Tankless Water Heaters: Energy Savers or Demand Busters?

By James Tidwell and Alice Clamp

Editor's Note: Tankless, or instantaneous, water heaters are being sold to consumers and home builders with the promise of energy savings and an endless supply of hot water. A few localities are starting to see installations of these units, and particularly worrisome is their use in new subdivisions. Are consumers well-served by tankless water heaters? Could they create unwieldy spikes in demand for electric co-ops? CRN commissioned James Tidwell, a former co-op manager and HVAC contractor, to investigate this potentially disruptive technology and analyze its potential impact on co-ops and their consumer members.

Contents:

As the western suburbs of St. Louis grow into the service area of Missouri's Cuivre River Electric Co-op, Troy, Mo., townhouse communities rise up in what was once forest or farmland. One new development, though it is served from the nearby lines of an investor-owned utility, has caught the attention of Cuivre River and its generation and transmission co-op, Central Electric Power Cooperative (CEPC), Jefferson City, Mo., because of a new electric load installed by the builder.

While the 70 residential units use natural gas for cooking and heating, electricity is the choice for hot water. Not with traditional tank heaters, but "tankless" water heaters that heat water on demand.

Alabama Electric Co-op technician installs a meter to monitor a tankless water heater. Source: Alabama Electric Co-op

Nancy Gibler, director of business development at Central Electric, says the nature of tankless water heaters has the co-ops worried. "Each of these water heaters uses 28 kilowatts of power," she says. "Think of what that might mean for the utility if they all come on at the same time."

And though this development is served by the neighboring utility, "the same thing could happen to our member cooperative, Cuivre River," as more town homes are built, she says.

As the Missouri co-ops were wondering how to prepare for a possible influx of tankless water heaters, a co-op customer service manager from Ohio posted this message on Cooperative.com:

"I'm getting more and more requests from members for information on tankless water heaters, but I don't have any experience with them. Does anybody know a source for information that I could check into (such as a Web site)? Does anybody have an incentive program for tankless water heaters? What are your thoughts—pros and cons—on tankless water heaters (pros and cons for the co-op and pros and cons for the member)? Do you know how they compare (efficiency, operating cost, initial cost, installation cost, comfort, etc.) to standard water heaters?"

Tankless water heaters, also known as demand or instantaneous water heaters, have piqued the interest of some co-op customers, who have turned to their utilities for more information. While claims by vendors and home builders are readily available, the facts about tankless water heaters can be harder to come by.

A trend toward more use of tankless water heaters could mean a loss of steady kWh sales, while the cost of delivering power may rise as a result of demand spikes from the tankless units. For consumers, the question is whether tankless appliances deliver superior comfort and convenience at an acceptable cost.

The Marketing of Tankless Water Heaters

A tankless water heater does not store hot water. Rather, it heats water only as it is used. One or a series of heating elements within the water heater is activated when a hot water faucet or valve is opened. The unit heats the water as long as the faucet or valve is open. When it is closed, the tankless unit stops heating the water.

The companies that make tankless water heaters generally cite four advantages that their product has over a tank-type water heater:

- Unlimited (continuous) supply of hot water
- Instantaneous hot water if installed at point of use
- Reduced water-heating costs
- Small amount of space required for installation (usually wall-hung)

It is true that tankless water heaters do not require a lot of space. A large unit requires an area no larger than 24 inches square, and extends from the wall about 8 to 10 inches. But what about the other three claims?

Is It Realistic To Expect 'Unlimited' Hot Water?

An unlimited supply of hot water may sound appealing, but it is not compatible with responsible water use, particularly in those areas of the country suffering from drought or chronic water shortages. Moreover, even the largest whole-house unit may not supply enough hot water for simultaneous, multiple uses. Such a unit may be able to supply only two showers simultaneously or perhaps one shower, a dishwasher, and a sink. If the users demand too much water, the temperature will drop. On its Web site, the California Energy Commission cautions large families that "a tankless system probably won't meet your needs."

James Sanders, member services director for Carroll Electric Cooperative Corp., a distribution co-op headquartered in Berryville, Ark., points out that the temperature rise will be determined by the kilowatt capacity of the heating unit, the water flow, and the temperature of the incoming water.

