Wind Energy for Native Americans

Larry Flowers
Golden, CO
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WIND POWER for NATIVE AMERICANS

INDIGENOUS ENVIRONMENTAL ECONOMIC NOW AND FOREVER
• NA wind resources
• On-site loads vs. export
• Investment vs. private developer royalties
• Tribal utility business development policies
• Transmission constraints vs. green tags opportunity
• Tax advantages/limitations
• (perceived) Private sector development risk
• Federal load aggregation/trust responsibility
• Hydro-wind firming
• NA Wind Interest Group
United States - Wind Resource Map


Wind Power Classification

<table>
<thead>
<tr>
<th>Wind Power Class</th>
<th>Resource Potential</th>
<th>Wind Power Density at 50 m W/m²</th>
<th>Wind Speed⁹ at 50 m m/s</th>
<th>Wind Speed⁹ at 50 m mph</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Marginal</td>
<td>200 - 300</td>
<td>5.6 - 6.4</td>
<td>12.5 - 14.3</td>
<td></td>
</tr>
<tr>
<td>3 Fair</td>
<td>300 - 400</td>
<td>6.4 - 7.0</td>
<td>14.3 - 15.7</td>
<td></td>
</tr>
<tr>
<td>4 Good</td>
<td>400 - 500</td>
<td>7.0 - 7.5</td>
<td>15.7 - 16.8</td>
<td></td>
</tr>
<tr>
<td>5 Excellent</td>
<td>500 - 600</td>
<td>7.5 - 8.0</td>
<td>16.8 - 17.9</td>
<td></td>
</tr>
<tr>
<td>6 Outstanding</td>
<td>600 - 800</td>
<td>8.0 - 8.8</td>
<td>17.9 - 18.7</td>
<td></td>
</tr>
<tr>
<td>7 Superb</td>
<td>800 - 1600</td>
<td>8.8 - 11.1</td>
<td>19.7 - 24.8</td>
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</table>

⁹ Wind speeds are based on a Weibull k value of 2.0
Wind Resource Mapping

- Identifies most promising areas for wind energy development
- Employs geographic information system technology to create layers of key information
- Used by state energy planners, Indian tribes, and developers
Incentives Make Small Wind Systems More Economical

The graph illustrates the simple payback (in years) for different electric rates (€/kWh) and wind speeds. The curves show:

- 12 mph is class 3 wind power.
- 14 mph is class 5 wind power.

Key lines:
- Net metering only
- 50% buydown and net metering

The graphs demonstrate that incentives significantly reduce the payback period, making small wind systems more economical at various electric rates and wind speeds.
Westcliff, Colorado

- Turbine Size: 400W
- Turbine Manufacturer: Southwest Windpower
- Application: Off-grid residential
Wheeler, Texas

- Turbine Size: 1 kW
- Turbine Manufacturer: World Power Technologies
- Application: Water-pumping for 120 head of cattle
Marienthal, Kansas

- Turbine Manufacturer: Bergey
- Capacity: 10 kW
Calverton, New York

• Turbine Size: 50 kW

• Turbine Manufacturer: Atlantic Orient Corp.

• Developer/owner: Long Island Power Authority

• Capacity: .050 MW
Wales, AK

Capacity: .01 MW, Completed in 2001
Turbine Manufacturer: Atlantic Orient Corporation
Developer: Kotzebue Electric Association
Saint Paul Island, Alaska

- Turbine Size: 225 kW
- Turbine Manufacturer: Vestas
- Developer/owner: Northern Power Systems
- Capacity: .225 MW
Rosebud, SD

- Turbine Size: 900 KW
- Turbine Manufacturer: NEG Micon
- Turbine Owner: Rosebud Sioux Indian Reservation (Commissioned May 2003)
- PPA: Basin Electric
Chamberlain, South Dakota

- Turbine Size: 1300 kW
- Turbine Manufacturer: Nordex
- Developer: Crown Butte Wind Power
- Capacity: 2.6 MW
Kimball, Nebraska

