



Wind Opportunities For Idaho State Lands

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State and Local Initiatives Group
National Renewable Energy Laboratory

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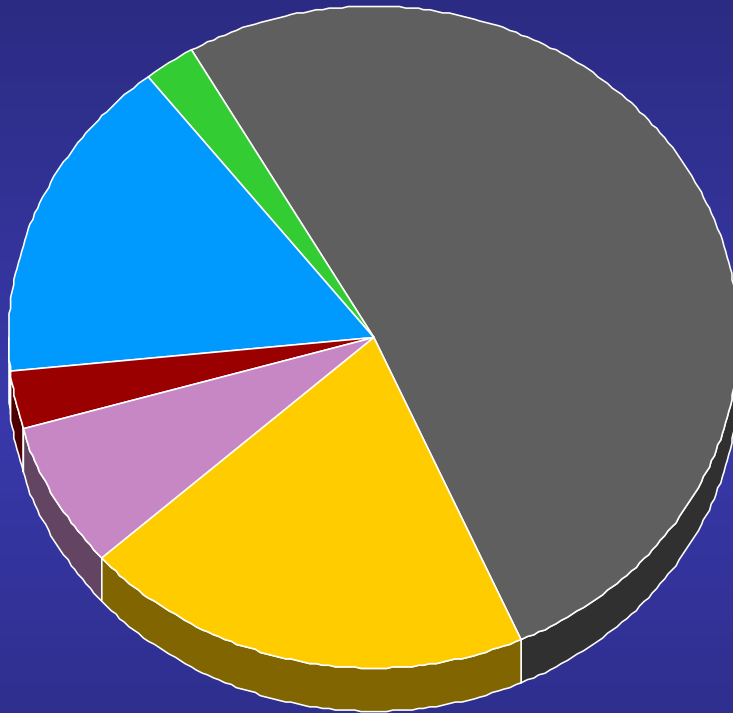
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Wind Overview

- Technology
- Resources
- Markets and Drivers
- Economic Development Opportunities
- Wind Powering America

U.S. Electricity Fuel Mix



■ Coal	51.8%
■ Nuclear	19.8%
■ Hydro	7.2%
■ Petroleum	2.9%
■ Gas	16.1%
■ Other/Renewables	2.2%

Sizes and Applications



Small (≤ 10 kW)

- Homes
- Farms
- Remote Applications

(e.g. water pumping,
telecom sites,
icemaking)



Intermediate (10-100 kW)

