

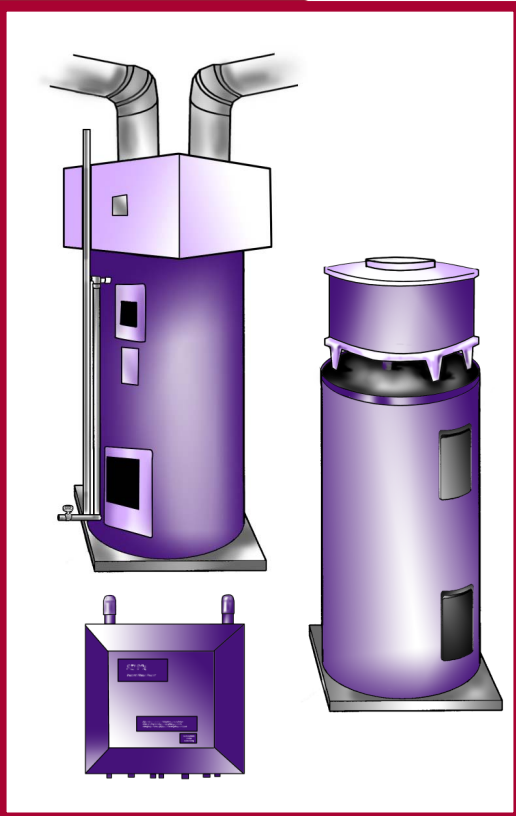
Energy Efficiency FACTSHEET

Energy Efficient Water Heating: Purchasing a new electric water heater.

Water heating accounts for about 18 percent of your home energy bill. Only space heating and cooling account for more. When you purchase a new water heater, energy efficiency upgrades can provide substantial savings. Because residential water heaters typically last 12 to 15 years, energy efficiency upgrades will provide long term benefits.

This fact sheet will assist you with your next water heater purchase. It provides descriptions of energy efficiency features you should look for. A comparison of the energy used by typical water heaters with and without energy efficiency features is also included. This will provide you with the information you need to choose a product that maximizes energy efficiency.

While this fact sheet focuses on new water heater purchasing, we would like to remind you that you will save the most energy through hot water conservation. Most households use 40 to 60 gallons of hot water per day. Large families may exceed this. If you frequently use a garden tub, or other high volume fixtures, your use could be as high as 80 gallons per day. Graph 1 illustrates the impact of hot water consumption on the annual electrical energy used by a standard electric water heater.

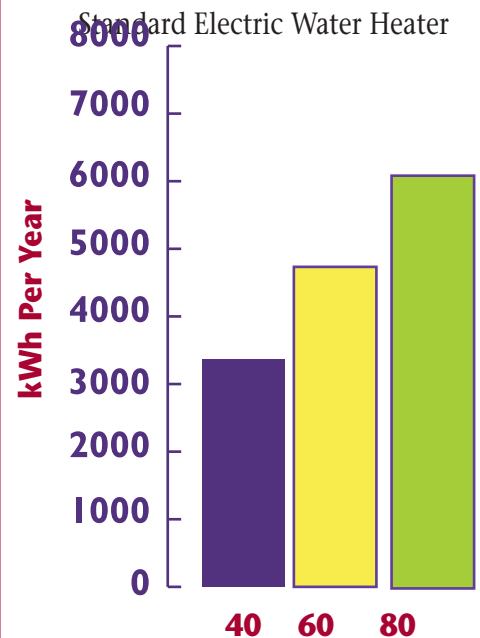


Definitions and Abbreviations:

Energy Factor (EF):

Average annual energy efficiency as determined by a standard test procedure. The higher the number, the more efficient the water heater. For example: a water heater with an 0.86 EF will deliver hot water at 86 percent efficiency. This rating includes the energy required to meet the water heating demand and the energy required to make up for the heat loss from hot water in storage. Look for the energy factor when reading the water heater's specification sheet.

Hot water use has a significant impact on your bill.



Graph 1

Hot Water Conservation Tips:

- Set your water heater thermostat at 120 degrees, no higher.
- Fix leaky faucets promptly.
- Install low flow showerheads and faucet aerators.
- Select short cycles and cold water rinse in the laundry.
- Only run full loads in the dishwasher.
- Consider water conservation when purchasing a new dishwasher or clothes washer. Look for the Energy Star label.

