



Northwest CHP Application Center

Combined Heat and Power for the states of
Alaska, Idaho, Montana, Oregon and Washington
in cooperation with the U.S. Department of Energy



KWIGILLINGOK, ALASKA, POWER PLANT AND RECOVERED HEAT FACILITIES

Facility Description

The Village Council operates the electric utility in Kwigillingok, Alaska. The power plant is a 30'x48' foam-core panel building on a steel piling foundation, *see Figure 1*. The power plant building was constructed new in 2004. The power plant is equipped with four diesel generators with a total capacity of 585 kW. Power is generated at 480V and is provided to the community via three phase 7.2/12.47kVA step-up transformers and a three-phase overhead distribution system. The 2005 annual electric generation is approximately 712,000 kWh, *see Figure 2*.

Heat from the diesel generator cooling system is currently used to heat the power plant building. Insulated arctic pipe was installed above grade from the power plant to the vicinity of the future water treatment plant. An existing heat exchanger located in the power plant isolates the generator cooling system from the installed arctic piping. When the water plant is completed recovered heat will be provided, *refer to Figure 3 and attached site plan and schematic*. A new washeteria may also be constructed in the vicinity of the new water treatment plant and could be connected to the recovered heat system as well.

Combined Heat and Power (CHP) Equip.

Power Plant

- Generators (#1 diesel fuel engines)
 - o John Deere 6081 190 kW
 - o John Deere 6081M 150 kW (marine jacketed)
 - o John Deere 6081M 150 kW (marine jacketed)
 - o John Deere 6068 M 95 kW (marine jacketed)
- Heat Exchanger (HX-1), brazed plate, 350 MBH, Ameridex SL140TL-LL-80
- Circulating pump (P-HR1), 60 gpm @ 8' TDH, 1/3 hp, 115V, 1 phase, Grundfos UPS50-40
- Circulating pump (P-HR3), 65 gpm @ 17' TDH, 3/4 hp, 115V, 1 phase, Grundfos UPS50-80/2



Figure 1: Kwigillingok Power Plant

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Cooperating agencies: Washington State University Extension Energy Program, U.S. Department of Energy, Alaska Energy Authority, Idaho Department of Water Resources Energy Division, Montana Department of Environmental Quality Energy Program and Oregon Department of Energy

End User

- Water Treatment Plant (future)
 - o Heat Exchanger (HX-2), brazed plate, 350 MBH, Ameridex SL140TL-LL-80
 - o Boilers
- Washeteria (future)
 - o Heat exchanger
 - o Boilers

Estimated Fuel Savings

The heat recovery system was installed in 2005 to provide heat to the planned community water treatment plant. The water plant is not complete at this time and does not utilize recovered heat yet. There is also a possibility that a new washeteria may be constructed near the water treatment plant. If both the water treatment plant and the washeteria are connected to the heat recovery system it could save an estimated 13,000 gallons of heating fuel per year, see *Figure 4*.

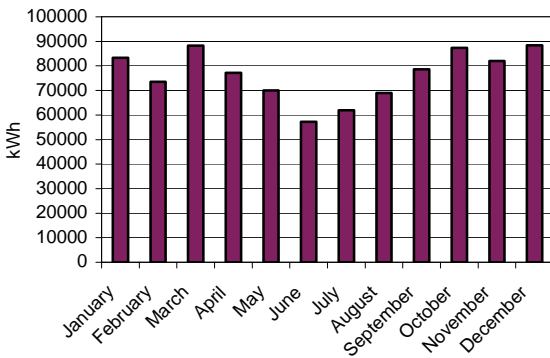


Figure 2: Electric Generation Profile

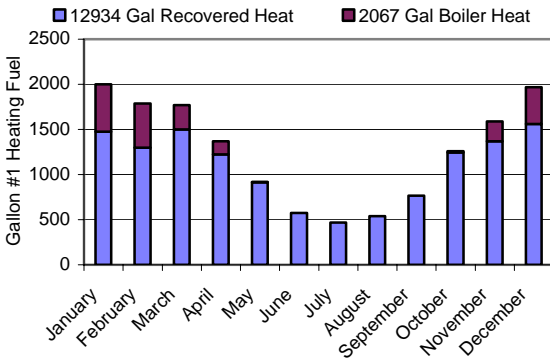


Figure 4: Thermal Energy Provided

Additional Considerations

A combination of “marine jacketed” and “non-marine jacketed” generators are used to meet the electric demand and to maximize recovered heat potential, and provide excellent fuel economy. Completion of the water plant and washeteria and connection to the heat recovery system should be a high priority for the community.



Figure 3: Heat Recovery System