- Village Power
- Hybrid Systems
- Distributed Power

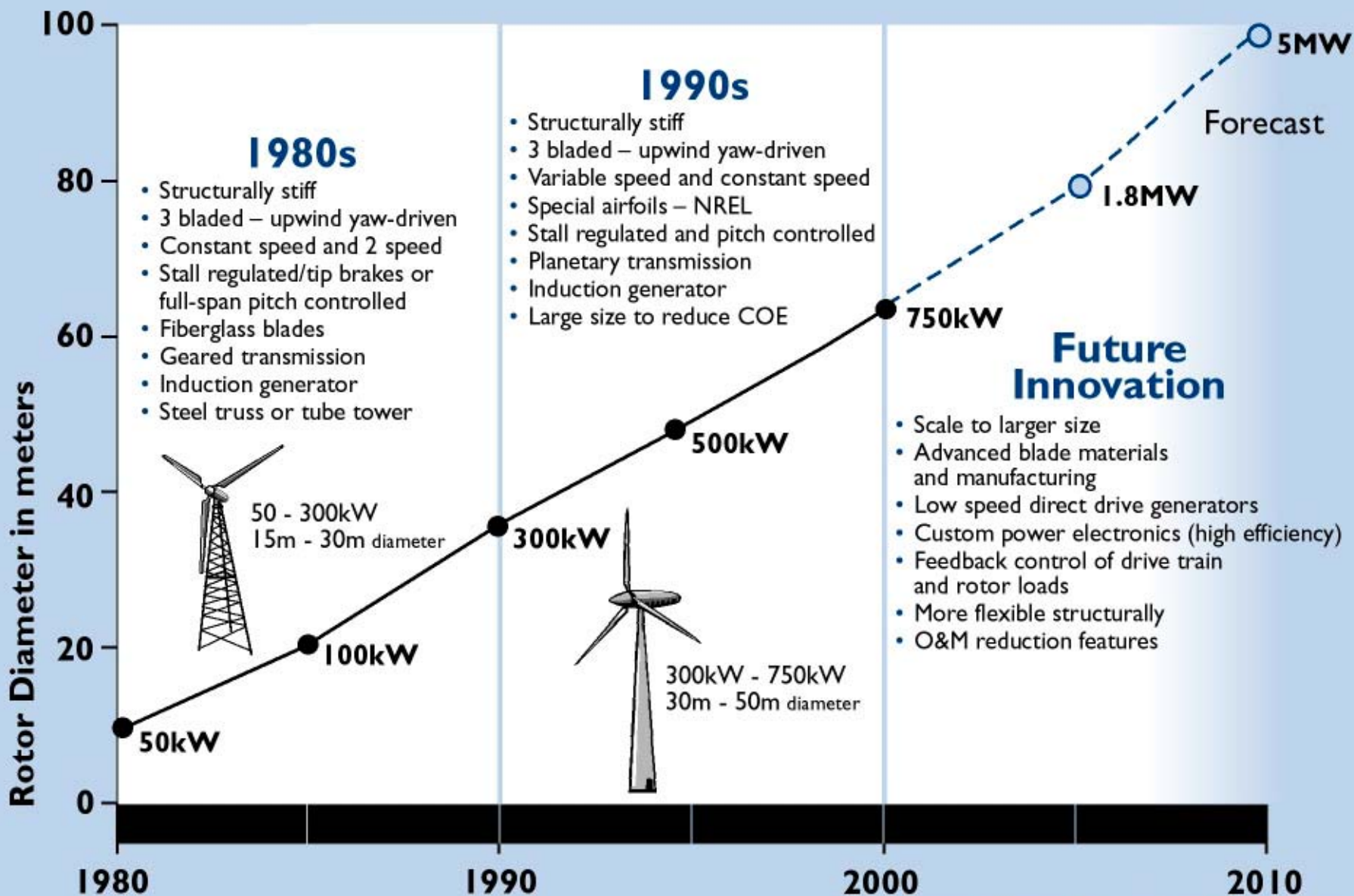


Large (660 kW - 2+MW)

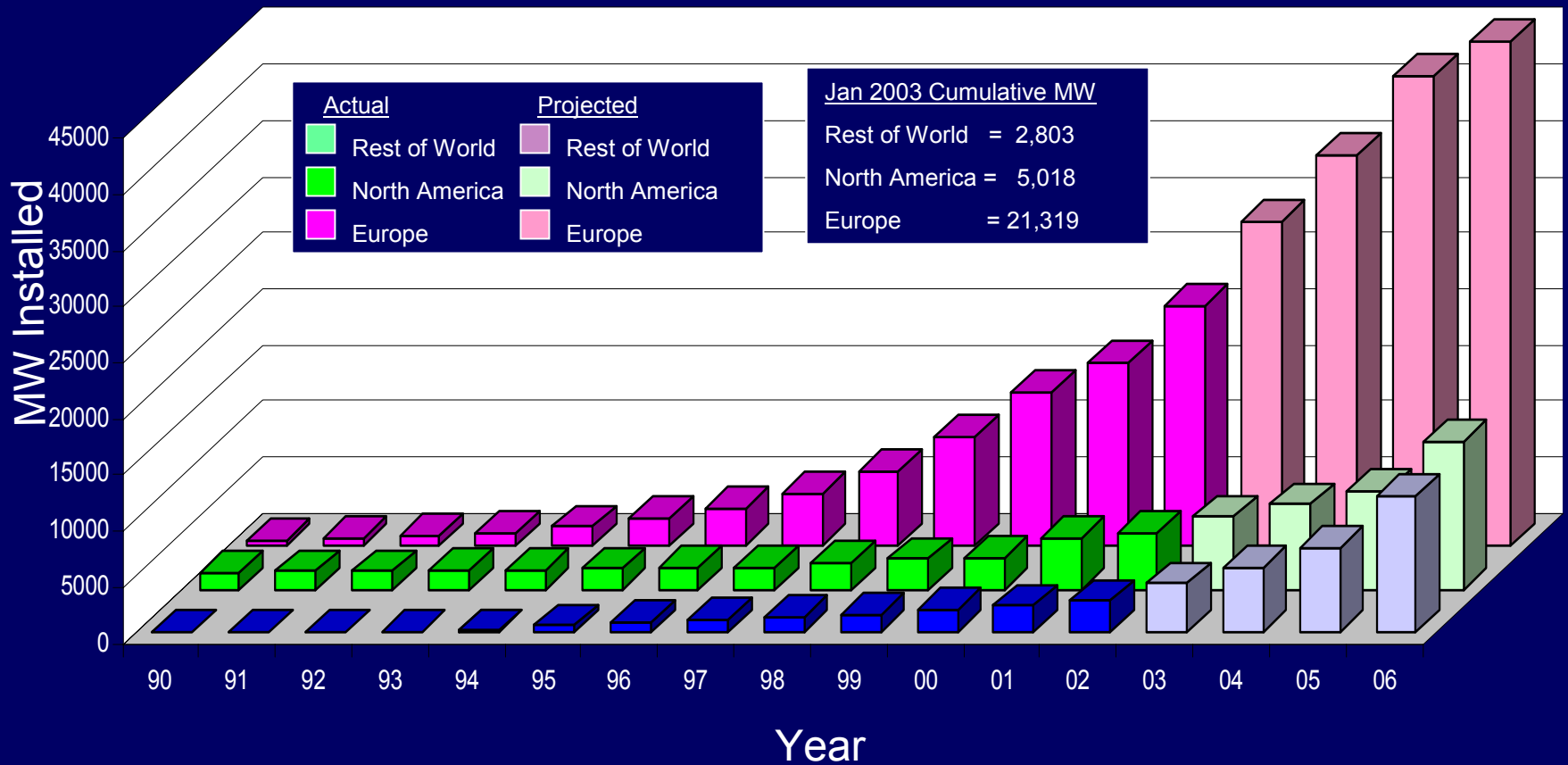
- Central Station Wind Farms
- Distributed Power



