

U.S. Department of Energy Office of Energy Efficiency and Renewable Energy  
Wind and Hydropower Technologies Program

2008 Wind Power Strategic Planning Meeting  
February 5-6, 2008 | Holiday Inn at Key Bridge



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**U.S. Department of Energy**  
**Energy Efficiency and Renewable Energy**  
Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable

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## INTRODUCTION

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The U.S. Department of Energy's Wind and Hydropower Technologies Program (Wind Program) convened a Strategic Planning Meeting at the Holiday Inn Rosslyn at Key Bridge, Arlington, VA, on February 5-6, 2008, to discuss the goals, strategies and future focus of the Wind Program. A total of 87 representatives from the wind industry, national laboratories, DOE Wind Program staff and support contractor organizations attended.

The goal of the meeting was to gather feedback and recommend priorities for each area of the 20% Scenario, looking initially at the next five years based on the long term priorities set out in the 20% Scenario. To this end, DOE asked each breakout group to,

- Identify specific needs and actions;
- Lay out roles and responsibilities;
- Define a five year strategy;

Each breakout group provided recommendations best suited to each of their topical areas per these guidelines, or as much as each group's discussion would permit.

DOE Wind Program managers and national laboratory staff participated in an observer and support capacity, with the majority of the meeting time yielded to industry stakeholders for their comments and contributions. Throughout the meeting, participants were led in exercises that sought to identify the issues and top activities that are most appropriately addressed by DOE, industry, other organizations, and/or a combination of these organizations.

The following sections of this report capture the results of each session. The appendices capture the agenda and participant details.

## ***Breakout 1: Wind Turbine Technology***

### **Topic 1: Partnerships for Advanced Rotors and Components: Larger, Lighter, Smarter**

#### **Top Activity:**

- Gearbox and generator R&D that will develop in manufacturing base in the US.

### **Topic 2: Targeted Applied Research**

#### **Top Activities:**

- Aeroacoustics research (e.g. higher tip speeds)
- Materials research (e.g. carbon fiber applications)
- Aerodynamics (inboard blade performance)
- Wind flow and wake modeling
- Advanced controls R&D

### **Topic 3: Atmospheric Fluid Dynamics**

#### **Top Activities:**

- National wind resource database
- National wind plant cost and performance database
- Tall-tower resource data
- Remote sensing development and deployment to measure the resource at elevation and offshore

### **Topic 4: Manufacturing R&D**

#### **Top Activities:**

- Manufacturing process R&D
- Automation in large scale manufacturing

### **Topic 5: Reliability Monitoring and Problem Resolution, Appropriate Standards, and Guidelines**

#### **Top Activity**

- Increase budget. Approximately \$8 million is needed to begin problem resolutions; the current \$4 million budget is not adequate.

#### **Other Activities for Consideration:**

- Mitigate the Risk of Large-Scale Deployment
  - Reduce the innovation risk of commercializing technology by public-private sector cost sharing of technology development and demonstration
  - Build and equip the next generation full-scale test facilities
  - Support effective certification standards that promote performance and operational excellence
  - Establish a national program to monitor and archive the US fleet reliability, including system performance and plant operations and maintenance

- Establish a national facility for offshore wind technology
- Foster the introduction of tech improvements
  - Target RD&D initiatives including towers, blades, controls, drive trains and power electronics
  - Increase the capacity factor by placing larger rotors on taller towers with lighter components and load-mitigating rotors

**General Comments:**

- More than half of the wind power in the 20% Scenario could come from offshore. However, onshore wind activities should still take precedence over offshore investment at this time because onshore applications are at least half the cost and come with substantially less risk.
- Manufacturing R&D should be framed in the interest of creating manufacturing jobs.

## ***Breakout 2: Transmission and Integration of Wind into the U.S. Electric System***

Participants in Breakout 2 discussed how to allocate funding among several key issue areas, as indicated in the chart below. Further details are discussed under each of the following topic areas.

