

Emmonak/Alakanuk Wind Turbines



Emmonak, Alaska



Emmonak School participates in Wind for Schools program

Project Overview

In partnership with the Alaska Energy Authority (AEA), the Alaska Village Electric Cooperative (AVEC) completed the final design and construction of a wind project to provide power to the communities of Emmonak and Alakanuk. Four 100 kW Northwind turbines were installed in addition to a 9.5 mile, 160-pole transmission line from Emmonak to Alakanuk.

Objectives

The main objectives of this project were to displace expensive diesel fuel and provide Emmonak and Alakanuk with a renewable, reliable, and cost effective energy source.

Economic Feasibility

The project became operational in September of 2011. Between September of 2011 and December of 2014, it generated 1,560 Megawatt hours of electricity and displaced 111,000 gallons of diesel fuel. This displacement saved the communities \$435,000 in just over three years. Over its 20-year projected lifespan, the project has a calculated benefit/cost ratio of .99.

Project Specifications

The four 100 kW turbines were provided by Northern Power. They have a design life of over 20 years and an operating temperature between -40 degrees F to +122 degrees F. Winter temperatures in Emmonak and Alakanuk typically range from -35 to +25 degrees F, so the turbines have no trouble operating during the coldest months. Wind energy is classified on a scale from 1 to 7, 1 being poor and 7 being superb. Emmonak is a high Class 3 for power generation. The 9.5-mile transmission line connects the communities

Quick Facts

Total Project Costs: \$8.9 million

Funding: Renewable Energy Fund & Local Match

Capital Costs

Design: \$24,235

Construction: \$8,867,392

Equipment Specifications

Make/Model: (4) Northern Power 100B

Rated Capacity: 100 kW

Net Capacity Factor: 17.7%

Rotor Diameter: 21 meters

Hub Height: 37 meters

Total Rated Capacity: 400 kW

Diesel Fuel Offset

Estimated Annual: 55,785 gallons

Actual Annual: 35,000 gallons

Sept. 2011-Dec. 2014: 111,000 gallons

Fuel Savings

Estimated Annual: \$205,017

Actual Annual: \$136,000

Sept. 2011-Dec. 2014: \$435,000



Emmonak School, photo courtesy of Skweskimos.com

Emmonak, Alaska

of Emmonak and Alakanuk so that they can share the harnessed energy.

Allocation of Funding

The Alaska Energy Authority's Renewable Energy Fund (REF) granted \$8 million for the project's design and construction. Local funds contributed \$891,627 which were used for the same project phases.

Learning Experiences/Challenges

Although originally proposed as a \$10.7 million project, the scope changed with the \$4 million cap applied to each community for a total REF grant of \$8 million. The scope was reduced from 6 to 4 turbines and the transmission line increased to 9.5 miles due to better ground and barge access.

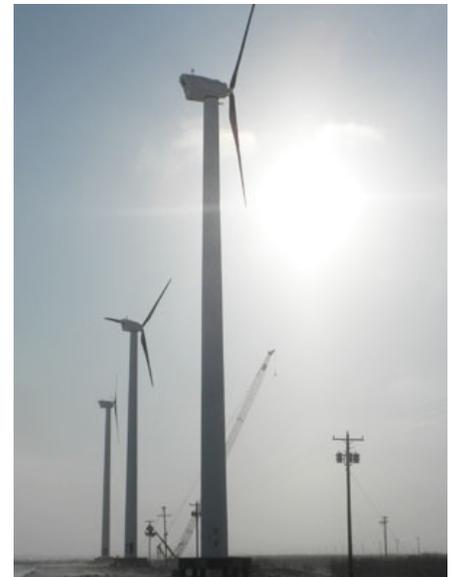
Like much of northern Alaska, Emmonak and Alakanuk are located on permafrost zones. Construction crews took this into account by engineering 60-foot steel pilings with a prefabricated concrete sectional cap on each turbine's foundation. These were engineered to isolate the turbine from the permafrost and dampen vibrations. This was a necessary innovation to deal with unique geotechnical and logistical conditions.

Community Benefits

Electricity costs from diesel average about \$0.50/kWh, compared with \$0.21/kWh with wind energy. This savings is important for the schools especially, which use substantial electricity for lighting and heating during the school year. Both Emmonak and Alakanuk

are subject to subzero temperatures, extended periods of darkness, blowing snow, and other factors that make electricity and heat essential. This project also provides excess energy for water heating at the school and water plant.

Emmonak School was one of five Alaska schools chosen to participate in the 2014 spring Wind for Schools (WfS) program. The Renewable Energy Alaska Project brought the WfS curriculum to classes. During their visit they facilitated WfS activities with teachers and students, provided the school with a wind experiment kit, and brought in real wind data so that students could see how the wind turbines contribute to their community's overall energy production. Using wind energy as a keystone, students learn about energy science, energy sources, climate change, physics, and mathematics.



Northern Power Turbines, photo courtesy of Solsticeak.com



Northern Power 100 turbines, photo courtesy of AEA.

Project Contact Information

Parties Involved:

Kirstin Enanoria, AVEC
Email: kenanoria@avec.org

Case Study Author:

Zoe Tressel, AEA
Website: Akenergyauthority.org
Phone: 907-771-3000

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