THE EVOLUTION OF COMMERCIAL U.S. WIND TECHNOLOGY



Growth of Wind Energy Capacity Worldwide



Sources: BTM Consult Aps, March 2001
Windpower Monthly, January 2003



Maturing Wind Technology



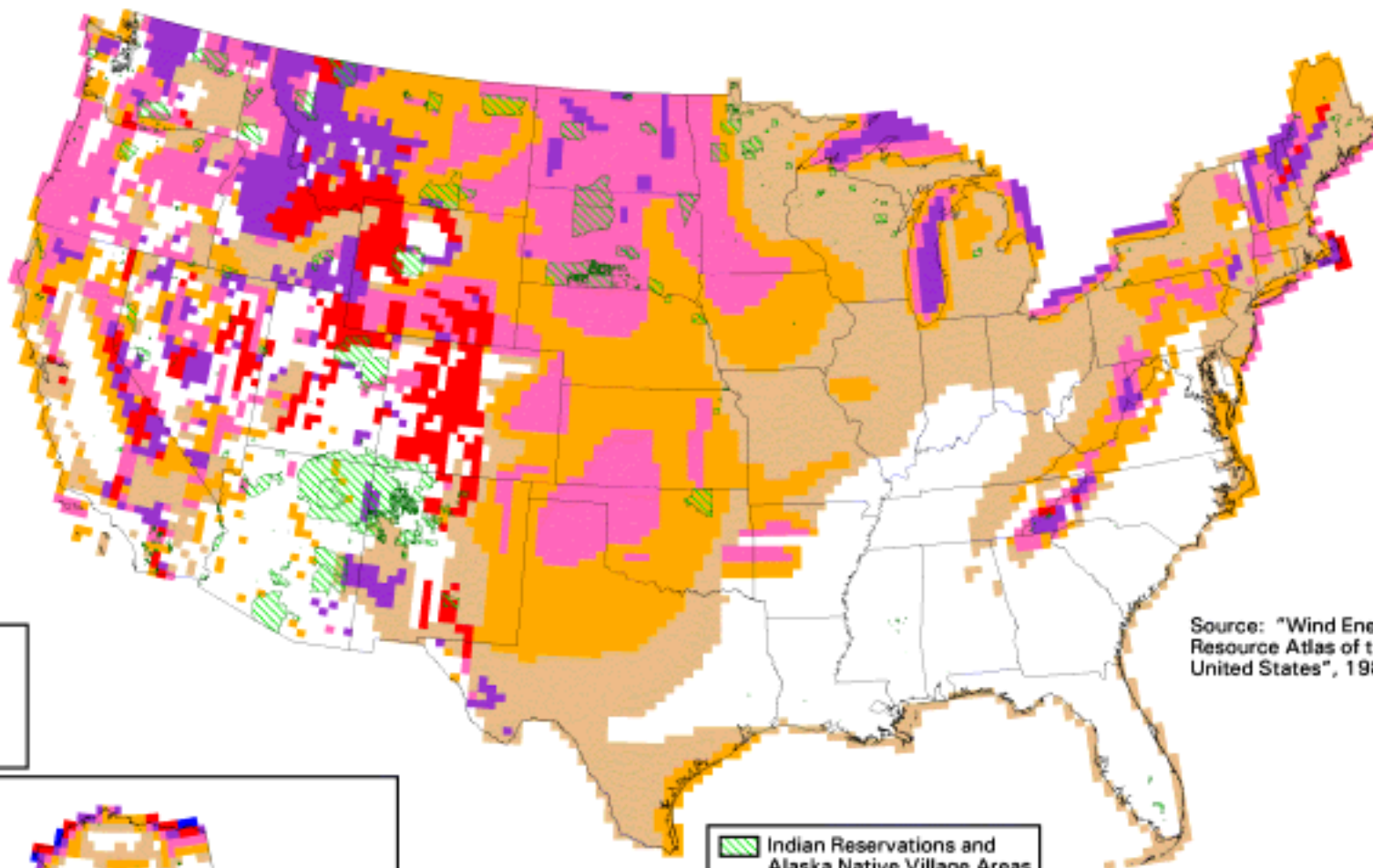
- Technology has matured over 25 years of learning experiences
- Availabilities reported of 98-99%
- Certification to international standards helps to avoid “show stoppers”
- Performance and cost have dramatically improved
- New hardware is being developed on multiple fronts:
 - higher productivity and lower costs
 - larger sized for both land and off-shore installations
 - tailored designs for high capacity factor, low wind speed and extreme weather conditions

**GE WindEnergy
3.6 MW Prototype
Turbine in Spain**

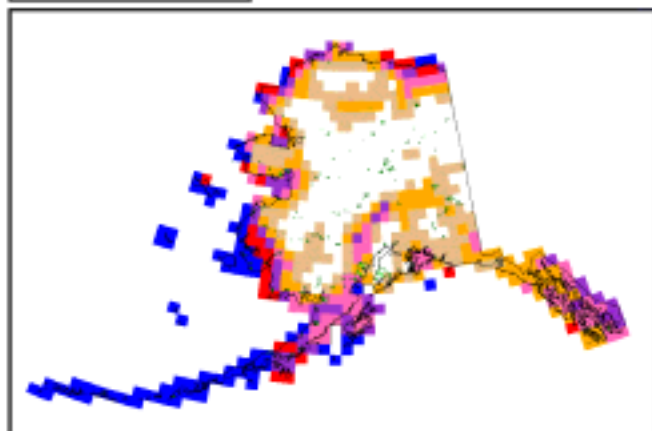
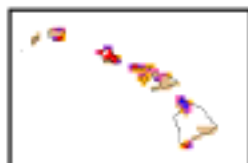
Boeing 747-200



