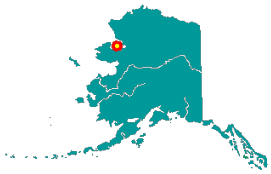
Kotzebue Wind Farm Expansion

Kotzebue, Alaska



Wind project increases education and renewable energy production

Project Overview

In 2008, the Kotzebue Electric Association (KEA) partnered with the Alaska Energy Authority (AEA) to complete the expansion of their 2.95 MW wind farm by adding two EWT 900 kW turbines. An energy storage device was also funded in 2010 to provide grid stability and ability to time shift electrical generation.

Objectives

The objectives of this project were to increase the wind generation capacity of KEA, to integrate the increased capacity with a 500 kW/3.7 MW Premium Power Flow Battery, and to utilize the excess electricity in a distributed heating system for the community.

Economic Feasibility

The entire project became operational in May of 2012. Between May of 2012 and December of 2014, the turbines generated 8,237 megawatt-hours of electricity and displaced 560,000 gallons of diesel fuel. This displacement saved the community $2 million. Over its 20-year projected life, the project has an estimated benefit/cost ratio of 1.36.

Project Specifications

Before this project began, Kotzebue's wind plant had an installed capacity of 1.14 MW that provided the city with 1.2 million kilowatt-hours per year. This met roughly 8 percent of the community's electrical demand and displaced an annual average of 140,000 gallons of diesel fuel. In order to further reduce diesel dependency, KEA increased the project's capacity to 2.95 MW with the commissioning of two additional turbines and a battery storage system. EWT's Direct Wind 900 kW turbine is a pitch-controlled, variable-speed wind turbine designed to maximize yield from sites that have low to medium wind areas. The Premium Power TransFlow 2000 is a battery system based

Quick Facts

Total Project Costs: $9 million

Funding: Renewable Energy Fund & Local Match

Capital Costs

Design: $179,219
Construction: $8,822,402

Equipment Specifications

Make/Model: (2) EWT Direct Wind 54
Rated Capacity: 900 kW
Net Capacity Factor: 28.4%
Rotor Diameter: 54 meters
Hub Height: 75 meters
Total Rated Capacity: 2.95 MW

Diesel Fuel Offset

Estimated Annual: 358,000 gallons
Actual Annual: 229,000 gallons
May 2012-Dec. 2014: 560,000 gallons

Fuel Savings

Estimated Annual: $1,261,000
Actual Annual: $811,000
May 2012-Dec. 2014: $2,009,000

Benefit/Cost Ratio: 1.36

"Using wind energy as a keystone, students learn about energy science & sources, climate change, physics, and mathematics."

EWT Direct Wind turbine, photo courtesy of AEA.

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on Zinc-Bromide technology. It was the lowest cost option for a utility-scale energy storage system and was rated to provide up to 500 kW of power and 2.8 MWh of energy storage capacity in a single enclosure.

Allocation of Funding

AEA's Renewable Energy Fund contributed $8,000,000 for design, construction, and commissioning. Local matches contributed $2,808,919. Funding totaled $10,808,919, but project costs only totaled $9,001,621. Leftover money was distributed back to AEA and the community.

Learning Experiences/Challenges

The Transflow 2000 was the first storage system that Premium Power had delivered to a utility. Upon arrival in Sept. of 2011, it was discovered that the battery had been improperly packaged and was damaged by salt water corrosion. Throughout the course of the short battery deployment, it also experienced several unexpected leaks.

In 2012, the battery was recalled and shipped back to the manufacturer. KEA is currently under discussion with Saft SA to provide an Intensium ® Battery System. KEA has learned a great deal from this experience. The emerging technology landscape of battery systems is fairly complex, and remote communities need technical support and guidance to determine when and if battery storage is the correct technical and economic solution to their specific conditions.

Foundation laying for a 900 kW turbine, photo courtesy of KEA.

Community Benefits

Kotzebue is currently looking to purchase two electric boilers to help heat their hospital and hotel. They are negotiating an agreement with KEA to purchase intermittent electricity for these boilers when the turbines produce excess energy. Because KEA can produce energy at a lower cost, they are able to aid community establishments that continue to struggle with high fuel prices. The agreement is still being worked out, but the current deal would allow the hotel and hospital to reduce their expenditures by 40 percent. This agreement would allow them to put more funds toward community service and quality of life and allow them to continue improving the lives of Kotzebue residents.

Kotzebue School was one of five Alaska schools chosen to participate in the 2014 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 a wind experiment kit, and brought in real wind data so students could see how wind turbines contribute to their community's energy production. Using wind energy as a keystone, students learn about energy science & sources, climate change, physics, and mathematics.

Kotzebue turbines, photo courtesy of AEA.

Project Contact Information

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Published August, 2015