



Solid Water Treatment Technology An Innovative Green Building Maintenance Solution

Allan Browning, V.P. Engineering and Technology

Green building is the practice of increasing how efficiently buildings use energy, water, and other resources, and reducing their impact on human health and the environment. Also referred to as sustainable building or sustainable design, green building is achieved through better design, construction, operation, and maintenance practices. Property and facility managers who understand the benefits of green building are looking for new ideas and technologies to meet these important objectives.

Water treatment programs are often overlooked in the green building equation for buildings with cooling towers, chillers, boilers, or recirculating loops as part of the HVAC system. This white paper reviews how effective water treatment helps achieve key green building objectives and introduces innovative solid technology. Solid programs provide the proven results of high-performance liquid chemicals but are easier to use and more environmentally responsible.

Energy and Water Use in Commercial Buildings

According to the EPA, commercial buildings account for 18% of the total energy consumption in the U.S. An estimated 30% percent of this energy is used inefficiently. Although the HVAC system is the largest single consumer of energy and water in most commercial buildings, it is often not operated or maintained to achieve peak efficiency. Commercial buildings also generate a staggering amount of waste and other by-products that harm the environment. These buildings are at the forefront of green building because they present opportunities for improvement.

The return on investment from green building is closely tied to energy savings and ultimately water treatment. In most commercial buildings, evaporative cooling is used because it is more energy efficient than air cooled systems. In terms of raw energy efficiency, it takes 50% more electricity to operate a 400-ton air cooled chiller than it does a 400-ton water cooled chiller (1.49 kW/ton vs 0.94 kW/ton). However, effective water treatment is required to obtain these efficiencies.

Water treatment is an essential part of preventative maintenance for HVAC systems. Effective programs: protect waterside surfaces from the ravages of corrosion, deposits, and microbiological growth; extend equipment life; keep heat exchange surfaces clean and energy efficient; and maximize how efficiently water is used.



Water treatment is required to ensure safe, reliable, and efficient operation of heating and cooling water systems. A properly maintained chemical treatment program is a dependable and widely accepted means of achieving these important goals.

Water Treatment, Energy Efficiency, and Greenhouse Gas Emissions

Maintaining energy efficient systems also reduces the discharge of greenhouse gases and other harmful pollutants. Carbon dioxide (CO₂) released from fossil fuel-fired utility plants, boilers, and cars is a major source of greenhouse gas emissions associated with global warming. Water treatment solves problems that reduce how efficiently electricity, natural gas, and oil are used. An effective water treatment program helps conserve these precious natural resources and reduces greenhouse gases.

Table 1 illustrates the impact of some typical water treatment problems on operating costs (for energy and water) and associated greenhouse gas emissions. For example, a mere 0.005 inch of slime in a 500-ton chiller increases electricity costs by over \$12,000/year and pumps over 316,000 lbs/year of CO₂ into the atmosphere. This is equivalent to the annual greenhouse gas output of 27.5 cars!

Table I - Impact of Water Treatment Problems on Operating Costs and Carbon Dioxide (CO₂) Emissions

System Type	Program Type	Increased Cost	Increased CO ₂ Emissions	Equivalent Emissions
500 Ton Chiller	0.005 Inch Slime Film	\$12,262 per year	316,766 lbs per year	27.5 cars per year
500 HP Boiler	1/32 Inch Iron Deposit	\$22,412 per year	437,327 lbs per year	37.8 cars per year
Leaking Hot Loop	1 GPM Water Loss	\$5,463 per year	54,733 lbs per year	4.7 cars per year

An effective water treatment program helps keep HVAC systems operating at maximum efficiency, reduces energy usage, saves money, conserves resources, and helps protect the environment. Good water treatment is the ultimate green technology

New Solid Technology Supports Green Building
Green building is also fueling interest in solid technology and a greater emphasis on recycling and reducing waste. The HandiChem® Solid Water Treatment System from Chem-Aqua was developed to address the handling concerns associated with liquid chemicals and offers several benefits associated with green building.

With the HandiChem Solid Water Treatment System, chemicals are provided as solid concentrates in one-gallon recyclable plastic bottles rather than liquid in drums. The HandiPak® Solid Concentrates are dissolved as needed into a small plastic reservoir using a reliable HandiFeed® Mixing Board. The feed solution is then pumped into the system being treated, just like with liquid chemicals.



The HandiChem Solid System provides the proven results of high- performance liquid treatment programs but is easier to use and more environmentally responsible. The green benefits of a HandiChem Solid System include:

- Significantly lower levels of hazardous chemicals . Because of their innovative, proprietary manufacturing process, every 30-gallon drum of liquid cooling tower or closed loop corrosion/scale inhibitor replaced by a HandiPak® Solid equivalent eliminates the need to manufacture, transport, and discharge up to 25 lbs of corrosive sodium hydroxide (NaOH).
- Reduces packaging requirements and landfill waste. Eliminates drum handling and disposal concerns. A case of four one-gallon recyclable plastic containers replaces a 30-gallon drum.
- Less fuel and lower greenhouse gas emissions associated with delivering the product to the customer. HandiPak Solids typically weigh less than 20% of equivalent liquids.

- Makes effective water treatment practical for smaller systems and out of the way places previously neglected. This can significantly reduce energy use and greenhouse gases. With the HandiChem System, operators only handle an 11-pound container versus a heavy drum. Cases of HandiPak Solids are easily moved through buildings on a hand truck or cart.
- Reduces splash and spill concerns versus traditional liquid chemicals.
- Reduces the risk of chemical spills during shipping and storage.

performance, the HandiChem System offers a simple, green water treatment solution for cooling towers, closed systems, and steam boilers.

The HandiChem Solid Water Treatment System provides effective water treatment that minimizes energy and water usage, and reduces environmental concerns. With field-proven

References

"The Benefits of Water Cooled Systems vs. Air Cooled Systems for Air Conditioning Applications." Michael D. Pugh. Presentation. March 19, 2001. Cooling Technology Institute (cti.org).