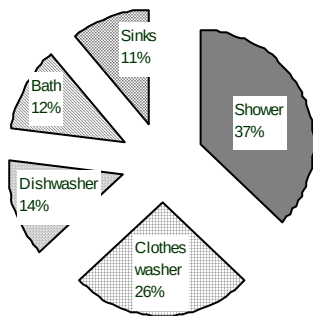




Water Heaters¹

Water heating is an important end-use that accounts for roughly 16% to 20% of a home's total energy consumption. The typical U.S. homeowners' hot water consumption, by place of use, is shown in the figure below:



Energy Conservation for Water Heating

No matter what type of energy source is used to heat water, be certain to take advantage of the savings from conservation measures:

- Lower the temperature setting on the water heater to 120°F.
- Wrap the outside of the water heater tank with an insulation jacket. This is especially useful for older water heaters, as new water heaters are often already well insulated. Insulate the first 3 to 4 feet of the cold and hot water pipes connected to the unit. Be sure to follow manufacturer's directions for installation.
- Install heat traps, or one-way valves, which allow water to flow into the tank and prevent unwanted hot-water flow out of the tank. Most new water heater models have factory-installed traps. The Florida Building Code states that such devices shall consist of either a commercially available heat trap or a downward and upward bend of at least 3½ inches in the hot water distribution line and cold water line located as close as practical to the storage tank. See Section 612.1.ABC.2.2 (Heat Traps) of the *Florida*

Building Code, Building volume (Chapter 13), for further detail.

- Put in shutoff valves on low-flow showerheads and kitchen faucets, which are designed to dribble when closed, so water in the pipe stays at the selected temperature while soaping, shaving or shampooing. These valves are built into many low-flow heads.
- Include low-flow aerators or laminar flow controls on sink and lavatory faucets.
- For new construction, minimize the piping runs to the bathroom and kitchen by design or by centrally locating the water heater.
- Insulate buried hot water piping for new construction to minimize heat loss while hot water is flowing through or remaining stagnant in the pipes. Leave an area 6" below and 6" above the slab *free* of insulation, as having insulation *through* the slab may increase the potential for insect problems.
- Install ENERGY STAR® washing machines. Most of the energy consumed when washing clothes is used to heat the water.
- Install ENERGY STAR® dishwashers; as with clothes washers, most of the energy consumed by dishwashers is used to heat the water.

Selecting an Efficient Water Heater

Sizing

The peak-hour demand capacity or the first hour rating (FHR), which is required on the EnergyGuide label, is actually more important to energy efficiency than the size of the storage tank. The FHR is a measure of how much hot water the heater will deliver during a busy hour. Gas water heaters with smaller tanks usually have higher capacities (FHRs) than models with larger tanks. The tank size needed will depend on the number of people living in the home and their patterns of usage. Selecting an oversized water heater

¹**DISCLAIMER** – This piece is intended to give the reader only general factual information current at the time of publication. This piece is **not** a substitute for professional advice and should not be used for guidance or decisions related to a specific design or construction project. This piece is not intended to reflect the opinion of any of the entities, agencies or organizations identified in the materials and, if any opinions appear, are those of the individual author and should not be relied upon in any event. Applicable to 2004 Florida Building Code.

will not only raise the purchase cost, but will also increase energy costs due to excessive cycling and standby losses.

The American Council for an Energy-Efficient Economy's (ACEEE) *Consumer Guide to Home Energy Savings* (http://www.aceee.org/consumerguide/peak_water_demand.pdf) and the Gas Appliances Manufacturers Association's (GAMA) *Consumer's Directory of Certified Efficiency Ratings* (<http://www.gamanet.org>) provide good, simple guidance on proper sizing of water heaters.

Fuel Type

One of the first steps in choosing a water heater is to determine the appropriate fuel type. Natural gas water heaters are *generally* less expensive to operate, but not always—check local rates. Also check rebates from your local utility company.

Energy Factor

Once you have decided what type of water heater best suits your needs, determine which water heater in that category is the most fuel efficient. The best indicator of a heater's efficiency is its Energy Factor (EF), which is based on recovery efficiency (i.e., how efficiently the heat from the energy source is transferred to the water), standby losses (i.e., the percentage of heat lost per hour from the stored water compared to the heat content of the water), cycling losses, and an average household use of 64 gallons of hot water per day. The higher the EF, the more efficient the water heater. The Office of Energy Efficiency and Renewable Energy, Department of Energy, sets the minimum energy factors of water heaters.

Electric resistance water heaters have EFs ranging from 0.7 to 0.97 (the most efficient electric storage water heaters all have energy factors between 0.94 and 0.97). The most efficient gas-fired storage water heaters have energy factors ranging from 0.60 to 0.67 with some high-efficiency models ranging around 0.8; and heat pump water heaters from 1.8 to 2.5. The efficiency of a dual integrated system is given by its combined annual efficiency, which is based on the AFUE of the space heating component and the energy factor of the water heating components. The US Department of Energy has an interactive Energy Cost Calculator for Electric and Gas Water Heaters at http://www.eere.energy.gov/femp/procurement/eeep_waterheaters_calc.cfm

EnergyGuide label

In the U.S., all water heaters are sold with a bright yellow and black EnergyGuide label to indicate the estimated annual energy consumption and operating cost of the appliance at a given rate. The labels provide estimated annual energy consumption, showing a range for similar models. By comparing a model's annual operating cost with the operating cost of the most efficient model, you can

compare efficiencies. Be sure to check the electric or fuel rates in your area for comparison purposes.

Types of Available Water Heaters

The following types of water heaters are now on the market: conventional storage, demand, heat pump, tankless gas/demand, indirect, heat recovery unit, and solar. It is also possible to purchase water heaters that can be connected to your home's space-heating system.

For safety as well as energy-efficiency reasons, when buying fuel-fired water heaters, look for units with sealed combustion or power venting to avoid back-drafting of combustion gases into the building.

If fuel-fired water heaters are located in interior spaces, such as interior mechanical rooms connected to conditioned spaces or laundry rooms, they should include provisions for outside combustion air. The Florida Building Code includes requirements for fuel-fired appliances, such as water heaters and furnaces. In particular, "Chapter 7: Combustion Air" of *Florida Building Code, Mechanical*.

Other Resources

Tankless Water Heaters:

<http://www.toolbase.org/techinv/techDetails.aspx?technologyID=1>

Plumbing Manifolds:

<http://www.toolbase.org/techinv/techDetails.aspx?technologyID=104>

Heat Pump Water Heaters:

<http://www.toolbase.org/techinv/techDetails.aspx?technologyID=128>

Hot Water Recirculation Systems:

<http://www.toolbase.org/techinv/techDetails.aspx?technologyID=142>

Solar Water Heaters:

<http://www.toolbase.org/techinv/techDetails.aspx?technologyID=112>

Drainwater Heat Recovery:

<http://www.toolbase.org/techinv/techDetails.aspx?technologyID=168>

Don't know where to go for an answer to a specific question?

Contact: Building A Safer Florida, Inc. 1-850-222-2772 or www.buildingasaferflorida.org

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