



U.S. Department of Energy
Energy Efficiency and Renewable Energy



Wind Program/ Wind Powering America Briefing Slides

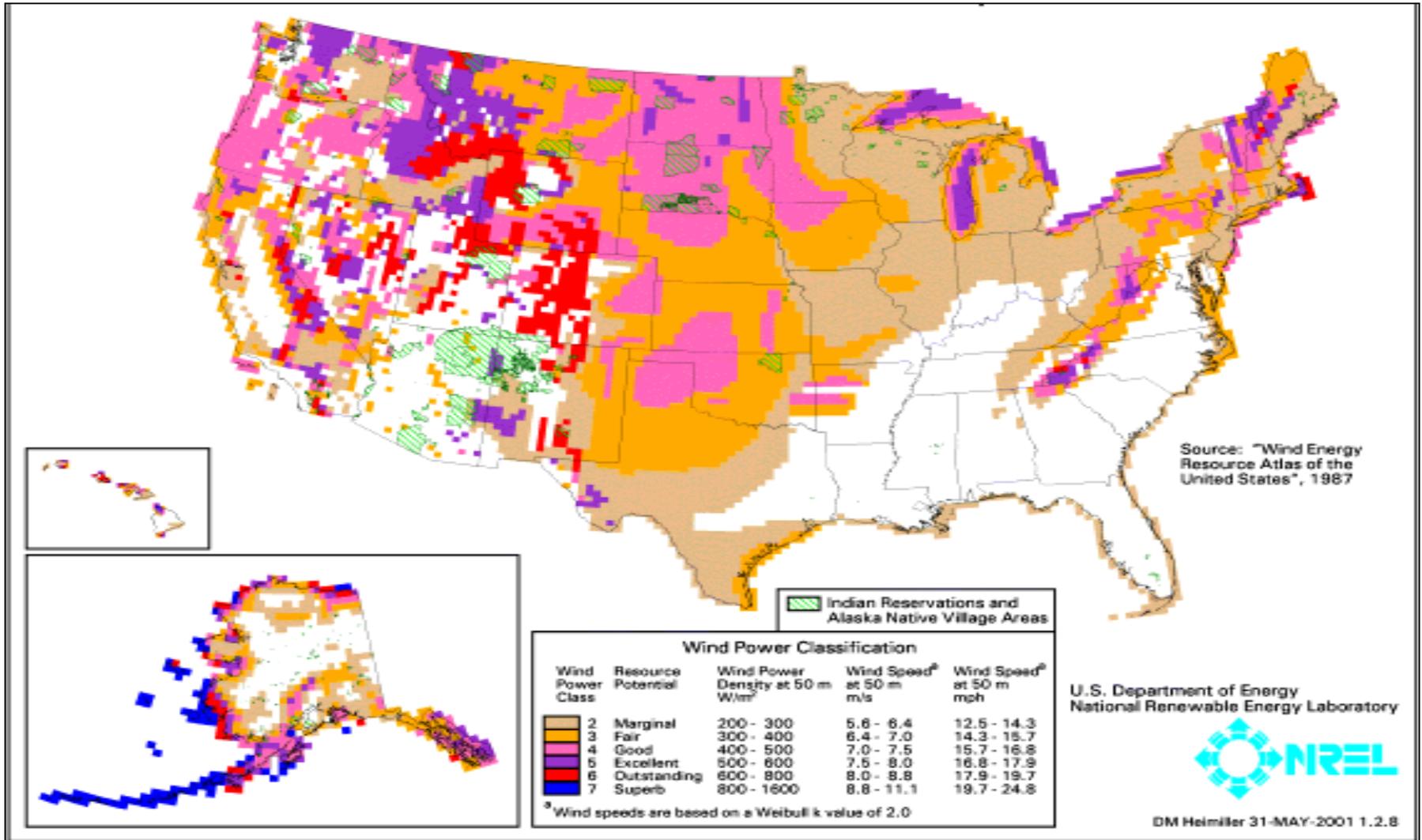
Maryanne Daniel

**U.S. Department of Energy
Philadelphia Regional Office**

September 23, 2003

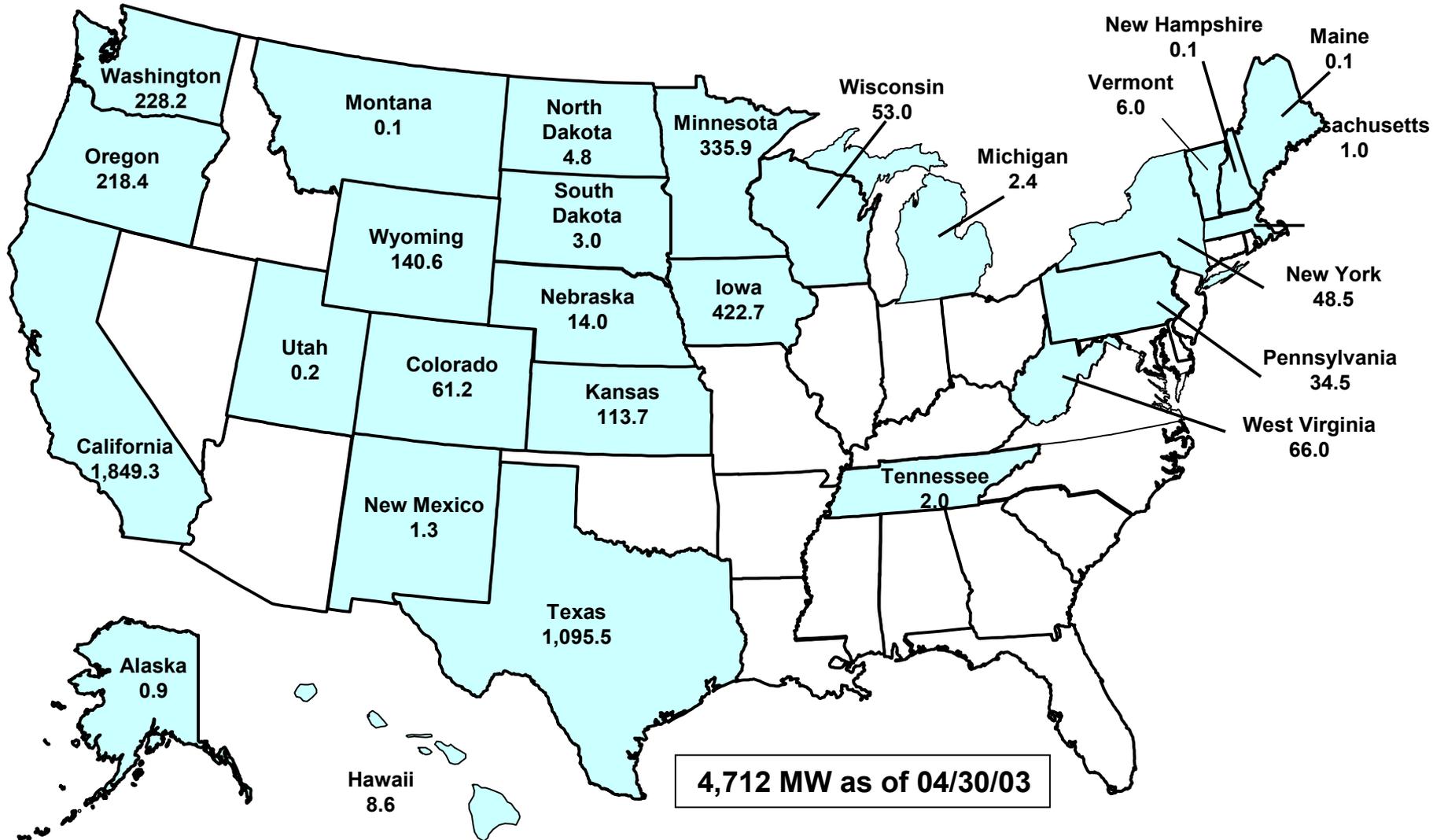


U.S. Wind Resources



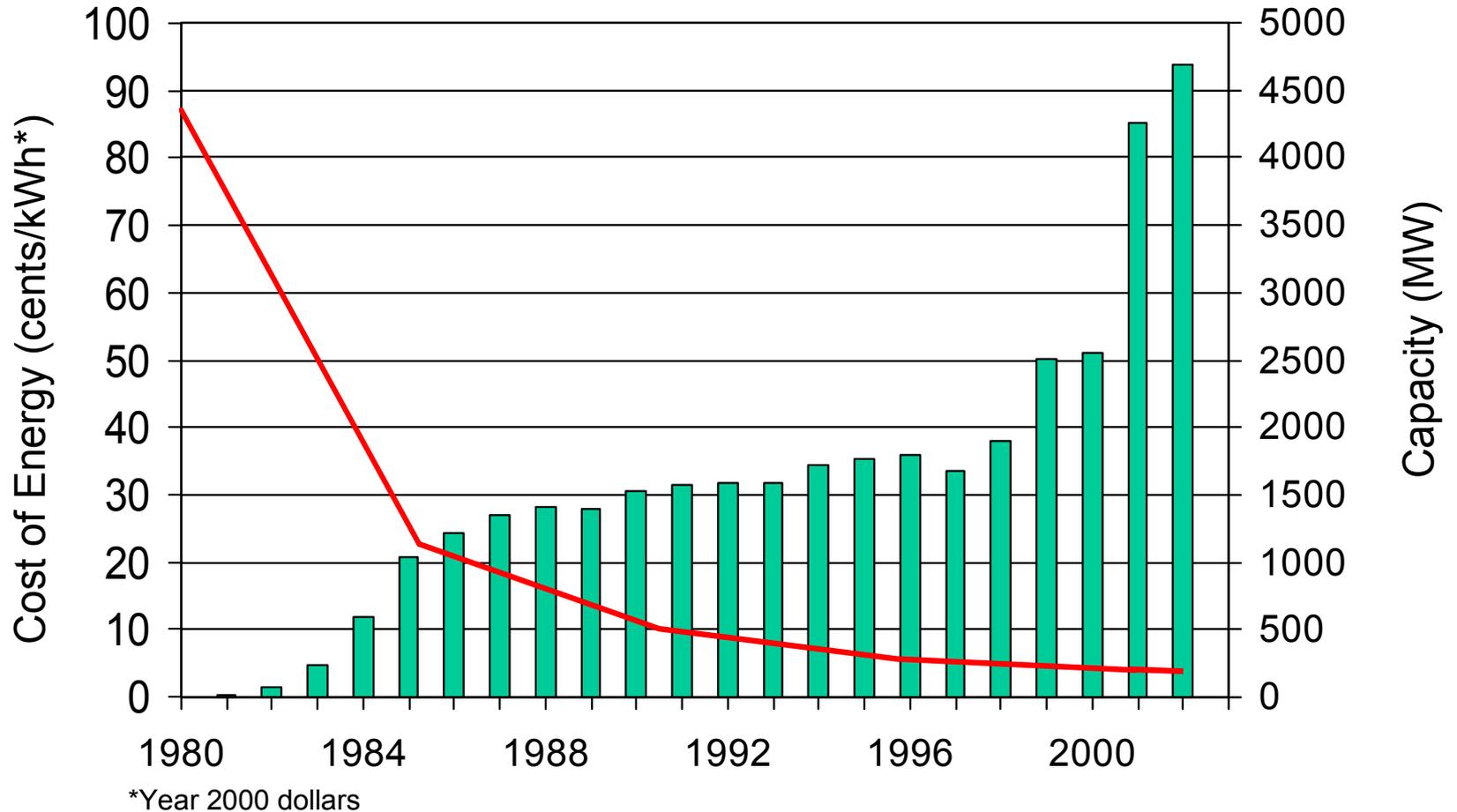


U.S. Wind Power Capacity (MW)





U.S. Wind Power Cost, Capacity Trends



Increased Turbine Size - R&D Advances - Manufacturing Improvements



Sizes and Applications



Small (≤ 10 kW)

- Homes
- Farms
- Remote Applications

