Kenaitze Indian Tribe
Kenai, Alaska

Department of Energy
Renewable Energy Feasibility Study
2005 Report
Tribal Context

- ~1000 Tribal members; Dena’ina Athabascan traditional culture
- Involved in commercial and subsistence fishing (salmon)
- Surrounded by oil and gas development
- Very little Tribal land (corporation land)
- Municipalities and federal land (Kenai National Wildlife Refuge)
Tribal Context (Cont’d)

• Tribal Programs:
  – Housing
  – Cultural
  – Environmental
  – Elders
  – Head Start
  – Health
  – General Assistance
Currently over 100 employees
Creating Relationships

U.S. Department of Energy
Alaska Energy Authority
Energy Technicians: Brian Hirsch and David Mogar
Homer Electric Association
Alaska Tribes
Project Goals

1. Study wind and solar energy in Kenai, Alaska
2. Conduct energy usage study of tribal office and buildings.
3. Plan energy development for the future; Tribal offices, clinics and housing.
We included our elders and families in a Renewable Energy gathering in 2004. Alaska Energy Authority gave us help about wind technology and the tower.
Site Selection

- Bluff causes wind turbulence
- Raptor and endangered species issues
- Public use lands (dipnetting)
- Proximity to power lines
- Accessibility/constructability
- Applications (small-scale vs. industrial)
- Land ownership
Help from Alaska Energy Authority

- Why measure the wind?
- How to measure the wind
- Analyzing the wind data
- Power production from wind turbines
State Anemometer Loan Program

AEA provides:
• Tower kit
• Installation assistance
• Technical assistance

Community provides:
• Land use for 1 year of monitoring
• Installation assistance
• Maintenance
• Data collection
Anemometer Loan Program

Met tower kit includes:

• Anemometers
• Wind vane
• Temperature sensor
• Data logger
• 100-foot tower
Location of Met Towers

25 Sites
Wind Map of Alaska

[Map showing wind classes across Alaska]
Site Information:
Project: New Project
Location: Elevation: 90

Sensor on channel 1:
NRG #40 Anem. mph
Height: ft
Serial #: SN:

January 2005
Hourly Averages Graph 2 Ch 1
SITE 5042
Kenaitze 1

Average Hourly Values

Values in mph

Days

Average Value: 8.2

Generated Sunday, April 17, 2005
Total 10-minute intervals: 4464 Intervals used in calculations: 4464 Percent data used: 100

NRG Systems SDR Version 5.02
# Wind Power Classes

*Based on a partial year of data, height of 30-meters.*

<table>
<thead>
<tr>
<th>1-2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palmer</td>
<td>Naknek</td>
<td>Bethel</td>
<td>Nightmute</td>
<td>Kokhanok</td>
<td></td>
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<tr>
<td>Whitestone</td>
<td>Perryville</td>
<td>Toksook Bay</td>
<td>Chevak</td>
<td>Savoonga</td>
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<tr>
<td>Yakutat</td>
<td>Togiak</td>
<td>King Cove</td>
<td>St. George</td>
<td></td>
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<tr>
<td>Kenaitze</td>
<td>Dillingham</td>
<td>Kongiganak</td>
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<tr>
<td>Chignik Lagoon</td>
<td>New Stuyahok</td>
<td>Port Heiden</td>
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<td></td>
<td>False Pass</td>
<td></td>
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</tbody>
</table>
### Potential Wind Power Production

<table>
<thead>
<tr>
<th>Village</th>
<th>Production from a NW100 Wind Turbine</th>
<th>Capacity Factor</th>
<th>Potential Fuel Savings* per Turbine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kenaitze (Nov 04- Mar05)</td>
<td>70 MWh/yr</td>
<td>8%</td>
<td>5,000 gal/yr</td>
</tr>
<tr>
<td>King Cove (May-July 05)</td>
<td>175 MWh/yr</td>
<td>20%</td>
<td>13,500 gal/yr</td>
</tr>
<tr>
<td>Kokhanok</td>
<td>307 MWh/yr</td>
<td>35%</td>
<td>23,600 gal/yr</td>
</tr>
<tr>
<td>Kongiganak (Oct 04 – Jul 05)</td>
<td>315 MWh/yr</td>
<td>36%</td>
<td>24,000 gal/yr</td>
</tr>
<tr>
<td>Gambell (Sept04-May05)</td>
<td>500 MWh/yr</td>
<td>57%</td>
<td>38,400 gal/yr</td>
</tr>
</tbody>
</table>

*Assumes diesel generator efficiency of 13 kWh/gallon. Based on a partial year of wind data.
What have we learned?

We learned how important the feasibility study is. Original wind tower site was near the beach: windy but too “swirling” and the estuary was a protected habitat – birds and wetlands. We needed permits from FAA and Fish and Wildlife. The site location is very important, and complicated!
Accomplishments

- Increased understanding of benefits and limits of renewable energy
- Completed permits and research for tower site
- Raised tower and began collecting data
- Conducted energy usage study for tribal offices
- On-going data collection for wind and solar energy
Future Plans

Collect more data! The anemometer had to be repaired and the tower was re-set.

Work on draft feasibility study final report.

Work with our Council to include renewable energy in new building plans and Indian housing projects.

Investigate solar thermal hot water on-site for fossil fuel reduction (space heating and water)
Special thanks...

Lizana Pierce, our DOE Project Officer
Brian Hirsch and David Mogar, Technicians
Mia Devine, Alaska Energy Authority

Douglas James Gates, Beluga Summer photo