
 New Jersey (2002)
 New Hampshire (2001)
 New Mexico (2003)
 North Carolina (2002)
 North Dakota (2000)
 Ohio (2004)
 Oregon (2002)
 Pennsylvania (2002)
 Rhode Island (2001)
 South Dakota (2001)
 Texas (2000)
 Utah (2003)
 Vermont (2001)
 Virginia (2002)
 Washington (2002)
 West Virginia (2002)
 Wyoming (2002)

Composite Wind Resource Map

— Existing 765 kV
 — New 765 kV
 AC-DC-AC Link



Transmission Lines
 Voltage (kV)

345 - 499
 500 - 699
 700 - 799
 1000 (DC)

Source: POWERmap,
 powermap.platts.com,
 ©2007 Platts, a division
 of the McGraw-Hill
 Companies

The remaining states use data from the 1987
 "Wind Energy Atlas of the United States".

Wind Power Classification

Wind Power Class	Resource Potential	Wind Power Density at 50 m W/m ²	Wind Speed at 50 m m/s	Wind Speed at 50 m mph
2	Marginal	200 - 300	5.6 - 6.4	12.5 - 14.3
3	Fair	300 - 400	6.4 - 7.0	14.3 - 15.7
4	Good	400 - 500	7.0 - 7.5	15.7 - 16.8
5	Excellent	500 - 600	7.5 - 8.0	16.8 - 17.9
6	Outstanding	600 - 800	8.0 - 8.8	17.9 - 19.7
7	Superb	800 - 1600	8.8 - 11.1	19.7 - 24.8

^a Wind speeds are based on a Weibull k value of 2.0

U.S. Department of Energy
 National Renewable Energy Laboratory



19-APR-2007 1.5.9

