#3975

WASHINGTON STATE ENERGY OFFICE

Washington Energy Extension Service

Home Hot Water

Wise Use of Resources Through Education

Hot Water Conservation

Your water heater uses more energy than any other appliance in the home except your heating system. It costs a typical family of four between $280 - $310 per year for water heating (see Table 1). For many families, this represents a significant portion of their utility bills. This pamphlet will discuss ways to reduce water heating costs by increasing efficiency and reducing consumption. Topics include water heater and pipe insulation, energy-efficient showerheads and faucet fixtures, thermostat setbacks and superinsulated water heaters.

If you have already taken basic hot water conservation measures, and seek further reductions of your hot water bill, other water heating alternatives may be considered. These include tempering tanks and demand water, heat pump, solar, and wood-fired water heaters. In general, these systems are most cost effective in new homes or for families using greater than average quantities of hot water. They are discussed in WEES publications referenced at the end.

Energy Savings

For most households, the energy used to heat water can be reduced by 25 percent - 50 percent through conservation. This amounts to a savings of approximately $55 - $155 per year at current rates.

One of the first things to do is to estimate your annual hot water consumption. This will help you better understand how you are using hot water and identify potential savings. This is especially important if you are contemplating the purchase of an alternative water heating system WEES publication "Calculating Your Hot Water Costs" (UD1301) shows you how to cal-culate your annual hot water costs. Next you should implement some, or all, of the suggestions on the following pages. Finally, you may want to recalculate your hot water consumption after you have adopted conservation measures.

Table 1

Annual Water Heater Energy Consumption and Cost[1]

	kWh[2]	Cost[2]
Demand	4000 - 5000	$200 - $250
Standby	440 - 1170	$ 22 - $ 60
Total	4440 - 6170	$222 - $310

1 For a 52 gallon electric water heater set at 120°F with 30 feet of distribution piping used by a family of four at $.05/kWh.

2 Ranges in kWh consumption and dollar costs account for variations in water usage (64 - 80 gallons per day) and variations in tank insulation levels and ambient air temperature.

Reducing Demand for Hot Water

Reducing the household's demand for hot water simply means using fewer gallons of hot water. This can be achieved by altering a few habits and reducing water flow by making changes in the plumbing system. Showering, bathing, and laundry activities are the biggest hot water uses so your efforts should focus there.

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Table 2

Hot Water Use of Various Activities

Household Activity	Hot Water Use (gallons/minute)
Bathtub	3.6
Laundry	3.3
Shower	2 - 5
Kitchen sink	1.6
Dishwasher	1.5
Bathroom	0.3

Source: *Energy Auditor and Retrofitter*, Jan/Feb 1986.

Reducing Water Flow

The easiest way to reduce consumption is to reduce water flow. There are two ways to do this:

1. Add flow restrictors and low-flow faucet aerators to existing fixtures, or
2. Install new energy-efficient fixtures. Shower flow restrictors look like washers and are made of metal or plastic. They are available from most electric utilities and water departments at no charge and can be easily installed with a wrench. They fit most showerheads and reduce water use by 50 percent.

   Older showerheads use 4-5 gallons of water per minute. With a flow restrictor in place, they'll use 2-2.5 gallons per minute. Flow restrictors don't guarantee a satisfactory shower, however. Some showers are reduced to a trickle, and others result in needle sharp sprays.

   Energy-efficient showerheads offer a good alternative to flow restrictors that don't work. They cost from $10-$40 dollars, and deliver water at a rate of 2-3 gallons per minute. The payback in energy savings is 1-3 years.

   Faucet aerators at bathroom, utility room and kitchen sinks can reduce water flow somewhat, but a changeover to low-flow aerators can reduce flow to a more effective and usable level (2 gallons per minute).

   If you have unusually high water pressure in your home, you may want to install a pressure reducing valve that can slow the flow rate of water 20 percent to 50 percent. The valves themselves cost about $50-$60. Having a plumber install one will cost $50-$100. Reduced pressure, in addition to saving water, can help reduce an existing water hammer problem in your plumbing.

Hot Water Leaks

The Faucet Leak.