First Hour Rating:

The number of gallons of hot water a tank can provide in the first hour of operation. This includes the hot water available in storage plus hot water generated by the heaters in one hour. Look for the first hour rating on the water heater's specification sheet.

Electric, kWh:

Kilowatt-hour. Standard unit of measuring electrical energy use. Also the standard unit for billing. Equivalent to 1000 watts of electrical use for one hour. Each kWh will provide 3413 British thermal units of heat. Consult your electric bill for your local rates

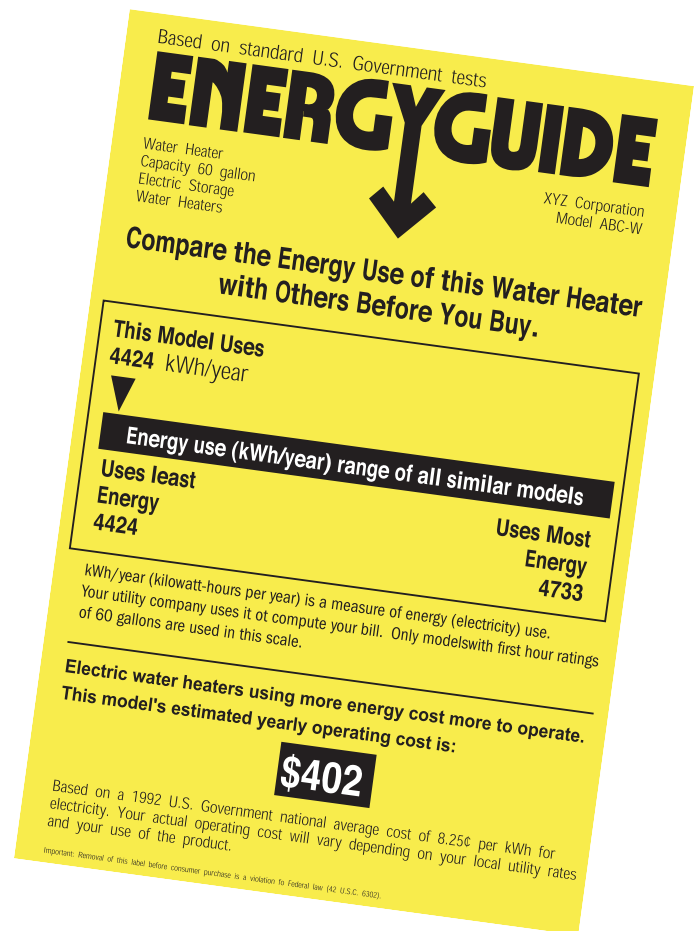
Which Water Heater is Best For You?

Most homes that heat their water with electricity have a 40-75 gallon tank with two electric heating elements. Other electric water heating options include heat pump water heater and instant water heaters. Each can reduce your hot water heating bill, but there are cost and limitations with these systems.

Graph 2 compares the energy use of four different water heaters: A 50-gallon electric storage water heater that meets the minimum federal standards, a similar electric storage water heater with R-24 insulation and better fittings, an instant water heater, and a heat pump water heater.

Look for the Energy Guide Label

The Energy Guide label will help you select a storage water heater that meets your needs. The Energy Guide compares the water heater being displayed to similar capacity models. The estimated energy use is listed and compared to the most and least efficient models on the market. The label also provides an estimate of cost per year to operate the water heaters, based on national average electrical cost.



Better insulation and fittings are the most common efficiency options

All storage water heaters lose heat from the tank and fittings throughout the day. By purchasing tanks with high levels of insulation and heat trap fittings you can improve the annual efficiency of an electric storage water heater by about 6 to 8 percent. Look for insulation levels of R-20 or higher. Heat trap fittings keep the hot water from drifting into the hot and cold water pipes when there is no demand for hot water. These features are available on all but the least expensive electric storage water heaters.

When the water heater is installed, two additional steps are recommended. Insulate the hot and cold water pipes within 18 inches of the water heater. If the water heater is placed on a concrete slab, place a 2 inch R-10 foam board under the tank. Both of these measures will also help reduce heat loss from the tank.