### **Topic 1: System Planning & Operation**

#### **Top Activities:**

- Support the development of large integration studies
- Support Balancing Area consolidation
- Support and monitor grid code development

#### **Other Activities for Consideration:**

- Storage R&D
- Examine the impact of the overlay transmission system based on the 20% report
- Illustrate/demonstrate how others benefit from increased levels of wind penetration

#### **General Comments:**

- The general consensus is that storage is not needed to reach 20% wind penetration.
- Additional funding for meso-scale modeling is necessary to verify model accuracy at modern hub heights and constantly provide up-to-date model information.
- A lingering issue with both the Western Interconnection and MISO studies is the need to coordinate with Canada. However, this task is outside DOE's jurisdiction.
- Wind needs to be part of resource planning, and utilities must coordinate with each other.
  - Without organized markets, utility resource plans are the most important stage in system planning.
  - As it is, Western utilities tend not to talk to their neighbors, so they miss low-cost opportunities and overstate the cost of wind integration. Wind and integration issues need to be brought up early in the planning process.
- Consolidation and ancillary service markets remove most barriers to entry.
- Education may be needed to show that greater balancing area coordination is needed to address current Western states issues.
- Consolidated balancing area control is not required, just improved coordination.
- Wind must be involved up front in NERC.
- The wind industry and utilities must both talk to each other so each knows what issues exist.

### **Topic 2: Transmission System Infrastructure**

#### **Top Activities:**

- Project Planning
- Financing

**General Comments:**

- Transmission is likely the largest impediment to reach the goal of 20% energy production from wind. According to industry representatives, approximately \$60B will need to be invested in enough transmission and distribution to integrate 200-400 GW – this additional capacity will be needed regardless of energy type. This needs to become a top priority as construction of new transmission and distribution has historically been a 5-10 year process.
- Promote use of unused existing transmission and distribution present at old mining/factory sights.
- Development of cost allocation methodologies and cost recovery mechanisms that relate to benefit accrual are needed.
- Many companies are willing to invest in transmission if the cost recovery issue is solved.
- Successful policies should be used as case studies.
- It would be useful to track and analyze the use of flexibility in cost recovery from California.
- The PTC provides enough revenue to pay for transmission.

**Topic 3: Market Operation & Transmission Policy****Top Activities:**

- Tariff Reform
- Interconnection Queuing Financing
- Integrated Markets

**Other Activities for Consideration:**

- Fund a study on alternate queuing techniques
- The wind industry should find an alternate way to provide products (e.g. ancillary services) to the energy markets, therefore making itself more convenient to current market structures.

**General Comments:**

- Markets
  - New analysis and information on market operations is needed.
  - Outreach on market operation issues could be facilitated through NARUC.
  - Many markets are not designed for renewables; therefore, creating new markets, and/or showing how renewables can add more value to existing markets, is necessary.
  - It was also suggested that the wind industry evaluate the concept of constructing peaking power plants to alleviate variability concerns, partially in response to the lack of markets facilitating such construction. Another alternative would be for wind farms to aggregate or work with other fossil fuel units to pool output.
  - While competitive wholesale markets are extremely useful to the wind industry, they are not a requirement. Many of the same benefits can be realized through the use of operating agreements with utilities.
  - There must be some interaction between reliability, flexibility, and markets; currently Ancillary Services markets pay more for controllability than for energy.

- Queuing
  - MISO has a queue reform working group that is producing recommendations on alternate techniques.
  - FERC has final authority on queue management issues, but ideas can come from the ISO stakeholder processes.
  - One possible fix to the queuing issue is to require parties to pay a higher fee to enter the interconnection process. Currently, the process costs \$10,000 to enter the interconnection queue.

### **Breakouts 3 and 12: Siting and Environmental Issues**

This section combines the output of Breakout Session 3: Wind Power Siting and Environmental Effects, and Breakout Session 12: Environment and Siting.

#### **Top Issues:**

- Comparing Lifecycle Effects of Energy Generation Options
- Researching Wildlife and Habitat Effects
- Defining Risk
- Engaging National/Regional/State/Local Leadership
- Developing Siting Strategies
- Addressing Public Concerns
- Engaging Environmental and other Public Health Communities

#### **Key Siting and Environmental Issues and Organizational Leadership**

Key Issues	Leadership		
	Federal	State/Other	Private
Comparing Lifecycle Effects of Energy Generation Options	All		
Researching Wildlife and Habitat Effects	Partial	Majority	Partial
Defining Risk	Majority	Partial	Partial
Engaging National Leadership		All	
Developing Siting Strategies	All		
Addressing Public Concerns	Majority	Partial	

The Session 12 breakout identified key issues, activities and timing, roles and responsibilities of relevant organizations, and prioritized those issues. The results of this exercise are illustrated in the following table.

