Fact Sheet

BETTER BUILDINGS ALLIANCE DEMONSTRATION OPPORTUNITIES: COMMERCIAL HEAT PUMP WATER HEATERS

The U.S. Department of Energy (DOE) and the Better Buildings Alliance have released technology specifications that have the potential to offer significant benefit to various end-use energy consumers in commercial buildings. As part of its specification deployments efforts, DOE is offering commercial building owners the opportunity to partner in heat pump water heater (HPWH) demonstrations. Participating organizations receive a discounted high-efficiency product in exchange for their cooperation with the field study and can see firsthand the performance, energy savings, and economic benefits of commercial heat pump water heaters. The host site also receives recognition in DOE literature for their participation and commitment to efficient buildings.

Photo credit: AO Smith®

AO Smith "AWH" commercial heat pump water heater

Project Benefits

In 2006, water heating represented approximately 9% of the U.S. commercial buildings sector site energy consumption and 6% of the total primary energy consumption. An electric resistance storage water heater operated in a building with a hot water demand of 500 gallons a day, 365 days a year, will consume 121 million Btu (35,000 kWh) per year, and can incur over $3,500 each year in electricity costs. A new heat pump water heater that meets the Better Buildings Alliance specification would consume 36 million Btu (11,000 kWh) per year. This is **70% less energy than an electric resistance storage water heater, and would save as much as $2,400 per year.** If 20% of all commercial electric storage water heaters in the U.S. were replaced with heat pump water heaters per the Better Buildings Alliance specification[1], businesses would save 3 terawatt-hours (TWh) of energy, or about $288 million in energy costs per year (assuming an installed base as of 2008 of 600,000).[2]

This project intends to speed the adoption of high-efficiency heat pump water heaters by showcasing their performance in demonstration projects. This demonstration will enable DOE to generate and deploy data, case studies and information to lower perceived risk regarding the efficacy and economic benefits of this innovative and under-utilized heat pump water heater. Projected and actual energy savings of each demonstration site will be measured and reported, as will lessons learned and projections for maintenance savings and user satisfaction when available. Broader, market-wide energy savings will also be reported based on the energy and cost savings results of these demonstrations. By participating in these projects, host organizations and heat pump water heater manufacturers will gain visibility for their roles in supporting the adoption of energy-efficient water-heating products.

Appropriate Host Sites

Commercial heat pump water heaters are ideal for full-service restaurants, or any other facility with hot water usage of 600-3000 gallons per day and a unit run time of 8-18 hours. Additionally, the host site must currently be using an electric storage water heater. Appropriate host sites will also have a fair amount of space to install the HPWH system, which consists of a heat pump that is mounted to a wall, an additional storage tank, and the necessary piping. The HPWH will help cool the surrounding space, thus, a warm commercial kitchen environment is best suited for a HPWH installation.

Participant Roles

These demonstration projects involve a host organization, one or more heat pump water heater manufacturers, and staff from Navigant Consulting supporting the DOE Better Buildings Alliance.

- Host organizations provide locations for demonstrations, assistance with installation and evaluation, and a willingness to participate in activities related to the demonstrations, such as site visits, photography, and publicity. The host organization will share relevant cost and energy data to inform technical

1 The specification can be found on the Better Buildings Alliance HPWH webpage: http://www4.eere.energy.gov/alliance/activities/technology-solutions-teams/food-service/heat-pump-water-heaters

2 Zogg et al., "Energy Savings Potential and RD&D Opportunities for Commercial Building Appliances " (Navigant Consulting, Inc., 2009)

analysis and develop case study or other market-facing materials. The host organization arranges and pays for the purchase and installation of the products. In many cases, utility rebates or manufacturer discounts may be available to help offset some of the costs.

- Manufacturers provide products for demonstrations and may assist in site evaluation and other aspects of planning and installation. In some cases, manufacturers may provide discounted pricing for the demonstration project; one major manufacturer has offered a 30% discount on the HPWH equipment.

- DOE provides technical support for analyzing site needs, comparing potential products for demonstration prior to selection, selecting appropriate the appropriate product for testing, conducting onsite measurements, and performing post-measurement evaluation of the data. DOE also writes and publishes reports on each demonstration, and often offers webinars and other educational programs based on the demonstration results. DOE does not contribute funding toward the purchase of installation of the product evaluated in the demonstrations.

DOE will collaborate with the Alliance members to evaluate potential demonstration sites, matching or improving water heating system performance, and offering cost-effectiveness information relative to the standard comparable electric resistance storage water heater. Ultimately, each site will be judged on its own merits by all members of the team prior to full implementation, and a "go/no-go" decision will be made based on the preliminary assessment of the opportunity.

Communication of Results

The results from these demonstrations will enable Better Building Alliance members and other organizations to better understand available high-efficiency water heating technologies before making large-scale purchasing decisions. Results will be shared through the Alliance member communications, workshops, webcasts, articles in trade publications, and other related activities. Team members may be invited to participate in subsequent DOE conferences and workshops to convey lessons learned, benefits obtained, and other aspects of the project.

Project Timing

Feb. 2014 – May 2014	Identify potential demonstration sites and partners.
June 2014 – Dec. 2014	Conduct up to four demonstration projects and complete final reports on each project. Reports will be published as each project is completed.
Jan. 2015 – March 2015	Complete a case study report that consolidates the findings from the demonstration projects and summarizes related data from other DOE projects.

Further Information

If your organization has suitable applications for heat pump water heaters, and is interested in exploring the possibility of serving as a host site for a demonstration project, please contact Kevin Foley at Navigant Consulting: kevin.foley@navigant.com.

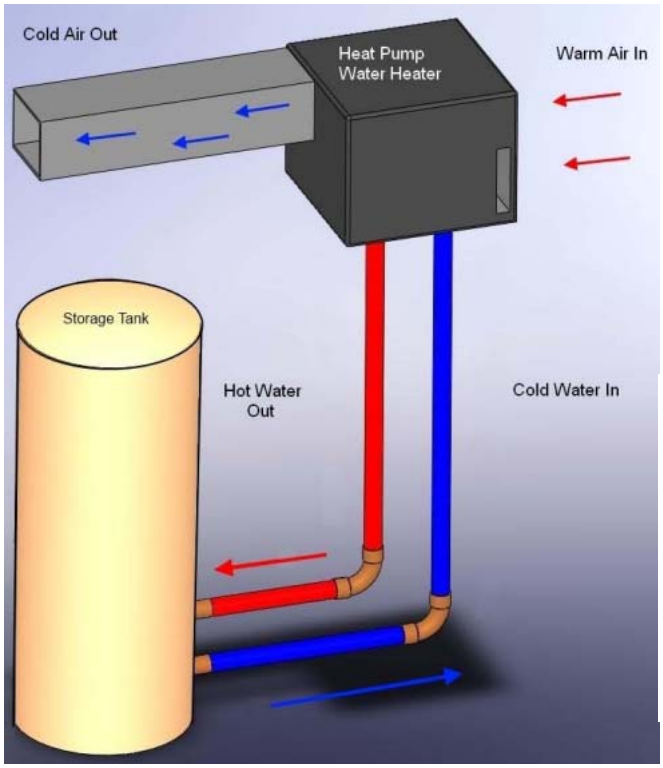

Photo credit: AO Smith®

Diagram showing typical commercial HPWH installation