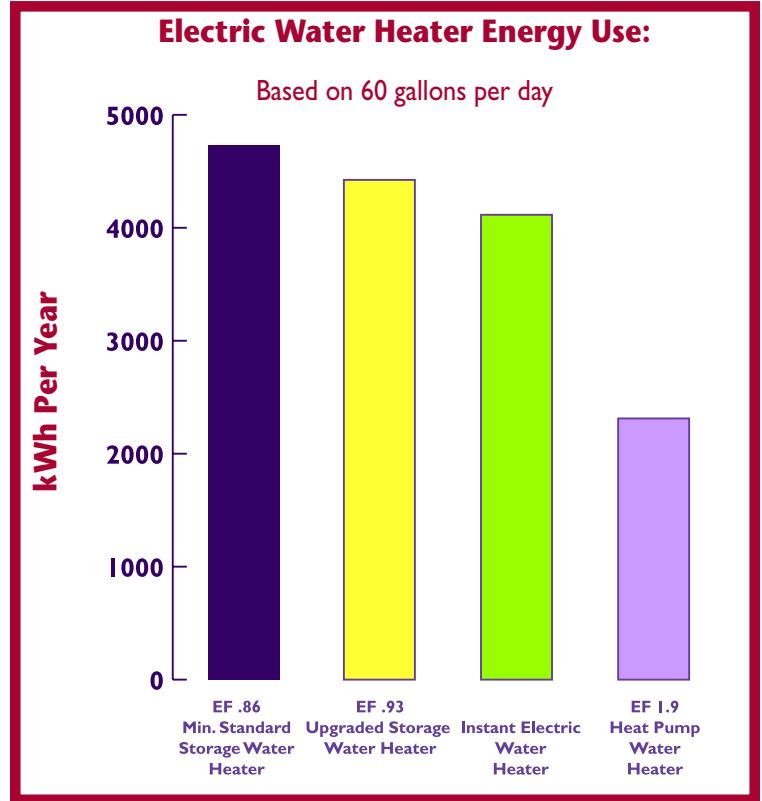
Heat pump water heaters

Heat pump water heaters can cut the cost of electric water heating by more than half. Using a mechanical process, heat pump water heaters capture heat from the air and transfer it to the water in the tank. There are two types of heat pump water heaters, "ambient air," and "exhaust air."

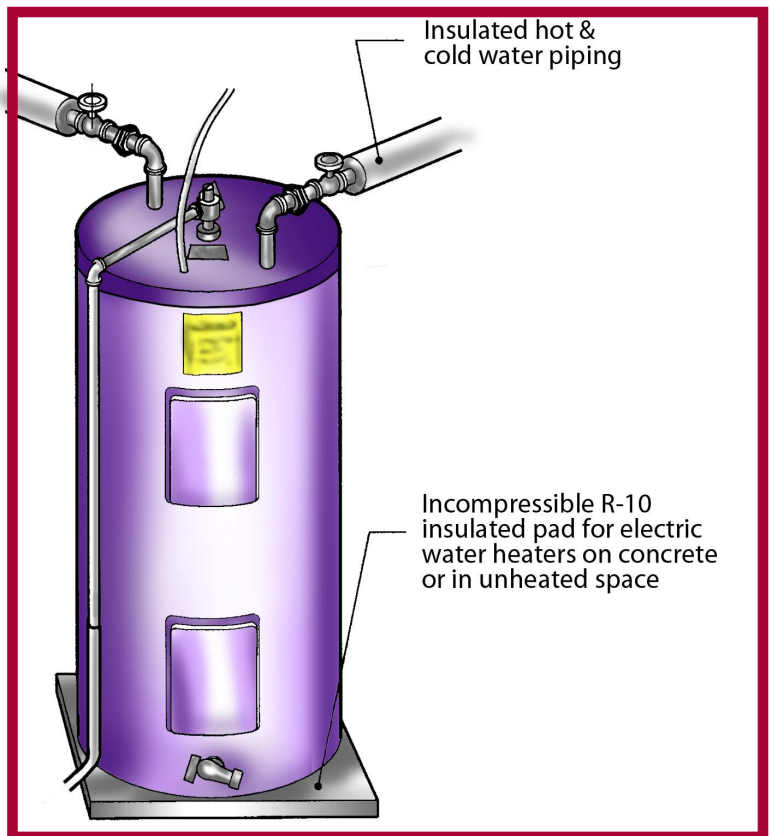
Ambient air heat pump water heaters take heat from the room they are located in and transfer it to the water in the storage tank. This not only heats the water, it also cools the room. Because of this, ambient air heat pump water heaters are most economical in hot climates.

