U.S. DEPARTMENT OF ENERGY
CHP Technical Assistance Partnerships
NORTHWEST

GRAYLING, ALASKA, POWER PLANT AND RECOVERED HEAT FACILITIES

Facility Description

Alaska Village Electric Cooperative (AVEC) operates the electric utility in Grayling, Alaska. The existing power plant is a 15'x36' insulated metal building on a wood post and pad foundation, *see Figure 1*. The power plant building was constructed circa mid 1970's and is equipped with three diesel generators with a total capacity of 546 kW. Power is generated at 240/120V single phase, and is provided to the community via 240/7.2kVA step-up transformers and a single phase overhead distribution system. The 2005 annual electric generation is approximately 589,600 kWh/year, *see Figure 2.*

The heat recovery system was originally designed to capture heat from the diesel generator cooling system, and pump it through below grade insulated arctic pipe from the power plant to the nearby school building, *refer to Figure 3 and attached site plan and schematic*. Heat exchangers isolate the generator cooling system and school hydronic system from the below grade arctic piping. Currently, the heat recovery system to the school is not holding pressure and is not operating.

Combined Heat and Power (CHP) Equipment

Power Plant/Heat Recovery Module

- Generators (#1 diesel fuel engines)
  - Cummins LTA-10 rated 203 kW
  - Cummins LTA-10 rated 168 kW
  - Allis Chalmers 6851 rated 175 kW
- Heat exchanger (HX-1), plate and frame, 350 MBH, APV SR350-T

End User(s)

- School
  - Heat exchanger (HX-2), plate and frame, 225 MBH, APV SR15
  - Circulating pump, estimated 24 gpm @ 14.5' TDH, 1/6 hp, 115V, 1 phase, Grundfos UP43-75F
  - Boilers (B-1,B-2), oil fired 1892.2 MBH, Weil McLain BL988SW, 18.8 GPH oil burner

Figure 1: Grayling Power Plant/Heat Recovery Module

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Estimated Fuel Savings

1f the heat recovery system to the school was operational, it is estimated that it would save the school approximately 6,800 gallons of heating fuel per year, *see Figure 4*.

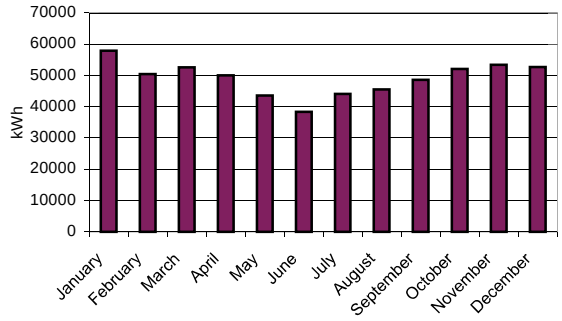

Figure 2: Electric Generation Profile

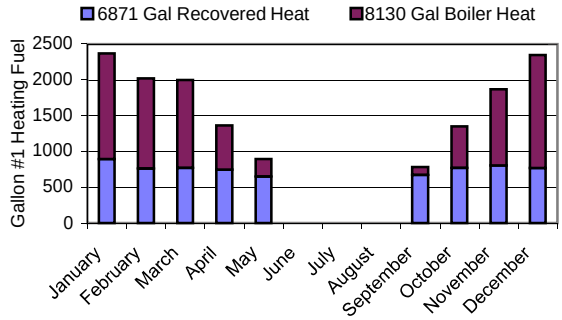

Figure 4: Thermal Energy Provided

Figure 3: School Building

Additional Considerations

Presently, the power plant does not utilize recovered heat, however, the Utility intends to modify the plant cooling system to provide heat to one existing and one new uninsulated 8'X20' storage containers, and one insulated 8'x20' crew living quarters. Due to the high heat demand of uninsulated or inadequately insulated storage containers, the estimated recovered heat available to the school will be reduced to approximately 1,100 gallons of heating fuel per year, *see Figure 5*. Should the storage containers be insulated equivalent to a minimum R13 envelope, the estimated recovered heat available to the school will be approximately 5,700 gallons of diesel fuel per year, *see Figure 6*. Due to the high cost of heating fuel in rural Alaska, careful consideration should be given to putting the heat recovery system into operation and to properly insulating the storage vans and generator cooling system piping manifold.

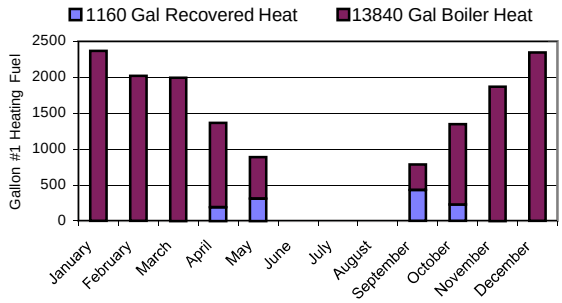

Figure 5: Expected Thermal Energy Provided

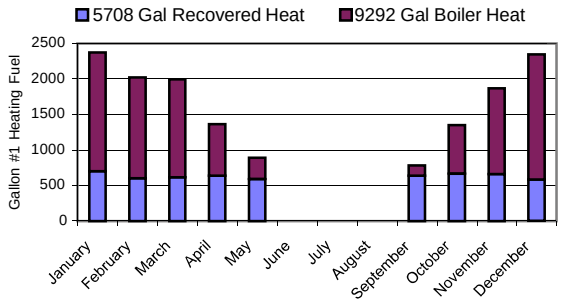

Figure 6: Potential Thermal Energy Provided