HSC Hartford Steam
Building Comfort You Can Rely On

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in the Loop

A Cool Proposition: New chillers bring added benefits

It was chilly last November in Hartford, especially at Hartford Steam. That's because the Hartford Steam Company started operation of two new high-efficiency electric chillers to provide chilled water for the company's district cooling system.

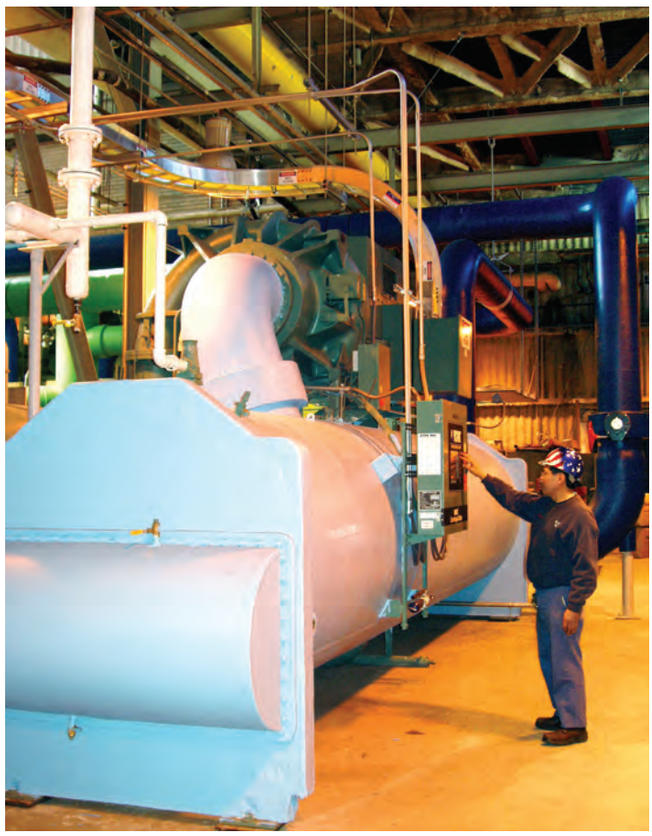
The two variable-speed-driven 2,500-ton York chillers have proved an excellent addition to the main plant, increasing system efficiency, lowering fuel costs and even reducing emissions. The new chillers replaced a 4,500-ton steam-driven chiller now being used as backup.

"This was an excellent decision by Hartford Steam," says consulting engineer Ishai Oliker of Joseph Technology. "We started looking at this back in 2005, and it began making more and more sense. Hartford Steam was focused on making the district energy system even more cost-effective and energy-efficient, which ultimately benefits customers. Extensive analysis proved these chillers would be a good investment."

After modeling and analysis by Oliker, the local firm of Legnos & Cramer provided system design and specification for the chiller installation. "Diversification of equipment within a large energy center is critical for the overall efficiency of a district system," says Rob Ricard, President of Legnos & Cramer. The new chillers help achieve just that.

Construction began in spring 2006, and the commissioning went smoothly in late 2006, with little time needed to get everything up and running. "During startup, the chillers significantly exceeded design expectations in both energy consumption and output," observes Jim Carmellini, Executive Sales Engineer at York/JCI. "In 18 years of selling chillers, I've never seen anything more impressive."

Oliker concurs that the project ran smoothly. "Hartford Steam has a dedicated, experienced team of people on the job. The technicians are able to get new chillers running quickly because they're so knowledgeable. And I can't say enough about Derek Rudd, Mike Croyle and Bruce Linder. It's a good combination, as they are always looking to introduce more efficient technologies to stay ahead of the game."



Hartford Steam's Gustavo "Gus" Acuna, plant technician, checks out the readings on one of the new chillers installed last fall in the main plant.

The company has a history of keeping its eyes on the future. In the late 1970s, Hartford Steam converted an old oil-storage tank to a 2.1 million-gallon chilled-water storage tank – the world's first in a commercial district energy system. The new electric chillers are a perfect complement for the tank, as they're able to cool the tank's water at night when the electric rates are lower. Then the chilled water is distributed out through the piping system for customers' use during the day.

Hartford Steam also has long used river water for cooling customer buildings during the winter and for chiller condensers instead of using cooling towers. This means the chillers can run at high electric efficiencies throughout the year, about 0.5 and 0.6 kW/ton in the summer and even lower during the winter when the river water is colder.