United States - Wind Resource Map









Source: "Wind Energy Resource Atlas of the United States", 1987



 Indian Reservations and Alaska Native Village Areas

Wind Power Classification

Wind Power Class	Resource Potential	Wind Power Density at 50 m W/m ²	Wind Speed ^a at 50 m m/s	Wind Speed ^a 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

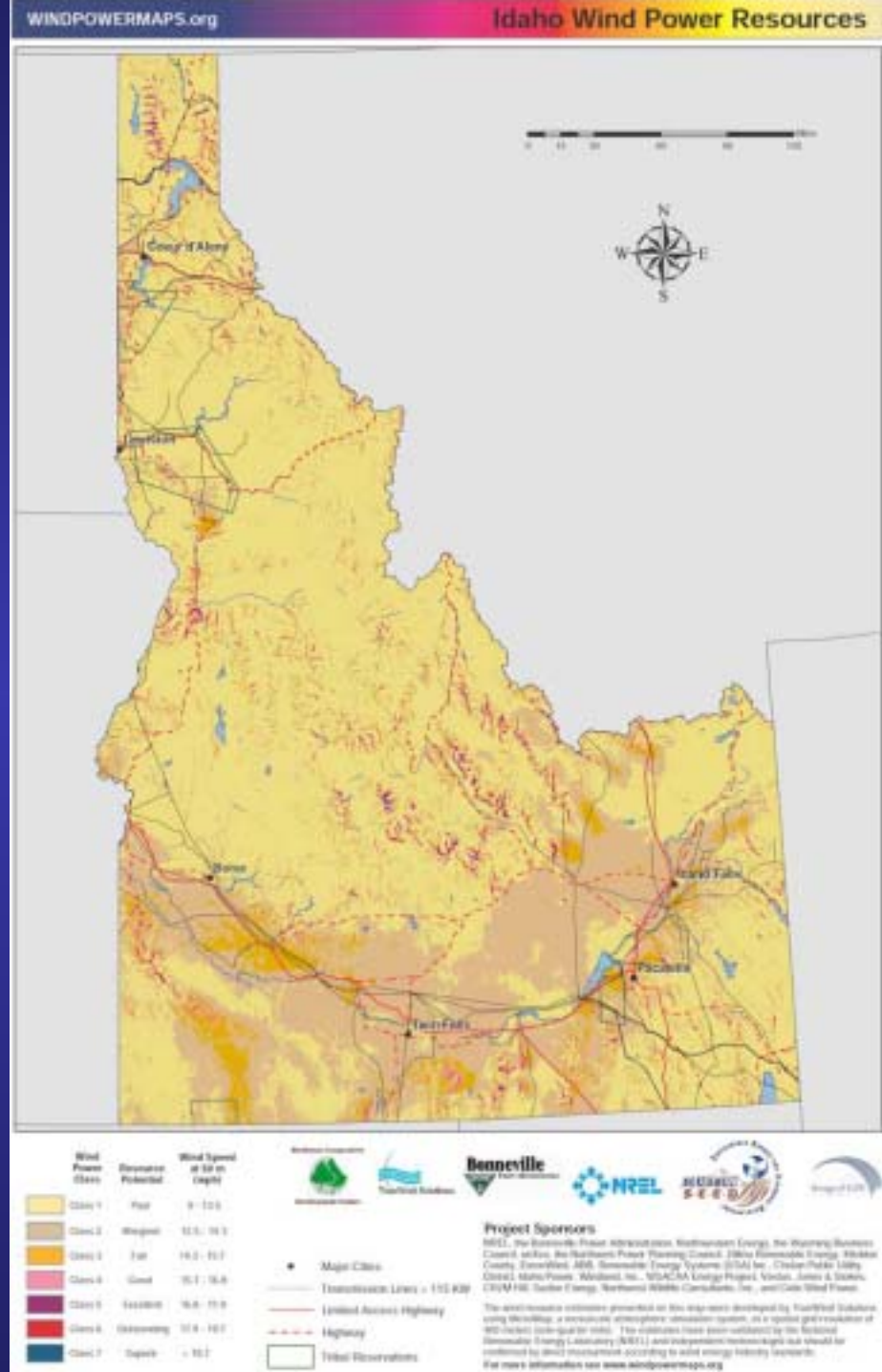
^a Wind speeds are based on a Weibull k value of 2.0

