

## **110 TON THERMOSORBER GIVES POULTRY PROCESSING PLANT \$100K PER YEAR UTILITY SAVINGS**

Energy Concepts Co. announces the commencement of a full-scale demonstration of a new energy-conserving water-heating and chilling technology. A “ThermoSorber” has been installed at a poultry processing plant in central California. This technology provides hot water and chilled water at roughly double the energy efficiency and half the cost of any conventional technology. The \$180K installation provides approximately \$100K per year savings in natural gas and electric utilities.

The sequence of preparing poultry for market is regulated by the U.S. Department of Agriculture, and includes a scalding step using 140°F hot water, followed in short order by chilling with 33°F chilled water. The plant which is hosting this demonstration processes 50,000 birds per hour for 15 hours each day. This requires a continuous flow of at least 190 gallons per minute (gpm) hot water and 190 gpm chilled water. The hot water is produced from 80-psig steam from natural gas-fired boilers, and the chilled water is produced from an ammonia vapor compression refrigeration plant powered by electricity. At current utility rates (\$10 gas and 9¢ electric), the plant spends \$420K per year on natural gas to make the hot water, and \$100K per year on electricity for the refrigeration to make the chilled water.

The ThermoSorber produces both chilled water and heat pumped hot water from a single heat source. It is powered by the same steam which otherwise would make the hot water, but with two important differences. First, instead of the 98% efficiency of a steam hot water heater, the ThermoSorber achieves 156% efficiency in converting steam to hot water, due to the heat pumping action. Second, the chilled water produced by the ThermoSorber is energy-free.

A ThermoSorber sized to produce the full 190 gpm of hot and chilled water for this host plant would save \$158K per year in natural gas and \$88K per year in electric, or a combined savings of \$246K per year, relative to current practice.

In view of the high projected benefit and reasonable cost, the Plant Manager agreed to host a demonstration project, and gave approval to proceed in mid-October, 2005. Energy Concepts Company installed an available demonstration prototype in January 2006. The supplied unit is capable of heating and chilling approximately 40% of the plant needs, i.e. approximately 75 gpm each of hot and chilled water.



This demonstration unit is designed to supply 75-tons of chilling at the full temperature spread necessary for poultry processing. With a lesser temperature spread, made possible when only “pre-chilling” and “pre-heating” are required, and the existing equipment completes the chilling and heating, then the design capacity increases to 100-tons chilling. Initial operation has been at about 82% of design capacity, and

measures have been identified which should increase capacity to 100%. Starting with the 69°F city water available at this site, 100 gpm is currently pre-chilled to 48°F by the ThermoSorber, and 110 gpm is pre-heated to 121°F.

Figure one is a photograph of this installation. This ThermoSorber weighs 5100 lbs. and has a 5ft. x 5ft. footprint. The ThermoSorber can be powered by any heat source above about 270°F. Other possible heat sources besides steam are: stack exhaust from boilers and furnaces; engine exhaust; and direct firing from natural gas, LPG, fuel oil, or biogas. Note that the ThermoSorber is more than twice as efficient as a boiler exhaust economizer in making use of the exhaust.

The ThermoSorber is a heat-activated heat pump which is based upon an absorption refrigeration cycle which uses ammonia-water as the working fluid. It was originally developed through the laboratory prototype stage with cost share support from the U.S. Department of Energy. The first field demonstration, at 10-ton scale, was financed by the California Energy Commission (CEC). Pacific Gas and Electric Company has committed to paying an incentive for this full-scale demonstration proportional to the actually realized savings in natural gas. The CEC plans to conduct a program of data collection and analysis in order to document the extended performance of this installation.

The ThermoSorber applies to any facility which needs both hot water and chilling. The heat output can also be applied to space heating or to drying. Food industry applications include poultry, meat, and fish processing; dairy processing; beverages; and greenhouses. Other applications are found at hotels, hospitals, laundries, and sports complexes.

Energy Concepts Company estimates that approximately half of all refrigeration and half of all water heating could be supplied energy-free by using the ThermoSorber and making use of "opportunity heat" available under current water heating practice. This project is intended to provide convincing proof that new energy efficiency measures are becoming available which markedly improve the bottom line. There are energy-saving opportunities throughout industry and commerce that will improve profitability and benefit both the installation site and the planet.

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