Exhaust air heat pump water heaters capture heat from air that passes through the ventilation system or dedicated ducts. During operation a small volume of warm air is taken from inside the home and passed across the heat pump coil where it transfers heat to the hot water. The cool air that results is exhausted to the outdoors. When cooling for the home is desired, the exhaust fan can be run in reverse. This type of system is most economical in tight new homes that benefit from additional ventilation.

Ambient air heat pumps cost about \$700 while exhaust air models cost \$1400 or more. This is a substantial increase in cost when compared to a standard electric water heater. In addition, heat pump water heaters require more maintenance. If your electric rates are high, or you use a great deal of hot water, this may be a good choice. Check the resources at the end of this fact sheet for additional information on heat pump water heaters.



Graph 2

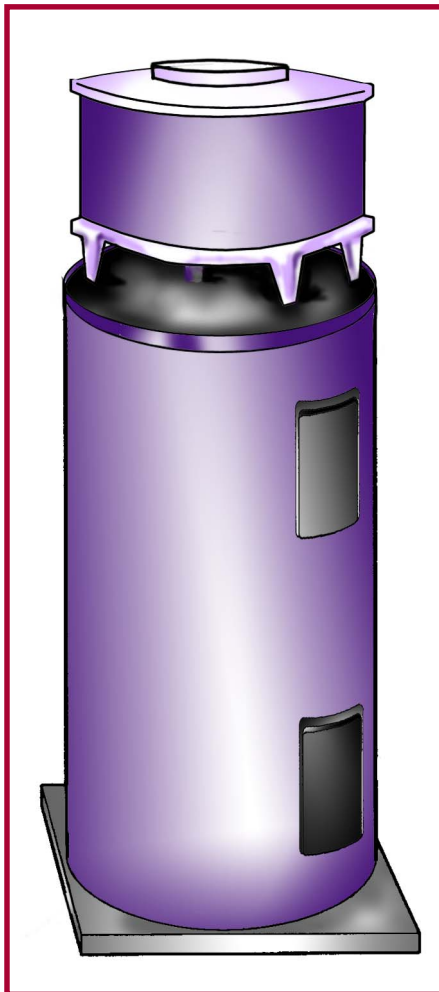


Standard Water Heater

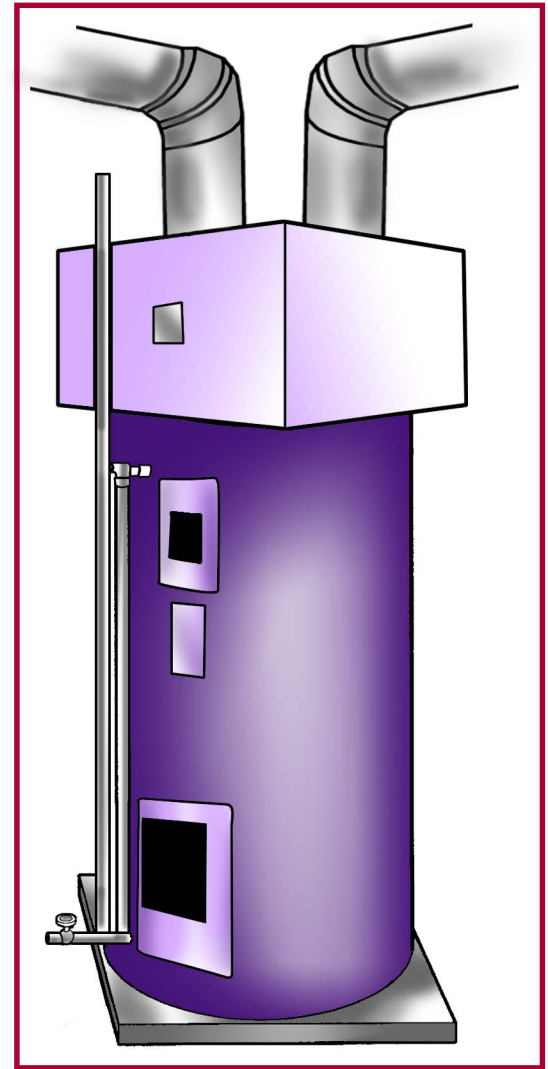
Instant Electric Water Heaters

Instant electric water heaters are able to heat the desired volume of water as it passes through the heater on the way to the fixture. No hot water storage is required. This optimizes the efficiency of the water heater.

