

Help

Appreciating Water Heaters

Stay Out of Hot Water by Knowing What to Look for in a New Water Heater

By Jeffrey Seisler

Most homeowners tend to think about hot water the way they do electricity. They expect it to be available in large quantities immediately upon demand, but take it for granted because it's such an integral part of everyday life.

But when there's not enough hot water to shower with, the absence of this "essential" creature comfort is a source of aggravation and frustration. Worse still, if a water heater suddenly stops working or if the tank springs a leak and needs replacing, homeowners tend to spend very little time—according to a private industry study—shopping for a replacement.

Water heaters are one of the less appreciated home appliances, but they account for about 15 to 20 percent of a home's energy usage and cost an average of \$150 to \$400 annually. Typically, the life expectancy of a water heater is about seven to 10 years, but it varies depending upon water quality and other factors. When it needs replacing, there are hundreds of models available produced by about 40 different manufacturers.

If your water heater is approaching the twilight of its years, having some familiarity with the equipment—pros, cons, costs and ways to select the right system—may help prevent you from throwing money down the drain.

NEW TECHNOLOGIES

Most appliances, including water heaters, come in three general ranges of quality. The "builder model" is often the bottom-of-the-line system in terms of cost and efficiency. What the builder of a new home saves on the cost of equipment, the homeowner will pay for in higher operating costs.

In such cases, the demise of a water heater can be a blessing in disguise, representing an opportunity to purchase a more efficient model. The average consumer opts for the "standard efficiency" system; it is a step up in cost and efficiency over the builder model, but it is still less expensive and efficient as the

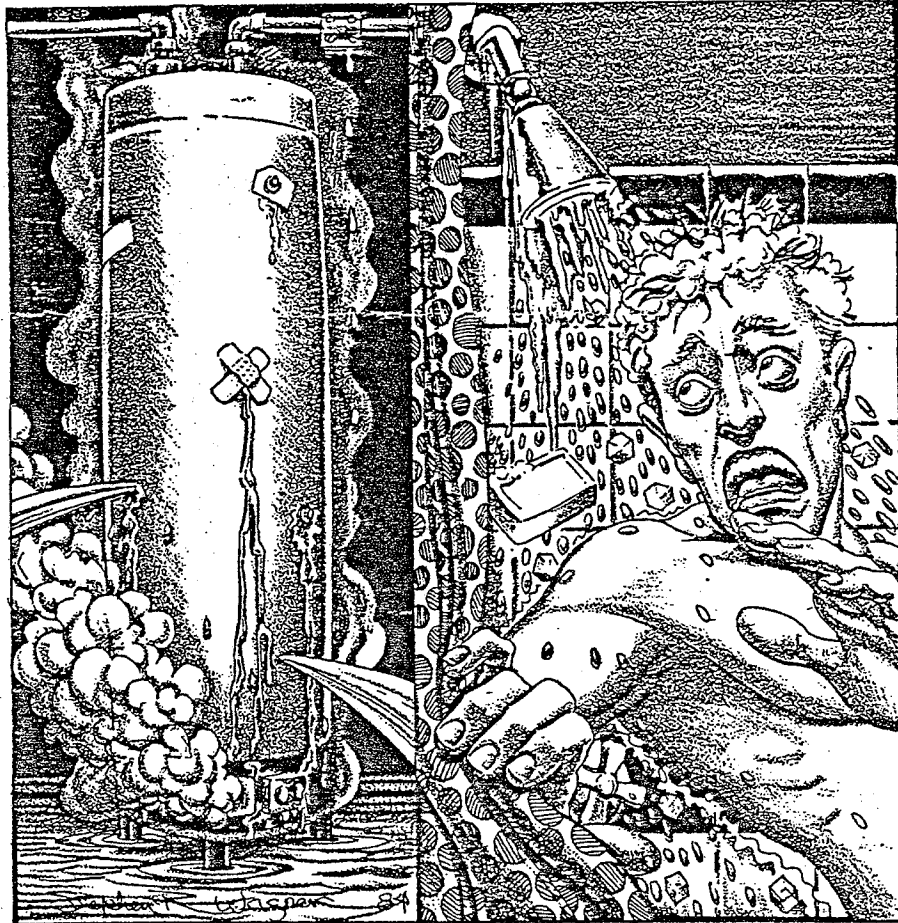


ILLUSTRATION BY STEPHEN WAGNER

top-of-the-line "high efficiency" variety.

Depending on your choice of energy source—electricity, natural gas, oil, or solar-assisted—there is a range of good equipment to choose from.