"The new units are working extremely well," says Derek Rudd, General Manager of Hartford Steam. "These electric chillers will achieve full-load run hours that stand-alone systems can never achieve, allowing us to minimize the impact of electric demand rates. We focus on optimizing the benefits of a large thermal system in ways that individual buildings can't. This provides a greater benefit to our customers. We're also evaluating adding a small cogeneration facility to determine if we can further reduce operational costs. We have cogeneration experience, so that makes it even more attractive for us. It may be down the road a bit, but it's an important concept to evaluate in light of the current energy situation. It's up to us to make the best-possible decisions on behalf of our customers."

The Intelligent Use of Energy: Outside Air and Ventilation

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Editor's Note: *This is the second in a series of articles on intelligent energy use in buildings.*

Outside air is the most expensive air that building owners and managers can use at their facilities. It is expensive because it is rarely the temperature that you want it to be; therefore, you must apply heating or cooling energy to make it the correct temperature. Of course when it is at the right temperature, it is the least expensive air you can use because you do *not* have to add energy to change its temperature.

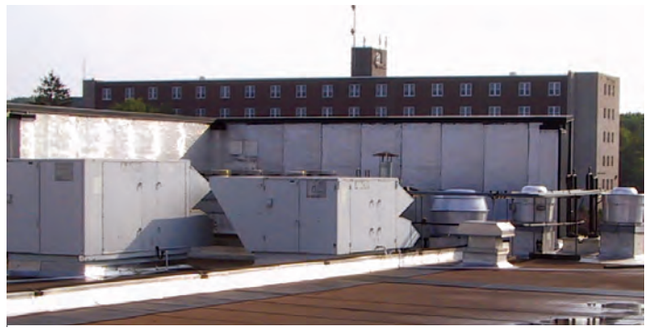
Yet no matter the time of year, outside air is very desirable in terms of indoor air quality, so it is important to optimize its use. The trick for using energy intelligently here is to know when to maximize, or minimize, the volume of outside air based on how close it is to the temperature that you need.

So what temperature do you need? The easiest answer: whatever the discharge air temperature (DAT) is from your air-handling unit. For example, if your DAT is 55 degrees F, then whenever the outside air is 55 F or less, you can use it for 'free' cooling – the classic 'economizer cycle.' Even if the outside air temperature is below 55 F, it still can be used because in most cases you can blend very cold outside air with the warm +/- 78 F return air to achieve the required DAT.

The trick for using energy intelligently here is to know when to maximize, or minimize, the volume of outside air based on how close it is to the temperature that you need.

But what about heating? It is very unlikely that outside air temperature can ever provide free heating. So where else can you find free heat? In your exhaust air. The air that is being exhausted from your building is the temperature of your return air – typically the upper 70s F. If outside air is colder than the exhaust, then you have a Delta T that allows you to minimize the energy lost with the exhaust. With a heat exchanger of various possible designs, the cold outside air can be preheated by the energy in the exhaust.

This is an important point: Every cubic foot of exhaust air will be replaced with outside air. You can only exhaust the volume of air that you return to the building. One way or another, the exhaust volume will get back into your building and become a load on your heating or cooling equipment. If you completely seal up a room and start an exhaust fan, the fan will eventually stop exhausting air.



Exhaust fans are often small but large in number. Other exhaust fans are built into the remote terminal unit. All affect your energy usage.

So pay attention to your exhausts. The only way that you can beat the laws of thermodynamics is by refusing to play. Shut off your exhaust fans when not needed. Reduce your exhaust volumes to the lowest possible volume unless the outside air is the right temperature. Whenever possible, recycle the energy that you paid for in the exhaust stream and use it to precondition the makeup air.

Time to Get Ready for Summer

To ensure you optimize your use of Hartford Steam's district cooling service, we recommend you check out our chilled-water startup tips at **www.hartfordsteam.com/seasonal.htm**. Also find out how to keep your building cool by pre-cooling it on summer's hottest days. Just go to **www.hartfordsteam.com/pre-cool.htm**. If you have questions, please contact Diane Wojcik at (860) 548-7357 or dianewojcik@hartfordsteam.com. She'll be glad to help.

Did you know…

nearly every college and university campus in the U.S. has a district energy system? Among the nationwide notables: University of Connecticut, Princeton University, Massachusetts Institute of Technology, Harvard University, University of North Carolina-Chapel Hill, UCLA-Los Angeles, University of Texas-Austin, University of Michigan, Stanford University, University of Idaho and more.

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