#### **Key Siting and Environmental Issues, Suggested Activities, and Priority**

Key Issues	Activities and Timing	Roles and Responsibilities	Priority
Comparing Lifecycle Effects of Energy Generation Options	<ul style="list-style-type: none"> <li>- Perform detailed technical study looking across all energy sector impacts, including water, air, climate/GHG impacts</li> <li>- Highlight other environmental benefits of wind</li> <li>- Duration- would be preferable to have studies done in the next couple of years.</li> <li>- But, Europe has been doing this, and it has spent significant time and resources doing so (see ExterneE)</li> </ul>	<ul style="list-style-type: none"> <li>- Tracking NAS upcoming comparative study (not fully funded) and the new initiative "Energy Futures"</li> <li>- DOE- has some studies started, but not likely that DOE would conduct comparative study</li> <li>- EPA - accepted as third party by some but may not read as credible to some audiences.</li> <li>- Possible third party</li> </ul>	High

		<p>solution- Contractor or University with International reputation to prepare</p>	
<p>Researching Wildlife and Habitat Effects</p>	<ul style="list-style-type: none"> <li>- Potential effects on bats and birds, and other potential wildlif and habitat impacts.</li> <li>- Identify effective mitigation strategies.</li> <li>- Research on deterrents.</li> <li>- Pontential tie into transmission planning studies with caution about taking too much responsibility over other energy sources</li> <li>- Capture positive implications of GHG reductions specific to wildlife and habitat.</li> <li>- Duration- ability to make decisions on best available information within a couple of years, but these activities will be ongoing and issues will change</li> </ul>	<ul style="list-style-type: none"> <li>- AWWI- 4 initiatives (mapping, research, biodiversity banking, education outreach)</li> <li>- NWCC- consensus based, broad constituency, established network</li> <li>- AWEA</li> <li>- DOE- (collaboration across programs)</li> <li>- NGO's (Audubon, Sierra Club)</li> <li>- USFWS, USGS, USDA</li> <li>- State Fish and Environmental Agencies</li> </ul>	<p><b>Moderate</b></p>
<p>Defining Risk &amp; Benefits</p> <p>Risk mitigation Structured Decision Making</p>	<ul style="list-style-type: none"> <li>- Review Environmental and Siting risks related to new turbine and project design criteria</li> <li>- Define Categories of Risk</li> <li>- Determine the actual risks of developing a project, and what criteria are available to capture these</li> <li>- Define Risk Framework for all potential categories (human, wildlife, economic, property values)</li> </ul>	<ul style="list-style-type: none"> <li>- State Government Agencies (e.g. CEC)</li> <li>- National Governors Assoc</li> <li>- NWCC- funded for past 3 years in defining risk (e.g. probability of impact)</li> <li>- DOE-</li> <li>- NGO's (Audubon, Sierra)</li> <li>- USFWS, USGS, USDA</li> </ul>	<p><b>High</b></p>
<p>Engaging National Leadership</p>	<ul style="list-style-type: none"> <li>- Get policy decision makers to look at diversity of information that is available; employ structured decision making</li> <li>- Need for Human Resources capabilities to do this work</li> <li>- National leadership should provide educational materials to inform States' decision makers.</li> </ul>	<ul style="list-style-type: none"> <li>- State Agencies</li> <li>- CESA</li> <li>- NGA</li> <li>- NARUC</li> <li>- NASEO</li> <li>- DOE working with other Federal Agencies</li> <li>- National Wildlife Federation, WWF</li> </ul>	<p><b>High</b></p>
<p>Developing Siting Strategies</p>	<ul style="list-style-type: none"> <li>- Best practices development, AWEA siting handbook</li> <li>- Wildlife</li> <li>- Air space and radar issues</li> <li>- Property value/aesthetics/viewshed impact studies</li> <li>- Renewable Energy Zones (REZ)</li> </ul>	<ul style="list-style-type: none"> <li>- DOE- develop master plan in next year as to how the implementation of siting 20% wind will be done</li> <li>- DOE working with Federal Agencies</li> </ul>	<p>*</p>

Addressing Public Concerns	<ul style="list-style-type: none"> <li>- Engage communities that have legitimate concerns</li> <li>- Fill in the gaps of missing information</li> <li>- Engage environmental, public health, and labor communities</li> </ul>		<b>Moderate</b>
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\*This category was not assigned a priority in this exercise.

