THE LUMMI NATION: PURSUING CLEAN RENEWABLE ENERGY

Introduction

The Lummi Nation has launched a number of renewable energy projects to reduce its environmental impact and to contribute to its goal of energy self-sufficiency. These projects include conducting a wind energy development feasibility assessment, lighting a walking trail with solar LEDs, installing a geothermal heat pump system for a new administrative building, and developing a strategic energy plan to coordinate future efforts.

Lummi Nation Reservation Location Map. Source: Jeremy Freimund, Lummi Nation Water Resource Division Manager

The Lummi Indian Reservation is located in northwest Washington, 20 miles south of the Canadian border and 90 miles north of Seattle. There are approximately 4,200 enrolled tribal members, including about 2,400 tribal members who live on the Reservation. This profile provides detailed information on the wind energy development feasibility assessment project and also examines the opportunities and motivation that inspired the Lummi Nation to explore the options for renewable energy on their tribal lands.

Wind Energy Project

In 1993, the Lummi Nation established a goal of energy self-sufficiency as a means to address the lack of a tribal power utility (Lummi Nation Presentation 2010). After being approached by wind farm developers for a number of years, the Lummi Nation initiated a process to explore the potential to develop wind power on tribal lands.[1]

In 2002, the National Renewable Energy Laboratory (NREL) completed a wind power assessment and mapped the results for the entire country. This nationwide assessment indicated that on the Lummi Reservation there are "fair" (Class 3) wind conditions, but the data were not sufficient to make substantial capital investments (Lummi Nation Presentation 2010). To provide the information necessary to make an informed decision, the Water Resources Division of the Lummi Natural Resources Department launched an assessment in 2009 to better quantify the feasibility of wind power. This assessment, titled the *Lummi Nation Wind Energy Development Feasibility Assessment,* is funded through a competitive grant from the U.S. Department of Energy's (DOE) Tribal Energy Program (DOE Tribal Energy Program).

The assessment is intended to determine if and at what cost wind energy development on the Reservation can help achieve the tribal goal of energy self-sufficiency (Lummi Nation website). To conduct the study, the tribe used the DOE grant funding to hire consultants to examine the following issues:

- Is there enough wind on the Reservation to justify further pursuit of developing wind generation capabilities on the Reservation?
- What are the likely wildlife impacts associated with installing one or more wind turbines on the Reservation and what are practicable mitigation measures if there are unavoidable impacts?
- What are the likely noise impacts associated with installing one or more wind turbines on the Reservation and what are practicable mitigation measures if there are unavoidable impacts?

[1] Personal interview with Jeremy Freimund, Lummi Water Resource Division Manager, on March 4, 2011

Installed Anemometer Tower on Lummi Reservation. Source: Jeremy Freimund, Lummi Nation Water Resource Division Manager

The consultant selected to conduct the wind energy assessment for the feasibility study, DNV Renewables (USA) Inc., performed a site survey and in consultation with the Lummi Nation installed two 50-60 meter anemometer stations to measure wind speed and direction for one year. These stations, installed in December 2010 and February 2011, will record data until March 2012. The collected data will be compared with wind data collected at nearby meteorological stations that have longer records. These data will be used with information about different wind turbine designs to assess the suitability of the wind resources on the Reservation and help the Lummi Nation to decide if there are sufficient wind resources to make wind power viable.

The Lummi Nation purchased the 60-meter anemometer tower and borrowed the 50-meter anemometer station through the NREL Native American Anemometer Loan Program. The NREL program loans anemometers and the equipment needed for installation to measure the wind resource on tribal lands (Native American Anemometer Loan Program).

The wildlife impact assessment will be conducted by Hammer Environmental in spring and summer 2011 and will take into account the migratory paths of potentially impacted wildlife. Species of particular concern on the Lummi Reservation are bats and marbled murrelets, as well as water fowl and other wildlife that are important to the Lummi way of life.

The third assessment will take place during the spring and summer of 2011 and gauge potential noise impacts that may arise from installing wind turbines. This assessment will be conducted by J.C. Brennan & Associates, and is meant to ensure that operating the turbines will not adversely impact residents and neighbors of the Lummi Reservation. (Lummi Nation Presentation 2010).

Lessons Learned

Since beginning this project in 2009, the Lummi have learned key lessons about wind energy development feasibility assessments. In October 2010, Jeremy Freimund, Lummi Nation Water Resource Manager, presented some of these ideas, summarized below, at a DOE Tribal Energy Program Review.

