Green building is the practice of increasing how efficiently buildings use energy, water and other resources, while 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 managers and facility engineers who understand the benefits of green building are continually looking for new ideas and technologies to meet these important objectives.

Although often overlooked within the green building equation, effective water treatment programs using innovative technology help achieve key green building objectives.

Energy and Water Use in Commercial Buildings
According to the EPA, commercial buildings account for 18 percent of the total energy consumption in the United States. 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 immense 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 percent 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 programs are 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, 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.

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.

**Innovative Solid Technology Supports Green Building**

Green building is also fueling interest in solid technology and a greater emphasis on recycling and reducing waste. Solid water treatment systems were developed to address the handling concerns associated with liquid chemicals and offer several benefits associated with green building.

Solid water treatment systems provide effective water treatment that minimizes energy and water usage and reduces environmental concerns. With field-proven performance, solid water treatment systems offer a simple, green water treatment solution for cooling towers, closed systems and steam boilers.

**Solid Water Treatment Systems**

With solid water treatment systems, chemicals are provided as solid concentrates in one-gallon recyclable plastic bottles rather than liquid in drums. The solid concentrates are dissolved as needed into a small plastic reservoir using mixing boards. The feed solution is then pumped into the system being treated like with liquid chemicals.

Some water treatment companies have also developed solid block systems that are designed to eliminate the difficulty of frequently changing solid concentrate jugs when treating larger cooling tower systems. Typically, up to four solid concentrate blocks can be stacked inside a feeder specially designed for the solid blocks. As the level in the feeder drops, more blocks are added as space permits. This allows uninterrupted chemical feed in high-volume applications.

Solid mixing boards are engineered to accurately and reliably dissolve solid concentrates into consistent feed solutions. For the original solid water treatment system, with one-gallon recyclable plastic bottles, the feed solution is made on demand by spraying water at a constant pressure on the solid concentrate.

When the level in the product reservoir is low, the makeup valve automatically opens allowing water to spray the solid concentrate and mix new chemical. When the product reservoir is full, the makeup valve automatically closes. For the solid block system, the feeder is molded with a hopper that holds up to four blocks of solid chemical and has two spray nozzles. You simply unwrap the blocks and stack them in the hopper. The feed solution is made on demand by spraying water at a constant pressure onto the block.

**Reduced packaging requirements and landfill waste.**

Drum handling and disposal concerns are eliminated as 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. Solid concentrates typically weigh less than 20 percent of equivalent liquids.

Effective water treatment is made practical for smaller systems and out of the way places previously neglected. This can significantly reduce energy use and greenhouse gases. With solid water treatment systems, operators only handle 11-pound containers versus heavy drums. Cases of solid concentrates are easily moved through buildings on a hand truck or cart.

Solid water treatment systems provide effective water treatment that minimizes energy and water usage while reducing environmental concerns. With field-proven performance, solid water treatment systems are a sustainable water treatment solution for cooling towers, closed systems and steam boilers.

**Environmentally Sustainable**

Solid water treatment systems provide the proven results of high-performance liquid treatment programs, but are easier to use and more environmentally responsible. The sustainability benefits of a solid water treatment 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 solid concentrate equivalent eliminates the need to manufacture, transport and discharge up to 25 lbs of corrosive sodium hydroxide (NaOH).

**Table One** 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>
<thead>
<tr>
<th>SYSTEM TYPE</th>
<th>PROBLEM TYPE</th>
<th>INCREASED COST</th>
<th>INCREASED CO2 EMISSIONS</th>
<th>EQUIVALENT EMISSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>500-Ton Chiller</td>
<td>0.005” Slime Film</td>
<td>$12,262/yr.</td>
<td>316,766 lbs./yr.</td>
<td>27.5 cars/yr.</td>
</tr>
<tr>
<td>500-HP Boiler</td>
<td>1/32” Iron Deposit</td>
<td>$14,941/yr.</td>
<td>437,327 lbs./yr.</td>
<td>37.8 cars/yr.</td>
</tr>
<tr>
<td>Leaking Hot Loop</td>
<td>1 GPM Water Loss</td>
<td>$5,463/yr.</td>
<td>54,733 lbs./yr.</td>
<td>4.7 cars/yr.</td>
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</tbody>
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