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



Intermediate (10-250 kW)

- Village Power
- Hybrid Systems
- Distributed Power



Large (250 kW - 2+MW)

- Central Station Wind Farms
- Distributed Power



Wind System Specifications / Performance

- 98% Availability
- 20-25 yr Life
- Composite Blades
- Variable Pitch Blades
- Capacity Factor (30-40%)
- Ancillary Service Costs

- 80-90ft Blades
- 190-220ft Hub Height
- 30-50 tons
- Nacelle can hold a Chevy Suburban





Wind Story...

- **Benefits:**
 - Stabilize/Hedge Energy Prices
 - Abundant Domestic Energy Resource
 - Safe, Pollution Free
 - Low-Cost Emissions Investment
 - Stretch Existing Fossil Fuels
- **Issues:**
 - Economics
 - Intermittency
 - Transmission
 - Utility Operations Impacts
 - Aesthetics, Noise
 - Avian
- **Markets:**
 - Distributed Generation
 - Wind / Hydrogen
 - Wind / Hydropower
 - Wind/Clean Water
 - Offshore Wind
- **Final Analysis:**
 - Wind Market will grow... but how much?
 - Legislation (RPS, PTC, State Tax)
 - Public/utility acceptance and demand



DOE Wind Energy Program

Mission:

“Enhance the level of technology development and deployment of the Nation’s fastest growing renewable energy resource.”