Estimating Costs for the Feasibility Study

Developing a competitive grant proposal requires understanding the costs associated with a feasibility assessment. To that end, the Lummi recommend getting more than one price quote from contractors or asking other tribes that have conducted wind energy feasibility assessments. Also, budgeting for staff costs is recommended, as it requires significant time and effort to conduct tasks like posting requests for proposals, negotiating and meeting with contractors, and conducting site visits. Finally, determining costs for elements like the wildlife assessment are best accomplished by seeking estimates for similar projects. The Lummi recommend selecting wildlife and noise contractors who have specialized expertise in evaluating wind energy projects, and also to conduct these analyses at the same time as the wind study.

Fostering Partnerships and Collaboration

The National Renewable Energy Laboratory and the Department of Energy's Tribal Energy Program have provided significant technical resources and grant funding to assist the Lummi Nation in conducting the feasibility study. The Lummi Nation has also made many useful contacts by participating in the Tribal Energy Program Review and other workshops.

Other Renewable Energy Projects

Solar Lighting

The Lummi Nation has installed two miles of solar lighting for the Haxton Way Pedestrian Pathway. The project was initiated by a *need to increase trail security and usefulness after dark, while preserving the integrity of the natural environment* (Solar Daily). Completed in 2010, the project was organized through the Lummi Planning Department, and conducted in conjunction with the Federal Lands Highway Department and the Recovery Accountability and Transparency Board (Solar Daily).

Haxton Way Pedestrian Path
Source: Rocket Horse Photography

The pathway stretches across environmentally sensitive wetlands that are home to a variety of different animals. In order to protect the species in the wetland, the Lummi Nation installed an ecosystem-sensitive technology offered by EverGEN. The system "*operates in accordance with International Dark Sky Association (IDA) Guidelines, which recommend limiting light trespass or 'sky glow' to help protect nocturnal ecosystems and nocturnal wildlife"* (Solar Daily).

Geothermal Heat Pumps

The Lummi Nation is also working to lessen its environmental impact, its energy demands, and its long-term energy costs by using geothermal energy. As part of the construction of the new tribal administrative building, the Lummi Nation Planning Department is in the process of installing a geothermal heat pump system in accordance with IGSHPA guidelines.

Geothermal heat pumps work by using the earth as a heat source in the winter and a heat sink during the summer. They do not require burning any type of fuel; instead loops are installed below the surface of the ground and throughout the building, and a fluid is circulated through the loop, carrying heat into or out of a building (Energy Savers). In July 2010, Geo-Energy Services began designing a borefield for the Lummi Nation's new Administrative building. A borefield is an area that contains the boreholes or wells through which the closed loops of a geo-thermal heat pump circulate fluids that either dissipate cooler or warmer building temperatures depending on the season. The project will require approximately 120 boreholes that average 350 feet deep and are tied together by a horizontal loop system that terminates in an underground vault (Geo-Energy Services 2010).

As of April 2011, all 120 boreholes were complete. The installation of the horizontal loop system is under way and the in-ground work should be completed by June 1, 2011, with termination of the system at an underground vault. The General Contractor will then complete the system in the building and the system will become operational. The Geothermal system will regulate air temperature, and is expected to reduce the cost of heating and cooling the building by 50% (Lummi Communications).

Strategic Energy Plan

In order to document and monitor their goal of shifting from fossil fuels to renewable energy, the Lummi Nation is also developing a Strategic Energy Plan with grant funding from the U.S. Environmental Protection Agency's (EPA) Indian General Assistance Program. The plan will formally evaluate the current demand and supply for power, projected future demands, potential alternatives for supplies, and potential for energy conservation. After the evaluation, the Lummi Nation will establish community objectives (e.g., reducing energy levels by 20% by 2015), and develop an action plan.