■ **Electric Water Heaters:** Most electric water heaters rely on the same engineering principle as they have for years—although contemporary models tend to be better insulated than older versions. Typically one or two electric resistance heating elements are submerged within the water tank. When the water temperature in the tank drops below a predetermined thermostat setting, the heating elements turn on.

Generally the efficiency of these systems is slightly above the average-efficiency gas water heater. But the time it takes to recover the hot water once the tank is drained is longer than

nonelectric varieties, and electric resistance water heaters usually have the highest operating costs.

The biggest improvement in electric water heaters is the heat-pump water heater. The heat pump removes heat from air in the house and transfers it, through the use of a compressed refrigerant, into the water tank. The compressed, heated refrigerant (like that used in air conditioners and refrigerators) travels through a heat-exchanger coil immersed in the water tank, heating the water.

Heat-pump water heaters typically save about 50 percent of the energy used by conventional electric water heaters, and are particularly ideal for indoor spaces that normally have waste heat, such as the basement near the furnace or the clothes-washing and drying area.

Two types of heat-pump water heaters are available: integral (with tank) and remote (without

tank). The integral model replaces the existing water heater. The system draws heat from the air and vents cool air into the house.

The tankless model is contained in a cabinet about the size of a room air conditioner. It is attached by two hoses or pipes to a standard water heater. The heat pump draws water from the water-heater tank (or from the main supply line), heats the water and returns it to the water-heater tank.

Heat-pump water heaters may be installed in basements, garages, crawl spaces or utility rooms—some care should be taken in the placement of the heater because exposure to extreme temperatures will reduce its efficiency. Normally they should not be located in occupied parts of the house, since they tend to draw heated air from the house and replace it with cooler air. Both types of heat-pump water heaters require

adequate air volume—about 1,000 cubic feet—or adequate ventilation for efficient operation.

Both systems produce a condensate near the refrigerant coils that is piped automatically out of the water heater, but which must be drained or pumped out of the house. These systems are available from about 21 manufacturers, most of which are domestic.

■ **Gas Water Heaters:** The standard gas-fired water heater has a burner beneath the water-storage tank. A thermostat controls the unit, signaling it when to generate sufficient flame to maintain a store of hot water.

The problem with these systems is that excess heat is lost to areas below and around the flame. Gas water-heater manufacturers have responded to this problem by developing a submerged heating chamber.

The gas-fired heating unit is located in a chamber within the water tank so that heat loss is reduced substantially. Coupled with adequate insulation around the body of the tank, this technology offers new opportunities to save gas energy for water heating.

Another recent entry in the gas water-heater market is a through-the-valled model. Most conventional water heaters require venting directly through the roof. This makes it more complicated to vent water heaters; it has been particularly difficult to install gas water heaters in multifamily buildings where through-the-roof venting tends to be very complicated. In apartment buildings, this means that individual, direct-vented gas water heaters can now be installed in each apartment, reducing the need to maintain a large quantity of hot water in a central boiler and allowing tenants to be metered individually.

Some gas appliance manufacturers have also developed systems that combine house-and water-heating function in order to avoid wasting heat. Such top-of-the-line systems, however, are economically attractive only if an entirely new system is being installed.

■ **Oil Water Heaters:** Oil-fired water heaters are produced by about a half-dozen manufacturer

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and appeal to homeowners who already heat with oil. If you currently heat with oil, do not have natural gas available and have a central boiler (which combines house- and water-heating functions), then a new oil-fired water heater is a logical choice. These systems are generally higher priced than comparable units using other fuels. They do, however, provide excellent heat recovery, so if you have a heavy "peak load" hot-water requirement and an existing oil furnace, the oil-fired water heater is an economically sound choice.

■ **Solar Water Heaters:** Until (and if) the federal tax credits run out as they are scheduled to in December 1985, solar will continue to grow as a popular alternative water-heating option. The quality and price of a solar water-heating system span a wide range; the system can be as simple as a dark, roof-mounted water tank with no moving parts (called a thermosiphon system) or as complex as an electronically controlled system with parabolic-shaped solar collectors that track the movement of the sun throughout the day.

Solar water-heating systems require a collector to capture the sun's heat. A heat transfer fluid—usually water or an antifreeze mixture—flows through pipes in the solar collector, is heated, and then flows either directly into the home's hot-water tank or into a separate storage tank. Normally two solar collector panels—about 40 square feet—are needed to fulfill the daily hot-water needs of a family of four. (This will vary by system, household, and region.)

Most solar water-heating systems can be expected to provide about 50 to 75 percent of a family's hot water requirements. Solar systems are compatible with any energy source used in conventional water-heating systems but their use and economics depend upon: the amount of sun your home is exposed to; the price of your current water-heating fuel, and the quantity of water used by your household.