Both the minimum and maximum hot water flow rate through the water heater are important. A field test of a 22-kW tankless water heater showed it had a flow rate of 0.25 gallons per minute (gpm) minimum, according to Alan Shedd, an engineer in the Commercial and Industrial Marketing division of Jackson Electric Membership Corp., Jefferson, Ga. The rate for a 28-kW heater was 0.7 gpm. Some bathroom faucets have a flow rate of 0.5 gpm, not enough to turn on the water heater, he notes.

"Pay attention to flow rates," says expert Tim Carter in his online "Ask the Builder" column. "As more hot water faucets are turned on at the same time, more water flows through the heater. When this happens, water may exit the heater before it gets to the desired temperature."

Home Energy Saver, a Web site sponsored by the U.S. Department of Energy, advises consumers to consider the minimum flow rate required. "Most [tankless water heaters] need a flow rate of about 0.5 gpm to

An Up-and-Coming Technology?

The Partnership for Advancing Technology in Housing (PATH) has selected tankless water heater as one of its top 10 technologies. Among the benefits, it says in a recent report (PDF 1.4 MB), are the units' compact size and the elimination of standby losses. PATH notes, however, that installation of electric units requires multiple circuits and/or heavier wire, and will draw more instantaneous power than tank-type heaters. "If electric rates include a demand charge, operation may be expensive," PATH says in some of its material. In addition, "more complicated electronics in tankless systems may require more attention than conventional tank units," PATH notes. Download Acrobat Reader.

PATH is a public-private initiative, supported by HUD, dedicated to accelerating the development and use of housing technologies.

Tankless water heaters have been installed in several PATH housing projects, and it has published field evaluations of five of those projects. One project—The Vistas at Kensington Park, in Dallas, Texas—is discussed in the research section of this report.

The tankless heaters installed in the Washington Square Development in La Plata, Md., have experienced some "nuisance problems" that PATH says are related to power surges. Further testing is needed, says the organization, to determine whether tankless water heaters can match the performance of tank-type heaters.

The other projects are: MADE Project in Bowie, Md.; Hughes Construction in Lexington, N.C.; and J.W. Miller Companies' Armory Park del Sol in Tucson, Ariz.

0.75 gpm to power up, but some are as high as 2 gpm, so they won't heat water unless you turn the water up high. This means you want to make sure that the flow rates at specific fixtures and appliances exceed the minimum requirements of the tankless heater you are considering." The editors of *E/The Environmental Magazine*, also offer an online caveat in their "Earth Talk" column. "While a constant supply of hot water is available through a tankless system, the flow rate may be somewhat limited, depending upon the needs of your household."

As the incoming water temperature drops, or as the volume of water moving through the heater increases, the temperature of the heated water will correspondingly decrease. The water temperature depends on the volume coming out of the faucet, says Carroll ECC's Sanders. "If you turn on the faucet only enough for a trickle of water, it will be cold. If you open the faucet further, you will trigger hot water—the hottest you'll ever get. If you open the faucet to maximum, the temperature will drop back a bit." It's possible to manufacture tankless water heaters that come on in stages—in increments of 1,000 watts, for example. But that results in a more complex unit that is subject to more maintenance, he says.

Is Hot Water Available Instantaneously?

Hot water is available instantaneously if—as the vendors note—the tankless heater is installed near the point of use. If a central, whole-house unit is located several feet away from the point of use, it will take a few seconds to a few minutes for hot water to get to the faucet, says Sanders. "It's instant at the heating unit, but it's not instant at the faucet. The water won't get to the faucet any faster than with a traditional water heater."

Do Tankless Heaters Really Save Money?

One company, E-Tankless Water Heaters, Kamloops, B.C., claims that its product can reduce heating costs by 50%, but most vendors give a figure of 15% to 20%. Of the brands reviewed for this report, only Microtherm/Seisco, Houston, referred to research to support the cost savings it claimed.

The California Energy Commission warns consumers that "sometimes [tankless water heaters] won't save that much energy or money." The American Council for an Energy-Efficient Economy, on the other hand, says it's possible to reduce energy consumption by as much as 30% with a tankless water heater. Who is right?

