In major agricultural center, savings is the latest growth crop following TES retrofit

San Joaquin County is situated in central California and is probably best known as the nation's 8th largest producer of agricultural products. Stockton, the county seat, is home to several county office buildings, including the Canlis Administrative Building. "When it was built in the 1970s, this 89,000-sq-ft building was originally designed to be a seven-story structure," said Craig Ogata, San Joaquin County's director of facilities management.

"However, only three stories and full basement were initially built, leaving three-foot steel column extensions exposed to allow for the eventual completion. Plans for these additional floors were scrapped because structural building codes were subsequently made more stringent due to earthquake potential in the region, Ogata added.

In 1997, David LaLonde took on the challenge of serving as the county's energy manager. "My job is to manage the county's use of energy," he said. "That not only means working to use less energy and using it more efficiently, it also means doing everything possible to lower the cost of that energy."

CHILLER REPLACEMENT

In 2001, the nearly 25-year-old water cooled chiller in the Canlis building began showing signs of age. "These signs included frequent breakdowns, longer downtimes, and ever-more-expensive replacement parts (e.g., $700 oil filters)," according to Ogata. LaLonde called on Taylor Systems Engineering, Inc. (TSE) who, after reviewing the program parameters, recommended that San Joaquin County conduct an engineering analysis.

"When the results came in, we were not surprised," said Wayne Watts, P.E., a senior engineer at TSE. "The analysis recommended an E-PAK Trane chiller coupled with ice thermal energy storage to take advantage of off-peak cooling (OPC) using Calmac IceBank™.

LaLonde presented the concept to county officials who agreed to consider this technology as a pilot program. He and Ogata based their argument on the fact that a good way of lowering the overall cost of energy is to use energy that costs less. "And," they noted, "night time energy is low-cost energy." The county selected an OPC system made by Calmac Manufacturing.

'TO SHIFT IS TO SAVE'

"The Courthouse Annex (Canlis Bldg) is an ideal candidate for off-peak cooling," said Watts, "because the building is primarily used during weekday, daytime hours of 7 a.m. to 5 p.m. This allows the ice to form at night and over weekends to be used to cool the building during the day's hottest time."

While a chiller retrofit helped saved money in the Canlis Administrative Building (Stockton, CA), San Joaquin County energy manager David LaLonde estimates that the new ice TES system saves an additional $3,000 during an average summer month.

Using the 3-ft column extensions (remnants of unrealized expansion plans) as anchors, girders were connected to create a suspended deck framework to support both the new E-Pak chiller and six Calmac IceBank™ thermal storage tanks. Installation was facilitated even further since the building's original seven-story design called for two elevator shafts of which only one was currently being used. The empty shaft served as a convenient means of running power from the basement to the new E-PAK-Trane Chiller on the roof.

Ogata said, "A decoupling plate-and-frame heat exchanger is used to 'isolate' the building from the ice side of the system. That is, the glycol liquid that flows from the chiller to the tanks also flows through the heat exchanger. In the heat exchanger, the chilled glycol now chills ordinary water." That chilled water is what actually circulates past fans that blow the resultant cold air into the building. "The benefit to this method is that water, being less viscous than glycol, requires less energy for its circulation."

"The installation operates as a partial storage system during the summer months. However, the six IceBank™ tanks provide sufficient cooling as a full storage system during the rest of the year," added Watts.

"The installation process went quite smoothly, all things considered," recalled LaLonde. "Our antiquated chiller broke down just as its replacement was on its way to the site. We were forced to set up a rented chiller outdoors to tide us over until the system became fully operational."

LaLonde is in the process of calculating the actual amount of energy savings being realized by the county in having adopted OPC technology. He indicated that preliminary figures are encouraging. Calculated savings during an average summer month is approximately $3,000 above using the new chillers alone. During July 2003, being the hottest single month since prior to 1996, the new ice system saved $10,000 compared to the old chiller system, which included oversized pumps for the projected full seven-story building.

"I'm confident we're lowering the cost of our energy," stated Ogata. "The cost of on-peak electricity is so much greater than off-peak."