Contacts

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Resources

Author	Title	Publisher	Date of Publication	Link
Lummi Nation	Lummi Nation Home Page	Lummi Nation	April 2011	http://www.lummi-nsn.org/website/index2.html
Lummi Nation Water Resources Division	Anemometer Tower Installation at the Smokehouse Road Site, February 4, 2011	Lummi Nation	February 2011	http://lnnr.lummi-nsn.gov/LummiWebsite/Website.php?PageID=212
Staff Writers	Solar LED Lights Illuminate Three Miles Of Lummi Nation Pathway	Solar Daily	January 31, 2011	http://www.solardaily.com/reports/Solar_LED_Lights_Illuminate_Three_Miles_Of_Lummi_Nation_Pathway_999.html
Lummi Nation Water Resources Division	Anemometer Tower Installation at the Blockhouse Site, December 28 and 29, 2010	Lummi Nation	December 2010	http://lnnr.lummi-nsn.gov/LummiWebsite/Website.php?PageID=212
DNV Renewables Inc.	Lummi Nation Site Survey and Wind Monitoring Recommendations	DNV Renewables Inc.	November 2010	http://lnnr.lummi-nsn.gov/LummiWebsite/Website.php?PageID=212
Jeremy Freimund	Lummi Water Resources Division. 2010. Lummi Indian Reservation Wind Energy Development Feasibility Assessment. U.S. Department of Energy Tribal Energy Program Review, October 26, 2010	Lummi Nation Water Resources Division	October 2010	http://lnnr.lummi-nsn.gov/LummiWebsite/Website.php?PageID=212
AJ Barse	Preview of Lummi's Tribal Administration Building	Lummi Communications	July 2010	http://web.me.com/lummicommunications/Lummi_Communications/Squol_Quol/Entries/2010/7/7_July_2010_SQ.html
Lummi Nation Water Resources Division	Lummi Water Resources Division (LWRD). 2009. Lummi Indian Reservation Wind Energy Development Feasibility Assessment. Presented at the U.S. Department of Energy Tribal Energy Program Review, November 19, 2009.	Lummi Nation Water Resources Division	November 2009	http://lnnr.lummi-nsn.gov/LummiWebsite/Website.php?PageID=212
Kari Neumeyer	Lummi Nation looks at wind power	Northwest Indian Fisheries Commission	January 2011	http://nwifc.org/2011/01/lummi-nation-looks-at-wind-power/

Related Government Programs

Program	Organizing Agency	Description	Link
Native American Anemometer Loan Program	Jointly organized by the National Renewable Energy Laboratory and Department of Energy's Wind Powering America Initiative	The Native American Anemometer Loan Program is part of an effort to promote the installation of wind turbines on Native American lands. NREL and the Western Area Power Administration (WAPA) jointly administer the program as part of the U.S. Department of Energy's Wind Powering America Initiative. The program allows Native American tribes to borrow anemometers and the equipment needed for installation so that they may measure the wind resource on tribal lands.	http://www.windpoweringamerica.gov/nativeamericans/anemometer_loan.asp
Tribal Project Assistance	National Renewable Energy Laboratory	NREL helps tribes develop and implement sustainable energy strategies with technical expertise and capabilities that support renewable energy technology deployment projects	http://www.nrel.gov/applying_technologies/tribal.html
Wind Powering America	U.S. Department of Energy	A nationwide initiative designed to increase the use of wind energy across the United States by working with regional stakeholders	http://www.windpoweringamerica.gov/
Tribal Energy Program	U.S. Department of Energy	Promotes tribal energy sufficiency and fosters economic development and employment on tribal lands through the use of renewable energy and energy efficiency technologies	http://apps1.eere.energy.gov/tribalenergy/
Indian General Assistance Program	U.S. Environmental Protection Agency	Provides General Assistance Program (GAP) grants to federally-recognized tribes and tribal consortia for planning, developing, and establishing environmental protection programs in Indian country, as well as for developing and implementing solid and hazardous waste programs on tribal lands.	http://www.epa.gov/aieo/gap.htm
Energy Savers	U.S. Department of Energy	Information on saving energy and using clean, renewable technologies; geothermal heat pumps.	http://www.energysavers.gov/
	U.S. Department of transportation, Federal Highway Administration, Office of Federal Lands Highway	Provides program stewardship and transportation engineering services for planning, design, construction, and rehabilitation of the highways and bridges that provide access to and through federally owned lands	http://flh.fhwa.dot.gov/
	Recovery Accountability and Transparency Board	Provide transparency of 2009 Recovery and Reinvestment Act-related funds and prevents and detects fraud, waste, and mismanagement	http://www.recovery.gov/About/board/Pages/TheBoard.aspx

Tribal Climate Change Profile Project:

The University of Oregon and the USDA Forest Service Pacific Northwest Research Station are developing tribal climate change project profiles as a pathway to increasing knowledge among tribal and non-tribal organizations interested in learning about climate change mitigation and adaptation efforts. Each profile is intended to illustrate innovative approaches to addressing climate change challenges and will describe the successes and lessons learned associated with planning and implementation. For more information about the initiative, visit: http://tribalclimate.uoregon.edu/.

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