R&D Priorities:

- Low Wind Speed Technology
 - Large
 - Distributed
- Transmission and Integration Issues

Goals:

- 2004 – COE from large systems in Class 6 winds = 3 cents/kwh
- 2007 -- COE from distributed wind systems = 10-15 cents/kWh in Class 3
- 2010 -- at least 100 MW installed in 16 states
- 2012 -- COE from large systems in Class 4 winds = 3 cents/kWh onshore or = 5 cents/kWh offshore
- 2012 -- Complete program activities for grid access, operating rules, ancillary service tariffs, and transmission expansion plans that support industry’s 2020 capacity goal of 100 GW (100,000 MW)



Offshore Wind

Benefits & Issues:

- Higher-quality wind resources
- Economies of scale
- Proximity to loads
- Reduced land use & aesthetic concerns
- Jurisdictional issues – Federal, state, local
- Capital/maintenance costs
- Navigable water uses

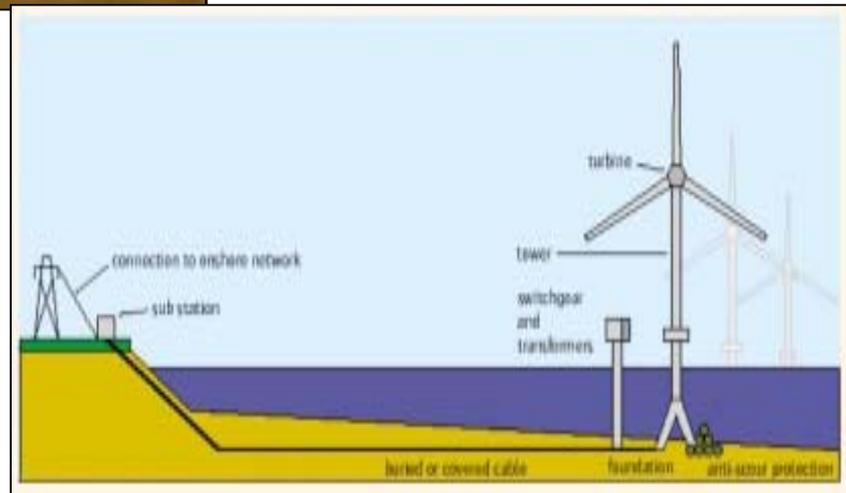
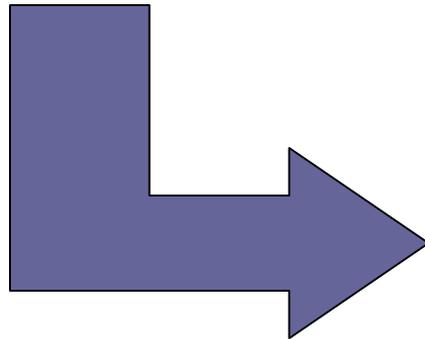
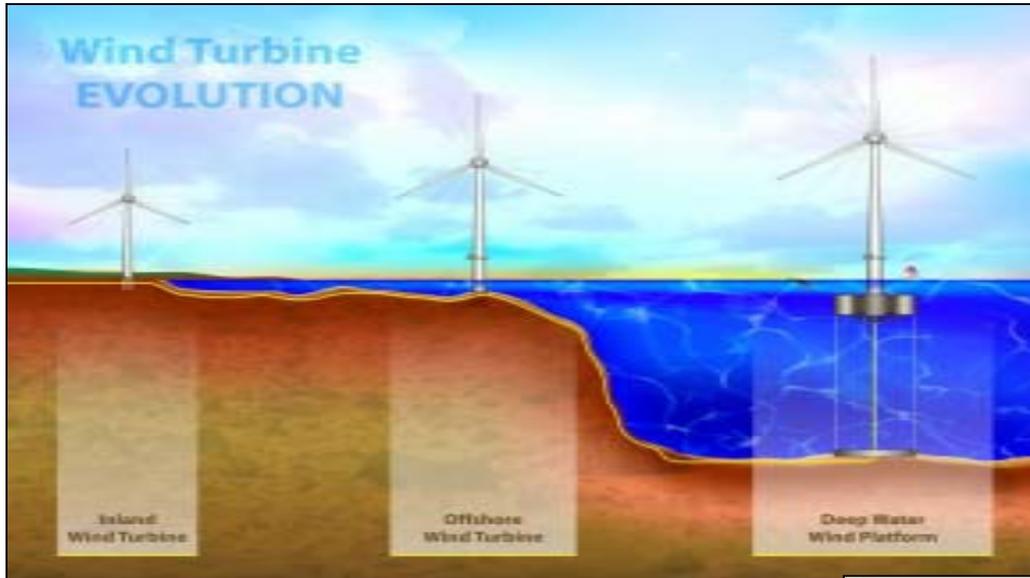


Program Activities:

- NWCC Offshore Workshop, July 2003
- Deep-water Tech. Offshore Mtg, Fall 2003
- LWST Phase II Solicitation – Offshore element
- Tracking Enviro. Issues and U.S. Offshore Projects
- Assessing European Offshore Activities



Offshore Wind





Wind Energy in Mid-Atlantic Regional States



Local Benefits of Wind:

