

## **WASTE HEAT POWERED THERMOCHILLER SAVES ELECTRICITY WHILE PROVIDING ADDED REFRIGERATION CAPACITY**

Desert Power Inc of Palm Desert, CA and Energy Concepts Company, LLC of Annapolis, MD jointly announce the commissioning of a new distributed energy project. 830 kW of electrical energy is being provided by two natural gas fired reciprocating engines, and the exhaust heat and jacket heat is further used to provide 160 tons of 26°F refrigeration to a cold storage building.

The engines and waste heat powered chiller were installed at Fisher Ranch in Blythe, California. This facility processes vegetables grown on 12,000 acres in the Colorado River Valley. The warm climate and irrigation extend the growing season year round, so the facility is in nearly continuous use. A cold storage warehouse with a footprint of approximately one-half acre is maintained at 34°F most of the year, including during 120°F summer days. The warehouse is chilled by 32°F chilled water from two 250-ton Baudollet coils plus associated ammonia compressors.



Fisher Ranch Melon Warehouse, Blythe, CA

The distributed energy installation is comprised of two 415 kW engines plus a 160-ton Thermochiller and 160-ton Baudollet coil. Chill water cascading over the coil is chilled from 34°F to 32°F by ammonia refrigerant evaporating at 26°F. About half of the refrigeration comes from the 750°F exhaust heat, and the remainder from the 220°F jacket water heat.

The 160 tons of waste heat powered refrigeration not only saves electricity, but it also provides important added refrigeration capacity. That added capacity helps debottleneck the plant on the hottest days, and can pick up the entire chilling load on cooler days. With the added capacity, an antiquated and inefficient natural gas engine-driven ammonia compressor is no longer required to operate.

The 160-ton Thermochiller has a footprint of 8 feet by 8 feet, and overall height of 10 feet. This small size facilitated both transport and siting at the plant. The engines were installed under the California Self Generation Incentive Program. The overall system installed cost was about \$1,600 per kW, before the incentive. This includes the Thermochiller and the chilled water coil. The refrigeration production effectively increases the efficiency of this installation by about 20%. Accounting for the electricity displaced by the refrigeration, the effective efficiency of converting natural gas to electricity is over 42%, making this the highest performing “refrigeration only” distributed energy plant on record. The installed cost is below that of more traditional lower efficiency DE plants, which do not use all the waste heat.



TC 160 has an 8 x 8 footprint

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415 kW Engine



Baudelot Coils



TC160 and one Heat Recovery Vapor Generator

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