



Sheboygan County Wind Forum

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Overview of Discussion

- **Growth of wind power in US**
- **Why look in Sheboygan County?**
- **Types of systems**

Drivers for Wind Power

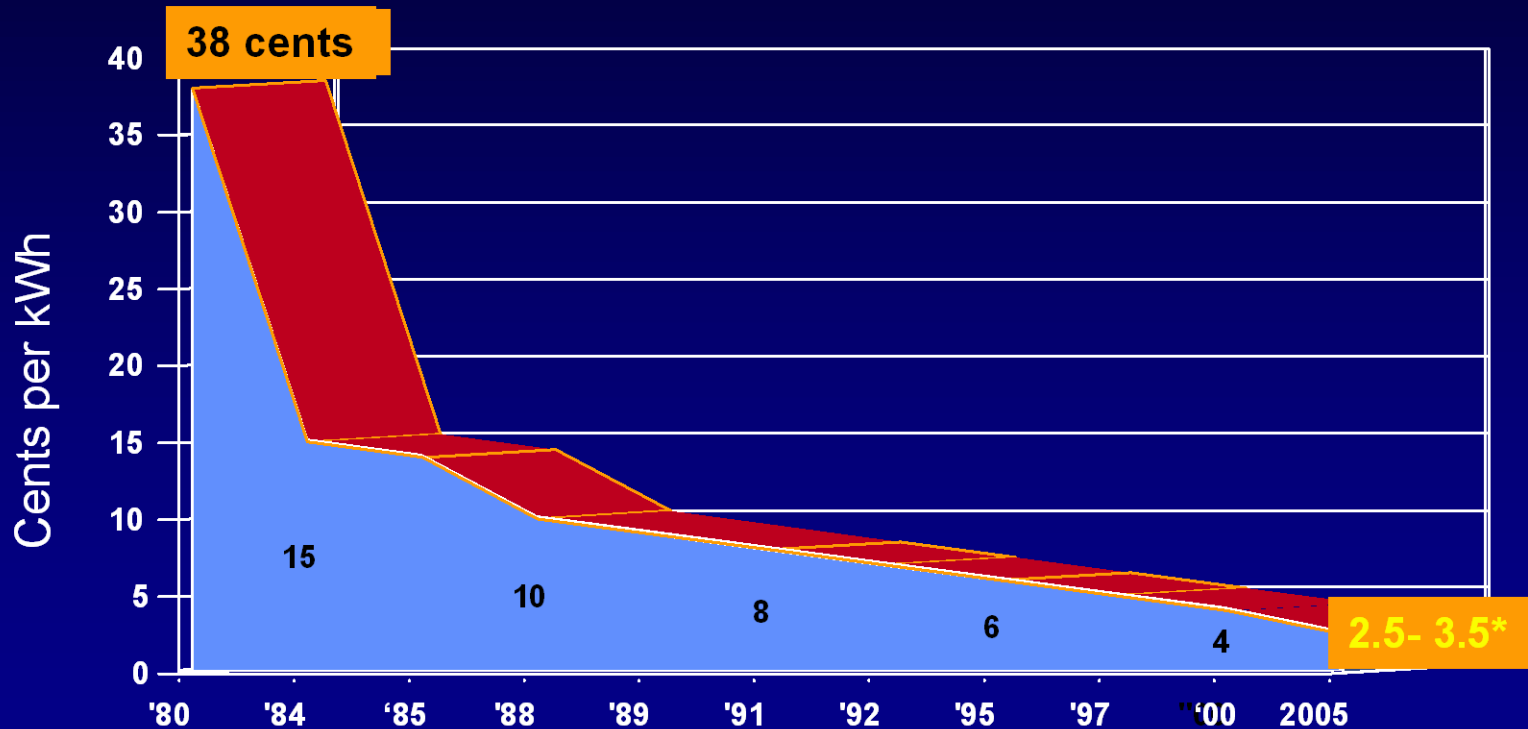
- **Fuel Price Uncertainty**
- **Federal and State Policies**
- **Economic Development**
- **Green Power**
- **Energy Security**
- **Declining Wind Costs**