**Other Activities for Consideration:**

- Create an ongoing effort on wildlife, environment and siting;
- Consider ramping down federal support for bird and bat research, if the states take up this challenge more and more
- Determine the appropriate scale of activities for DOE on the siting of wind plants
- Begin examining marine offshore effects in collaboration with MMS and NOAA

## ***Breakouts 4 and 9: Manufacturing Issues***

The results of the following section combine the discussions of Breakout 4: Manufacturing, Material Resource and Economic Impact, and Breakout 9: Federal Support for Expanded Manufacturing.

### **Topic 1: Expand U.S. Manufacturing Capability for Components and Turbines**

#### **Top Activities:**

- Form partnerships for advanced R&D for the following types of component suppliers:
  - Rotors (blades and pitch systems)
  - Drivetrains, gearboxes, and generators
  - Towers
- Form partnerships for supply chain expansion
  - Review design and technical analysis capability for new equipment supplier products to meet turbine manufacturer specifications
  - Create opportunities for field testing to enable suppliers to develop and certify new components
- Model the PVMat to create a similar program to conduct cost-shared manufacturing R&D
- Engage in second generation of WindPACT type studies to develop new critical component designs (e.g. heavy castings, towers, bearings, and rotors)
- Run a series of design competitions that stimulate innovation
  - Target critical components (gearboxes, blades, generators)
- Develop a transportation database to help manufacturers find appropriate shipping methods

#### **Other Activities for Consideration:**

- PTC extension should contain a “local content requirement” to spur foreign firms to invest in U.S. manufacturing capacity

#### **General Comments:**

- DOE should consider collaboration with the Department of Commerce on their smart manufacturing initiatives.
- The lack of predictability in the PTC is a reason manufacturers do not invest in the US, even if they want to.

### **Topic 2: Improve Availability of Critical Materials**

#### **Top Activities:**

- Continue to support a materials database for use by industry
- Through a second generation of WindPACT studies, focus on developing improved permanent magnets

### **Topic 3: Expand Skilled Labor Force for Manufacturing, Installation, and Operation**

#### **Top Activities:**

- Create teacher working groups through Wind Powering America
- Broaden “Wind for Schools” scope to cover different levels of vocational and college education, and develop a curriculum for technicians

**General Comments:**

- There is currently no organization/board in the wind industry to coordinate essential activities like research, education, marketing, which is necessary to meet and exceed the 20% goal.
  - This organization could be modeled after the Transportation Research Board.

**Topic 4: Expand Engineering and Scientific Work Force****Top Activities:**

- Form R&D Centers of Excellence at universities
- Create and support a internship/fellowship/scholarship program for undergraduate and graduate students at the national labs
- Support school assistance for advanced education, creating fellowships/scholarships for renewable energy
- Fund post doctoral work
- Fund on-going university research grants for targeted R&D efforts
- Ensure that universities/curricula can be funded by ongoing research grants; universities need reliable funding to establish curricula

**Topic 5: Quantify and Communicate the Export Opportunity****Top Activities:**

- Invest in automation to reduce labor component
- Focus on activities in which the US leads – e.g. control systems
- Conduct outreach to states and industry to improve their understanding of export opportunities

**General Comments:**

- U.S. is a leader in control systems; however, controllers are often engineered in the U.S. but manufactured overseas.