- **Land Lease Payments**
 - \$3 – 4,000/MW/year
- **Sales and Property Tax Revenues**
- **Payments in Lieu of Taxes**
 - Local Infrastructure, Schools
- **Construction, Service, O&M Jobs**
- **Manufacturing and Assembly**
- **Tourism**
- **Clean Air Compliance**

August 2003: 100 MW Installed

December 2004: 215+ MW Projected



Wind Powering America

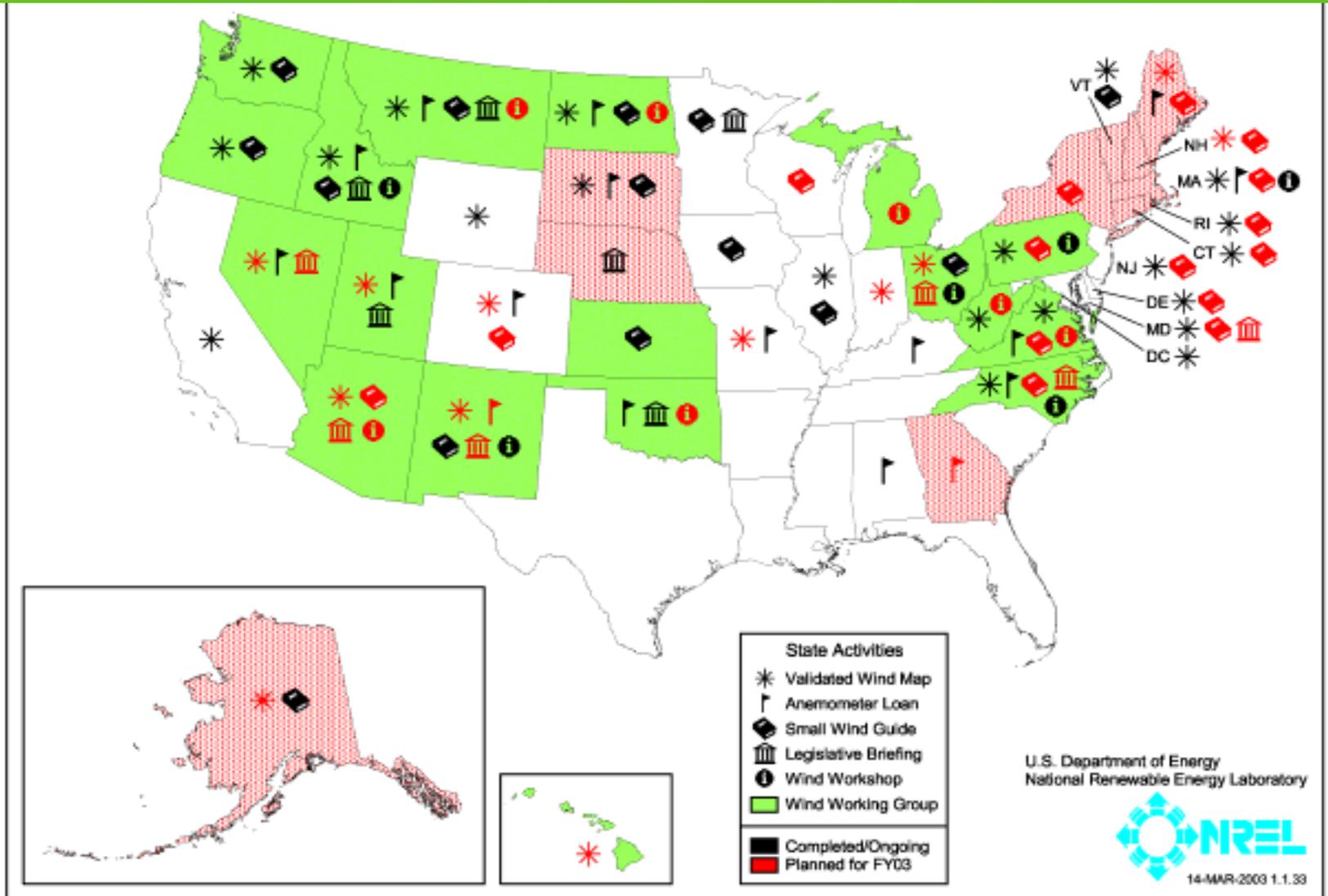
Mission: Promote increased use of domestic wind resources to enhance rural economic development and expand environmental options across America.

