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Wind Power

Fueling America with Wind, Solar, & Methane Energy Breakout Session

Agriculture at the Crossroads:
Energy, Farm & Rural Policy

2007 Agricultural Outlook Forum

Washington, DC

March 1-2, 2007

Thomas A. Wind, P.E.
Wind Utility Consulting

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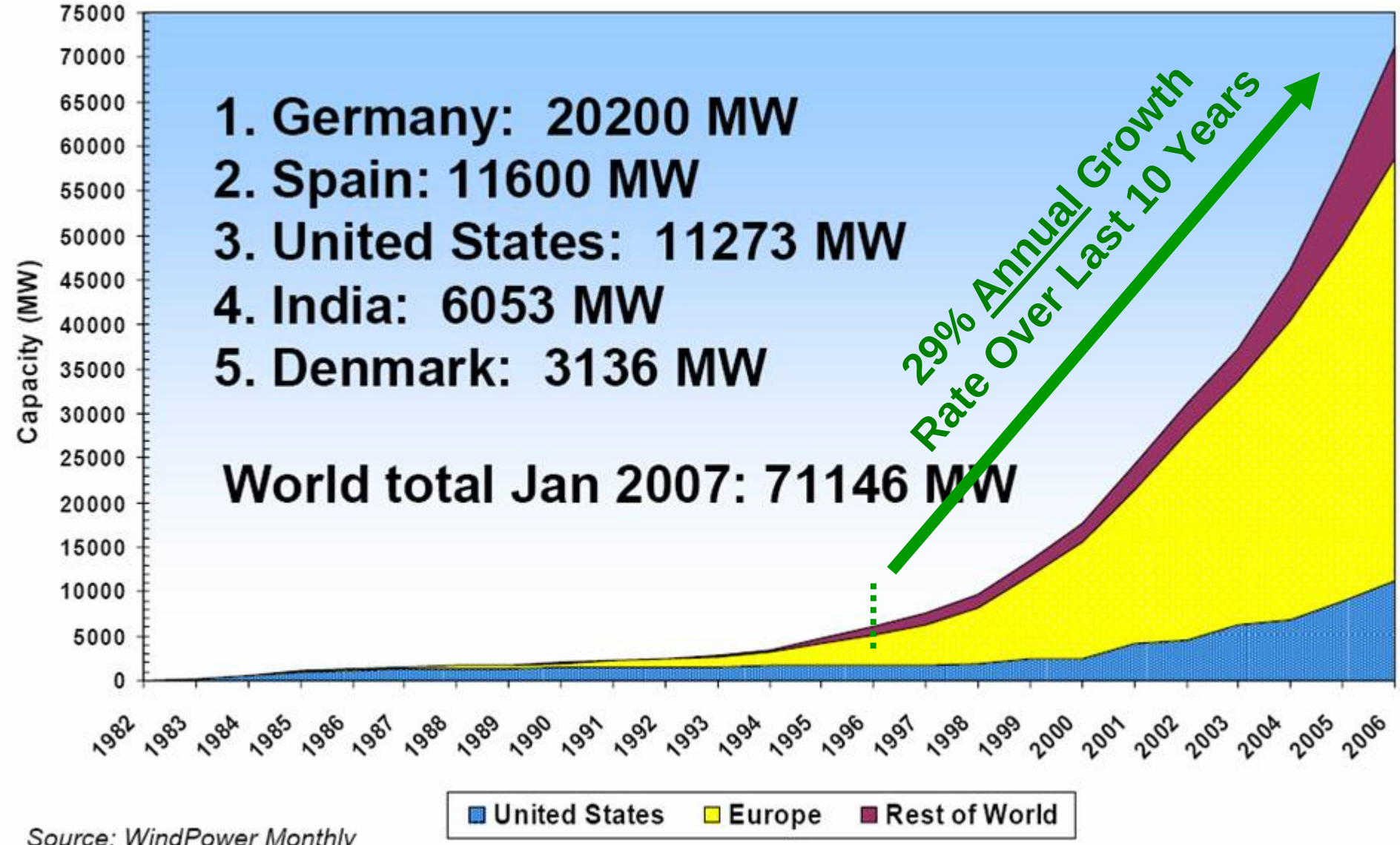
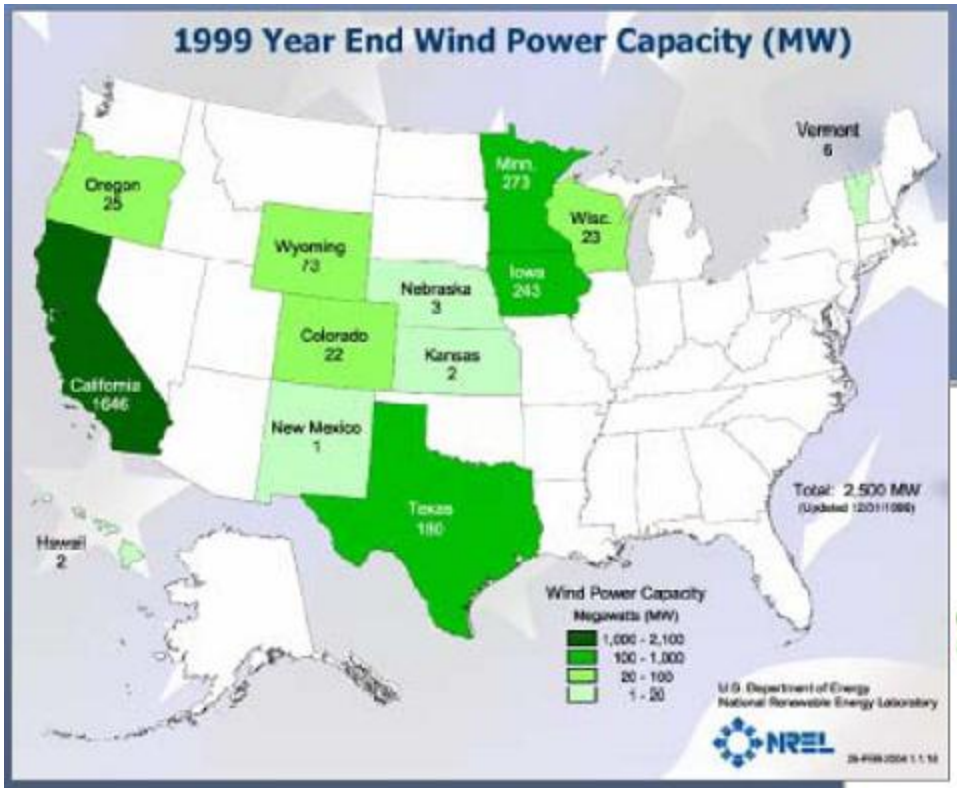
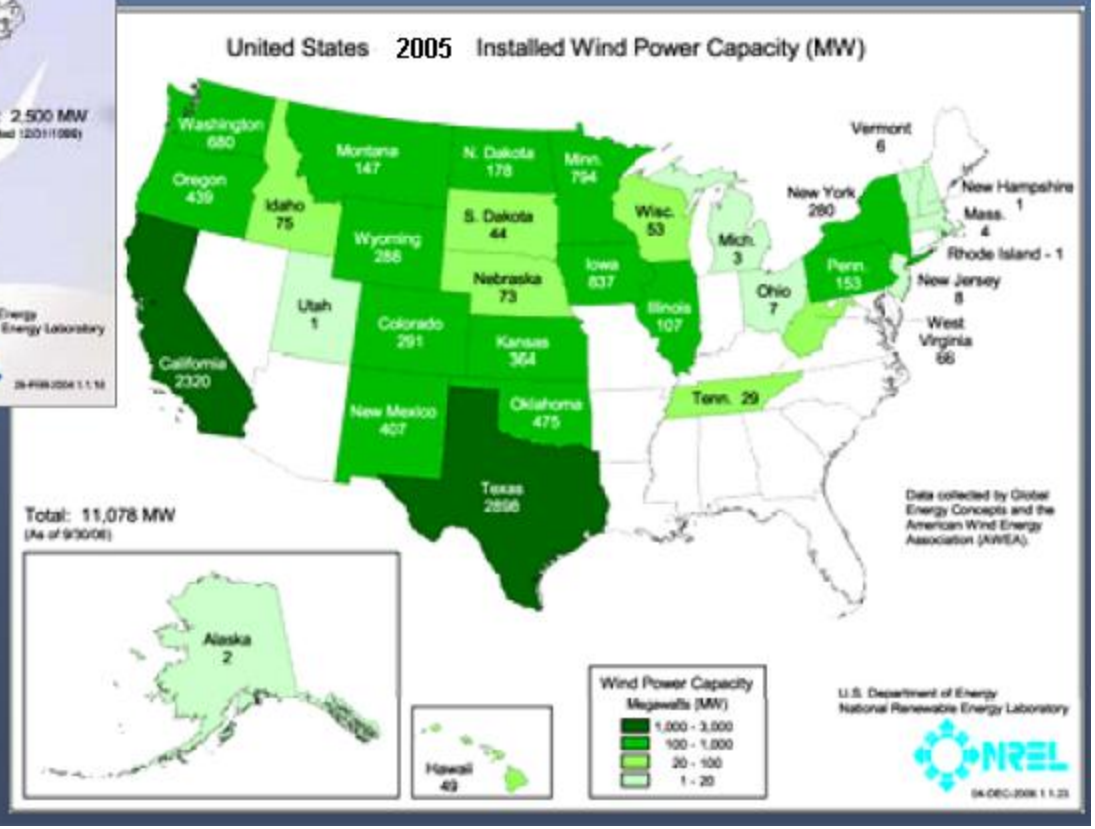
There is Tremendous Growth in Wind Power Worldwide