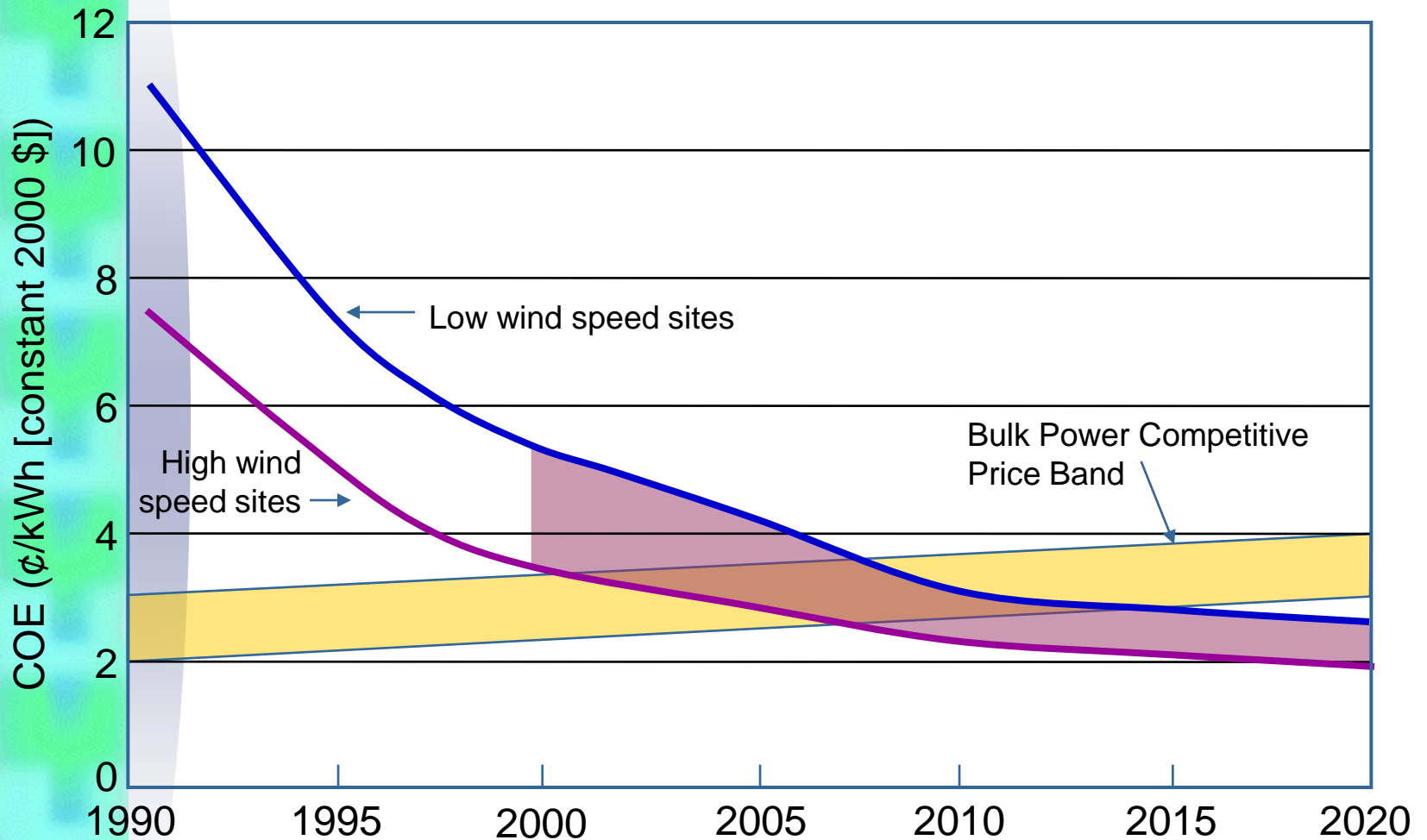
Wind Energy:

