Thermal Energy Storage

Thermal Energy Storage

The University added a Thermal Energy Storage tank to the Campus Chilled Water System located on South Oak Street. This 6.5 million gallon tank can provide 50,000 ton-hours of cooling which allows an additional 8,000 tons of peak cooling for the central system and eliminates the need to install additional infrastructure.

The central system arrangement allows optimizing chiller sizing, shared "N+1" redundancy, higher reliability, increased operating efficiency, and reduced production assets through system load diversity. It also saves on required mechanical room space and cooling tower installations in central campus buildings.

Improving the load factor is basically achieved by reducing the (night time) off-peak loads by programming set-backs and scheduling building systems off during unoccupied hours. This releases additional off-peak chiller capacity to assist in charging the tank, leveraging further energy conservation work (including Retro-commissioning) and converting additional building cooling to CCWS.

Central Chilled Water System

Production Plants:
- 5 Plants - VSD Distribution
- 21 Chillers - 37,500 tons

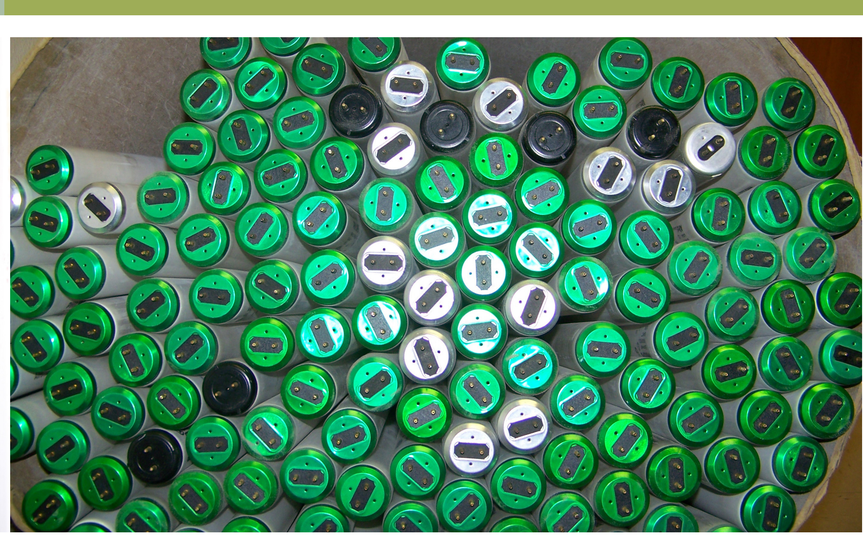
Distribution Piping (Direct Buried)
- Two Pipe (Supply / Return)
- Up to 54 inch diameter pipe
- ~ 5 miles main loop

Building Loads
- 90 Main Campus Buildings
- 30,000 tons (diversified peak)
- Variable Flow (no pumps)
- Load Factor .87 (2010)

Thermal Storage Enhancement
- Insulated Steel Tank (Above Ground)
- 6.5 million gallon (Nominal)
- Stratified Chilled Water
- 50,000 ton hours (@13 F TD)
- VFD pumping (3 @ 600 HP)
- 8.5 MW Peak Demand Reduction

How Does It Work?

The new facility remains full of chilled water (stratified) that is "charged" by continuing to operate existing chillers at night as the building loads subside and allowing the excess chilled water to flow into the bottom of the tank. Warm water is simultaneously drawn off the top of the tank through new pumps and returned to the chiller plants for cooling. To provide cooling to the buildings (during the afternoon peak cooling periods) the cold supply water will be pumped from the bottom of the tank to the buildings (with warm water returned to the top). This system also allows us to produce the additional chilled water capacity at night to take advantage of our ability to purchase electricity during the low cost off-peak hours through Real Time Pricing (RTP).



ILLINOIS
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN