Everyday Environmental Stewardship

Domestic Hot Water
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Key issue:
Energy Waste for DHW Generation

Stewardship Opportunity
On-Demand DHW Heaters

Standard domestic hot water ("DHW") vertical tanks are not very efficient (65±%) even when DHW is needed; they are 0% efficient when DHW is not needed. (Heating water that you are not going to use is by definition wasteful and expensive! You don't keep the tea-kettle heating on the stove all night just for a morning cup of tea!). *On-demand* water heaters are 95±% efficient and they use energy when only when generating DHW.

What On-Demand Hot Water Is

On-demand hot water heats your hot water as you use it, so there is no tank to wastefully heat-and-hold water. Instead, the water is heated as it flows through the water heater. Unlike a DHW tank (which is measured in gallon capacity) *on-demand* hot water is measured in gallons per minute. Switching to an *on-demand* tank-less DHW heater can save you 30% or more on your utility bill as compared to the standard DHW tank. *On-demand* hot water heaters use either electricity or gas. Gas fired *on-demand* water heaters have greater capacity than electric, and are more efficient. Either natural or propane gas can be used.

Where on-demand DHW is applicable

On-demand systems are useful in every home and House- Of Worship ("HOW"). They are especially appropriate for locations which have hot water demand that is either 1) low or 2) highly variable. For example, a home where two parents live alone except when children come home during the summer months, Christmas, and Thanksgiving is a great opportunity for on-demand hot water. The primary DHW consumption in most HOWs is for dishwashers and sinks. Dishwashers use 13 gallons or less per load while sink hot water use varies. Neither of these uses comes close to the standard 40 gallon DHW tank.

NOTE: When installing a new boiler (that will be, of course, highest efficiency!), use an *in-direct fired DHW tank* instead of on-demand. Let the boiler work year-round, getting the same efficiency benefit as on-demand but lower capital cost. See MIP&L's ***Boilers & Furnaces*** EES *Brief* on boiler equipment choices.

Care and Maintenance

Most *on-demand* water heaters have a life span of over 20 years. They are easily serviced and have replaceable parts, so the life span may be considerably longer. This is in sharp comparison to DHW tanks that last from 5 (or fewer) to 10 years.

Incentives
Since *on-demand* hot water systems are over 80% efficiency, they qualify for rebates. Residential or commercial heating customers (including HOWs) of gas companies are eligible. For more information call your gas company.

How To Calculate Savings
You can easily calculate use and cost savings by looking at your utility bill. Most DHW generation is by gas. So take a summer month where there is constant use (that is, when not away during vacation) and write down the number of therms used. Multiply this by the current price of natural gas ($1.50/therm in May 2013) and you have your cost of hot water per month. Multiply this by 70% to get your approximate monthly cost of hot water with an on-demand system. (This assumes saving at least 30% of prior use and cost.) Subtract the difference. Multiply by 12 and you'll learn how much you will save in a year. [You can do the same calculations with oil except with gallons instead of therms and the higher cost per gallon.]

30 therms x $1.50/therm = $45.00 x 70% = $31.50 new monthly gas cost for DHW
($13.50 saved/month = **$162/year**)

A standard 40 gal DHW tank costs approximately $400 and installation costs approximately $400 for a total of $800. A 6 gal/min on-demand DHW heater costs approximately $800 with an installation cost of approximately $1,000 for a total of $1,800. Using the $300 rebate from the gas company lowers the price to approximately $1,500. Though there is a "net" difference of $700 in these two systems, nearly all of that is paid back in the first four years!!! And it only gets better every year as fuel prices rise and when you realize that you won't be spending $800 every 5± years for a new DHW tank!

Over 20 years the on-demand tank described above saves over $3,200 (in 2010 $s) on use and eliminates $2,400 of replacement at $800/replacement for a standard tank. That is about $5,600 in savings. This is truly…

DOING WELL BY DOING GOOD

Saving More Hot Water
The most effective way to lower DHW heating use is to ***USE LESS HOT WATER***. Showers are a HUGE opportunity for savings. See MIP&L's ***Shower Cost*** EES brief, which includes an Excel template to calculate cost in $s and CO_2 for you shower!

Encourage Others To Use On-Demand DHW
The on-demand DHW system at the top of the first page is in a HOW, installed over the kitchen sink. Posted on it is a short explanation of what it is, what is saves, and where to go to get information on this and other environmental stewardship opportunities. Be sure to take the opportunity to explain and encourage this (and every similar sensible action) when installing an on-demand DHW in your HOW or home.

Updated July 2013: Tom Nutt-Powell