U.S. Department of Energy
National Renewable Energy Laboratory



Idaho Wind Resources

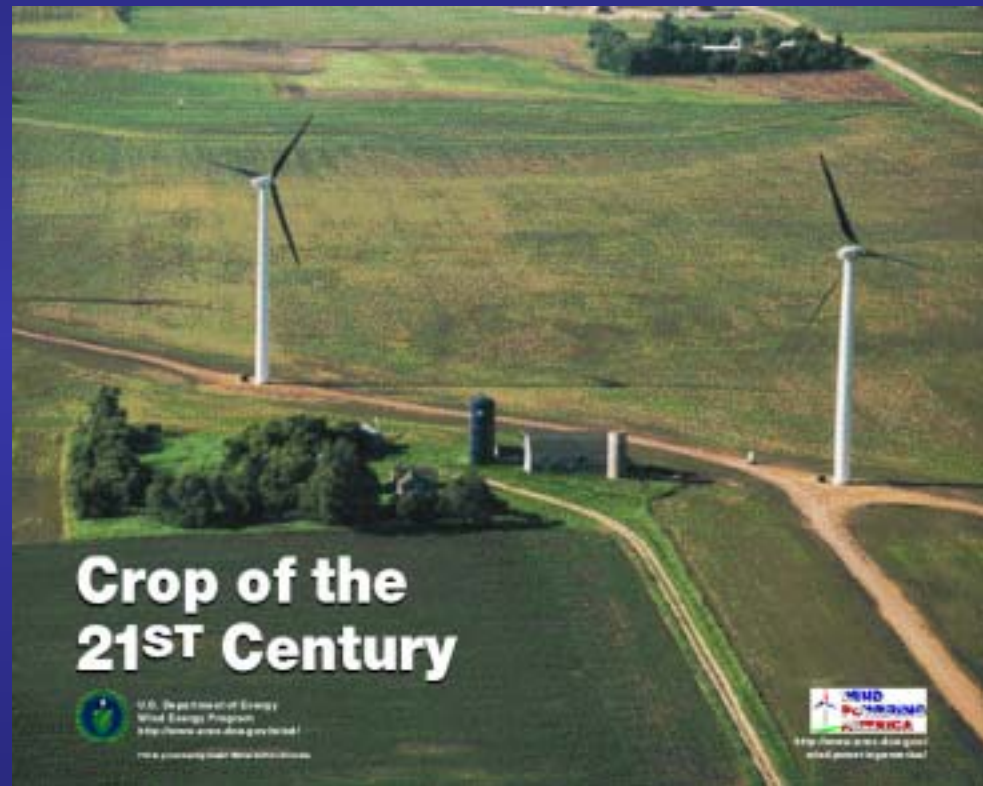
- Class 4+ for utility-scale wind turbines
- Idaho has significant potential for wind development
- Proximity to transmission can be important factor in development
- Very small areas on map can lead to significant wind development





