Case Study: Condensate Recovery System Reduces Water Usage and Discharge

The U.S. General Services Administration's Ralph H. Metcalfe Federal Building in Chicago saved more than 150,000 gallons of water in one year through the installation of a condensate recovery system that collected condensed water from the building's cooling system. By doing so, the scheme provides the cooling towers with about 15 percent of their water needs and reduces the amount of water entering Chicago's combined sanitary and storm water sewers.

A GSA-commissioned study on water recovery options helped the agency determine that the most cost-effective option was to install a condensate recovery system on the Metcalfe building's two large air handlers. From a cost perspective, having two air handlers on the same floor was ideal so that only one condensate system was needed. But, their location on opposite ends of the large building added additional complexity because the plumbing needed to pass through other rooms. A separate energy project to upgrade all of the air handling equipment was completed during this same period. The air handler improvements reduced the cooling requirement and as a consequence, resulted in a reduction in the anticipated amount of water recovered from the condensate system. Relatively inexpensive water in Chicago makes the return on investment for this type of project longer.

Condensate holding tank with piping, GSA Metcalfe Federal Building in Chicago.

Key Topics

- Water conservation.
- HVAC condensate recovery.

Results

- 150,000 gallons of water conserved.
- 15 percent of cooling tower water provided by recovered condensate.
- Reduced water going into Chicago's sewer system.

Facility at a Glance

- A 28-story federal building in Chicago's central business district.
- Houses federal offices, a conference center and a food court.
- Has an ideal layout for the implementation of a condensate recovery system.
- Participant since 2011 in the FGC energy, waste and water categories.
- Nominated for EPA Region 5 FGC Award: Innovation.

Water Usage and Discharge Reduction

However, city water prices are projected to rise over the next several years which should favor projects like this one. Cost savings aside, reducing water demand and preventing thousands of gallons of water from flowing into Chicago's combined sewer system are major environmental enhancements.

GSA has found this project to be a worthwhile exercise in testing new technology and promoting sustainability to building visitors and other GSA facilities. Guests touring the system often remark how interesting it is to see such a simple technology in action. "For the lay person who doesn't know or understand HVAC — Heating, Ventilation and Air Conditioning — technology well, a condensate recovery system is an easily understood concept," said GSA's Sustainability Program Specialist Bridget Richardville.

Why is reducing discharge important?

In a typical commercial air conditioning system, warm, humid air from the building is run over a cold air handler that cools the air. When this is done, condensate water — like water on a cold glass on a hot day — is created and recovered for reuse. A drip pan collects this relatively clean water and it is discharged to a sewer. In Chicago, the discharge goes into a combined storm and sanitary sewer system where it must go through resource-intensive treatment prior to discharge into the Chicago Sanitary and Ship Canal and then the Des Plaines River. However, in large storm events, the combined sewer system becomes overloaded and the treatment system is bypassed, diverting untreated rain water and sewage into Lake Michigan instead. In a condensate recovery system, this excess water is instead collected in a tank and is used in the building's cooling towers, reducing the load on the sewers and water supply system.

About the Federal Green Challenge

The Federal Green Challenge, part of EPA's Sustainable Materials Management Program, is designed to challenge federal agencies throughout the country to lead by example in reducing the federal government's environmental impact. It helps agencies meet obligations under Executive Orders 13514 and 13423.

In 2012, nearly 300 federal agencies, representing more than 500,000 employees participated in the Federal Green Challenge. Their combined efforts resulted in an estimated cost savings of more than $31 million to U.S. taxpayers.

For More Information

GSA's Chicago Metcalfe Federal Building contact:

Bridget Richardville
312-385-3038
bridget.richardville@gsa.gov

Federal Green Challenge:
http://epa.gov/fgc

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