A decision to go solar must be made with plenty of input from reputable dealers of solar equipment, which can be found in the Yellow Pages.

■ **Instantaneous Water Heaters:** An instantaneous water heater has little or no storage capacity and is activated when the hot water faucet is turned on to provide "instant" hot water. The instant heat is produced by a high temperature electric- or, in most cases, gas-fired burner. No energy is wasted keeping a 40- to 80-gallon tank of water heated day and night. For a household with relatively low hot-water demand—about 20 gallons per

day for a single person—an instantaneous water heater can be economical over the long run.

Gas and electric instantaneous water heaters are popular in Europe and the Far East. There are only eight or nine American manufacturers of instantaneous water heaters, according to the Gas Appliance Manufacturers Association (GAMA). About half a dozen European and Japanese firms have distribution agreements with U.S. firms.

CHOOSING THE RIGHT WATER HEATER

There are four criteria that should influence your choice of water heaters: first-hour rating, which is the measure of a water heater's ability to heat water quickly; the system's energy factor, a measure of overall efficiency; the first cost of the system; and the operating cost over the life of the system.

■ **First-Hour Rating:** A water heater should be able to provide enough hot water to meet a household's peak demand. Calculating the peak demand is easy. First, determine the general time of day when hot water is in greatest demand. Then, using industry-accepted estimates for water consumption per household activity, calculate the total number of gallons used during the household's busiest period. This is the first-hour rating your water heater will need. The rating number is shown on the energy efficiency label found on the water heater.

Here are some estimates for the average amount of hot water used in various household activities: a load in an automatic clothes washer uses approximately 32 gallons; a shower or bath, 20; a load in an automatic dishwasher, 14; food preparation, 5; hand-washing, 4; and a shave, 2. Estimates are from GAMA's directory of Certified Water Heater Efficiency Ratings.

■ **Energy Efficiency:** A water heater's energy-efficiency factor is also shown in the GAMA directory; the higher the number, the more efficient the system. The efficiency is calculated by dividing the amount of energy going into the water by the amount of energy consumed by the water heater.

■ **First Costs:** A water heater's first costs (installed) depend mostly upon the system's capacity and its efficiency. More efficient systems, some of which include timer controls and highly insulated tanks, tend to be higher priced. Here are some estimated costs for 30- to 80-gallon heaters: electric water heaters from \$255 to \$450; gas-fired systems, \$270 to \$615; oil systems, \$810 to

\$1,550; heat pump water heaters, \$600 to \$1,300. Prices vary with special dealer offers and sales.

■ **Operating Costs:** The cost of operating a water heater depends on the system's efficiency and the cost of energy. For comparative purposes the highest and lowest energy costs of similar water heaters are shown on the FTC label. In addition, the estimated yearly costs to operate the water heater are calculated in a chart that takes into consideration the different energy costs in various parts of the country (for example, the cost of a gas system is estimated using a cost-per-therm of natural gas of 60 cents, 70 cents, 80 cents, etc.). These labeling measures have been adopted to help eliminate confusion and assist consumers in making purchasing decisions.

Assuming industry averages for hot water consumption, operating costs by fuel type break down as follows: a natural-gas fueled system will cost from \$96 to \$315; propane (LP), \$198 to \$474; oil, \$233 to \$347; electric (resistance), \$163 to \$912; heat pump (with tank), \$44 to \$290; and heat pump (without tank), \$59 to \$336. Estimates are from the GAMA directory. Before shopping for a water heater, check your latest utility bill to determine your current energy prices.

HELP FOR CONSUMERS

One of the best sources of information for water heaters is GAMA's biannual directory of Certified Water Heater Efficiency Ratings. The certification program covers electric, gas, oil and heat-pump water heaters, and lists manufacturers, hundreds of model selections, energy factors, first-hour ratings and operating costs.

The directory is available for \$10 and can be ordered directly from GAMA in Arlington, VA (703) 525-9565. The directory should help you zero in on the best water heater for your household.

If you are interested in solar-assisted systems, contact the federally funded Conservation and Renewable Energy Inquiry and Referral Service (CAREIRS); it provides good, free information about local contractors and descriptions of currently available solar systems. Write to CAREIRS, Box 8900, Silver Spring, Md. 20907 or call (800) 523-2929.

If you are interested in the instantaneous water heater, call GAMA or the American Gas Association in Arlington, Va. (703) 525-9565 for distributors.

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For write to GAMA Efficiency Certification Program,
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