Expanding the Wind Industry: Wind Vision Initiative - Part 2

June 2007

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Background

- As the nation's expert in 765 kV transmission, AEP was invited by AWEA to participate in formulating a conceptual transmission vision for wind integration on a national scale.

- A core team of industry professionals provided:
  - key assumptions
  - a set of principles that were used to guide the development of a conceptual Extra High Voltage (EHV) overlay
  - input and provided consultation on the development of the conceptual plan.

- Based on the principles articulated by this core team, AEP developed a conceptual EHV overlay to harvest the benefits of large scale renewable resources to consumers.

Transmission Assumptions

- Existing transmission constraints often limit the development of new generation resources.
- Existing infrastructure will not enable the interconnection of significant wind resources. As such, expansion of wind power relies on new transmission development.
- Location of wind resources modeled in the overlay was based on information provided by AWEA and NREL.

Transmission Principles

Overlay would be guided by a set of principles which include:

- A national, robust interstate EHV transmission system would be used to serve as the foundation for the wide scale integration of renewables.

- An integrated EHV network would provide the maximum customer benefit by:
  - i) promoting efficient markets.
  - ii) facilitating the deliverability of economic and environmentally friendly energy to load centers.

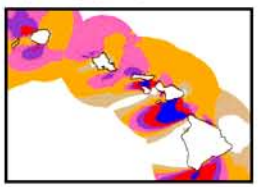
- AC system was selected as the model in order to ensure maximum connectivity and deliverability on a system wide basis.

- AEP's expertise resides in 765 kV technology and 765 kV serves as the backbone EHV voltage for its system. Given the advantages associated with this voltage class and the over 2100 miles of line already in existance, this voltage class was selected to model the EHV expansion.

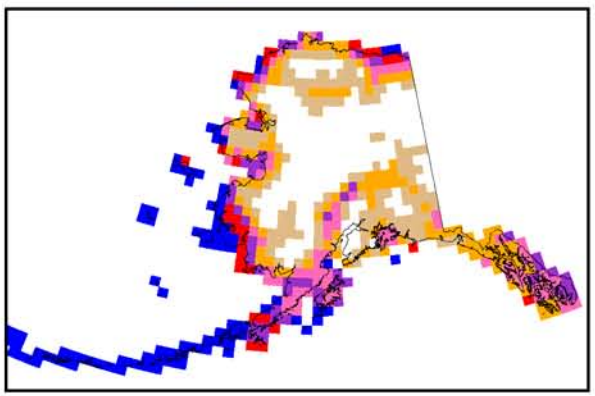
Composite Wind Resource Map

NREL Updated Maps:
Arizona (2003)
California (2002)
Colorado (2004)
Connecticut (2001)
Delaware (2002)
Hawaii (2004)
Idaho (2002)
Illinois (2001)
Indiana (2004)
Maine (2001)
Maryland (2002)
Massachusetts (2001)
Michigan (2004)
Missouri (2005)
Montana (2002)
Nebraska (2005)
Nevada (2003)
New Jersey (2002)
New Hampshire (2001)
New Mexico (2003)
North Carolina (2002)
North Dakota (2000)
Ohio (2004)
Oregon (2002)
Pennsylvania (2002)
Rhode Island (2001)
South Dakota (2001)
Texas mesas (2000)
Utah (2003)
Vermont (2001)
Virginia (2002)
Washington (2002)
West Virginia (2002)
Wyoming (2002)

Existing 765 kV
New 765 kV
AC-DC-AC Link



The remaining states use data from the 1987 "Wind Energy Atlas of the United States".



Transmission Lines
Voltage (kV)
345 - 499
500 - 699
700 - 799
1000 (DC)

Source: POWERmap, powermap.platts.com, ©2007 Platts, a division of the McGraw-Hill Companies

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

NREL

19-APR-2007 1.5.9

Technical Challenges

- Current lack of available transmission capacity and remote locations of wind resources create the need for significant levels of new transmission to connect the resources to the load centers.
- Electric systems need to balance generation to load; lack of predictability of the resource can pose concerns for weaker transmission system.
- Intermittent profile of wind generation can pose reliability concerns.
- Siting and right-of-way acquisition, regardless of voltage class, will continue to be a challenge.
- PTC timeframe is too short resulting in a risk that transmission infrastructure could be abandoned.

Policy Challenges

- **“Chicken & egg” problem - generators are hesitant to develop until there is an adequate transmission system in place, and transmission is not often pursued until the generation is committed.**

- **Development of an interstate transmission grid will require coordination between RTOs, Transmission Owners, regulators, generation owners and policy makers to resolve:**
  - **Coordination of transmission projects with development of wind generation.**
  - **Cross-boundary and inter-jurisdictional planning and cooperation.**
  - **Cost-recovery for new regional transmission projects.**


http://www.aep.com/go/i765project/