Drivers for Wind Power

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

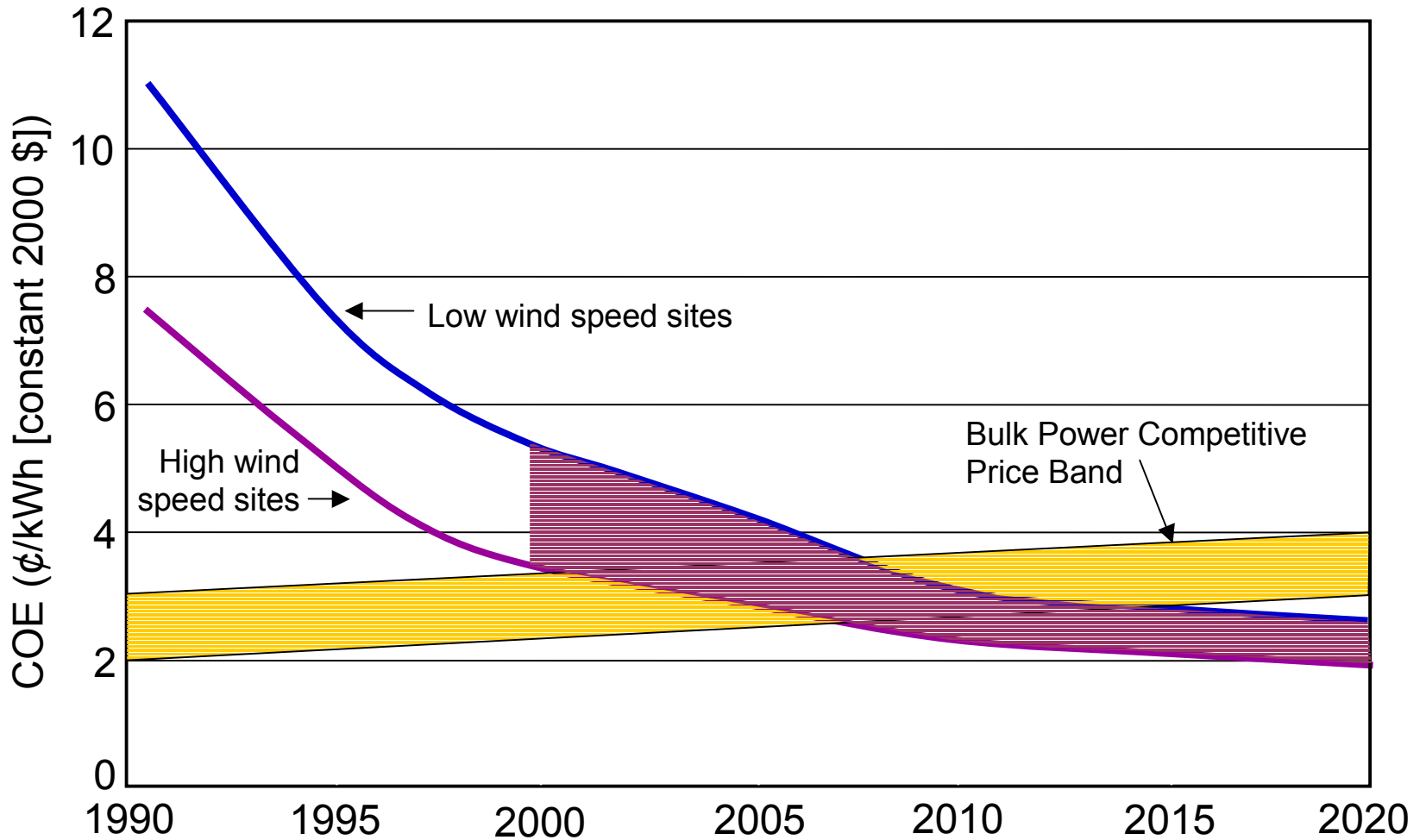


Wind Economics - Determining Factors

- Wind Resource
- Financing and Ownership Structure
- Taxes and Policy Incentives
- Plant Size: equipment, installation and O&M economies of scale
- Turbine size, model, and tower height
- Green field or site expansion
- What is included: land, transmission, ancillary services



Wind Cost of Energy

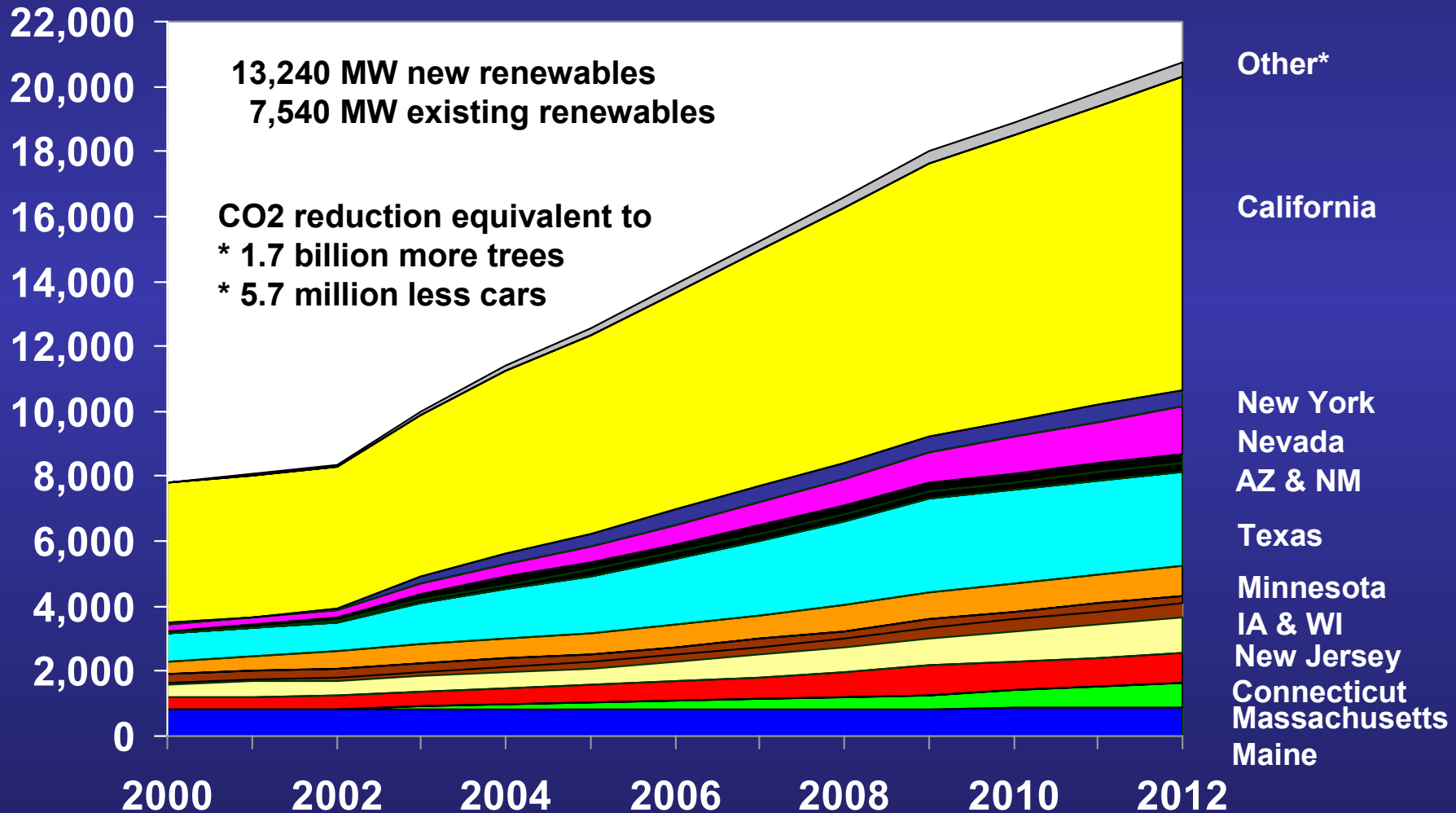


Renewable Energy Policies

- 13 states have instituted **Renewable Portfolio Standards** ranging from 1% to 30% of total power supply.
 - Covers about 33% of retail load nationwide.
- 16 states have established **Renewable Energy Funds**.
 - Fund collections will total \$4.3 billion through 2012.
- Nearly 45% of U.S. electricity customers have access to a **Green Power** product from either their utility or a competitive power supplier.
 - More than 1,400 MW of new renewable capacity



Renewables Expected From State Standards and Funds



*Includes Illinois, Montana, Oregon, Pennsylvania and Rhode Island.