Leaky hot water faucets waste both water and energy. A hot water leak that fills a cup in 10 minutes will waste over 3,000 gallons of hot water in a year. Many leaks can be repaired by replacing the faucet washer. Occasionally, the valve stem packing is leaking and may also need to replaced.

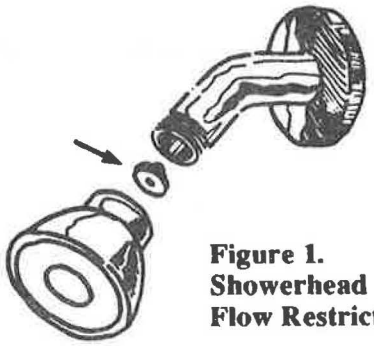


Figure 1. Showerhead Flow Restrictor

Some faucets in older homes will continue to leak even after the faucet washer and packing has been replaced. This is because the valve seat that the washer presses against has become worn and pitted. An inexpensive grinding tool can be used to resurface the valve seat so the washer will sit tightly against it.

Some modern fixtures are more difficult to repair than standard designs of the past. For complex tasks, it's best to consult household plumbing repair manuals beforehand, or seek a plumber to make the repairs.

The Relief Valve Leak.

The pressure relief valve on top of your hot water tank can be another source of expensive leaks. If the drain pipe which connects to this valve is warm over its entire length, your valve is leaking. Before replacing the valve, try to flush it out by moving the control lever attached to the valve. This will sometimes flush out foreign matter stuck in the valve. If this doesn't work, you probably need a new pressure relief valve.

The Hidden Leak.

Lastly, you may have hidden leaks. To find them, perform this simple test. Find the two pipes which come out of the top of your water heater. One supplies the cold water to the tank and the other is the hot water outlet. When your hot water has not been in use for a few hours, the temperature of the two pipes will equalize. Feel both pipes. If temperatures are unequal, repeat the test in two hours, making sure not to use hot water in the meantime. If both pipes are equally warm, you don't have a hot water leak. If only the hot water outlet is still warm, you have a leak. The pipe will be warm all the way from the tank to the location of the leak.

Your Habits Can Reduce Demand

Shower vs. Bath.

A bath generally uses more hot water than a shower. A bath takes 15 - 25 gallons of hot water whereas a shower takes 10 - 15 gallons. You can

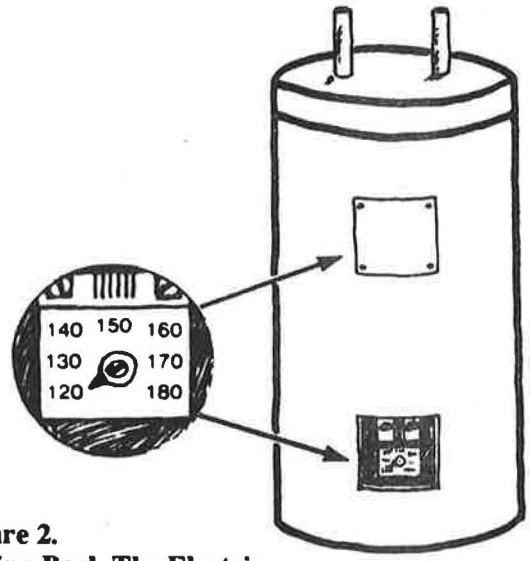


Figure 2.
Setting Back The Electric Water Heater Thermostat

compare the amount of water used in a shower to that of a bath by closing the drain before showering. If your tub is less full after a shower than it would have been after a bath, then you know you can save hot water by showering. If it's just as full, or even fuller, you may want to stick to baths or take shorter showers. When showering, turning off the water while soaping up is an effective way to reduce consumption.

Cold Water Wash – Laundry.

The clothes washer is second only to bathing in consumption of hot water. A standard size clothes washer uses about 25 gallons of hot water when operated in hot wash/warm rinse mode. A large capacity washer can use as much as 40 gallons of hot water.