**Topic 6: Refine the Analysis of Contributions to the Economy and Jobs Support****Top Activities:**

- Develop a model, similar to JEDI, that provides more macro-level analysis
- Use analysis to communicate economic growth opportunities to industry and government
- Work more closely with industry to quantify these impacts; find ways to obtain and protect confidential private sector data

## ***Breakout 5: Public Policies for Wind Development***

### **Topic 1: Policy Analysis**

#### **Top Activities:**

- Perform and provide policy analysis on a number of topics, including:
  - MW incentivized by federal policy
  - Job creation
  - Costs of policy to the Department of Treasury
- Collection of market data, including:
  - Project costs
  - Number of installations
  - Pricing of wind power (\$/kWh)
  - Wind farm performance
  - Operations and maintenance costs
  - Job creation
- Evaluate the impacts of a stable PTC
- Provide analysis on the relationship between wind energy and the associated carbon emissions reduction
  - Potential application of data in development of federal carbon policy

#### **General Comments:**

- Preliminary studies conducted by AWEA indicate that the monetary costs of the PTC and new transmission are about the same. Policies to promote new transmission ought to take precedence over the extension of the PTC.

### **Topic 2: Requirements for Electric Cooperatives and Municipalities**

#### **Top Activities:**

- Revision of Federal lending rules to incentivize loans given to wind and other renewable energy projects
- Rethink full requirement rules to include wind and other forms of renewable energy
- Review demand response requirements linked to renewable energy delivery

### **Topic 3: Roles of Power Marketing Administrations (PMAs)**

#### **Top Activities:**

- Incentivize replacement power with wind power
- Increase amount of renewable energy required in full requirement contracts
- Increase coordination between PMAs
- Review the role of PMAs as transmission builders

### **Topic 4: Small Wind**

#### **Top Activity:**

- Perform and provide analysis on a number of topics, including:
  - A residential investment tax credit
  - Net metering
  - Interconnection standards
  - Turbine certification

The following table describes in more detail the key issues, specific tasks necessary within those key issues, and the organizations that should be responsible for carrying out those tasks.

### Key Policy Issues, Tasks, and Organizational Roles and Responsibilities

Key Issues	Specific Tasks, Duration	Roles and Responsibilities
All	<ol style="list-style-type: none"> <li>1. Advocacy</li> <li>2. Policy analysis <ul style="list-style-type: none"> <li>– MW incentivized</li> <li>– Job creation</li> <li>– Cost/benefit to consumers</li> <li>– Policy cost to treasury</li> <li>– Associated emissions reduction</li> </ul> </li> <li>3. Market data collection <ul style="list-style-type: none"> <li>– Project costs</li> <li>– Installations</li> <li>– Pricing</li> <li>– Performance</li> <li>– O&amp;M</li> <li>– Jobs</li> </ul> </li> <li>4. Create tools for use by others <ul style="list-style-type: none"> <li>– WinDS</li> </ul> </li> <li>5. State and Federal level tech assistance</li> </ol>	<ol style="list-style-type: none"> <li>1. AWEA, Industry</li> <li>2. DOE, AWEA, NGO's, Other Fed Agencies, State, Universities, RTO/ISO</li> <li>3. DOE, AWEA, States, Universities</li> <li>4. DOE</li> <li>5. DOE</li> </ol>
Stable PTC	Evaluate impacts, Regional analysis	DOE, AWEA, Universities
Extended RPS	Evaluate impacts of State vs. Fed RPS	AWEA
Carbon policies	International Climate Models Effect of Carbon policies on electric prices Relationship between renewable energy and Carbon Development of tools related to Carbon	DOE, (others from General Policy), EPA, NGO's
Co-op, Municipal	Lending rules Rethinking full requirements rules (incorporate renewable energy) Demand response requirements linked to renewable energy delivery	DOE, USDA, NRECA, APPA
Roles of Power PMAs	Interaction of Hydro and Wind Incentivize replacement power with wind Get more renewable energy in Full Requirements contracts Coordination between PMAs PMAs as transmission builders	DOE, PMAs, NRECA, APPA
Small Wind	ITC Net Metering Interconnection Certification	DOE, States, Industry

## ***Breakouts 6 and 10: Market Issues***

This section combines Breakout 6: Wind Power Markets and Breakout 10: Stakeholders and Market.