*Cost of Wind-Generated Electricity
1980 to 2005 Levelized Cents/kWh*

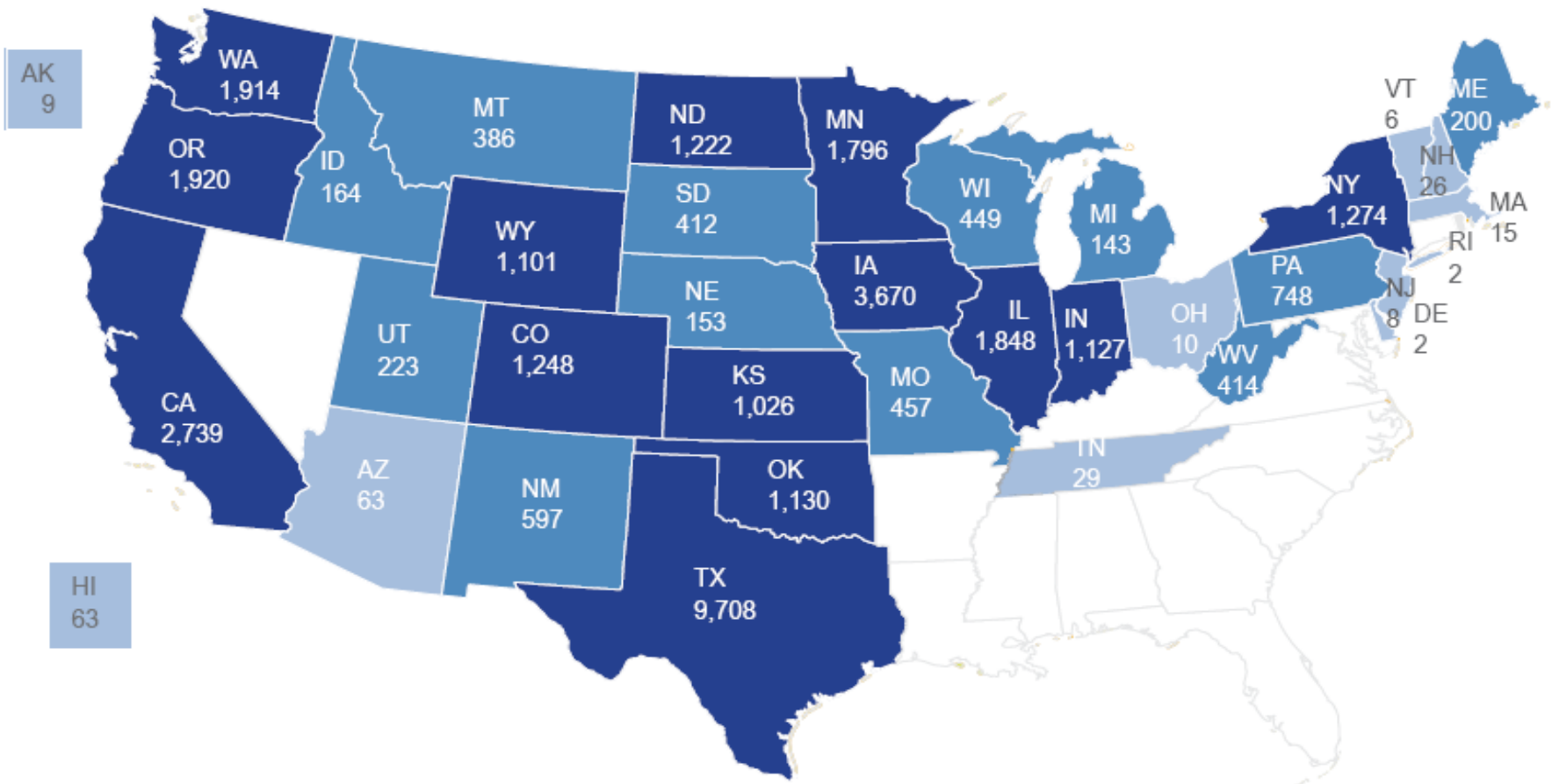


* Assumptions: Levelized cost at excellent wind sites, large project size, not including PTC (post 1994)

