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

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ALASKA ENERGY AUTHORITY

GOLOVIN, ALASKA, POWER PLANT AND RECOVERED HEAT FACILITIES

Facility Description

The City operates the electric utility in Golovin, Alaska. The power plant is a 30'x48' foam-core panel building on a steel post and pad 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 570 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 690,000 kWh, *see Figure 2.*

Heat from the diesel generator cooling system is used to heat the power plant building and is pumped through combination above and below grade insulated arctic pipe from the power plant to the nearby washeteria, City hall, shop building and post office, *refer to Figure 3 and attached site plan and schematic*. Heat exchangers located in the power plant and washeteria isolate the generator cooling system from the arctic piping and washeteria hydronic heating systems.

Combined Heat and Power (CHP) Equip.

Power Plant

- Generators (#1 diesel fuel engines)
  - John Deere 6081 190 kW
  - John Deere 6081M 150 kW (marine jacketed)
  - John Deere 6068 115 kW
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- Heat Exchanger (HX-1), brazed plate, 350 MBH, Ameridex SL140TL-LL-80
- Circulating pump (P-HR1), 50 gpm @ 6' TDH, 1/3 hp, 115V, 1 phase, Grundfos UPS50-40
- Circulating pump (P-HR3), 60 gpm @ 13' TDH, 3/4 hp, 115V, 1 phase, Grundfos UPS50-80/40

Figure 1: Golovin Power Plant

End Users

- Washeteria
  - Heat Exchanger (HX-2), brazed plate, 350 MBH, Ameridex SL140TL-LL-80
  - Circulating pump (P-HR4), 40 gpm @ 5' TDH, 1/3 hp, 115V, 1 phase, Grundfos UPS40-40
  - 2 each boilers (B-1, B-2)

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- City Hall
  - 2 Circulating pumps
  - 1 Boiler
- Shop & Post Office
  - Shop Unit Heater (UH-3)
  - Post Office Unit Heater (UH-4)

Estimated Fuel Savings

The heat recovery system was installed in 2004 to provide heat to four City-owned buildings. The washeteria is not complete at this time and does not utilize recovered heat yet. When the washeteria is complete the heat recovery system will save the City an estimated 11,250 gallons of heating fuel per year, *see Figure 4*.

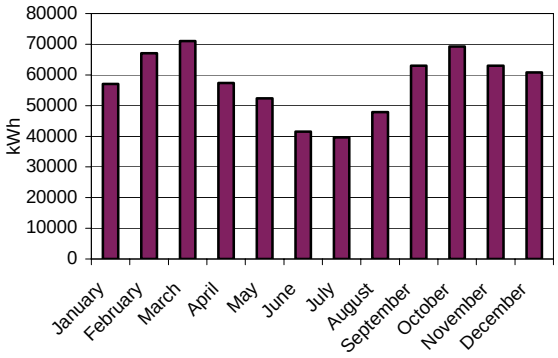

Figure 2: Electric Generation Profile

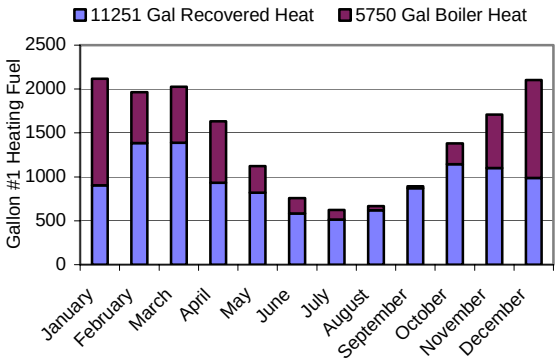

Figure 4: Thermal Energy Provided

Figure 3: Energy Meter Display

Additional Considerations

The community should operate one of the smaller (115kW) units as a lead unit to build up hours. When this unit is ready for replacement a marine manifold unit of similar capacity should be installed to increase the amount of jacket water heat available for recovery.

Alaska Native Tribal Health Consortium (ANTHC) has been working on the washeteria heat system for 3 years and is still unclear on the final configuration. Improper interface of the washeteria boilers with the heat recovery system could limit the effective utilization of recovered heat. The final washeteria heating design should be coordinated by a consultant with heat recovery expertise to ensure the heat recovery system operates as intended and provides maximum benefit.