One approach to reducing demand is to use a warm wash/cold rinse setting on your washing machine. This can save about 65 percent of the energy you would use with a hot wash/warm rinse. You should note that perspiration and oily stains can be difficult to remove from synthetic fabrics without hot water. Also, in addition to cleaning, hot water helps destroy bacteria.

Using cold water only for washing can be appropriate for some loads. This setting offers the greatest savings since no hot water is used. It is important to use a suitable cold water or liquid detergent for best results.

When shopping for a new washing machine, look for an energy-efficient, low water volume model.

Washing Dishes.

Automatic dishwashers use about the same amount of hot water as washing dishes by hand (10-16 gallons per load). However, some models require higher water temperatures to adequately dissolve the detergent. To conserve energy, only use the dishwasher when it's fully loaded, and switch it off when it reaches the dry cycle. The dishes will dry from the heat of the washer.

When shopping for a new dishwasher, look for an energy-efficient, low volume model.

Increasing Water Heating Efficiency

In addition to reducing the demand for hot water, there are a number of measures you can take to improve the efficiency of your hot water system.

Set Back the Water Heater Thermostat

The state of Washington now requires that all new water heaters be set at 120°F at the time of sale. This increases the safety and energy efficiency of the heater.

If your water heater was purchased prior to 1984, however, it's likely that the thermostat is set higher than this, probably between 140°F and 150°F. You should set it back if this is the case. Most people shower at a temperature of 105°F, so a setting of 120°F will still require mixing with cold water for a comfortable temperature.

Hot water temperatures greater than 120°F are not necessary and should be reduced for several reasons:

- It can cause scalding. Children and seniors are most often scalded. Scalding occurs in:
  2 seconds at 150°F
  15 seconds at 140°F
  30 seconds at 130°F
  10 minutes at 120°F
- It causes the water heater to lose heat at a much greater rate than would occur if the temperature was kept lower.
- It increases the rate of corrosion on internal fittings and other surfaces.

By setting back the thermostat to 120°F (down from 150°F), energy demand is reduced by 15 percent.

To learn how to set back an electric or gas water heater, see the WEES Energy Update titled *Setting Back the Thermostat on Your Water Heater* (UD1302).

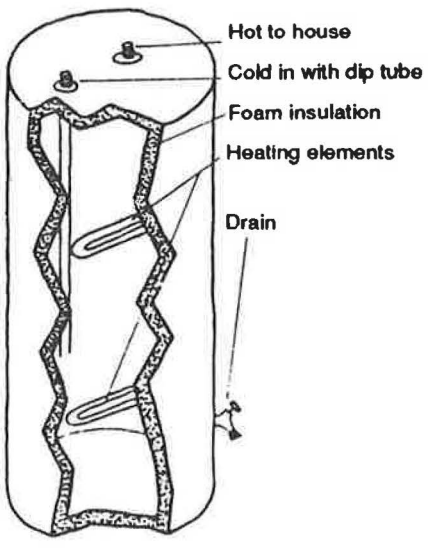
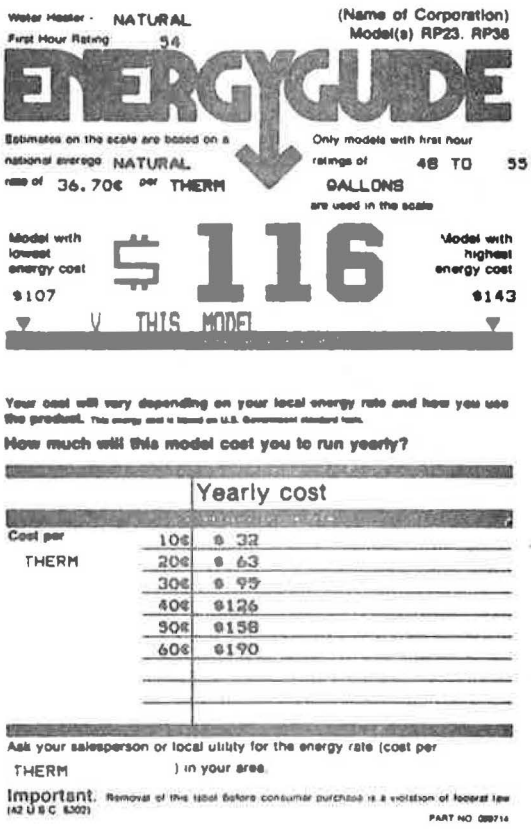


