

Sand Point Wind Project



Sand Point, Alaska



Wind project improves infrastructure and reduces local energy costs

Project Overview

In partnership with the Alaska Energy Authority (AEA), Sand Point Generation (SPG) and TDX Power completed the design and construction of a 1-MW wind farm in Sand Point, Alaska. The system is comprised of two 500kW Vestas V39 turbines. It was designed to integrate into the existing diesel Sand Point Generation utility and provide wholesale power to the community. A secondary load system was designed to help heat the school, clinic, and community building through excess wind energy but has yet to be completed. Funding has been appropriated and SPG is ready to move into its next phase of completion.

Objectives

The objectives of this project were to displace diesel fuel and provide the community of Sand Point with a renewable, reliable, and cost effective energy source.

Economic Feasibility

The project became operational in August of 2011. Between August of 2011 and December of 2014, the turbines have generated 2,864 megawatt-hours of electricity and 413 MMBtu of thermal energy. This has allowed SPG to displace 210,000 gallons of diesel fuel and has saved the community \$965,000 in avoided fuel costs. Over its 20 year projected lifespan, the project has a calculated benefit/cost ratio of 4.54.

Project Specifications

The project was a joint effort between AEA, SPG, TDX Power, and Aleutian Wind Energy (a subsidiary of TDX). AEA provided funding and project support while SPG owns the utility. Through TDX Power, AWE designed, constructed, and maintains the project. The Vestas V39 are each 500 kW and are intended for a range of harsh conditions, especially exposed locations. The turbine's electronic controller checks the

Quick Facts

Total Project Costs: \$2,989,606

Funding: Renewable Energy Fund & Local Funds

Capital Costs

Design: \$294,000

Construction: \$2,695,265

Equipment Specifications

Make/Model: (2) Vestas V39

Rated Capacity: 500 kW

Net Capacity Factor: 26.8%

Rotor Diameter: 39 meters

Hub Height: 40.5 meters

Total Rated Capacity: 1 MW

Diesel Fuel Offset

Estimated Annual: 126,429 gallons

Actual Annual: 81,000 gallons

Aug. 2011-Dec. 2014: 210,000 gallons

Fuel Savings

Estimated Annual: \$386,872

Actual Annual: \$371,000

Aug. 2011-Dec. 2014: \$965,000

Benefit/Cost Ratio: 4.54



Sand Point and Vestas V39, photo courtesy of AEA.

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power output several times per second; when the power output is too high, a blade pitch mechanism turns the blades slightly out of the wind. Conversely, the blades are turned into the wind when the wind drops again. This maximizes output for all wind speeds. In addition to the turbines, TDX considered adding a secondary load system to the power plant to transfer electricity to electric boilers in the school, clinic, and community building.

Allocation of Funding

The Alaska Energy Authority's Renewable Energy Fund contributed \$1,168,359 for the design and construction of the project. The Department of Energy contributed \$945,136 and TDX power contributed \$875,800 for the same project phases.

Learning Experiences/Challenges

Rather than operating at 500 kW, the turbines have been curtailed at 300 kW each until the new secondary load system is integrated. In 2015, TDX Power and SPG received \$307,120 in legislative appropriations for the \$383,900 project. Construction is the only phase to complete before operation can begin.

Community Benefits

Prior to turbine installation, electricity costs were \$0.39/kWh. With the displacement of fuel and AEA's Power Cost Equalization program, SPG has been able to reduce electricity costs to \$0.20/kWh. This shows a cost reduction of 25 percent.



Vestas V39 turbines, photo courtesy of Rich Stromberg, AEA.

One of the benefits this project provides is that the increase in local savings has allowed for improvements to be made around the community. Infrastructure is expanding to include new harbor development and additional projects are also underway.

This project will serve to further demonstrate a successful excess wind-to-heat application, leading to project and operating experience that can be shared across the industry.

The school, clinic, and community building also benefit from the secondary load system; using excess wind energy will allow them to displace a portion of their diesel heating costs. With their savings they can invest more money in community health, education, and infrastructure projects. Installing the system in the school also provides an opportunity to reach children and influence their understanding of energy use and impact.

Other non-economic public benefits include a reduction in atmospheric emissions and a reduced dependency on fuel sources with volatile prices.



Vestas V39 turbines, photo courtesy of Rich Stromberg, AEA.

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Published August, 2015