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COMMERCIAL/INDUSTRIAL/INSTITUTIONAL MECHANICAL CONTRACTORS

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Water Treatment Programs For HVAC Systems Play A Major Role In Meeting Green Objectives

Green building is focused on increasing how efficiently facilities use energy, water and materials while reducing their impact on health and the environment. Although often overlooked in the green equation, the water treatment program for a building's HVAC systems can play a major role in meeting green objectives. In many facilities, the water treatment program can be engineered to significantly improve energy and water efficiency. Steps can also be taken to reduce chemical usage and associated handling concerns, and more environmentally responsible chemicals can be used with equivalent or improved results. Water treatment can have a significant impact on meeting green objectives.

Energy And Water Efficiency

The return on investment for green building is closely linked with increased energy and water efficiency. In a typical facility, the energy used to operate HVAC systems accounts for 60% of utility costs. Water can easily total 5% of utility costs. Although water treatment is a small fraction of utility costs, the results received from water treatment programs have far-reaching impact in terms of operating costs, resource conservation, and reducing greenhouse gas emissions.

The accompanying table shows the significant impact even minor waterside deposits in building heating and cooling systems can have on energy use and costs. Equally dramatic is the increase in GHG emissions. The carbon dioxide produced when fossil fuels are burned to generate energy is a major source of GHG emissions. Consequently, reducing energy

use reduces a building's carbon footprint.

Energy efficiency is vital for facilities seeking LEED-EB: O&M certification by the U.S. Green Building Council. Energy efficiency, as measured by the U.S. Environmental Protection Agency's Energy Star rating system, constitutes the largest single category of points in LEED-ED: O&M. Federal agencies are focusing on energy efficiency also, and have been directed to reduce energy usage per square foot of building space by 3% annually through 2015 versus 2003 baseline usage. A high-performance water treatment program that maximizes energy efficiency by keeping HVAC system waterside surfaces clean helps increase a facility's energy efficiency and improve its Energy Star rating.

Likewise, cooling towers are often the biggest water consumer in commercial buildings and frequently are not operated to maximize water efficiency. In many cases, the cycles of concentration can be increased to significantly reduce tower blow down. Alternate makeup water sources, like air handler condensate and harvested rainwater, can be used also. Boilers and closed loops afford similar water saving opportunities with the added bonus of energy savings and GHG emissions reductions. The table illustrates potential savings associated with increasing water, efficiency in cooling, boiler and hot water systems.

Minimizing Chemical Usage

Water treatment measures that help

reduce chemical usage also support green building. Pretreatment and filtration equipment can often optimize a water treatment program's results while reducing chemical requirements. Feed and control equipment that precisely apply treatment chemicals ensures no more than necessary is used. This same equipment can also benchmark chemical and water usage. Concentrated treatment chemicals also provide significant green benefits by reducing packaging, transportation and chemical handling requirements.

More Environmentally Responsible Chemicals

No organizations currently have standards to certify water treatment chemicals as green. However, certain chemicals and technologies are considered more environmentally responsible than others. For example, treatment chemicals that more readily degrade when discharged into the environment are less hazardous to manufacture or use, or have lower usage/packaging requirements, can be considered environmentally responsible.

Solid water treatment systems in particular offer several green benefits over the liquids traditionally used. Solids contain less hazardous chemicals and require less packaging material. This

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piping systems inc.

32 Mill Street (Rt. 79)

P.O. Box 409

Assonet, MA 02702

TEL: 508/644-2221 • FAX: 508/644-2447

E-MAIL: psi@piping-systems-inc.com

WEBSITE: www.piping-systems-inc.com

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reduces both landfill waste and shipping weight along with the energy usage and CO₂ emissions associated with product delivery. Combined with ease of use, these factors can make solids an attractive alternative to liquid chemicals.

While it is important to minimize chemical usage and use environmentally responsible chemicals, it is essential that green water treatment programs provide similar or better results in terms of system protection and energy/water efficiency. Otherwise, the environmental benefits from reducing chemical usage will be offset by increased energy, water and material usage.

Green Water Treatment

The following are some hallmarks of an effective water treatment program supporting green building objectives:

- Maintain clean heat transfer surfaces. Consider pretreatment equipment, filtration, chemical cleaning, and treatment program upgrades to maintain and restore optimum heat transfer efficiency.
- Maintain the minimum blow down rate consistent with good deposit control in boiler and cooling tower systems. Install equipment upgrades that allow reduced blow down.

- Consider alternate makeup water sources like harvested rain water or air handler condensate.
- Install automatic feed and control systems that precisely apply treatment chemicals.
- Use web-enabled, data-logging controllers to monitor and log key treatment and system parameters.
- Use concentrates to minimize handling, packaging and shipping requirements.
- Consider solid water treatment technologies.

The water treatment program for a building's HVAC system is integral to the operation of energy, water and resource efficient facilities. Obtaining optimum results from a water treatment program has huge economic payoffs and helps meet green building objectives.

Need help with your water treatment requirements? Call Piping Systems, Inc. and ask for either Mike, Tom, Greg or Brian. They are available to help with your water treatment project.

—by Allan Browning
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The High Cost of Water Treatment Problems

| Waterside Problem | Increased Energy Use | Increased Water Use | Increased Cost | Increased GHG Emissions |
|--|----------------------|---------------------|----------------|-------------------------|
| 0.005" Biological Deposit on Chiller Condenser Tubes | 282,632 kWh | - | \$16,958 | 192.4 Tons/Year |
| 1° F increase in Condenser Supply Temperature | 120,050 KWh | - | \$7,203 | 81.7 Tons/Year |
| Maintain 3 vs. 5 Cycles in a Cooling Tower | - | 1,675,350 Gallons | \$10,052 | - |
| 1/64" High Iron Deposit in a Steam Boiler | 1,904.2 MMBtu | - | \$19,042 | 110.8 Tons/Year |
| Maintaining a 10% vs. 5% Boiler Blow down Rate | 1,464.2 MMBtu | 527,425 Gallons | \$17,170 | 85.2 Tons/Year |
| 0.5 GMP Hot Water System Leak | 274,0 MMBtu | 262,800 Gallons | \$4,316 | 15.9 Tons/Year |

Based on a 500-ton chiller load and 500 hp boiler load; systems operated 24 hours/day, 365 days/year; electricity 0.06/kWh; 1.36 lb. CO₂ emissions per KWh electricity; natural gas \$8.00/MMBtu; 116.4 lb. CO₂ emissions per MMBtu natural gas.

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The entire Piping Systems team wishes you a safe and healthy New Year!



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P.O. Box 409
Assonet, MA 02702

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