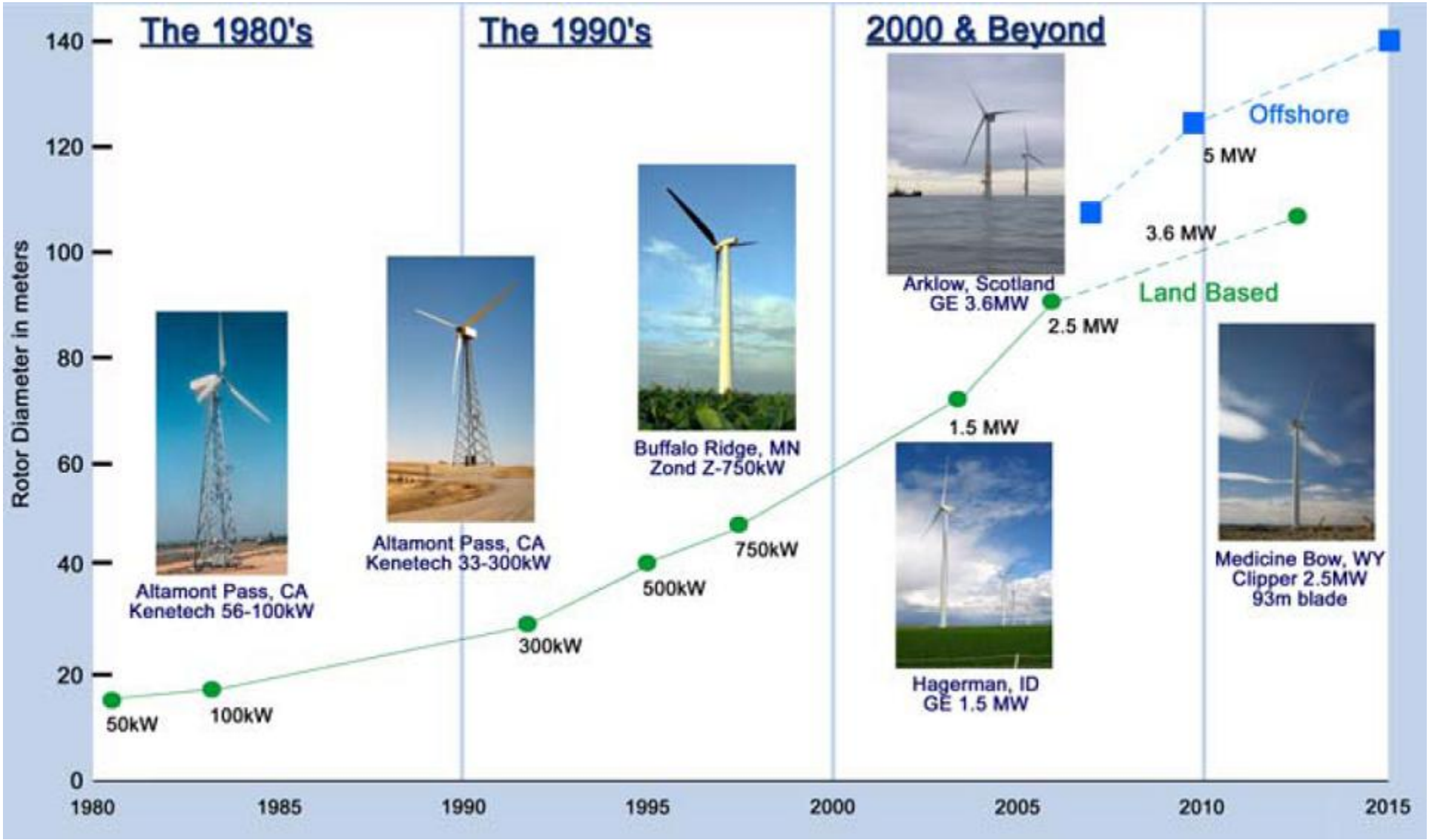
Source: WindPower Monthly

Since 1999, the Number of States with a Significant Amount of Wind Power Has Tripled

