Kennecott Utah Copper

Molybdenum Autoclave Process
Combined Heat and Power Information Brief
August 2010

Context
We plan to install a new combined heat and power (CHP) system at our new molybdenum facility known as Molybdenum Autoclave Process or MAP. The purpose of the CHP unit at the MAP facility is to produce steam to meet the needs of the facility (about 60,000 pounds per hour) while efficiently co-producing 6 megawatts of electricity (which is equivalent to the electrical needs of about 6,000 average-size homes.)

The Molybdenum Autoclave Process Combined Heat and Power System
The MAP CHP system is expected to be fully constructed and operational by 4th Quarter of 2012. It will displace 6 megawatts of electricity that would otherwise be purchased from the grid and produced using more conventional processes (like coal). The MAP CHP unit has been sized to meet the steam needs of the MAP facility and co-produce approximately 86% of the electrical needs of the MAP facility for first phase of the project. The remaining electricity needs will come from grid purchase.

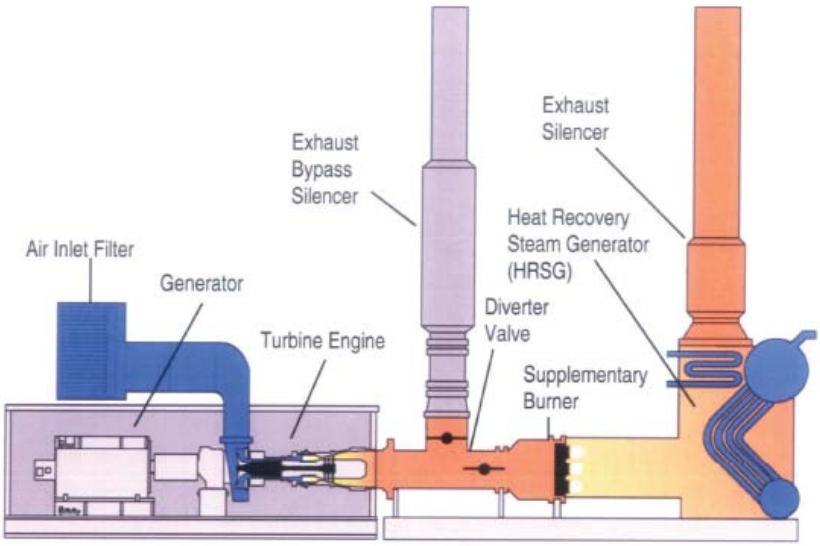
Summary of Kennecott's Alternative Electricity Production
After the MAP CHP system is installed and running, we will generate about 15% of our total electricity requirements using renewable and/or alternative technologies. Other systems where renewable and alternative electricity systems are or will be installed include the following:

- A CHP system at our copper Refinery that co-produces approximately 6 MW of electricity and 70,000 pounds per hour of steam.
- A waste-heat power generation system at our smelter that captures waste heat from the two furnaces (the flash-smelting and converting furnaces) at the smelter's acid plant (which captures 99.9% of sulfur dioxide emissions and converts it into sulfuric acid). The waste heat generates about 20 MW of electricity (about two-thirds of the smelter's electrical power demand.)
- A solar photovoltaic system at our Reverse Osmosis Plant generates enough electricity for 65% of the building's lighting needs. (System size 32.5 kilowatts.)

Overview of Combined Heat and Power Systems

According to the EPA, combined heat and power or CHP, also known as cogeneration, is an efficient, clean, and reliable approach to generating power and thermal energy from a single natural gas fuel source. By installing a CHP system designed to meet the thermal and electrical base loads of a facility, CHP can greatly increase the facility's operational efficiency and decrease energy costs. At the same time, CHP reduces the emission of greenhouse gases, which contribute to global climate change. The system uses a natural gas fired turbine-generator combined with a heat recovery steam boiler to capture heat from hot turbine exhaust for efficient production of process steam at the facility. (Source: http://www.epa.gov/chp)

Below is a simple graphic of a CHP system:



Benefits of Combined Heat and Power

Transmission losses are avoided and system reliability is improved by co-producing steam and electricity onsite where it is needed and consumed. Combined heat and power systems generate at efficiencies of 80 to 84 percent, compared to about 50 percent efficiency for traditional power plants.

Other key benefits of the combined heat and power systems include the following:

- Uses technology more environmentally friendly than traditional power options.
- Provides distributed onsite steam and power production at individual facilities.
- Meets short-term rising demand for energy with highly-efficient technologies.
- Diversifies our energy generation portfolio and reduces the risk of power outages.