### **Topic 1: Stakeholder Education and Outreach**

#### **Top Activities:**

- Understand what consumers want and providing it to them
- Help Rural Electricity Co-ops understand the economic benefits for rural areas
- Communicate the message, through the 20% Scenario, that wind is not marginal and can become mainstream.
- Form coalitions with environmental and other like-minded groups (other energy groups)
- Target specific messages to specific groups of stakeholders
- Cultivate manufacturing capabilities in Southeast despite lack of robust wind resources
- Clarify “Right of Way” for Eastern Interconnect Transmission Planning Study
- Targeted outreach at State Fairs (Making wind fun)

### **Topic 2: Lack of Consistent National & State Policies**

#### **Top Activities:**

- Talk to and deliver 20% Wind Scenario message to NGA, WGA, NCSL
- Tell the economic development story (JEDI model)
- Extend PTC and establish ITC for DWT
- National RPS
- Conducive regulatory and permitting regime
- Net metering
- Coordination with USDA
- Encourage local ownership financing (CREBS, federal loan guarantees)

### **Topic 3: Application Diversity and Coordination**

#### **Top Activities:**

- Analysis of new policies for financial structuring for community energy
- Facilitate among different approaches (Large Wind, Community, DWT)
- Product development and market expansion for mid-size turbines (250kW – 1MW)
- Expansion of talent pool (developers, installers, O&M) for small projects

### **Topic 4: Federal Government as Owner, Customer and Transmission Provider**

#### **Top Activities:**

- Technical/financial/procurement assistance on site
- Management of buy-in and site champion
- Access to private sector capital for owner financing/ ESPC
- Encourage Federal agencies to exceed mandated levels (e.g., DOD has mandated 25% renewables by 2025)

- Federal leadership for transmission solutions (e.g. pay for transmission lines)

### **Topic 5: Education (K-12 and Universities)**

#### **Top Activities:**

- Interactive competitions and activities to get students involved
- Scholarships
- AWEA University Chapters
- Engage universities in pilot projects
- Develop curricula for universities
- Collaborate with other government/NGO renewable energy partners
- Expand Carbon Footprint Challenge for all schools
- Use ACORE Education Committee as a forum model
- Reach out to HBCU/MURA program
- Greening universities (provide assistance with PPAs)
- Site visits to wind farms
- Recruiting students to serve as champions/wind ambassadors

### **Topic 6: Wind Maps**

#### **Top Activities:**

- Wind maps at 80-100m
- Maps at lower levels (20-50m) for DWT

### **Topic 7: Need Very Large Projects with Stakeholder Buy-in**

#### **Top Activity:**

- Develop a best practice pilot power project (addressing transmission, turbine procurement, siting, risk mitigation, etc.)

### **Topic 8: Regional Coordination**

#### **Top Activity:**

- Model other organizations and build on what they are doing (WGA, Great Lakes Consortium, Midwest Gov Assoc, New England Sustainable Coalition, DOE Regional offices)

### **Topic 9: REC Markets**

#### **Top Activity:**

- Develop a uniform commercial code for RECs to be used across REC market borders (state boundaries, ISO's)

### **Topic 10: Expand and Diversify Market Players**

#### **Top Activity:**

- Need to expand product offerings and supply (manufacturers, developers, owners)

#### **Other Activities for Consideration:**

- Increase national-level voice

- DOE needs to get more involved with other federal agencies.
- Ensure that 2010 administration transition story is ready to go
- CEQ interagency activities (e.g. NEPA compliance with renewable energy)
- DOE should establish a team to handle hydrokinetic/offshore wind
- Look at effective messaging/branding
  - Work with national conference of state legislators
- Streamline permitting
- Analysis of 20% wind in the context of carbon (inject the 20% report into the carbon debate)
- Increase communication between Resource/generation planners
- Determine how the Southeast can play a role in the manufacturing picture
- Educate National Council of State Legislatures

**General Comments:**

- National politicians seem to have less of a voice than state politicians.
- The 2010 administration transition team needs to be identified; and DOE needs to determine if governors should be involved.

## **Breakout 7: National Wind Energy Center**

### **Topic 1: Dynamometer Testing Facility**

#### **Top Activities:**

- Determine whether any existing NWTC facilities can be retrofitted to allow for increased capacity (MW) testing
  - Determine whether additional side loading can be added to the existing dynamometer
- Determine proper capacity (MW) for new dynamometer testing facility\*

#### **General Comments:**

- Manufacturers need to test drivetrains that have 10MW+ torque ratings. Therefore, it is necessary that any new dynamometer testing facility needs to have more capacity than just 10MW in order to validate drivetrains.
- According to some industry partners (e.g. Vestas), a dynamometer testing facility is the most important step DOE can take to help turbine manufacturers.
- The new Spanish CENER 8MW dynamometer testing facility should be further examined to determine economics of their project.