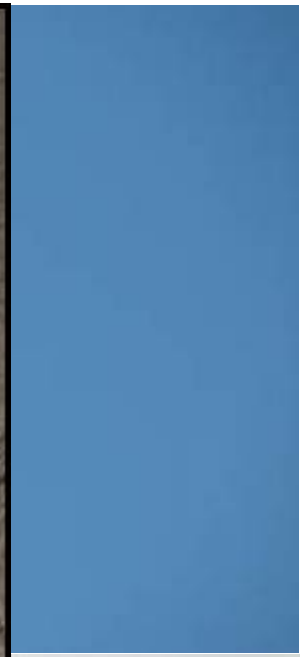




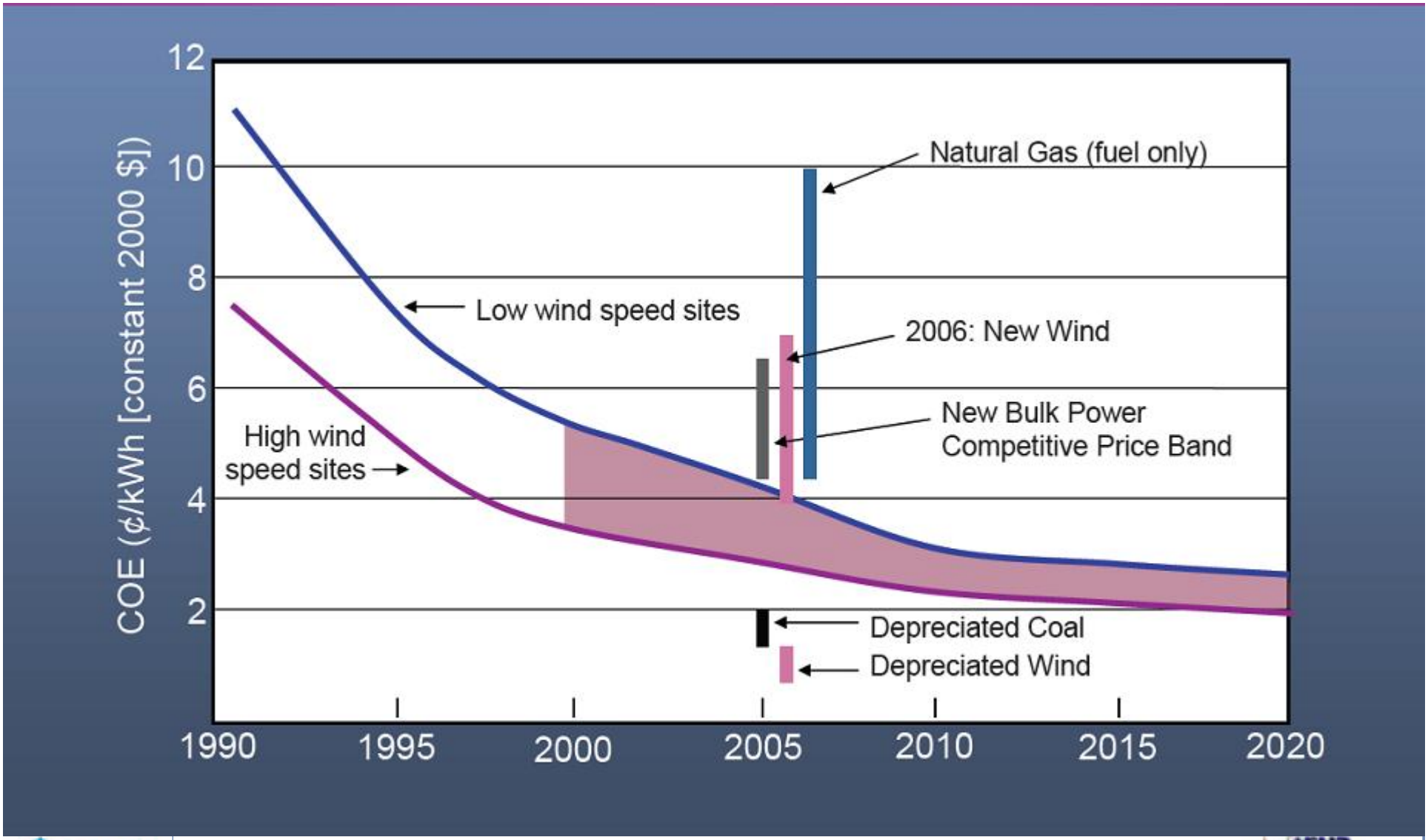
Wind Turbines Have Increased in Size



Today's Wind Turbines Are Very Large



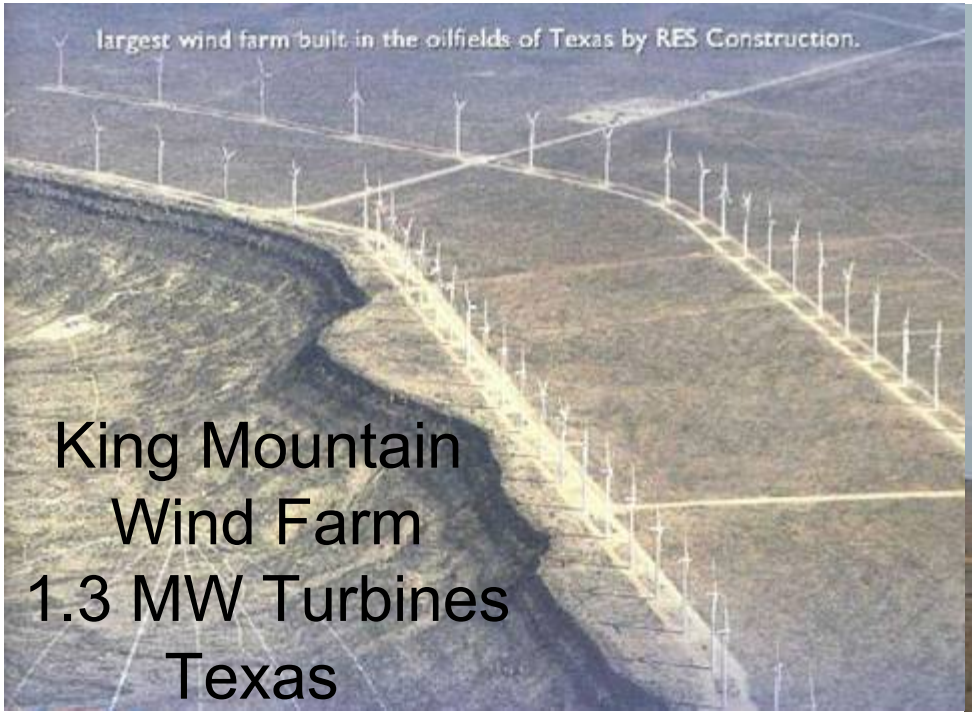
The Cost of Wind Energy Has Declined to the Point Where it is Starting to Become Competitive.



Most Wind Farms in the U.S. are Large Compared to Those in Other Countries

Largest Wind Farms in the U.S.				
Wind Farm Name	**State**	**Year**	**MW**	**Turbines**
Storm Lake I & II	Iowa	1999	193	257
King Mountain	TX	2001	278	214
State Line	WA/OR	2001	263	400
Woodward Mtn, I & II	TX	2001	160	242
New Mexico WE Center	NM	2003	204	136
Sweetwater I, II, & III	TX	2005	264	176
Horse Hollow I, II, & III	TX	2006	735	421
Maple Ridge	NY	2006	231	140
Big Horn	WA	2006	200	133
Wild Horse	TX	2006	229	127

These wind farms are usually owned by large corporations or utilities and they typically cost from $1.1 to $1.7 million per MW.


