FREE COOLING

Project Description

The Texas Instruments (TI) facility in Attleboro, Massachusetts uses "free" cooling techniques to substantially reduce energy costs. Typical vapor compression cycle refrigeration systems are rated buy their coefficient of performance (COP) which is the ratio of cooling energy provided divided by the amount of energy used to run the refrigeration plant with typical values between 4 and 5. The 1300-ton cooling load in TI's buildings 11 and 12 represents about 4.57 MW of cooling load, which is effectively provided with about 1.1 MW of electrical consumption for a COP of 4.16. However there are periods of the year where (in the case of TI) cooling towers can be utilized to provide nearly free cooling (COP >50) - where the only energy consumption is from the use of re-circulating pumps and cooling tower fans.

Figure 1: Cooling Tower VFD Panel

The TI chilled water/thermal ice storage system is by-passed during seasonal periods where ambient temperatures are generally above freezing 32F and below 55F wet bulb temperature. The secondary cooling source (i.e. cooling tower) acts as the primary cooling source under these conditions. A plate and frame heat exchanger within the building is then used to provide heat transfer from the cooling tower loop to the internal cooling loop. This system effectively provides nearly free cooling using the cooling towers during cold weather without the requirement to run a chiller. The chiller is essentially shut off during this period, thereby saving energy and also allowing scheduled preventative maintenance to take place. The chiller can be shut down from 1 to as many as 4 months a year (from late Fall until early spring) the payback of the plate heat exchanger system varies based on its use in the system from six months and two years.

Project Energy and Cost Savings

Free cooling saves a projected $121,000 in energy costs annually. From 1990 – 2001, free cooling has saved TI an estimated $284,000.

Project Environmental Benefits

Utilization of free cooling techniques at the TI facility avoid approximately 0.7 tons per year of NOx, 2.4 tons per year of SO2, 586 tons per year of CO2 and an estimated 0.003 lbs of Mercury emissions from avoided electric generation.

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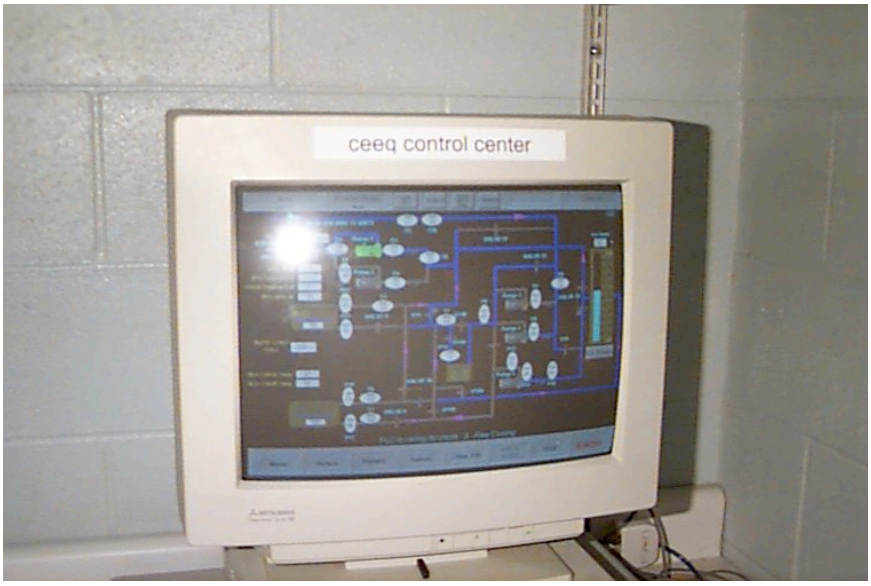

Free Cooling Project

Total Capital Costs	**$**
MECo Rebates	**$**
Net Cost to TI	**$**
Demand Savings	**MW**
Cost Savings	**$year**
Emissions Avoided	
NOx	**~ tons/year**
SO_2	**~ tons/year**
CO_2	**~ tons/year**
Mercury	**~ lbs/year**