Goals: By 2010, at least 100 MW installed in 30 states
By 2010, at least 20 MW installed in 40 states

Annual Goals & Targets			States Supported To Date	General Focus Areas	
Year	> 20 MW	> 100 MW			
2003	19	10	<ul style="list-style-type: none"> Alaska Hawaii Washington Oregon California Idaho Nevada Utah Arizona Montana Wyoming Colorado New Mexico North Dakota South Dakota Nebraska Oklahoma Iowa Missouri Wisconsin Illinois Michigan Ohio Kentucky Maine Vermont New Hampshire Mass. Rhode Island Conn. New York Pennsylvania New Jersey Delaware Maryland/DC Virginia West Virginia Georgia North Carolina Puerto Rico 	<ul style="list-style-type: none"> State Wind Support Utility Partnerships Tribal Wind Outreach Federal Sector 	
2004	25	12			
2005	32	16			
2006	34	19			
2007	36	22			
2008	38	25			
2009	39	27			
2010	40	30			
					Activities Supported
					<ul style="list-style-type: none"> State Wind Working Group Wind Workshops Anemometer Loan Programs Legislative Briefings Wind Maps



Wind Powering America State Activities





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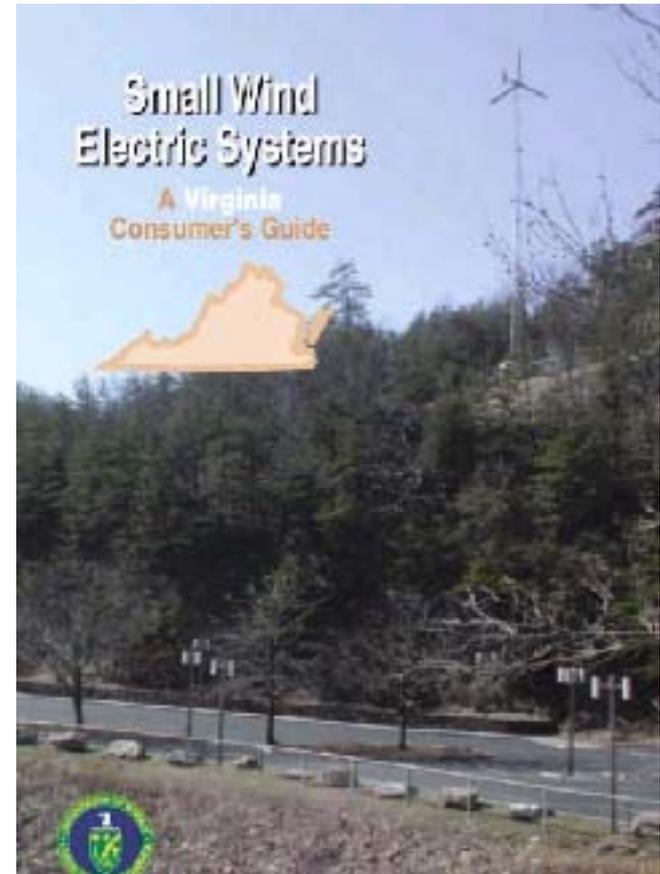
Wind Powering America Support to Mid Atlantic Region

• Strategy

- Examine wind as option to enhance economic development
- State Energy Office key partners
- Focus on resource-rich states with little development
- Leverage Fed/State/Local resources
- Develop info & tools for decisionmakers

• Funding

- \$420K direct program funds to SEOs to date
 - Omnibus & Financial Assistance awards to key states
- Lab technical assistance
 - NREL
- SEP Special Project Awards
 - FY 02: \$75,000 to VA





Mid-Atlantic Region Accomplishments

- Virginia Anemometer Loan Program
 - DMME/James Madison University
 - Ten 20M Towers expanded to include 30M and 50M Towers
 - Data available on website
- Other Locations
 - Eastern Neck National Wildlife Reserve, Rockhall, MD
 - Gateway National Recreation Area, Sandy Hook, NJ
 - Delaware Aerospace Education Foundation Innovation Technology Exploration Center, Smyrna, DE
- Validated State Wind Maps (Regional)
- State Specific Wind Guides (DE, NJ, PA, VA)
- Mid-Atlantic Regional Conferences (August 2000; February 2003)
- Six Wind Workshops (NJ, VA, WV)
- State Wind Working Groups (PA, VA, WV)





Wind – Industrial Sector Partnerships

- Opportunities:
 - Sales of advanced materials and processes
 - On-site developments
 - Investments in Wind Companies/projects
 - Land Lease Arrangements
 - Green Power/Green Tags purchases
 - New Markets (DisGen, Wind / Hydrogen)
- Benefits:
 - Meet Distributed Energy Needs
 - Stabilize Energy Prices
 - Low-cost Environmental Compliance
 - Corporate & Community Leadership



Supplying Advanced Materials & Components for Wind Power Systems

October 2001

Sponsored by

U.S. Department of Energy
Office of Industrial Technologies
Office of Power Technologies



Prepared by

Mark Ellis
Energetics, Inc.