largest wind farm built in the oilfields of Texas by RES Construction.
King Mountain
Wind Farm
1.3 MW Turbines
Texas

State Line Wind Farm
0.66 MW Turbines
Washington & Oregon

Storm Lake
Wind Farm
0.75 MW
Turbines
Iowa

Horse Hollow Wind Farm in
(World's Largest)
1.5 MW Turbines
Texas

Ownership of Wind Farms

- FPL
- AEP
- AES
- Horizon
- Babcock & Brown
- Shell Oil
- Seawest
- GE
- Edison Energy
- Cielo
- Oak Creek
- Orion
- PPM
- Invenergy
- Puget Sound
- NW Energy
- MidAmerican
- Alliant
- Xcel

- Until the last couple of years, most wind generation was owned by independent power producers, such as Florida Power and Light, with power sales contracts to the local electric utility.
- Now, a few electric utilities are building wind farms, such as Xcel, MidAmerican Energy, and Alliant (Colorado, Iowa, Wisconsin, & Montana)
- These two ownership categories account for 97+% of the total MW
- The remaining 2-3% of the wind generation is owned by farmers, businesses, cooperatives, municipal utilities, schools, and colleges. This group of owners is collectively called “Community Wind”

Community Wind Generation Projects

- Community Wind generation projects usually sell all of their wind power to the local utility. However, in some cases the power is used by the owner to reduce their own electric power bill, such as a school using a wind turbine to reduce their electricity purchases.
- Community ownership usually provides more financial benefits to the local community per MW of capacity, because the ownership benefits stay in the community
- Because of favorable state policies in Minnesota and Iowa, it is economically feasible for farmers, landowners, and small businesses to own large wind turbines.

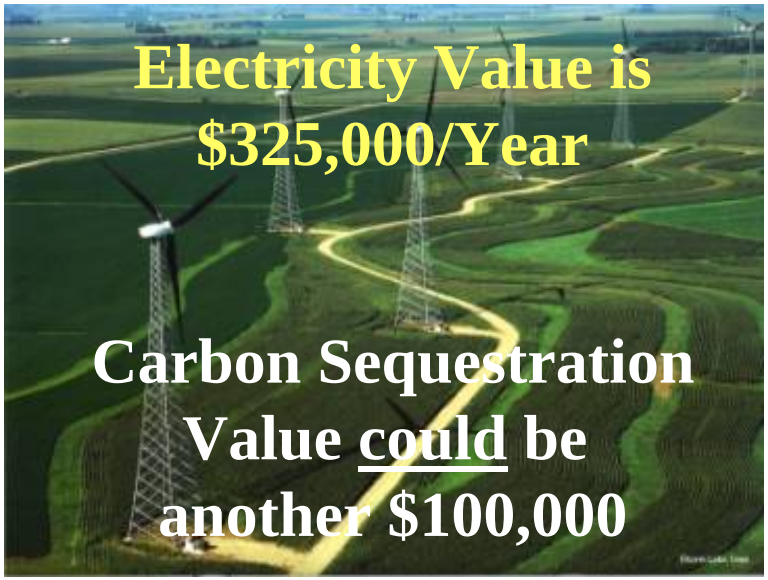
Examples of Community Wind Projects

Comparison of Value of Grain Crops to Electricity Produced on a 160 Acre Crop Farm

