

HEATING WATER EFFICIENTLY

by Mark Croce and Raiyan Nazim

Reducing operating costs and limiting expenses campus-wide can be achieved in many ways by administrators of educational institutions. Given how many gallons of hot water flow through dormitories, cafeterias, athletic field houses, and other facilities, achieving maximum efficiencies on water heater operation can help prevent dollars from **going down the drain.**





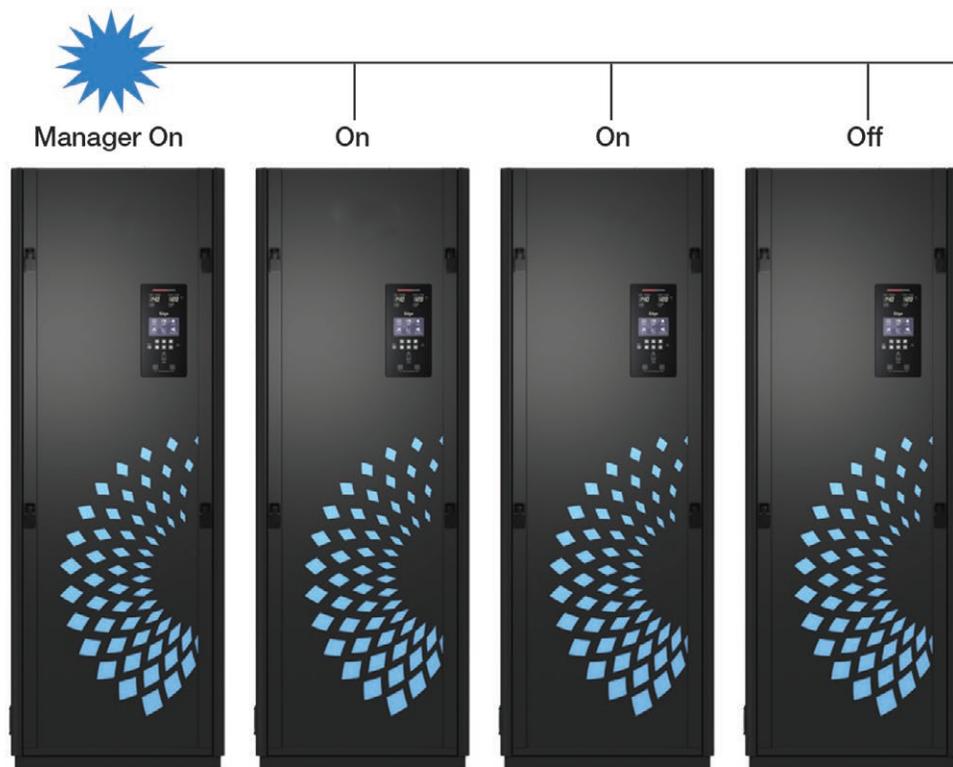
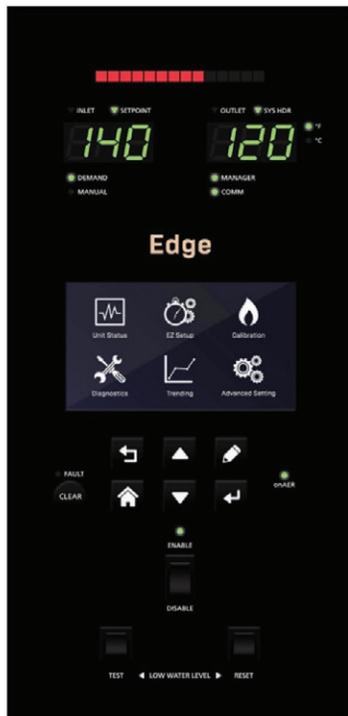
Installing water heaters with innovative design techniques such as dual returns and O2 trim, advanced communications, and monitoring tools—along with properly sizing the units based upon load—can dramatically improve efficiency.

Matching Loads to Improve Efficiency

Understanding the application in which the water heater will be used is just as important as product design to achieve maximum performance. After all, load demand is considerably different for a 200-room dormitory than for one with 500 rooms. When misapplied, a water heater may not achieve peak performance. Considering the actual system load profile is key, as most systems are oversized when initially designed.

