Xcel Energy Demand Side Management
Rebate Program Idea – Thermal Storage Incentive
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Thermal Storage is a battery that stores energy for comfort cooling in the form of ice, or Btu's of energy storage. A chiller is used to create and store the energy by making ice in the tanks at night. The tank, filled with ordinary tap water, has low temperature glycol solution pumped through nearly 3 miles of tubing that sits in the water. This turns the water that is in contact with the tubing into ice by removing heat from the water. The following day the process is reversed; the tanks act as a heat exchanger by taking warm return fluid and supplying cool fluid to the building. In other words, they perform the same function as a chiller without running the compressor(s). They act just like a conventional battery in storing energy but are limited to chilled water applications which are often the largest load in a commercial building; and the thermal storage medium (water) will not degrade over time or require treatment of hazardous waste.

Storage incentives are typically based on kW shifted, or kW avoided by not meeting cooling loads with a chiller. Depending on the site specifics, a single tank might shift +/- 20 tons. Then we must examine the efficiency of the chiller that was avoided by using storage. If considering a water-cooled chiller & cooling tower, this might relate to about 15 kW shifted per tank. For air cooled chillers this might covert to 20 kW or more shifted per tank.

Depending on the site specifics tanks might sell for $17K per tank, if we roughly double for installed cost this might lead to an installed cost of $35K per tank. If a tank shifts 15-20 kW then this range is +/- $2,000 per kW installed. Some sites will require additional monies spent on controls, heat exchangers or siting the tanks. And some of this additional cost can be avoided by downsizing chiller capacity since we are meeting cooling load with storage. As a rule, thermal storage installations are 25% to 75% more expensive than conventional chillers depending on the chiller and tank sizing.

Obviously, a higher incentive level will move the market more quickly. At $750 per kW shifted there would be interest, at $1,000 per kW shifted there would likely be significant activity. And standard chiller options are already incentivized with energy efficiency rebates, so a DSM incentive needs to be more attractive. California had a program (PLS program) at $875 per kW shifted. It was unsuccessful because the program was too complicated – engineers and designers had little incentive to spend the extra time required to meet the requirements of the program when they could install conventional equipment and easily apply for energy efficiency incentives.

Annual savings are typically +/- 20% of the total electrical bill. Once again, this will depend on the amount of storage installed, building type, electric rates, etc. Cecil Peel, the Sarasota Schools Manager for the Sarasota School District cited a 25% savings in electrical cost. See more detailed information regarding testimonials and articles about installations on our website at:

http://www.calmac.com/calmac-thermal-storage--testimonials
http://www.calmac.com/featured-energy-storage-installations

Florida Power & Light (FPL) has had a successful (and simple) program in operation since 1991. There are approximately 400 storage installations shifting an average of 250 kW/site. FPL contact:

- Richard Brooks, (239)691-7746, richard.brooks@fpl.com
- Other utility contacts can be provided for TECO and Duke, Florida.