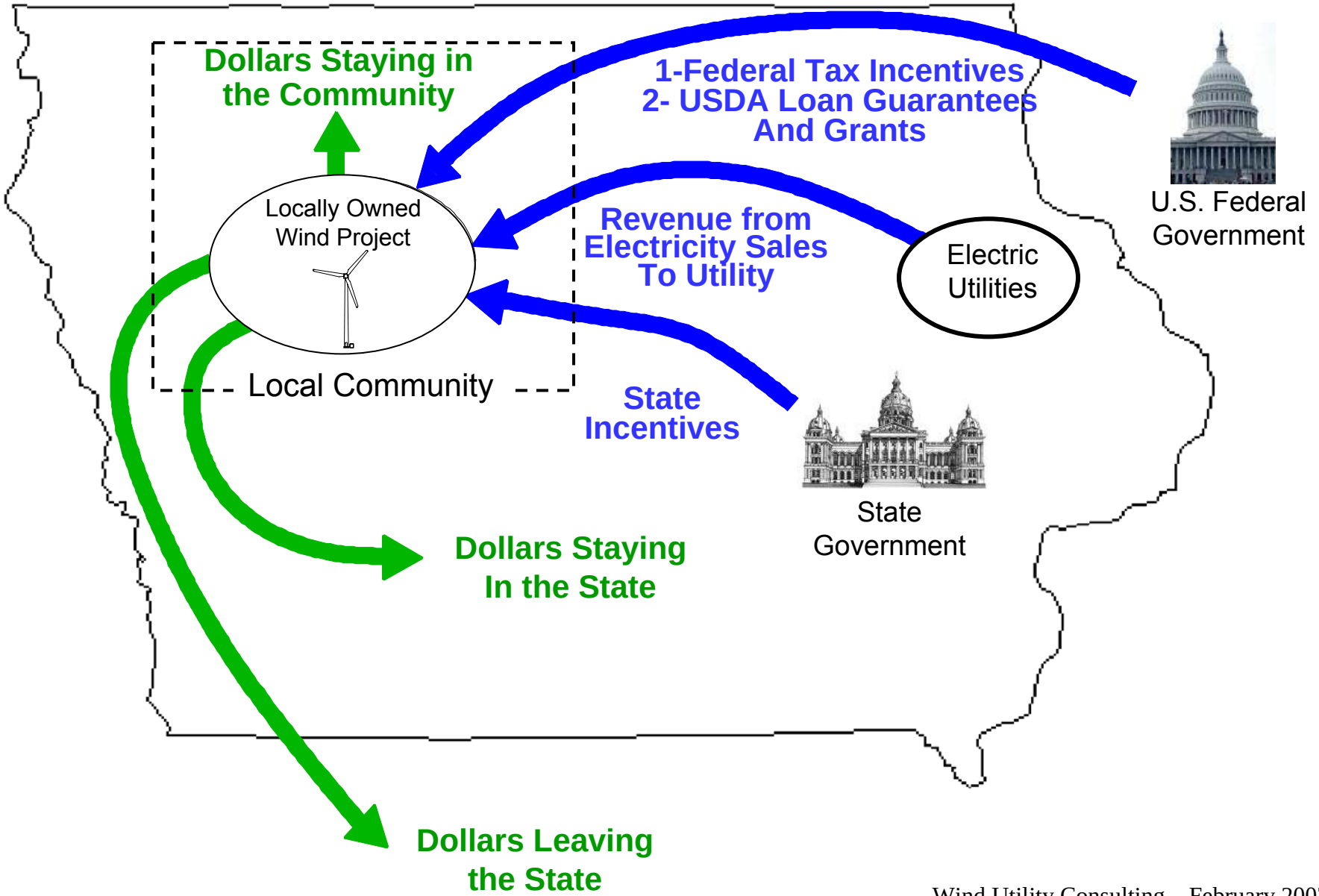
- Gross value of corn and soybeans produced annually is about $60,000 in Iowa
- Gross value of electricity that could be produced annually from two 1500 kW Wind Turbines producing 9 million kWh per year is $325,000*
- Value of electricity is 5 times the value of the crops
- Value of avoiding carbon dioxide emissions from coal-fired generation could easily be worth another $100,000 per year within a decade. **

(*Based on 3.5¢ per kWh and 16 mph wind speed at 50 meters height.)

(**Based on $10 per ton of CO_2



Community Owned Wind Projects Retain More Dollars for the Local Community and State