"I'm not sure there's a true story about the actual cost efficiencies of these units," says Neal Frizzell, vice president of member services at First Electric Cooperative Corp., a distribution co-op in Arkansas.

"The tankless heater manufacturers often claim all sorts of energy savings when you switch to their products," says Carter in "Ask the Builder." "My calculations show just the opposite."

In fact, tankless water heaters can save money, but not by heating water more efficiently. Rather, the savings stem primarily from the reduction of standby heat losses associated with tank-type heaters. But, says Carroll ECC's Sanders, if standby loss is the issue, it can almost be eliminated "with an insulated traditional water heater."

Some manufacturers of tankless water heaters say their units can match the performance of any 40-gallon tank heater. Without knowing what performance parameters are being compared, this is meaningless, says Jackson EMC's Shedd. "It's comparing apples to oranges."

He notes that storage water heaters are rated by first-hour rating—a number that takes into account the heating capacity and storage volume of the water heater and suggests how much hot water the user can get during one hour. A 50-gallon electric resistance heater might have a first-hour rating of 60 gallons. This doesn't mean it only supplies 60 gallons in 60 minutes, or 1 gpm. It can deliver 10 gpm from the storage tank until it's depleted. A one-hour interval is arbitrary and just about meaningless in determining whether the user will run out of hot water, says Shedd, who adds that field tests show 10 to 15 minutes is more representative for residential applications.

As with conventional tank heaters, if a consumer uses too much hot water, the temperature of the water from the tankless heater will drop to an unsatisfactory level.

While the feasibility of whole-house use is questionable, there are applications where a tankless water heater makes sense. It is a good option for a one- or two-person household, in a vacation home, or as a backup system for a solar water heater, according to the DOE Home Energy Saver Web site.

Smaller units are used for remote bathrooms or isolated areas that require only a modest amount of hot water. In some situations, consumers may prefer to have several smaller units serving individual bathrooms and other points of use to ensure that they have instantaneous hot water.

Consumers also buy small tankless water heaters for use in remote locations where smaller quantities of hot water are needed. One cooperative installed a tankless unit in a remote restroom where hot water was needed only for hand washing.

Caveat Emptor: What Co-op Customers Need To Know

What tankless water heater vendors fail to tell prospective buyers is probably more important than what they do tell them.

TVA Evaluated One System

The Tennessee Valley Authority (TVA) conducted an evaluation in 1997 of the Seisco electric tankless, or instantaneous, water heater. A Seisco RA-28 tankless water heater was installed in a home in Chattanooga, Tenn., by Siesco/Microtherm without TVA incentives or TVA involvement.

The residence had a natural gas water heater that was left intact and operation was alternated between the two units, with data being collected from both. The report notes that the hot water profiles for this house were not typical and could not be used for overall system analysis. The data analysis indicated that the unit "operated as claimed by Seisco with electric demand tracking the actual instantaneous water heating demand without the need for a recovery period."

During the test, blinking of the lights became obvious to the homeowner as well as to trained observers. The system was then monitored for harmonic distortion. The results suggested that the heavy current distortion produced by the unit was causing voltage drops and blinking. Seisco modified its solid-state controller and in September installed a new one, which reduced the blinking of the household lights to an unnoticeable level. Additional power quality testing did not reveal any problems.

TVA did not install the test system but did estimate customer benefits. Under the assumptions used, the system would save an average homeowner approximately $30 per year. The report concludes, "With savings this low, it is not anticipated that this system will be fully accepted by the mass market due to its long payback."

Tankless heaters are expensive, says "Ask the Builder's" Carter. "A large whole-house model typically costs $1,000. A traditional water heater that has a super-fast recovery time costs less than $500."

Purchased online, tankless water heaters can cost less. For example, a Seisco Model RA-28 whole-house unit is advertised on its Web site for $675 plus $15 for shipping and handling. The price in retail outlets for similar units may be considerably higher.

Tankless water heaters usually require an upgrade in electrical service, something the home improvement stores often do not mention.

A tank water heater with 4,500-watt elements operates on #10 wire and a 30-amp circuit breaker. The Seisco Model RA-28 whole-house tankless water heater has four 7,000-watt elements for a total electrical load of 28,000 watts. This load requires wire and a circuit breaker that will handle at least 120 amps, at a cost many times that of electrical service to a conventional tank water heater. The load will also necessitate a larger and more expensive meter loop and main panel for the house. In some cases, the customer also must pay for wiring between the distribution transformer in the neighborhood and the electric meter.

