Gulkana Central Wood Heating Project

Gulkana, Alaska

Biomass boilers provide long-term and sustainable heat supply

Project Overview

Through the Renewable Energy Grant Fund (REF), Alaska Energy Authority (AEA) funded construction of a central wood heating system in Gulkana, Alaska. The community installed two Garn WHS 2000 cordwood-fired boilers, a Tarm pellet-fired boiler, and a distribution system to connect community buildings. The majority of pellets used to feed the system are purchased from Anchorage. Cordwood is provided as a byproduct of hazardous fuels treatments and road construction activity. To promote safety, oil-fired boilers remain as ready backups.

Objectives

The main objectives of this project were to displace fuel oil and provide the community of Gulkana with a renewable, reliable, and cost effective energy source. These objectives are achieved by heating community facilities and the community water circulation loop with the biomass system described above.

Product Selection

A cordwood-fired hydronic system was chosen because of its long life, low maintenance, ease of construction, and simple operation. The Tarm pellet-fired boiler was chosen to compliment the cordwood fired boilers during the night and weekends because it requires less maintenance and labor.

Economic Feasibility

The project became operational in October 2010. Between October 2010 and December 2014, the boilers produced 3,800 MMBtu of thermal energy and displaced 35,000 gallons of diesel fuel. This displacement has resulted in $117,000 in fuel savings for the community. With proper maintenance, the boiler life is expected to exceed 20 years.

Quick Facts

Total Project Costs: $553,356

Funding: Renewable Energy Grant Fund: $414,686
Matching Funds: $102,000

Capital Costs
Design: $46,000
Construction: $507,356

Equipment
Make/Model: (2) Garn WHS 2000
Output: 700,000 Btu/hr
(1) Tarm 4.0 - Output: 147,000 Btu/hr

Diesel Fuel Offset
Estimated annual: 14,643 gallons
Actual avg. annual: 10,769 gallons
Comprehensive savings: 35,000 gallons
(Oct. 2010-Dec. 2014)

Fuel Savings
Estimated annual: $33,000
Actual annual: $36,000
Comprehensive savings: $117,000
(*Oct. 2010-Dec. 2014)*

Jobs Created: One full-time equivalent

Boiler facility & wood storage, all photos courtesy of Dan Bihn.

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Allocation of Funding

AEA's Renewable Energy Grant Fund contributed $414,686 to the project. Funds went to boiler purchase, construction/installation of a combined heat building and wood storage, and adapting buildings to hot water heat systems. $10,000 was provided through the US Forest Service "Jumpstarting Wood Energy in Alaska" grant, and local match provided the remaining funds.

Fuel and Storage

The system is designed to displace 90 percent of the fuel oil previously used in community facilities. Cordwood is supplied locally, and quartlery trips to Anchorage are made to purchase pellets and other supplies. The fuel hopper for the pellet system has to be filled once every several days whereas the cordwood system must be fed several times each day. The community is currently investing in a local pellet mill to reduce costs, and it is expected to become operational in 2016.

Learning Experiences/Challenges

The project originally included two Tarm boilers in addition to the two Garn WHS 2000s. Due to a shortage of funding the project was reduced to two Garn and one Tarm unit. Gulkana was also unable to purchase a silo storage container for their bulk pellets. In spite of funding challenges, the project has thrived and savings continue to benefit the community.

Garn boilers

Another lesson learned was that the Tarm boiler did not have an UL rating and had to be modified to an atmospheric system for Fire Marshall approval. Future equipment evaluations will include making sure that the systems are certified in Alaska.

Community Benefits

The biomass heated hot water circulation loop is integrated with the conventional hot water heating systems in community buildings using a heat exchanger. In June of 2013, additional funding was provided by AEA to modify the hydronics system for better heat distribution. A Btu meter measures the amount of heat delivered to customers, allowing the tribe to meaure and sell the energy.

The two Garn WHS 3200s and Tarm boiler currently supply heat to four duplexes, a teen center, community hall administration, fitness center, shop, new offices, clinic, the potable water distribution loop, and a new bus garage. Thanks to this project Gulkana community facilities have a long-term and sustainable heat supply.

Heat exchanger piping

Project Contact Information

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