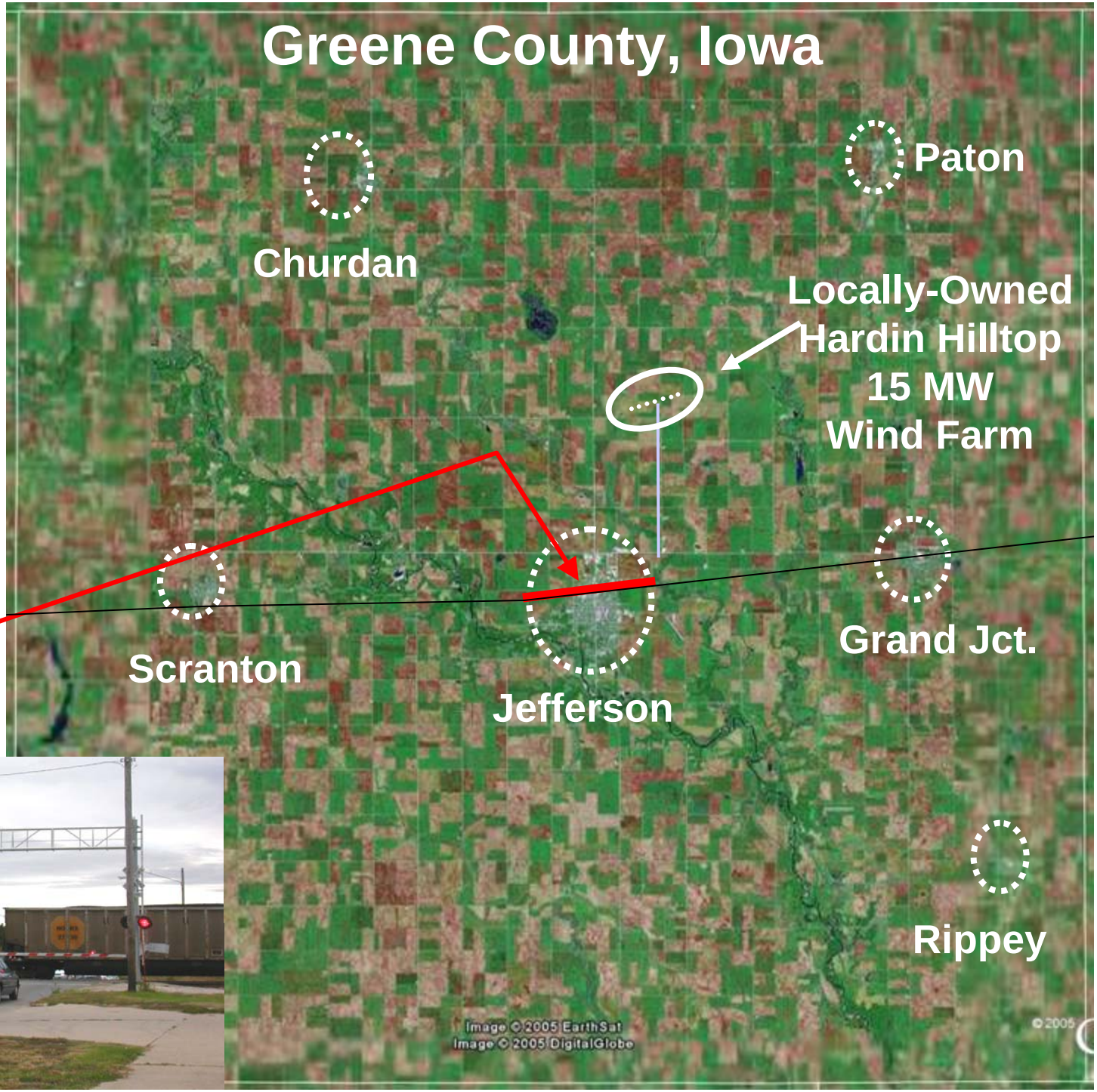
State Policies Needed for Community Wind Generation

- To enable schools and businesses to use wind turbines to effectively reduce their power bills, they need:
  - Net Metering rules for turbines up to 1 MW
  - Demand charge billing credits that recognize value of wind generation to the grid
- To enable farmer or landowner-owned wind generation projects they need:
  - State production incentives that are justified on the local economic benefits of wind generation
  - Other common incentives such as abated property and sales taxes.

Federal Policies Needed for Community Wind Generation

- To enable farmer, landowner, and small business ownership of wind generation, they need:
  - Continuation of the USDA Section 9006 guaranteed loan and grants for wind generation energy projects and structuring of the incentive so that it doesn't reduce the federal production tax credit
  - Removal of the restrictions on the use of the federal production tax credits, so that the tax credits can also be used against active income instead of passive income only
- To enable farmers businesses to use wind turbines to effectively reduce their power bills, they need:
  - To receive the federal production tax credit for all wind power generated, instead of only the power sold back to the utility.

The locally-owned Hardin Hilltop Wind Farm will generate about 48 million kilowatt-hours per year, which is about what the county seat town of Jefferson, Iowa uses during a year

The wind farm will save the equivalent of enough coal <u>every year</u> to fill a train

<u>3 Miles Long</u>