Instant water heaters have advantages and limitations when compared to storage water heaters. High input instant water heaters will provide a gallon or more per minute of continuous hot water. This is enough to shower, or do just about any chore around the house. The limitation is that you will probably only be able to do one chore at a time. If two fixtures are operating at the same time, an additional heater may be needed. While the flow is limited, it is continuous. You can continue to draw hot water without running out. Large instant water heaters require as much input as your range or electric clothes dryer. A 240-volt, 40-amp service is typical. This level of service may not be available in an existing electrical breaker box. Smaller units are designed for low demand. Some small models are available that can be plugged into a regular electrical outlet.



Ambient Air Heat Pump Water Heater



Exhaust Air Heat Pump Water Heater

Instant Electric Water Heater Capacity:

Heater size – Kilowatts	Hot Water Gallons Per Minute
11	1.07
10	0.97
9	0.87
8	0.78
7	0.68
6	0.58
5	0.48

Table 1

“Off Peak” or “Time-Of-Use” electric rates and your water heater.

If your utility offers “off peak” or “time of use” rates you will want to use a storage type water heater. You may also want to consider additional storage capacity.

A growing number of electric utilities are offering lower rates to customers who will heat hot water on a schedule that the utility selects. This usually means shifting the time the heating elements are on from 7 or 8 AM to 11 or 12 AM. If your utility offers this type of rate structure, a larger storage tank will be useful. More capacity will make sure you have hot water throughout the morning, even without turning on the heating elements.

If you select an instant water heater you will not be able to take advantage of these rates without giving up hot water completely during peak hours.

Utilities control your water heater by using a timed switch or through a radio controlled switch. This equipment will not reduce the total energy your water heater uses. It simply changes the time of day that the water heater is on. This provides your utility benefits that they pass on to you as a lower household rate. Contact your local electric utility to determine if these rates are available in your service area.

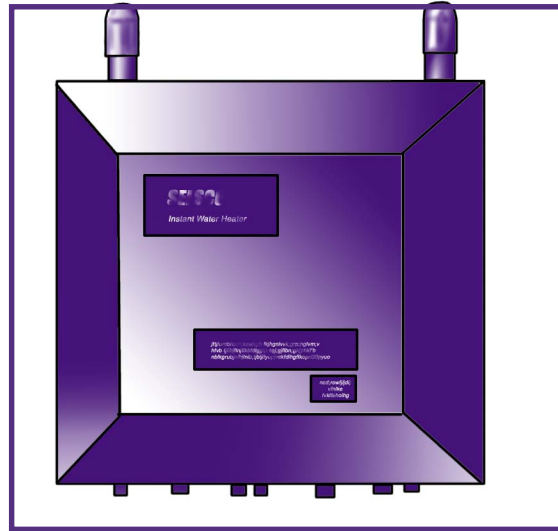
Make Sure You Have Enough Hot Water

Electric Storage Water Heaters

When shopping for a storage water heater, look for the “First Hour Rating.” This figure reflects the combined capacity of the hot water in storage plus the heating capacity of the electric heating elements to heat a depleted tank. For electric water heaters the best strategy is usually to buy a larger storage tank. Increasing the wattage of the heaters will only provide marginal benefits. The first hour rating of typical 50 to 100 gallon electric water heaters is usually slightly greater than the tank’s storage capacity.

Instant Electric Water Heater Capacity

Instant water heaters are rated for gallons per minute, not hour. Table 1 gives estimate of the volume of hot water produced by different size heaters. This table assumes an incoming cold water temperature of 50 degrees, with a hot water temperature of 120 degrees, a 70-degree temperature rise. Always consult the manufacturer literature for specific figures.



Instant Water Heater

Additional Resources:

Books

Consumers Guide to Home Energy Savings, American Council for and Energy Efficient Economy. Berkeley, CA
<http://www.aceee.org/consumerguide/index.htm>

Websites

Western Area Power Administration, Residential Efficiency
<http://www.es.wapa.gov/ee/>

Residential Heat Pump Water Heaters: Energy-Saving Alternative for Home Hot Water.

Pacific Northwest National Lab
http://www.pnl.gov/fta/3_res.htm

Federal Trade Commissions Energy guide
<http://www.ftc.gov/bcp/online/pubs/homes/applnces.htm>

Energy Savers, Department of Energy
http://www.eren.doe.gov/consumerinfo/energy_savers/

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