



Kennecott Utah Copper Refinery

6-MW CHP System

Site Description

Kennecott Utah Copper, a subsidiary of Rio Tinto, is the second-largest copper producer in the U.S. It produces about 300,000 tons of copper cathodes per year, which currently supplies about a quarter of the country's copper. In addition, Kennecott produces 500,000 ounces of gold, 4 million ounces of silver, 30 million pounds of molybdenum, and about 1 million tons of sulfuric acid on an average annual basis.

The copper refinery is the final stage in the copper production cycle, and is located on the west side of Salt Lake County.

Reasons for CHP

A 6-megawatt (MW) combined heat and power (CHP) system installed in 2010 produces more than half of the refinery's total electricity needs. Waste heat from the CHP is recycled to produce process steam.

CHP is a good technical and economic fit for the refinery because of its steam demand, and it also fits into Kennecott's larger movement towards improving energy efficiency throughout operations.

Quick Facts

LOCATION: Salt Lake County, Utah

MARKET SECTOR: Primary metals

CHP IN OPERATION SINCE: 2010

EQUIPMENT: Gas compressor, Solar Taurus 60 turbine generator, HRSG, supplemental burner

ELECTRIC NAMEPLATE CAPACITY: 7.6 MW

AVERAGE ELECTRIC OUTPUT: 6 MW

USE OF THERMAL ENERGY: 70,000 lbs/hour of 50-psi process steam

PRIMARY FUEL: Natural gas (300 psi)

TOTAL EFFICIENCY: 80-82%

TOTAL PROJECT COST: \$10 million

ENVIRONMENTAL BENEFITS: Displaces 6 MW of electricity otherwise purchased from the coal-powered grid, plus energy otherwise required to make process steam. NO_x emissions reduced by 90%, SO₂ emissions by nearly 99%, and annual CO₂ emissions by 36,000 tons compared to separate heat and power systems.



CHP provides the Kennecott Utah Copper refinery with a clean source of power, and the waste heat is recycled to produce steam for the refinery's copper chemical baths – part of the process to turn copper anodes into copper cathodes. PHOTO COURTESY OF KENNECOTT UTAH COPPER

CHP System Equipment & Configuration

Natural gas is compressed to 300 psi and then fed into a Solar Taurus 60 turbine generator. Exhaust heat is recovered in a heat recovery steam generator (HRSG). The HRSG together with a supplemental burner produces 70,000 lbs/hour of 50-psi process steam used in the chemical baths that turn copper anodes in cathodes.

CHP Operation

The CHP system runs according to the refinery's steam needs, which is determined by the amount of copper being processed at the time. The CHP's output by the numbers:

- Electrical output is between 5.6 and 7.6 MW (the nameplate capacity).
- This covers approximately 50–60% percent of the refinery's electric requirements.
- It is scheduled for constant run-time except for periods of maintenance, with reliability expected at 96–97%.
- Total efficiency is estimated at 80–82%.



Finished copper cathodes from the refinery.

PHOTO COURTESY OF KENNECOTT UTAH COPPER

Environmental Stewardship

Kennecott sees CHP as a main component of its strategy for environmental stewardship. Since nearly all of Kennecott's activities (mining, milling, refining, smelting and ancillary operations such as railways and power stations) are energy intensive, all existing operations have targets for increasing energy efficiency, reducing energy consumption, and reducing greenhouse gas emissions.

By displacing 6 MW of electricity otherwise purchased from the mostly-coal-fueled electric grid, and by recycling the CHP waste heat to produce steam, the CHP system cuts annual CO₂ emissions by 36,000 tons (the equivalent of more than 6,000 passenger vehicles). It also reduces NO_x emissions by 90% and SO₂ emissions by nearly 99% compared to the emissions from an equivalent separate heat and power system.

Consistent with our sustainable development principles, we are committed to continual improvement in how we manage, generate and use energy. This includes using technologies like CHP that contribute to greenhouse gas reductions and use energy more efficiently.

*– Nicol Gagstetter, Principal Advisor on Sustainable Development and HSE Assurance
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For More Information

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