Wind Cost of Energy



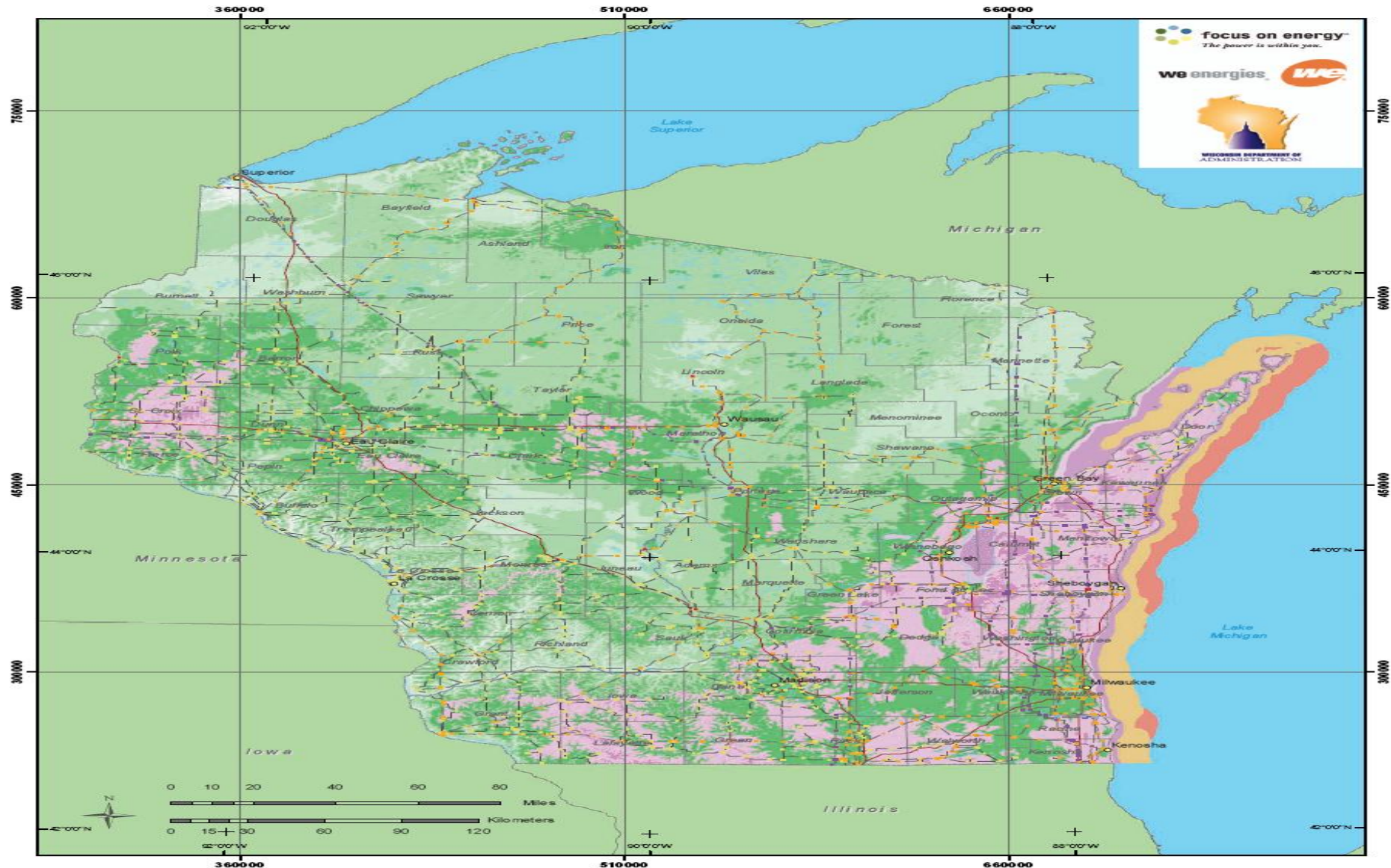
Cumulative Wind Capacity by State





Why Look In Sheboygan County?

