

# Delta Area Wind Turbines



## Delta Junction, Alaska



### Delta Junction reduces liquid hydrocarbon use

#### Project Overview

In partnership with the Alaska Energy Authority (AEA), Alaska Environmental Power (AEP) completed the design and construction of a 1 MW wind project near Delta Junction, Alaska. The project installed two wind turbines and was the first of its kind to integrate into the Railbelt Grid using an experimental program by Golden Valley Electric Association (GVEA). It employs a Northern Power Systems (NPS) Northwind 100 kW turbine and an EWT DirectWind 900 kW turbine. These turbines are cold weather resistant, operate down to -40 degrees F, and have proven successful in Alaska. The project serves all the communities on the Northern Railbelt Grid and produces power without any emissions.

#### Objectives

The objective of this project was to provide residents with an affordable and reliable energy source by displacing costly diesel fuel with renewable wind energy.

#### Economic Feasibility

The turbines became operational in September of 2010. Between September of 2010 and December of 2014, they have produced 7,033 megawatt-hours of electricity and displaced 436,000 gallons of diesel fuel. This displacement saved \$1,105,000 in just over four years. With proper maintenance and operation, the turbines are expected to last longer than their projected lifespan of 20 years.

#### Project Specifications

The wind farm project was a joint effort between AEA and AEP. Before the project began, GVEA was sourcing about one third of their power from liquid hydrocarbons, one third from coal, and the rest from South-central Alaska utilities through the Northern Interior. The Delta wind project reduced their use of liquid

#### Quick Facts

**Total Project Costs:** \$3.97 million

**Funding:** Renewable Energy Fund: \$2,000,000  
Local Match: \$1,970,000

#### Equipment Specifications

**Make/Model:** (1) NPS Northwind 100B  
(1) EWT Direct Wind 54  
**Rated Capacity:** 100 kW, 900 kW  
**Net Capacity Factor:** 21%, 24%  
**Rotor Diameter:** 21 meters, 54 meters  
**Hub Height:** 37 meters, 75 meters  
**Total Rated Capacity:** 1 MW

#### Diesel Fuel Offset

**Estimated Annual:** 166,090 gallons  
**Actual Annual:** 145,000 gallons  
**Sept. 2010-Dec. 2014:** 436,000 gallons

#### Fuel Savings

**Estimated Annual:** \$415,225  
**Actual Annual:** \$392,000  
**Sept. 2010-Dec. 2014:** \$1,105,000

**Benefit/Cost Ratio:** 3.58

*"This project provides GVEA members with both a fixed rate of electricity and a renewable energy source with zero atmospheric emissions."*



Project construction, photo courtesy of AEA.

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hydrocarbons, GVEA's most expensive power source. The project took approximately two years to construct. The installed Northern Power turbine stands 37 meters tall and the Direct Wind turbine stands 75 meters tall. The original 138 kV transmission line was tied into a new 1.5 mile 25 kV line and step-up transformers to transmit power to the GVEA grid. Prior to the project's construction, detailed wind studies were conducted to ensure the feasibility of such a project. The project's resource availability is a class 3 out of 7, but low road system costs make the project economical. The class improves in winter when the demand is highest and wind strongest.

## Power Sales Agreement

A power sales agreement was made with GVEA prior to release of grant funds that allowed GVEA to purchase up to 2 MW of power capacity under the Experimental Renewable Resource Purchase Program. GVEA's power purchasing price was equal to the actual avoided fuel cost, or \$0.14/kWh. GVEA recently changed the formula from an annual average avoided cost to a monthly calculation, so their payments fluctuate slightly throughout the year.

## Learning Experiences/Challenges

Avian issues are often a concern at wind farm facilities because of the potential for disturbance, habitat impact, and mortalities or injuries from collisions. In response to this, project managers had biological studies conducted on avian migration patterns, frequency, population, species, etc. to determine and ensure their safety.



Delta Junction turbines, photo courtesy of AEA.

The original project requested funding for the installation of 20 Northwind 100 kW turbines. After determining that the cost was too high, an amendment was made to substitute 18 of the Northwind 100 turbines for two of EWT's 900 kW turbines, yielding a reduced cost. AEA ended up funding one 900 kW turbine and one Northwind 100 kW turbine. AEP later installed a second 900 kW turbine with a loan from AEA's Power Project Fund, bringing total capacity to 1.9 MW.

## Community Benefits

One of the benefits of this project is that wind energy prices do not fluctuate with Alaska's oil and gas prices. This project provides GVEA members with both a fixed rate of electricity and a renewable energy source with zero atmospheric emissions.

Thanks to the project, electricity rates have gone down from 22 cents per kWh (liquid hydrocarbon use) to 18 cents per kWh with wind energy.

Much of the power from this project is transmitted to the Fairbanks area. Prior to this project, Fairbanks experienced air quality issues as a result of the atmospheric inversion layer at their location. Whatever emissions (diesel, forest fire, etc.) are released are generally trapped underneath this layer and stay hovering over the community. As a result of this wind project, less diesel emissions have been trapped, improving air quality for all residents.

## Project Contact Information

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