

## Another 125 Tons of Waste Heat Powered Refrigeration

A vegetable processing plant in Santa Maria California is now benefitting from 125 tons of refrigeration powered by waste heat instead of electricity. A Thermochiller converts the waste heat to 10°F refrigeration. The waste heat is from a low emission gas-fired 633 kW reciprocating Jenbacher engine cogeneration package, in the form of hot water between 175°F and 221°F. The 125 ton Thermochiller ammonia absorption refrigeration plant ("TC125") delivers a Coefficient of Performance of 0.63. Both the exhaust heat and jacket heat are converted to 10°F refrigeration at the equivalent of 63% efficiency. The TC125 requires 10 kW for pumps and 8 kW for the cooling tower fan.

The TC125 is a low charge system, containing less than four pounds of ammonia per ton of capacity. The ammonia is diluted with four pounds of water per ton, rendering it safer than conventional anhydrous ammonia. Between the water dilution and the absence of any oil in the ammonia, the range of flammability is narrowed to inconsequential. The less than 500 lb. anhydrous ammonia charge excluded the system from California's Risk Management Plan requirements. Ammonia is a natural refrigerant and has zero Global Warming Potential and zero Ozone Depletion Potential.

The TC125 has a compact footprint of seven feet by eleven feet. The cooling tower is mounted above it to save valuable plot space. The TC125 operates completely automatically, adjusting to any engine loading. When the engine starts and stops, the TC125 cycles between Run and Standby. It accommodates wide variations in chill glycol flowrates and temperatures. It is remotely monitored via the internet.

Industrial refrigeration is typically a 24/7 load, and highly energy intensive. By converting engine waste heat to refrigeration, the Thermochiller brings added value to cogeneration or CHP projects. The TC125 is also sustainable, as it is relatively easy to back up with a different source of heat, such as solar thermal or biomass-fired heat.

The Thermochiller is provided by Energy Concepts Company of Annapolis, Maryland. The overall CHP project was developed by CLP Energy LLC of Smithtown, NY and Monterey CA. Project Engineering and Management was by Axiom Engineers of Monterey, California. The high combined electrical and thermal efficiency of the cogeneration system qualifies it for a State of California self-generation incentive (SGIP).