Facility managers can reduce load needs up to 10% by installing high-efficiency condensing water heaters that match existing load compared to mid-efficiency models. As an added benefit, properly sizing the water heater lowers the system's carbon footprint. Broadening the focus to the entire system can also reap efficiency advantages. A combination plant approach that integrates space heating boilers with indirect heat exchangers and water heaters can increase boiler efficiency by as much as 6%. This configuration also reduces total carbon footprint compared to two separate systems.

Taking a wider view will also help architects, engineers, and facility managers see other ways to maximize operation. Factors such as replacing older fixtures with low flow fixtures can improve overall system efficiency. Selecting the proper Building Automation Systems (BAS) can ensure optimal interoperability that can lead to better operation, as well.



Advanced Communications and Controls

BAS is only one communications tool that can help improve water heater efficiency. Water heaters now integrate advanced control technology to create myriad benefits. Advanced controls provide unparalleled capabilities from setup and configuration to maintenance and diagnostics. They streamline and simplify operation for more effective and efficient management of domestic hot water systems campus-wide.

Advanced controllers come with integrated Water Heater Management (WHM) features that allow facility managers to easily sequence up to sixteen units to optimize system efficiency on the same system. By doing so, load requirements are met and all water heaters in the system operate at maximum efficiency. The result is the most energy-efficient and reliable water heating system design available (figure 1). Such systems monitor the fire rate of all water heater sequences by opening or closing the motorized valve, as required, to meet hot water demand.

Using such advanced controls allows only those units required to meet load operate. Water heaters in standby mode do not needlessly cycle to maintain set point,

minimizing system standby losses as well as unit wear. A system that features advanced controls with WHM provides reliable domestic hot water on demand in the smallest possible energy footprint. Operating costs, as well as maintenance expenses, are significantly reduced for maximum return on investment (ROI).

Optimize System-related Issues

Facility managers, as well as architects and engineers, must consider system-related issues that can contribute to poor performance or failures of existing equipment. Two key factors are water quality and piping. The impact of water quality cannot be underestimated relative to maximizing efficiency and longevity of water heaters.

Some manufacturers offer environmentally-friendly commercial scale control systems. Certain solutions include Template Assisted Crystallization (TAC) technology to control the formation of scale in plumbing systems by transforming dissolved hardness minerals into harmless, passive microscopic particles without using salt or harsh chemicals such as water softeners and chemical additives. Water heaters supported by TAC have increased operational efficiency. Maintenance costs

Above: Water Heater Management systems allow multiple water heaters to be easily sequenced to increase operational efficiency.

Left: Proper O₂ levels help achieve a higher dew point, which enables a larger condensing zone for greater efficiency and reliability.

are reduced, as well, which helps prevent premature equipment failure.

Overall Water Heater Design

Water heating designs have evolved over time to address the needs of the market as well as regulations. When evaluating water heaters, people who select units will be helped in their choices when they understand efficiency and lower cost of ownership.

Materials of Construction

Advanced materials of construction provide long-life, high efficiency, and improved operation. A new generation of water heaters utilize an engineered material that blends austenitic and ferritic steels to combine the

continued on page 12



Supporting You From the Ground Up

Since the introduction of our ECB® membrane more than 35 years ago, we've worked to revolutionize the way decorative flooring is installed and specified.



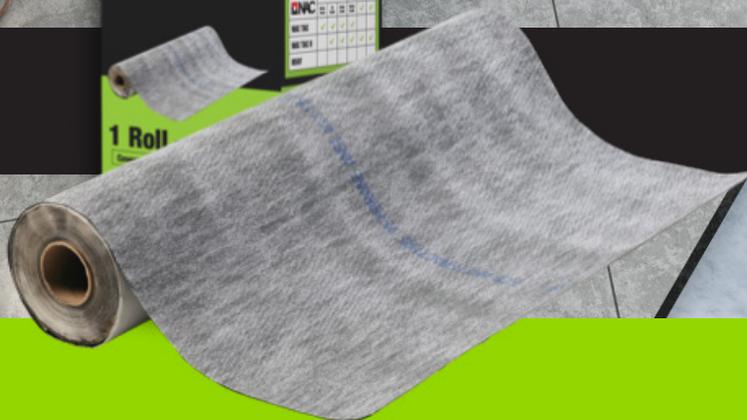
Sound Control



Crack Isolation



Waterproofing



ECB®
Crack Isolation Sheet Membrane



Contact Us for Order Information or to Become a Distributor
800-633-4622 • nacproducts.com



Two key factors are water quality and piping. The impact of water quality cannot be underestimated relative to maximizing efficiency and longevity of water heaters.

advantages of 300 and 400 series stainless steel. This synergy makes water heaters highly resistant to aqueous corrosion and chloride stress corrosion cracking in potable water at any temperature. Tank linings and anode rods have reduced service needs, as well.