- Turbine Size: 1.5 MW
- Turbine Manufacturer: NEG Micon
- Developer/Owner: Municipal Energy Association of Nebraska (MEAN)/TVIG
- Capacity: 10.5 MW
Klondike, Oregon

• Turbine Size: 1.5 MW
• Turbine Manufacturer: GE Wind Energy
• Developer/Owner: Northwest Wind Power
• Capacity: 24 MW
Peetz, Colorado

- Turbine Size: 900kW
- Turbine Manufacturer: NEG Micon
- Developer: enXco
- Capacity: 29.7 kW
Carbon County, Wyoming

- Turbine Size: 1 MW
- Turbine Manufacturer: Mitsubishi
- Developer/Owner: SeaWest Wind
- Power/Shell Renewables
- Capacity: 50 MW
Trent, Texas

- Turbine Size: 1500 kW
- Turbine Manufacturer: Enron Wind Corp.
- Developer: AEP Energy Services
- Capacity: 150 MW
Umatilla Oregon & Walla Walla County, Washington

- Turbine Size: 660 kW
- Turbine Manufacturer: Vestas
- Developer/Owner: FPL Energy
- Capacity: 262 MW
## Wind Development Parameters

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<th>Resource Characterization</th>
<th>Application/Options Analysis</th>
<th>Policy Review</th>
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<td>Project Implementation &amp; Operation</td>
<td>Interconnections Study</td>
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<td>Permitting</td>
<td>Sales Agreements</td>
<td>Financing</td>
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</table>
Native American Activities

- Native American outreach strategy development
- 16 regional NAWIG workshops
- 38 anemometer loans
- Lakota wind assessment options
- Tribal Wind Maps
- TA to DOE tribal RE grantees
- Tribal reps to WEATS
- NA section on WPA website
- NAWIG Newsletter
Native American Anemometer Loans

NREL Native American Anemometer Loan Program Installation Sites
(13 Nov 03)

Legend
- Monitoring Completed
- Anemometer installed
- Indian Reservation or Alaska Native Village Area

Installation Year

2000
- Bay Mills Indian Community - MI
- Hopi - AZ
- Rohnerville Rancheria - CA

2001
- Houlton Maliseet - ME
- Iowa Tribe of Oklahoma - OK
- Robinson Rancheria - CA
- Shakopee Mdewankan - MN
- Shoshone-Bannock - ID
- Ugashik Traditional Village - AK
- Sinlahekin Band of Luiseño Indians - CA
- Tanana Village - AK
- Walker River Paiute - NV
- Winnebago Tribe of Nebraska - IA
- Kewa Pueblo - NM
- Fort Belknap - MT
- Fort Yukon - AK
- La Jolla - CA
- Quinault - WA
- Duck Valley - NV
- Pine Ridge - SD
- Otsego-Bay Mills - OK
- Fort Belknap - MT
- Fort Hall - ID

2002
- Caddo Nation - OK
- Sac & Fox - KS
- Navajo - AZ
- Sherwood Valley Rancheria - CA
- Galiuro - AZ
- Grand Portage - MN
- Potawatomi - KS
- Crow - MT
- Table Bluff Reservation - CA
- St. Joseph Point Rancheria - CA
- Sisseton - SD

2003
- Northern Cheyenne - MT
- Cheyenne River - SD
- White Mountain Apache - AZ
- Los Coyotes Band of Indians - CA
- Ysleta del Sur - TX
- Augustine Band of Mission Indians - CA
- Pascua Yaqui - AZ
- YKHC - AK
“In evaluating the potential of wind energy generation, Native Americans realize that wind power is not only consistent with our cultural values and spiritual beliefs, but can also be a means of achieving Native sustainable homeland economies.”

Ronald Neiss, Rosebud Utility Commission President, Rosebud Sioux Reservation, South Dakota

www.windpoweringamerica.gov