Wind Power Provides State Economic Benefits

- Landowner revenues
 - Typical lease rates: \$2500-4000 per Megawatt per year.
 - State of Colorado increased revenues from 950 acres of land from \$950/year to \$32,000/year with wind lease
- Property taxes
 - Carbon County, WY gets 30% of its annual revenue from a local wind farm
- Economic Impact Model – Idaho Example
 - 100 MW project in Idaho would yield 216 jobs during construction plus 53 ongoing jobs (direct, indirect and induced)
 - Same project would have a \$21.4 million economic impact on the local economy during construction alone.
 - Project would have an ongoing economic impact of over \$3.2 million per year.



Wind Power Provides Rural Economic Benefits

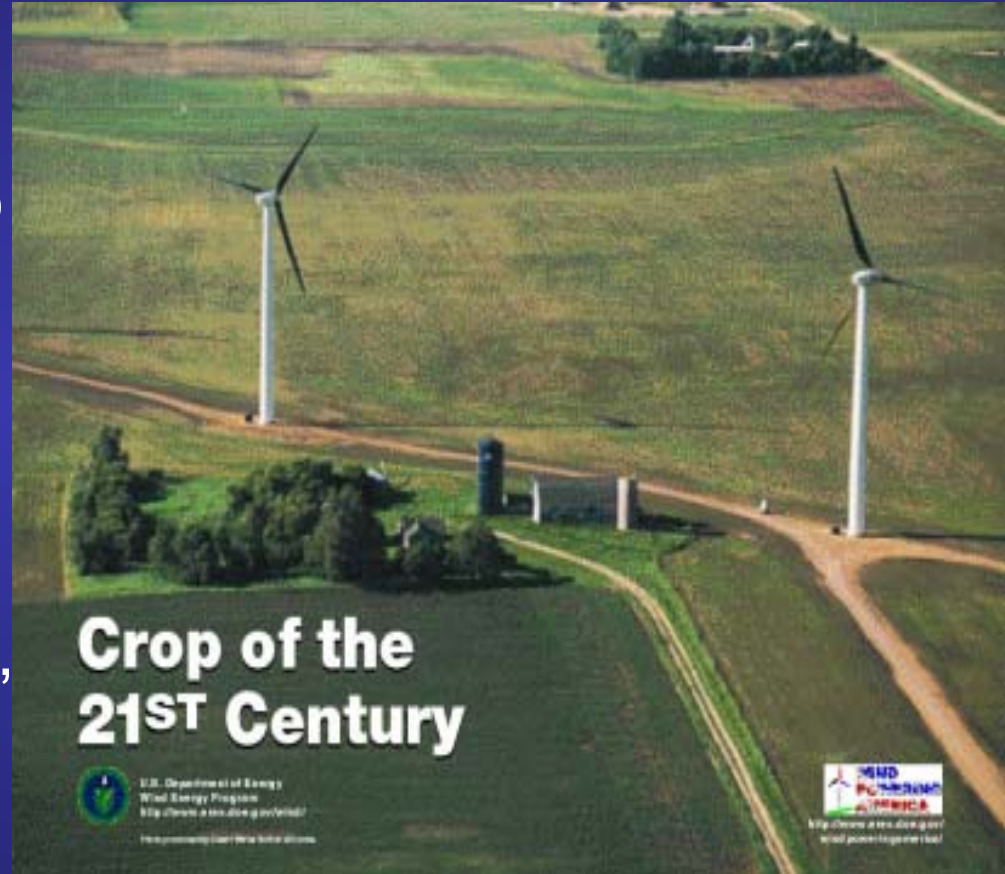
- 240 MW of wind in Iowa
 - \$640,000/yr in lease payments to farmers (\$2,000/turbine/yr)
 - \$2 million/yr in property taxes
 - \$5.5 mil/yr in O&M income
 - 40 long-term O&M jobs
 - 200 short-term construction jobs
 - Doesn't include multiplier effect
- 107 MW wind project in MN
 - \$500,000/yr in lease payments to farmers
 - \$611,000 in property taxes in 2000 = 13% of total county taxes
 - 31 long-term local jobs and \$909,000 in income from O&M (includes multiplier effect)





Key Issues for Wind Power

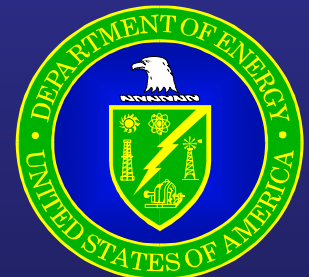
- Restructuring and Policy Uncertainty
- Transmission: access, RTO formation and rules, new lines
- Operational impacts: intermittency, ancillary services, allocation of costs
- Siting and Permitting: avian, noise, visual, federal land
- Accounting for non-monetary value: green power, no fuel price risk, reduced emissions





