Makah Renewable Energy Feasibility Study

Makah Project Manager: Bud Denney
Coordinator: Ryland Bowchop
Technical Contact: Bob Lynette
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Background

- Enrollment for the Makah Tribe is 2,389
- Reservation is 47 square miles, elevations typically between 500 and 1,000 feet.
- Four major watersheds; over 100” rain/yr.
- Closest town is 60 miles away.
- 30 MW line to reservation; frequent loss of power.
# Participants

<table>
<thead>
<tr>
<th>Project Participant</th>
<th>Contact</th>
<th>Role</th>
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<tbody>
<tr>
<td>Makah Indian Reservation</td>
<td>Bud Denney,</td>
<td>Project manager,</td>
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<td>Ryland Bowchop</td>
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<td>Springtyme Company, L. L. C.</td>
<td>Robert Lynette</td>
<td>Technical contact, wind consultant</td>
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<td>AP&amp;T Solutions, LLC*</td>
<td>Bob Grimm, Larry Coupe</td>
<td>Financial Analyst, Engineer</td>
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<td>John Wade Wind Consultant LLC</td>
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<td>Meteorologist, wind power analyst</td>
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<td>Northwest Wildlife Consultants</td>
<td>Karen Kronner</td>
<td>Biologist</td>
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<td>Met Tower Services</td>
<td>Mike Sailor</td>
<td>Wind tower installation</td>
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Project Objective

Determine feasibility of one or more wind power and/or small hydro installations that could:

- Produce electricity for the Tribe
- Produce power to sell to local utility
- Provide back-up power
- Provide employment during construction & O&M
Project Status – Micro-hydro

- Two potential projects identified.
  - 500 kW, producing approximately 1,300,000 kWh per year
  - 900 kW, producing approximately 3,100,000 kWh per year

- But – both projects would cost too much by wide margins.
Project Status - Wind

• Two sites for met towers selected in conjunction with wildlife study.
  - 1 -50 meter at 1,200’, 1 - 40 meter at 900’
  - Three levels of anemometry on each
• Data collected and analyzed for 13 months.
• Long-term reference data used to see if it was a “typical” year. (It was)
• 100% data retrieval
Difficult Terrain
Met Tower Locations
Measurement Results
Wind Direction - Energy Rose N. Site
Measurement Results
Wind Shear & Turbulence - Energy Rose N. Site

Shear and Turbulence by Direction Site 801N

Shear

Turb Inten
Wind Speeds and Energy

• Annual average wind speeds at 65 meters
  - South site: 13.2 mph
  - North site: 13.6 mph

• Using the G.E. 1.5 MW wind turbine yields a gross capacity factor of 0.23, and a net capacity factor of 0.19.
Conclusions

• Site cannot be financed with conventional commercial means based on today’s technology. (Needs some financial help.)
• Anemometer stations’ data may have value to other entities:
  - Weather forecasting
  - Wind speed forecasting for inland windfarms.
Future Plans

• Investigate supplemental sources for financing.
• Seek other uses for anemometry.
• Document results.
• Additional work ongoing and will be discussed later this morning.