Dual Returns

Circulation of hot water into the cold inlet on a condensing water heater lowers the efficiency. To offset this issue, some water heaters feature dual returns. They have a dedicated connection to building return loops in order to maintain two distinct temperature zones. To increase efficiency, only the coldest water enters the lower condensing zone of the water heater during a firing cycle.

O₂ Trim Technology

Advanced combustion control systems in high-efficiency water heaters need to maintain precise air-to-fuel ratios to work properly

and maximize efficiency. Environmental variations—such as humidity, atmospheric pressure, filter dust loading, and delivered gas energy content—can create problems in gas-fired water heaters. The result is inefficient operation, as water heaters do not achieve the ideal oxygen: fuel ratio.

There are other adverse effects if O₂ levels are not optimized. If they are too low, unstable combustion can occur, creating faults and increasing unscheduled maintenance, ultimately adding to the lifetime costs of a water heater. Conversely, if O₂ levels are too high, the dew point is lower and the water heater is less likely to condense, lowering efficiency.

Proper O₂ levels can be achieved by water heaters with O₂ trim technology, which creates the ideal environment for condensing to occur. Water heaters will have increased uptime reliability and efficiencies for cost savings. Lower emissions will also be achieved.

Nothing else compares to the Dynamic V8®

Energy costs are hitting the fan.

Over 20% of energy consumption in commercial buildings is HVAC supply and return fan usage – more than lighting in most buildings.

Category	Percentage
HVAC	51%
Other	23%
Lighting	20%
Plug Load	6%

- We can cut fan energy in half
- 2/3 less fan energy than MERV 14 filters
- Extends filter service intervals from months to YEARS
- Better IAQ with MERV 15 performance
 - Removes ultrafine particles, VOCs odors, and airborne pathogens

MERV 15 air filtration and ideal for retrofits

Clean+Green™
Dynamic V8®
AIR CLEANING SYSTEM

Visit DynamicAQS.com or ask us about a free Life Cycle Cost Analysis to find out how much you can save on fan energy and maintenance costs.

Dynamic
Air Quality Solutions
The Science of Clean Air.™

Show Video

Conclusion

Facility managers and institutional administrators can lower operating expenses while also reducing a campus' carbon footprint by installing high-efficiency water heaters. Selecting units that utilize advanced design and materials, integrate innovative communications and monitoring tools, and maintain high water quality will increase efficiency. Proper sizing of the water heaters also aids in optimizing efficiencies to achieve operational and budget goals.



ABOUT THE AUTHORS: Mark P. Croce, Senior Product Manager with Watts Heating and Hot Water Solutions, is responsible for all Domestic Hot Water products within the AERCO & PVI Brands. He has over thirty years of experience in product management, sales management, system design and direct sales of commercial HVAC and plumbing products.



Raiyan Nazim, Product Manager at Watts Water Technologies, is responsible for managing the product lifecycle of commercial water heaters.

Raiyan is certified as a ASSE 12080 Legionella Water Safety and Management Specialist.



Be. Overly. Protected.

Acoustic Doors

Metal

- Metal Swinging Doors
- Fixed Window Systems
- STC ratings from 43 to 57
- Available with up to 3-hour fire labels

Wood Finish

- STC ratings of 43 through 50
- Dual-glazed Vision Lights
- Wood veneers and plastic laminates
- 3/4 hour and 20 minute fire labels

Bullet-Resistant Doors

Metal

- Weapon Protection Levels 1-8
- UL Standard for Safety 752
- Fixed and Teller Window Systems
- Pass-Throughs, Gun and Voice Ports

Wood Finished

- UL Standard for Safety 752
- Weapon Protection Levels 1-8
- Single or pair configurations
- Wood veneers and plastic laminates

OVERLY
DOOR COMPANY

Phone: 1-800-979-7300 • Fax: 724-830-2871 • E-mail: overly@overly.com • Web: www.overly.com