### **Topic 2: Visitor Center**

#### **Top Activities:**

- Determine size (ft<sup>2</sup>) and desired amenities, including
  - Auditorium
  - Class/Conference Rooms
  - Lodging/Hotel facilities
  - Museum and scale models of dynamometer/blade test facilities
- Determine best operating scheme
  - Consider contracting nonprofit company to operate the facility, do tours, etc.
- Begin development of a virtual visitors center featuring different types of educational multimedia

### **Topic 3: Role of Regional Testing/Training Centers**

#### **Top Activities:**

- Monitor profitability of new blade test facilities in Massachusetts and Texas
- Determine how NREL can best affiliate/partner with regional test centers, such as those in Connecticut, New York, and Texas
- Explore university partnerships for the purpose of running testing facilities
- Design a "train the trainer" program to encourage community college staff to start their own training centers
  - This program can model itself after the Solar Program's training program

## ***Breakout 8: Systems Integration***

### **Topic 1: Resource Characterization and Performance Modeling**

#### **Top Activities:**

- Meso-modeling
- Tall Tower Measurement
- Forecasting
- Solar modeling and database cooperation

#### **Other Activities for Consideration:**

- Wind turbine model creation
  - There is a strong need to create good public models of wind turbine performance, as most models are proprietary to specific manufactures.
- Integration studies
- Evaluation of the value of storage related to penetration level

#### **General Comments:**

- The lack of inclusion of Canada is an issue associated with both the Eastern and Western Interconnection studies. Lack of inclusion of Arkansas in the Eastern Interconnection study is also an issue.
- Turbine model validation using actual output data is critical. Use of meso-scale model information and turbine power curves is not accurate, primarily because of local site issues such as waking from nearby turbines.
- Many utility control centers are capturing SCADA information from wind farms, but they are not archiving the data.
- The Western Governors Association is looking into doing an evaluation of REZs in the Western states. This provides an opportunity for considering interstate policy issues.
- There is a need to increase the number of people who can do renewable energy related grid integration studies. University outreach may aid in this effort.
- In Denmark, wind penetration has reached the 20% level (other parts of Europe are seeing increasing wind penetration levels) and storage is still not needed to maintain system reliability and continuity of operations.
- Demand response can provide the same benefits as storage.
- Smart building development and automated demand control will effectively serve as storage; there is simply a need to see these technologies more widely deployed.
- Storage should be considered in the context of a flexibility supply curve.

## ***Breakout 11: Technology Development Partnerships***

### **Topic 1: Important Issues for Industry**

#### **Top Activities:**

- Consider extending the five year timeframe for IP secure cooperative agreements to accommodate companies undertaking certain experimental projects
- Conduct market studies with an emphasis on emerging small wind companies

#### **General Comments:**

- The program's new distribution of assistance based on lower corporate risk is actually inhibiting the development and deployment of new technologies.

### **Topic 2: Future Project Funding Direction**

#### **Top Activities:**

- Conduct wind turbine concept studies with an emphasis on smaller turbines and undefined markets
- Increase funding opportunities for small technical assistance grants
- Utilize wind turbine or component development "trade off studies" with industry to allow for increased cross pollination of ideas
- Develop a second generation of WindPACT

#### **General Comments:**

- DOE's focus should remain on high risk technologies because, due to devotion of all industry resources towards meeting current turbine/component demand, industry has no incentive to focus on these.

## Appendix A: Agenda



### Day 1: Tuesday, February 5, 2008

7: 30am Continental Breakfast/Registration & Speakers' Meeting

**8:15 Welcome, Introductions, and Agenda Review by DOE**

8:45 Review of the 20% Vision (15 minute presentations on each chapter)  
 Vision Overview - *Ed DeMeo*  
 Wind Turbine Technology – *Paul Veers*  
 Manufacturing, Material Resource and Economic Impact – *Larry Willey*  
 Transmission and Integration into the U.S. Electric System – *Charlie Smith*