- **Utility Interest in Wind Projects**
- **Existing Transmission System**
- **Favorable Siting Conditions**
- **Potentially Acceptable Wind Profile**
 - onshore
 - offshore



Wind Resource of Wisconsin

Mean Annual Wind Speed at 100 Meters



Sizes and Applications



Small (≤ 10 kW)

- Homes
- Farms
- Remote Application



Intermediate (10-250 kW)

- Village Power
- Hybrid Systems
- Distributed Power



Large (660 kW - 2+MW)

- Central Station Wind Farms
- Distributed Power
- Community Wind

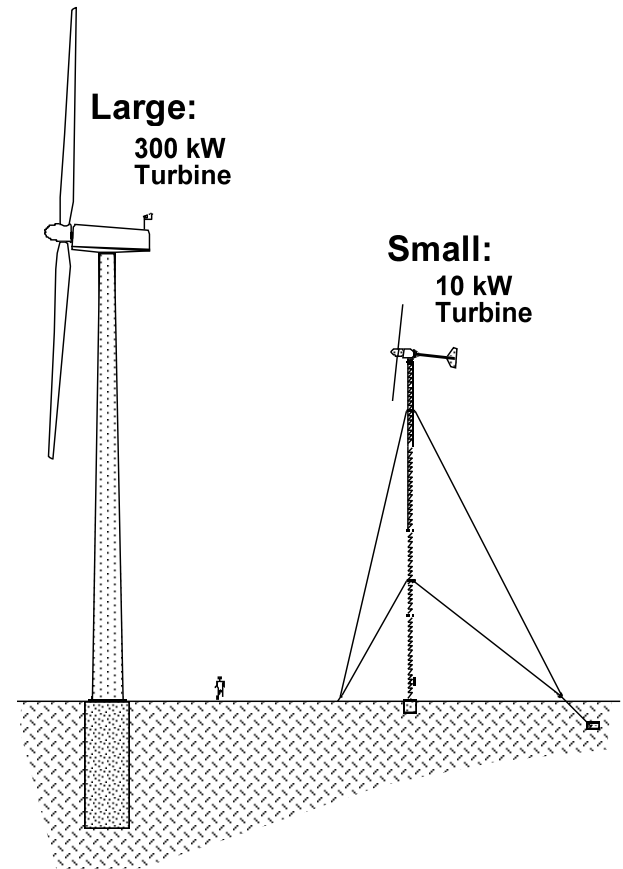
Large and Small Wind Turbines are Different

- Large Turbines (500kW-3 mW)

- Installed in “Windfarm” Arrays
- Totaling 1 - 100 MW
- \$2,000/kW; Designed for Low Cost of Energy
- Requires 6 m/s (13 mph) Average Sites

- Small Turbines (0.3-100 kW)

- Installed in “Rural Residential” On-Grid and Off-Grid Applications
- \$2,500-5,000/kW; Designed for Reliability / Low Maintenance
- Requires 4 m/s (9 mph) Average Sites