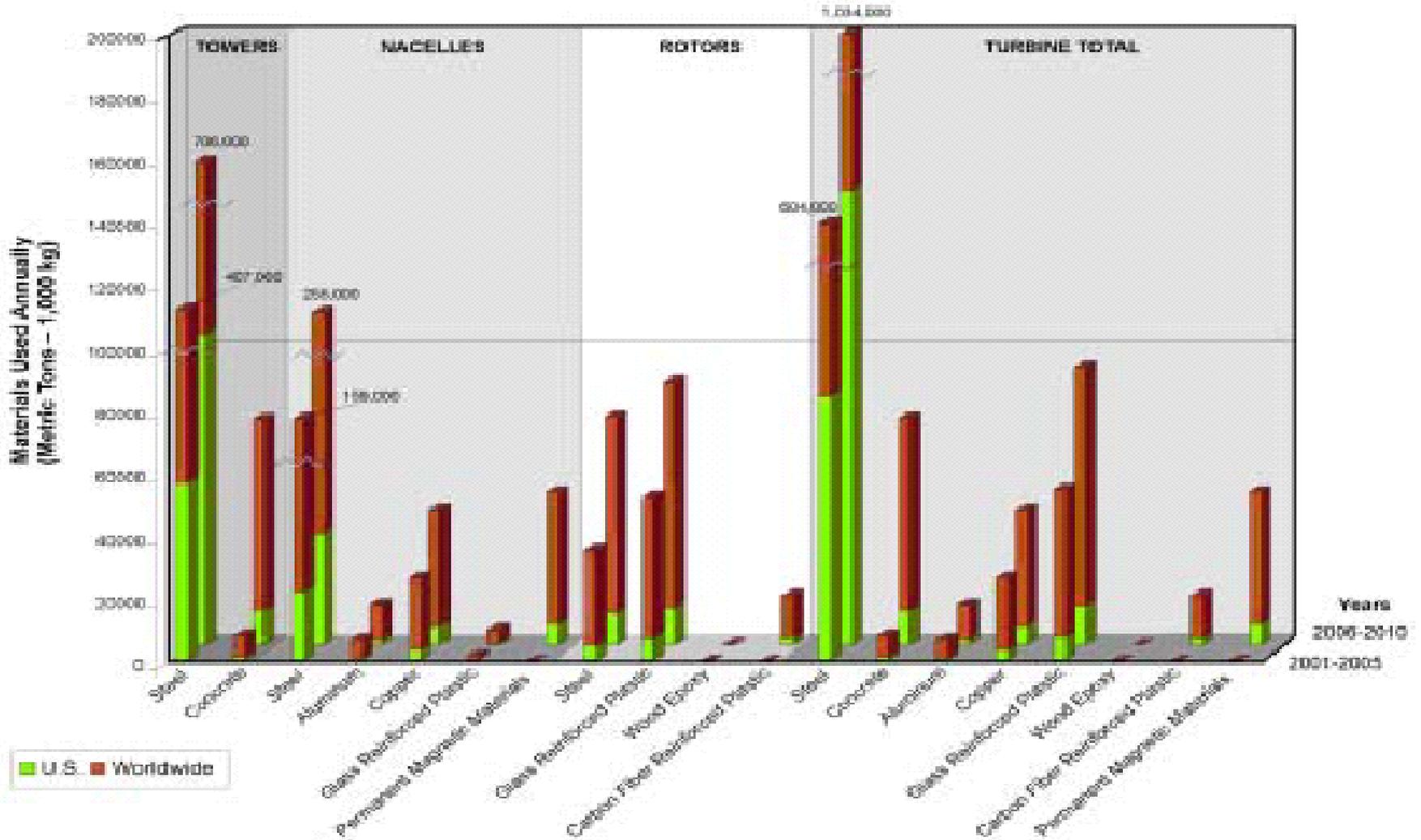
Jock Eisenhower
Energetics, Inc.



Growing Market for Materials

(Dan Ancona and Jim McVeigh, Princeton Energy Resources International, 2001)

