Wind-Diesel Project   Nikolski, Alaska

“10,000 Years of Sustainability… and Counting”

Wind Energy Application & Training Symposium
August 13, 2007
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1131 E. International Airport Rd.
Anchorage, AK  99518
LOGISTICS

- Anchorage to Nikolski is 916 air miles for $1,316 rt – refundable fare.
- During fishing times in Dutch Harbor the price rises to $2,648 rt.

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Fuel deliveries get delayed by weather and more recently by fuel company policy.

Diesel retails for up to $5.00/gallon.

Electricity costs $.42/kWh to produce.

To improve Umnak Power’s sustainability Ampy Pre-Pay Electric Meters were installed in March of 2007.
World Class Wind: A Mixed Blessing

- 150 mph gusts
- Extreme Turbulence Potential
- Corrosive Salt Spray

Annual Wind Power Resource

<table>
<thead>
<tr>
<th>Power</th>
<th>Class</th>
<th>Speed</th>
<th>Power Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.0-5.6 m/s</td>
<td>0-200 W/m²</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>5.6-6.4 m/s</td>
<td>200-300 W/m²</td>
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<tr>
<td>3</td>
<td>6.4-7.0 m/s</td>
<td>300-400 W/m²</td>
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<tr>
<td>4</td>
<td>7.0-7.5 m/s</td>
<td>400-500 W/m²</td>
<td></td>
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<tr>
<td>5</td>
<td>7.5-8.0 m/s</td>
<td>500-600 W/m²</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>8.0-8.8 m/s</td>
<td>500-800 W/m²</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>&gt;8.8 m/s</td>
<td>&gt;800 W/m²</td>
<td></td>
</tr>
</tbody>
</table>

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Siting Considerations

- Protection from the Wind
- Land Ownership
- USFWS Approval
- SHPO Approval
- DOD Approval
- FAA Approval
Summary Information
Nikolski has superb potential for wind power development with Class 7 wind power density, moderate wind shear, bi-directional winds and low turbulence.

Meteorological Tower Data Synopsis
Wind power class (measured to date)  
Class 7 – Superb  
Average wind speed (30 meters) 9.01 m/s (at 30 meters)  
Maximum wind gust (2 sec average) 40.9 m/s, 1/24/07, 12 p.m.  
Turbulence Intensity (30 meters) 0.108

Data start date December 11, 2005  
Most recent data date March 13, 2007
Nikolski Project Facts

• Umnak Power is owned by the Nikolski IRA.
• Average electric load is 25 kW.
• Peak load is 50 kW.
• AEA “commissioned” a new diesel plant with 2 John Deere 70 kW generators and one 37 kW generator in May of 2006.
• USDA/RUS awarded APIA $474,475 to incorporate a remanufactured Vestas V-15 (65 kW) wind turbine with the diesel plant.
• The rising prices for steel, concrete and freight has increased the budget by nearly $100,000 since grant award.
• Unfunded modifications to the controls in the diesel plant may be required. Cost yet to be determined.
• A tilt up tower was designed and built by TDX Power and Halus in San Francisco, CA.

• The tower was shipped in pieces and assembled on site.

• The tower is 80’ high and weighs 7,000 lbs.

• At $60,000 this tower design saved the project the cost of leasing and transporting a crane to the site.
The gin pole is a rectangular metal frame.
Three winches, fitted with strain gauges, are operated by a master hydraulic control unit.
The tower must come down within ¼ inch of the bolts set in concrete.
• The turbine was erected over 12 hrs. on July 28, 2007.

• Connection is pending repairs to the diesel power plant and an assessment of the existing controls.

• Penetration level is pending evaluation of new technology – Static versus Dynamic mean VAR support.
Lessons Learned

- Build a significant contingency fund into your budget.
- A power plant operator that loves the job and does it well is priceless.
- Technical problems are usually much easier to solve than people problems.
Made Possible with Funding and Assistance from:

USFWS
USDA/RUS
Bureau of Indian Affairs
US Department of Energy
State of Alaska Energy Authority
Tanadgusix Corporation / TDX Power
Aleutian Pribilof Islands Development Corporation

Thank You, Thank You Very Much

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