

Staying Cool with Copper

*New HVAC design uses substantial amount of copper
for shifting electricity loads during peak-hours*

When the temperature outside soars above 90 degrees, walking into a building that's well air-conditioned is a welcome respite. This instant rejuvenation comes with a cost, paid in demand on the electrical supply. In warmer climates, the constant demand for energy during a hot summer's day require additional "peaking power plants," to kick in strictly to support the load when air-conditioning demand is at its highest. These plants are less efficient than base power plants, and expensive to build and operate.

Ice Energy in Windsor, Colorado has come up with a solution to keep offices cool by tapping into the electrical grid when it's used the least, without having to build additional "peaker plants" to support it.

Ice Energy, a leading provider of intelligent energy storage solutions for the utility industry, first introduced the Ice Bear® Ice Storage Air-Conditioner in 2004. The thought process behind this new technology is simple: use electricity at night to store energy in the form of ice, by making the ice when electricity is less expensive and more abundant, and use that stored energy during the day to provide cooling with less electrical input during times of peak demand.

The actual system is about the size of a regular commercial air-conditioning unit, and it attaches to the pre-existing unit. The Ice Bear system functions like a regular AC unit, but uses its onboard compressor, expansion valve, and large copper cooling coils containing 250 – 400 pounds of copper, to freeze 450 gallons of water into ice overnight. During the day and times of peak demand, the stored ice is used to cool refrigerant within the Ice Bear and transfer it to the condenser coil in the companion air-conditioning unit rather than running the unit's compressor. The cold refrigerant is routed through the Ice Bear and the existing AC unit by a small pump, rather than a compressor, cutting down on electricity usage for cooling from 6 kilowatts to 100 watts (similar to the electricity load of a light bulb).

"The Ice Bear can be considered a thermal energy storage system and a load shifting device," said Ice Energy's director of engineering and manufacturing, Ed Giordano. "Each Ice Bear can cool about 4,000 square feet, and its application focuses on public and commercial buildings."

This new technology is now being used at healthcare facilities where proper cooling ventilation is critical for patients and its visitors. Glendale Optometric Center and the Glendale Cancer Treatment Center recently installed the systems on their rooftops.

“Utilities benefit because they can postpone building new peaker plants, and society benefits because producing energy at night is cleaner and less expensive,” Giordano said. “It’s embraced as a green technology since installing one Ice Bear is the equivalent to taking one car, and its exhaust, off the road.”

Giordano said copper is used because it’s durable, easy to use, and a good thermal conductor.

“We use copper for all the reasons you’d expect: good ductility to create the forms we need, excellent heat transfer capability, and because traditionally it’s the preferred metal used by the HVAC industry. Furthermore, the copper is in contact with water and dissolves atmospheric gases throughout its entire life, so the application demands the fine environmental tolerance offered by copper.”

Currently, Southern California is where a majority of these systems have been installed. Ice Energy is completing the first year of a 5-year program with the Southern California Public Power Authority (SCPPA) to install as many as 7,000 units. The company estimates that the program, once completed, will shift 64 gigawatt-hours each year of on-peak electrical consumption to off-peak.

For more information on Ice Bears visit: www.ice-energy.com

For more information on copper in HVAC visit: www.copper.org