

Bethel College Mennonite Church
Creation Stewardship Notes # 27
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Heating Water in the Home
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Have you ever thought about the wasted energy--natural gas, electricity, or propane--required to keep the water in your water heater hot, even when you're gone or asleep? Perhaps you have insulated the hot water heater yet it still takes too long for the water to get hot at the kitchen sink or the shower or utility room or second floor because of the distance from the hot water heater. Water is wasted and so is your patience. Have you thought about how convenient it would be to have a faucet in the kitchen that would give you instant 200o water for brewing your tea or coffee without having to consume more energy by heating the water in the microwave?

The standard hot water heater is considered to be the second largest consumer of energy in the home behind air conditioning (i.e., heating and cooling), typically costing between \$175 and \$450 a year to operate. Of course, there may be measures you can take to improve the efficiency of the standard tank-type water heater and to reduce water usage. A first measure to consider is reducing ones consumption of hot water if feasible, for example, taking shorter showers. (Your friends might object if you took fewer showers!) Setting the heat level setting on the water heater only as high as it needs to be for your use is an important consideration. Setting the thermostat at 120o is preferred to 140o. The higher the setting, the greater will be the heat loss. Consequently, more energy is wasted and the life of the unit will also be shortened.

Another measure is to wrap the water heater tank with additional insulation that is available in kit form at most hardware, home improvement, and some discount stores. If you want to buy a kit, check the dimensions of the insulation wrap before you buy to be sure it will fit your tank. Fortunately, most hot water tanks on the market today are insulated much better than they were ten to twenty years ago. The foamed-in-place insulation between the tank and the sheet metal outer shell generally has a higher insulating value than the older fiberglass insulated tanks.

The hot water pipes can also be insulated with pre-formed foam insulation. However, most often the piping is not accessible in a finished house. When buying a new water heater, always look for the "Energy Star" that identifies higher efficiency units. A good way to compare units is to check the projected annual costs of operation that is stated prominently on the label. If you get a natural gas or propane unit, be sure it does not have a pilot light that stays on continuously.

If one is planning a new residence, a recirculating loop can be plumbed into the hot water line for long runs so that the hot water will reach the point-of-use sooner. Adding a recirculating loop after a house is finished is usually impossible. Since such a loop is moving heated water, the pipes should definitely be insulated. While this measure will improve the performance of the system, it generally will not reduce energy consumption since an electric circulating pump is usually required, depending on the design of the system.

Tankless water heaters

Tankless water heaters, common in Europe, are available to solve the problems identified in the first paragraph. Also, these units are eligible for up to a \$300 energy efficiency tax rebate (check with your tax advisor or IRS to get details). They vary considerably in output, performance, cost, and energy consumption. They are, of course, much smaller than the conventional tank type water heater, with the smaller output units easily fitting under a sink. This Stewardship Note is intended to provide a general understanding of the application, operation, and approximate costs of tankless water heaters. An excellent resource for more information is the "Tankless Water Heater Buying Guide" available at www.tanklesswaterheaterguide.com.

As the name implies, a tankless unit does not store hot water but heats water only on demand. These units require a powerful heating unit, but gains efficiency over a standard tank type water heater simply because the heating device does not operate except on demand. The size (output) of a tankless unit is determined by the purpose for which it is to be used. Will the unit replace a tank type water heater and be expected to supply heated water for the whole house, or for only one end-use like a shower, or only to heat water for brewing coffee? The following list suggests the flow rates--given in gallons per minute--required by each of the respective devices 1:

Lavatory	0.5	Laundry sink	2.5-3.0
Bathtub	2.0-4.0	Dishwasher	1.0-3.0
Shower	1.5-3.0	Kitchen sink	1.0-1.5

While some small tankless units can be thermostatically controlled such as the 200o unit, the output of most tankless water heaters is described in terms of temperature rise per flow rate. For example, if the incoming (ambient) water temperature is 60o which is common here, you are using a 2.0 gpm shower, and you want to raise the temperature to 115o, you would want to find a unit that could raise the temperature 55o, i.e., from 60o to 115o with a flow rate of 2.0 gpm. As the number of outlets drawing hot water from a single heating unit increases, a larger unit needs to be chosen or you would not get the temperature rise that you want. Also, the greater the desired temperature increase, the larger the unit.

The "Buying Guide" provides the following statement regarding energy efficiency.

For homes that use 41 gallons or less of hot water daily, Tankless Water Heaters can be 24% - 34% more energy efficient than conventional storage tank water heaters. They can be 8 % - 14% more energy efficient for homes that use a lot of hot water, around 86 gallons per day. You can achieve an even greater energy savings of 27% - 50% if you install a tankless water heater at each hot water outlet 1.

Here are three examples of tankless types on the market 2:

Rheem RT-74PVN Indoor natural gas, 7.4 gpm, 2-3 bathrooms - \$860

Bosch 1600H-NG Indoor natural gas, 4.3 gpm, one bathroom - \$599

Stiebel Eltron Tempra 24, electric, whole house, 3.6 gpm, one bathroom - \$479

The **Insinkerator** by Emerson (I had nothing to do with it) can be thermostatically set to temperatures up to 210o for making hot drinks or heating dish water. Its output is only

a cup a minute (1/16th of a gallon per minute). Home Depot stocks two models, one for \$189, and the other for \$259.

A note was made earlier of the powerful heating units in the larger tankless water heaters. An example of the operating cost of one model is given in the booklet "Build Comfort into Your New Home" (in the Church library)³. An Eemax model requires two 40 amp, 240 volt circuits. That is nearly three times the electricity that would power a standard tank type water heater. Yet a three minute 2.0 gpm shower would only take .96 kilowatt hour and cost 11.5 cents if you are paying 12 cents per kwh. (Have you ever taken a three minute shower? I have tried it and am not sure which parts not to wash!) All manufacturers offer several models to accommodate different needs. If you are interested in a more efficient way of heating water **and** in saving water, look into tankless water heaters. Check with your favorite plumbing contractor, hardware store, or home improvement store. These businesses usually stock tankless units or can order them. Or you can shop on-line and explore the different brands at their Websites. If you search the Internet for "tankless water heater" you will get 754,000 hits!

Footnotes:

1 "Tankless Water Heater Buying Guide" www.tanklesswaterheaterguide.com

2 "Choose the Right Tankless Water Heater" www.tanklesswater.com

3 Francis, C. E., A. E. Wiens, & J. Marley. *Build Comfort into Your New Home*. Illinois Department of Commerce and Community Affairs, 1999, pp. 59-60. (In Church library)