Wind Powering America

- Federal Initiative to increase the use of wind energy in the United States
- Partnerships with states, tribes, utilities, federal agencies, others
- Goals:
 - Regional economic development
 - Enhance power generation options
 - Protect the local environment
 - Increase energy and national security





Wind and State Lands Network

- Partnership of Wind Powering America started in January 2003
- Peer Network of state land officials
- 14 states attended April 2003 workshop
- About to restart monthly conference calls
- Technical assistance with wind issues
- Analyses for state land officials

For more information or to join:

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www.windpoweringamerica.gov/state_lands.html



Wind Development Process

- Key Issues for Wind Development
- BLM Wind Policy
- Wind on State Lands



Key Steps in the Wind Development Process

- Resource
- Land
- Permit
- Interconnection
- Power Purchase Agreement

Economics underlie the development decision based on the above factors, the ownership, the financing, and the O&M



Land

Lease Agreement Issues

- Need to balance potential for revenue generation with providing attractive land options for developers.
- An informed landowner can avoid pitfalls of tying up land without revenue or missing out on key revenue streams
- Developers need certainty before investment -- i.e., if a developer accesses land to do detailed wind study, he/she needs to have first rights to development.



Land

Lease Agreement Issues

- Payment to Landowners – various options
 - Reservation fee on land
 - Installation fee -- i.e., \$3000/MW
 - % of gross revenue (can include a floor payment)
- Definition of “gross revenue” is important as there can be 2 revenue streams for a wind development.
 - Physical sale of energy, \$/MWh
 - Sale of environmental attribute. Often referred to as “Renewable Energy Credit” or “Green Tag”. Can be sold entirely separately from energy.
- Floor Payment is paid regardless of production - for example, \$2500-\$3000/MW per year.



Land

Lease Agreement Issues

- Term of Agreement: can create a phased approach like the BLM
 - Phase I – Study Term: wind study, transmission analysis, environmental assessment, market study, etc. Term of 3-5 years.
 - Phase II – Operational Term: this agreement includes all specifics of development, revenue, etc. Developers prefer 35 years.

Permits

- On public lands, the permitting process needs to be as transparent as possible.
- BLM policy conducts an EIS by exception only, not the rule.
- State Lands can attract developers by being as clear about the permitting process and requirements.
 - National Wind Coordinating Committee has guidelines general accepted in industry
 - BLM has guidelines for Federal Land
- Avian issues gets elevated attention – proper development practices can generally alleviate significant impact.
- Cultural Site issues -- ethnographics



Interconnection and Power Purchase Agreements

- The proximity of land to available transmission capacity can make or break the economics of a development.
 - Low to mid voltage transmission can run between \$2.5 and 12 million per mile
- The market for wind power is also critical. Is there a demand?
 - Green Pricing Programs
 - Renewable Portfolio Standards
 - Government Purchase Programs
 - Utility plans – Bonneville, Pacificorp
- No merchant power plants being built – need to have a PPA

Economics

- States policies can affect the economics of projects
 - RPS requirement
 - Renewable Energy Incentives
 - Property Tax parity
- Uncertainty of Federal Production Tax incentive has led to market swings
- Sites with better economics, including resource, transmission, taxes and incentives will get better lease terms for landowners.



Bureau of Land Management

Types of Wind Authorizations

- Site-specific Testing and Monitoring
 - Does not retain interest in land.
 - For small site-specific met towers
 - \$50/year per tower upfront rental, term limited to 3 years
- Testing and Monitoring of a Project Area
 - Retains interest in larger project
 - \$1/acre annual rent (\$1000 min.)
 - Term can be extended beyond 3 years
 - Holder must submit a separate Plan of Development and application for future development within 3 years.
- Wind Energy Development
 - Includes turbines, access roads, electrical and support facilities
 - Bond required
 - Minimum annual rent (\$2,365/MW) plus production rent
 - Term of 30-35 years



Bureau of Land Management

Wind Environmental Review

- Testing and Monitoring Applications are categorically excluded unless a critical environmental concern with site.
- Development application requires broader NEPA analysis compliance with
 - Endangered Species Act
 - Migratory Bird Treaty Act
 - National Historic Preservation Act
 - Other appropriate laws
- Programmatic EIS to streamline further review process in West



State Land Activities

- Several states already have operating wind farms on state lands:
 - Texas
 - Wyoming
 - Colorado
 - New Mexico
- Other states in process or have developed policies, including Montana, Hawaii and Washington.
- We have gathered details of many of the state land agreements already in place.
- You have some of the key people present who have worked with those agreements.



For More Information

Wind Powering America

www.windpoweringamerica.gov

Wind and State Lands

www.windpoweringamerica.gov/state_lands.html

Windustry: Paper on “Wind Energy Easements”

www.windustry.org/opportunities/easements.htm

National Wind Coordinating Committee

www.nationalwind.org

Publications include:

- *Permitting of Wind Energy Facilities: A Handbook*, August 2002
- *Assessing the Economic Development Impacts of Wind Power*, March 2003
- *The Proper Use of Studying Wind Energy / Bird Interactions: A Guidance Document*, August 2003



Carpe Ventem

www.windpoweringamerica.gov