



Chill out with ice storage systems

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As the built environment continues to search for the most sustainable and energy efficient solutions, mechanical equipment provides a great opportunity for development. One system that is gaining traction is the ice storage systems. Ice storage is the method of using large quantities of ice for thermal storage, also known as thermal energy storage (TES). These systems are breaking into the mainstream as more owners are realizing their value. The DOE estimates that air conditioning systems contribute up to 9% of buildings energy consumption in all U.S. office and professional buildings.

The technology works by using electricity to create ice in the night. Most systems use chillers to cool an antifreeze solution, typically a water-glycol solution, to about 25 degrees Fahrenheit. This solution will then pass through a spiral tube heat exchanger in the insulated tanks of water and gradually ice is formed. The entire process takes between 6-10 hours to fully freeze the tanks to provide cooling for the next day. Now this ice is used to cool warm refrigerant that passes through the same coils, instead of using the A/C unit's compressor. As with standard air conditioning systems, the fluid can be used to either directly cool the building or cools air distributed through a ducted system. The refrigerant slowly melts the ice during the daytime and by evening the freezing process will start over again.

A properly designed system can reduce the chiller capacity by 50%. Additional financial savings can be seen by switching from consuming energy at the higher priced peak rates during the day to consuming energy at the lower off-peak rates at night. Consuming energy from the grid during off peak hours has an environmental benefit as well. This is particularly critical during the very hot summer days when significant strain is placed on the utilities to provide the grid with enough power to meet the demand. Often on days like this, more inefficient and higher polluting power plants are relied on to supply sufficient power. By reallocating the demand to the night time, it shifts the utilities demand to a more sustainable power consumption ratio. On-site renewable energy, such as solar or wind power, can work in tandem with an ice storage system.

Currently ice storage systems are used most frequently in large commercial buildings and campus settings, although the residential market is beginning to be explored. These systems are in various green buildings throughout New York City, and the interest in the market is continually growing. When designing a building, ice storage systems aren't just for the sustainability minded, they are a solution for anyone interested in both energy and financial savings (and this should be appealing to everyone!)

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