Energy Efficiency Case Study

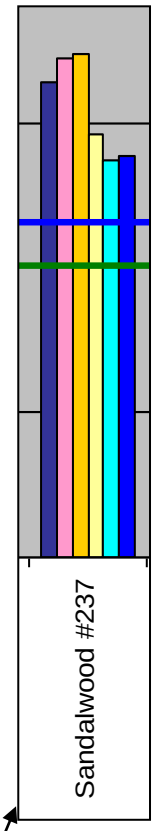
Facility: Public Education Facility

A grade 9 through 12 high school in North Florida

Problem: Gaining more energy efficiency and protecting the environment

The School board was tasked with saving energy by looking at existing older HVAC & Chiller systems for opportunities to gain energy and cost savings. This school had two 400Ton Chillers with R11 refrigerant(a CFC), Y-delta starters with constant speed drive system.

The Chilled plant configuration was a primary/secondary loop design. Frequently with this design, warm secondary return water(approx 54 degrees F) was mixing with primary chilled water at 44 degrees and pumped by secondary pumps to the school cooling load at elevated mixed temperatures of approximately 48 degrees. A loss of capacity to dehumidify was the main consequence of this condition and would precipitate the start and continued operation of a second 400Ton Chiller and its related auxiliary equipment even though the first chiller was not yet operational at 100% capacity. This resulted in a very inefficient operation of multiple chillers at loads under 50% capacity. A very inefficient condition.



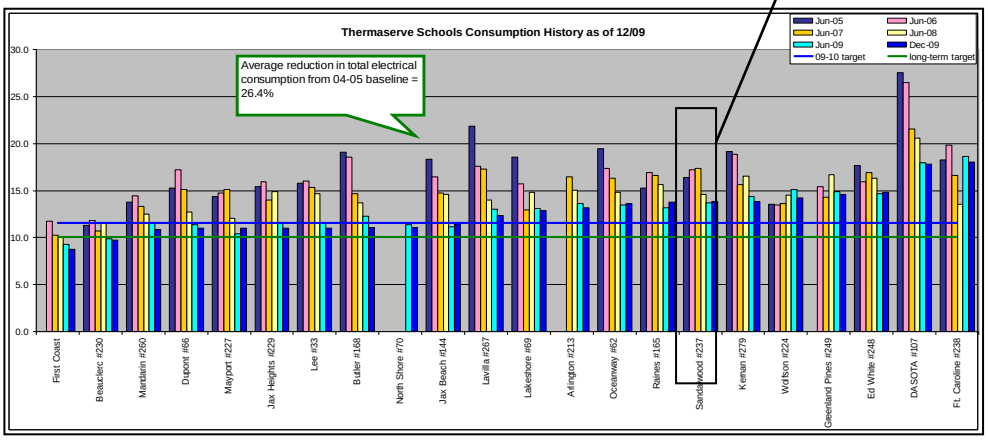
Solution: Changing the design and replacing one chiller

We converted the primary/secondary loop design to a variable primary design by removing the primary chilled water pumps, and installing a minimum flow chilled water by-pass to ensure the manufacturers recommended minimum flow to operate chillers. This prevented the necessity to start the second chiller before the first chiller was operating at 100% capacity. In fact since we made this retrofit conversion, there hasn't been a need to run the second chiller and it's related auxiliary equipment.

As part of this energy retrofit, we replaced one chiller with a Variable Speed Drive (VSD) driven 400-ton chiller using R-134A refrigerant. We also adjusted the Variable Frequency Drives (VFD's) to control chilled water pumping volume, installed VFD's on the cooling tower fans and set condenser water control point at 55 degrees with a wet-bulb reset to conserve tower fan energy. The 55 degrees condenser water control point, when conditions allowed, permitted the new variable speed chiller we installed to operate at efficiently as low as .33Kw Ton.

Payback: 20% Energy Reduction

Not only was the CFC refrigerant replaced, protecting the environment, and a better solution to removing more moisture out of the air, but a 20% energy savings was gained.



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