Makah Renewable Energy Feasibility Study in Neah Bay Washington

Makah Project Manager: Bud Denney
Technical Contact: Bob Lynette
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Background

- Enrollment for the Makah Tribe is 2,389
- Approximately 1,213 tribal members live on the Reservation; an additional non-Indian residential population of about 295
- Reservation is 47 square miles with elevations typically between 500 and 1,000 feet
- Four major watersheds; over 100” rainfall/year
- Closest town is 60 miles away.
- 30 MW line to reservation; frequent loss of power
Makah Reservation
Makah Reservation
## 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>Tribal planner, Project manager / liaison</td>
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<tr>
<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</td>
<td>Financial analyst</td>
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<td>Larry Coupe</td>
<td>Engineer, hydropower</td>
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<td>Terranova Power</td>
<td>John Wade</td>
<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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*A subsidiary of Alaska Power & Telephone
Project Overview

Objectives

• Determine feasibility of one or more wind power and/or small hydro installations that could provide one or more of the following functions:
  – Produce electricity for the Tribe
  – Produce power to sell to Clallam County PUD
  – Provide back-up power
  – Provide employment during construction and for O&M
One Day Course-Wind Energy

• Technology (small and large WTGs)
• Siting considerations
  – Wildlife (e.g., birds)
  – Visual
  – Noise
• Wind resource assessment - wind speed, shear, direction, turbulence
• Energy production calculations
• Installation, operation & maintenance
The Work – Wind Energy

Narrow down to 3 potential sites based on:

– Past wind resource assessments
– Topography
– Climatic conditions
– Anecdotal information
– Location of current and planned human activities (e.g., logging)
– Transmission infrastructure
Wildlife Study

• Conduct a study to determine potential avian conflicts within the candidate sites.
• Identify areas where wind turbines should be prohibited based on potential conflicts with biological resources such as level of avian use or presence of unique habitat.
Wind Resource Assessment

• Select two sites for wind resource assessments
• Erect one 50-meter tower with 3 anemometers and 2 direction sensors and data logger at each site
• Monitor sites for one year
Final Site Feasibility Report

- Site layout
- Interconnect and transmission diagrams
- Equipment, infrastructure
- Annual energy output
- Financial analyses
  - COE
  - Financing options and potential financing sources
Micro/Small-Hydroelectric Power

• Identify potential sites
  – Adequate stream flow
  – Adequate head
  – Proximity to existing transmission lines
  – Downstream barriers to fish migration
• Conduct on-site field analyses
• Develop/calculate critical parameters
Micro/Small-Hydroelectric Power

• Develop layout of the generating facilities
• Develop construction cost estimates
• Calculate the expected COE and determine if the project is economically feasible.
• Evaluate the potential and cost impacts of alternative financing methods.
Report and Business Plan

Prepare business plan based on feasibility results
- Match to the tribes’ social and economic development needs
- Implementation plan
- Financial analyses
Requested Technical Support

• Supply a CD with power curves of current WTGs
• Can NREL provide visual terrain/windpark simulation software?