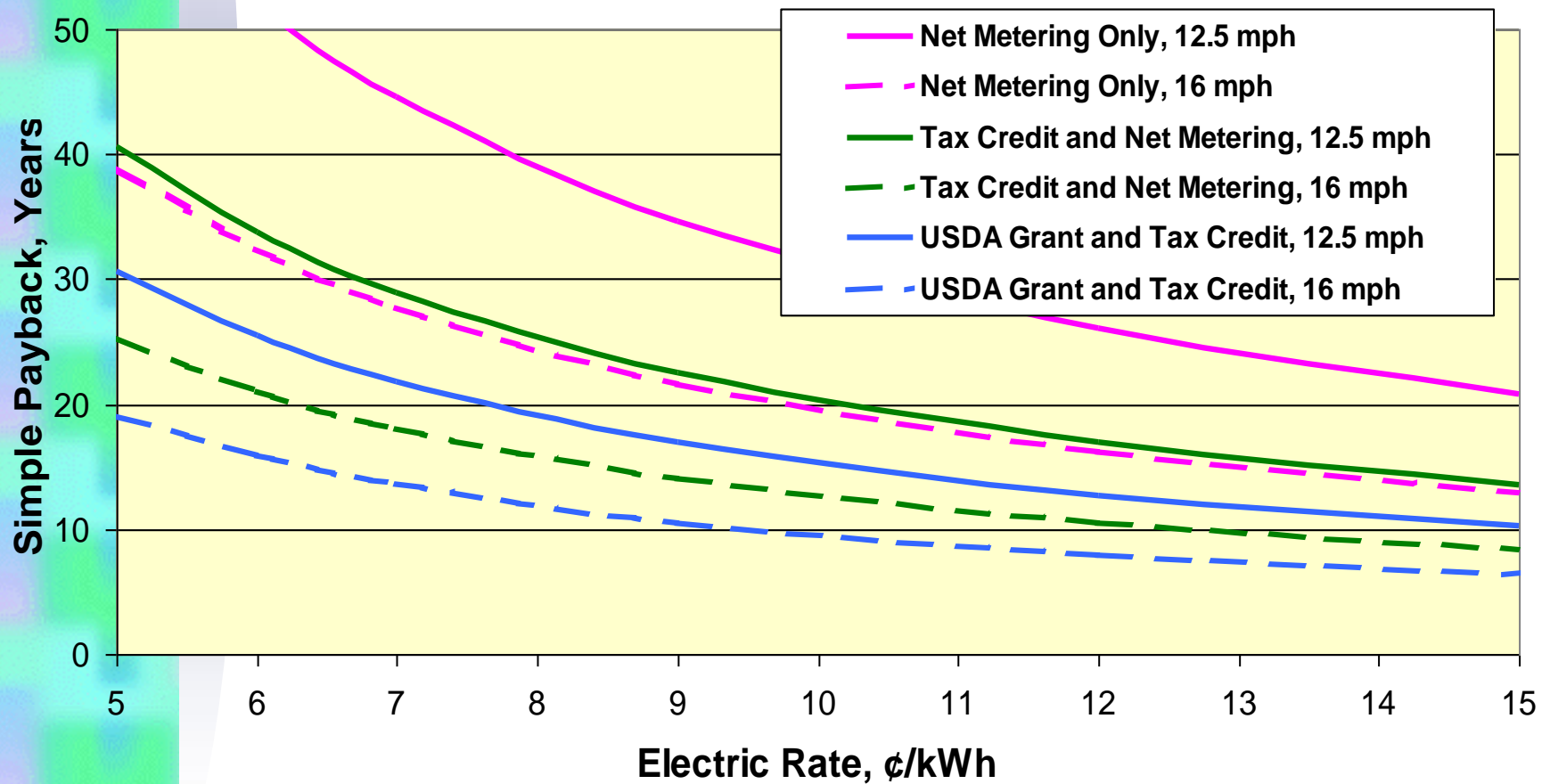


Uses of Small Wind Turbines in Rural America



Small Wind Economics

Simple Payback Bergey Excel, 100 ft Tower



Utility Scale Wind



Large Scale Wind Machines





General Characteristics of Utility Scale Systems

- **1.5 MW machine, enough to power 325 homes**
- **Tower and blades can be 350-450 feet high**
- **Required setback by state rule**
 - **1.1 X max blade tip height from participating property residences and non-participating property lines**
 - **3.1 X max blade tip height from non-participating residences and occupied community buildings**
- **Footprint – quarter to half acre**



Payments to affected parties for utility scale wind

- **WI homeowners average about \$2700 per MW per year**
- **Wind turbines exempt from property taxes (sec 70.111); impact fees used to recover government costs, but**
- **Exempt wholesale generators must pay:**
 - **\$2333 per MW per year to city/village**
 - **\$1667 per MW per year to county**