Break ~ 10:00

Wind Power Siting and Environmental Effects – *Laurie Jodziewicz*  
 Wind Power Markets – *Larry Flowers*  
 Public Policies for Wind Development – *Aaron Severn*  
 Project Analysis – *Maureen Hand*

11:15 National wind research and budget plan to achieve 20% wind – *Steve Lockard*

12:00 noon Working Lunch – *tables will have discussion topics based on 20% chapters*

1:15 pm 20% Breakout Discussions: - *Topical groups to establish priorities for each area of the report, looking initially at the next five years based on the long term priorities set out in the 20% initiative.*

Each group should address the following:

- 1) Define a five year strategy.
- 2) Identify specific needs and actions.
- 3) Lay out roles and responsibilities.
- 4) Determine a split between federal, state and private funding.

Breakout 1: <b>Wind Turbine Technology</b> Leaders: Steve Lockard, Paul Veers	Breakout 2: <b>Transmission and Integration</b> Leaders: Brad Nickell, Charlie Smith	Breakout 3: <b>Wind Power Siting and Environmental Effects</b> Leaders: Steve Lindenberg, Laurie Jodziewicz
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Break ~ 3:00

3:15

Breakout 4: <b>Manufacturing, Material Resource &amp; Economic Impact</b> Leaders: Ed DeMeo, Larry Willey	Breakout 5: <b>Public Policies for Wind Development</b> Leaders: Alejandro Moreno, Aaron Severn	Breakout 6: <b>Wind Power Markets</b> Leaders: Larry Flowers, Suzanne Tegen
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5:00 Adjourn

6:30 Group Dinner (Tivoli) – *R.S.V.P. to maddie@cemamerica.com for this dinner*

**Day 2: Wednesday, February 6, 2008 – Recommendations for DOE's roles**

7:30 am Speakers' Meeting

8:00 Continental Breakfast/Registration

8:30 Report Back (outcome of the 20% breakout sessions from Day 1) – leaders from Day 1 should be available for this session.

General Discussion on an Integrated Action Plan

Break ~ 10:30

10:45 Breakout Session Discussions - *Topical groups to discuss specific strategic questions. With information gathered this morning, make recommendations about DOE plans.*

<p>Breakout 7:  <b>Need and Role for a National Wind Energy Center</b>                  Leader: Dave Simms</p>	<p>Breakout 8:  <b>Renewable System Interconnection</b>                  Leader: Brian Parsons</p>
<p>Presentation on NWECC concept - Bob Thresher                  Discussion on role, requirements and timeline:</p> <ul style="list-style-type: none"> <li>• Near term need for an expanded dyno facility</li> <li>• Role for a federal facility for training implementers and consumers</li> <li>• Role of regional research and testing centers</li> </ul>	<ul style="list-style-type: none"> <li>• Overview of existing RSI plans - Brad Nickell</li> <li>• Discussion of storage and dispatchability</li> </ul>

12:00 noon Working Lunch – Speaker: Roya Stanley, *The Iowa Story*

1:00 pm – 2:10

<p>Breakout 9:  <b>Federal Support for Expanded Manufacturing</b>                  Leaders: Bob Thresher, Jose Zayas</p>	<p>Breakout 10:  <b>Customers, Stakeholders and the Market</b>                  Leaders: Larry Flowers, Abby Arnold</p>
<p>Based on the AWEA proposed activity, expand at a strategic level regarding what role DOE/NREL/SNL has in addressing manufacturing supply constraints</p>	<p>Clarifying current and future work by DOE, including WPA and National Wind Coordinating Collaborative (NWCC)</p>

2:15 – 3:25

<p>Breakout 11:  <b>Technology Development</b>  <i>Partnering with industry</i>                  Leaders: Ian Baring-Gould, Dennis Lin</p>	<p>Breakout 12:  <b>Environment and Siting</b>                  Leaders: Steve Lindenberg, Bonnie Ram</p>
<ul style="list-style-type: none"> <li>• Review and discussion of program/industry partnership mechanisms</li> </ul>	<ul style="list-style-type: none"> <li>• Review of the 20% vision priorities</li> <li>• Gap analysis with current DOE environmental program</li> <li>• Setting priorities for the future</li> </ul>

3:30 Final Thoughts and Next Steps – Steve Lindenberg

3:45 Adjourn

## Appendix B: Participants List

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