Wind Turbine Materials Usage





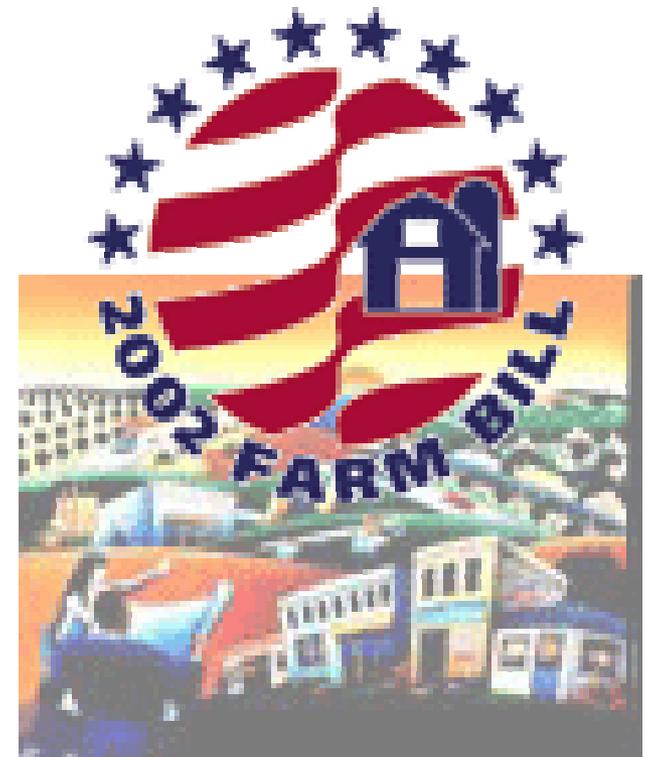
2002 Farm Bill

Title IX, Section 9006:

- 5 Years, \$23 M/year for Renewable and Energy Efficiency Projects
 - Wind, solar, biomass, geothermal, hydrogen, building and industrial efficiency
 - Farmers, Ranchers, Rural Small Businesses
 - **USDA Award Announcements in late-August**

USDA-DOE Partnership:

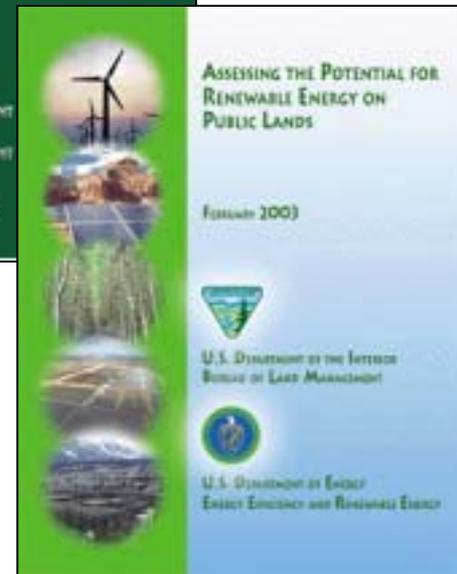
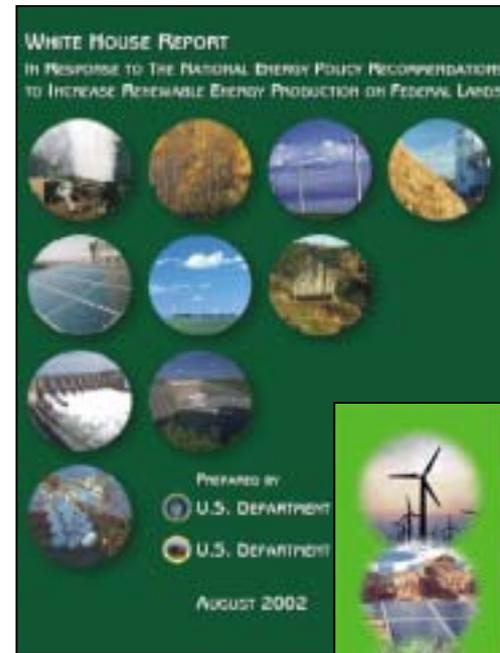
- Development of Notice of Funding Availability (NOFA)
- DOE-Lab Technical Team
 - NREL, SNL, ORNL
- Renewables and Efficiency Technologies Briefings
 - Oklahoma City, April 8-10, 2003
 - Orlando, July 17, 2003
 - EERE Regional Office and NASEO Representation
- Development of Web-Based Info
- DOE Technical Review of Proposal, Completed July 25
- Program Measures and Metrics Development Underway
- Cost-shared Technical Staff Support Underway
- DOE/RO/SEO Outreach to Applicants Planned for FY04





Renewables & Federal Lands

- National Energy Policy, May 2001:
 - Increase Renewable Energy Development and Use on Federal Lands
 - DOE-Interior Lead Interagency Effort
 - August 2002 Summary Report to White House
- Bureau of Land Management:
 - Resource Assessment/Revision of Land Use Plans
 - DOE/NREL Support – MOU
 - February 2003 Report – Top Sites
- Forest Service
 - Review of BLM Process & Products
 - Briefings from DOE/NREL staff
- Department of Defense
 - \$6 million assessment of renewables on or near military bases
 - DOE labs providing technical support





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For further information...

DOE Wind and Hydropower Technologies Program & Regional Offices

- www.eere.energy.gov/wind

American Wind Energy Association

- www.awea.org

National Wind Coordinating Committee

- www.nationalwind.org

Utility Wind Interest Group

- www.uwig.org





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