Figure 3.
Superinsulated Electric Water Heater


Water Heater - NATURAL
(Name of Corporation)
First Hour Rating 54
Model(s) RP23, RP38
ENERGY GUIDE
Estimates on the scale are based on a national average NATURAL rate of 36.70¢ per THERM
Only models with first hour ratings of 48 TO 55 GALLONS are used in the scale
Model with lowest energy cost $107
$116
Model with highest energy cost $143
THIS MODEL
Your cost will vary depending on your local energy rate and how you use the product. This energy cost is based on U.S. Government standard tests.
How much will this model cost you to run yearly?

Cost per THERM	Yearly cost
10¢	$ 32
20¢	$ 63
30¢	$ 95
40¢	$126
50¢	$158
60¢	$190

Ask your salesperson or local utility for the energy rate (cost per THERM) in your area.
Important. Removal of this label before consumer purchase is a violation of federal law (42 U.S.C. 6302)
PART NO 089714

Figure 4.
Sample Energy Guide Label

Insulate Your Water Heater

Older water heaters lose heat quickly because they contain only an inch or two of fiberglass insulation (R-5). To reduce heat loss, they should be wrapped with an additional fiberglass insulation.

Insulating kits can be purchased at home supply and hardware stores, and some electric utilities will install them at no charge for customers. Most have an insulating value of R-11 and will save $20 - $28 per year at current rates.

Rigid foam board insulation placed under the water heater can further reduce heat loss. About 2 inches of extruded polystyrene board is recommended since it resists compression and does not absorb water.

Gas water heaters should be wrapped with insulation specifically made for gas water heaters. These kits are designed so that they won't block the air intake and insulation will not come in contact with the flue. This is essential for proper functioning of the heater and to avoid a fire hazard.

Insulate Pipes

Your house is a good candidate for pipe insulation if you use water frequently throughout the day, if the pipe runs are long, or if they pass through an insulated crawlspace or basement. It is necessary to wrap hot water pipes only.

Pipe insulation comes in different forms:

- Closed-cell flexible foam tubes (R-3 to R-5);
- Rigid foam (R-7); and
- Fiberglass batts (R-11).

Anti-Convective Valves

If the hot and cold water outlet and inlet run vertically up from the water tank, convection up these pipes causes heat loss when the tank is not being used.

To reduce heat loss, anti-convection valves, essentially tiny ball check valves, can be purchased at plumbing outlets and installed on both the inlet and outlet of the water heater. You may need a plumber to install them for you. If so, wait until other plumbing work needs to be done. This will save on costs.

Water Heater Timers

Timers are not very effective at reducing energy use unless time of use (or "peak") rate structures are in use. Washington does not have these rate structures. Also, if the tank is well insulated, the savings from timers would be relatively small.

A water heater timer might save 36 kWh (or $1-$2) per year on a well insulated water heater. Tank insulation wraps, because they are simpler, less expensive and more effective, are a preferable means of saving energy.

Buying a New Water Heater

Water heaters have an estimated life of 10-12 years. After that time, most water heaters develop leaks from corrosion and need to be replaced. When it's time to replace your old water heater:

- Buy an energy efficient one. They cost somewhat more to purchase than conventional water heaters, but the savings in reduced heat loss can offset this in 2 to 4 years;
- Use the Energy Guide label. Affixed to all new water heaters, it helps you compare the energy use and cost of different models. The information on the label is derived from standard testing procedures established by the U.S Department of Energy. A bar scale offers the range of operating costs for similar models so you can see how the different models compare. Also, a yearly cost table allows you to estimate the cost of operation at your local rate.

Written by Randy Acker and Cynthia Putnam.
Illustrations by Sam McJunkin.

Suggested WEES Publications

Demand Water Heaters, (FS-1302).
Solar Domestic Hot Water Heating, (FS-1607).
Water Heating With a Woodstove, (FS-1705).

Washington Energy Extension Service

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