Kyle Murry, marketing vice president of Controlled Energy Corp., a water heating equipment manufacturer, acknowledges that the whole-house electric tankless water heater "has some very big limitations." Such a heater would need 120 to 160 amps of service, and he notes that many houses have only 200 amps for everything.

Consumers who want to replace an existing conventional water heater with a tankless unit or add a tankless unit in a home-remodeling project will incur initial installation costs much greater than for installations in a new home.

When a high amperage load comes on, voltage levels can be significantly affected. If a tankless water heater is installed in an existing home without upgrading the electrical service, low voltage or sudden voltage drops are likely to result in dimming lights, blinking lights, and other problems. Some co-op customers are complaining about blinking lights after reportedly connecting 28-kW tankless units in homes with 150-amp services on 10-kW transformers.

Given the expense of buying and correctly installing a tankless water heater, says Spencer Hoskins, a transmission engineer at CEPC, "I don't like the return on investment." Carter of "Ask the Builder" says "it could take years and years to achieve the breakeven point."

There is another consideration, too, notes DOE's Home Energy Saver Web site. "If a tankless heater breaks down, it may be hard to find a contractor who can fix it. And if it needs parts, they may not be readily available."

If consumers want to reduce their water heater energy costs, there are several ways to do so, according to a report by DOE's Oak Ridge National Laboratory. The report suggests such measures as tank insulation, temperature setback, timers, heat traps, and low-flow shower heads, all of which are more practical, much

less expensive, and have a greater return on investment than installing a tankless water heater in an existing home with a conventional water heater.

Understanding the Impact on Cooperatives' Demand

A major concern of electric co-ops is the effect of the tankless water heaters' kilowatt demand on peak demand for the system. "The tankless water heater isn't load-factor friendly," says Bret Curry, manager of energy marketing for Arkansas Electric Cooperative Corp., Little Rock.
"The biggest disadvantage is the high amp requirements when they start up," says First Electric's Frizzell. "It's a big detriment to our peak and wholesale power bill."
Central Electric Power has studied data collected from some Missouri residences that have installed 28 kW whole-house tankless water heaters, says Hoskins. "An average water heater puts out 2 kW to 5 kW—at the most—on the demand peak. The tankless water heater would make an instantaneous demand on the residence of more than 20 kW. Basically, it would quadruple water-heating demand."
A whole-house tankless water heater would, in many cases, prompt the need for a larger transformer and service wire, thereby costing the co-op a significant additional investment in the cost of serving that consumer. Larger transformers also will contribute to increased line losses. For one house, that's not significant. But if tankless water heaters are installed in a whole subdivision, "you have major problems," says CEPC's Hoskins. Referring to the tankless water heater-equipped townhouses near Cuivre River EC, he wondered, "If it happens in our community, what would we do?"
Although little research has been done on this subject, the use of hot water would logically be greatest in most homes during the evening and the early morning. In the summer, most systems peak during the late afternoon or early evening hours unless they have extraordinary agricultural or industrial loads. A large number of tankless water heaters installed on a system could significantly increase the peak demand and have an impact on power cost for the entire system.
For cooperatives that pay a ratchet demand charge, the impact would be multiplied. Rates for all members could eventually be affected by installation of tankless water heaters in large numbers.
Jackson EMC's Shedd says that limited testing has shown the diversified demand impact of tankless water heaters to be not much higher than that of the tank-type water heater. But he adds that more testing or simulation is needed. EPRI developed a program in the early 1990s to calculate diversified demand impact, but it apparently no longer supports the program. One co-op that used the program, called WATSIM, said that it limited the variables that could be modified to model various homes. Shedd says two other EPRI programs—HOTCALC and WATSMPL—are relatively quick and easy to use as screening tools.

Use of Electric Tankless Water Heating Systems in Europe is Modest

According to a 1998 study done for the European Commission (EC) by the Austrian Energy Agency, approximately 30% of households in the European Union (EU) use electric tankless water heating systems. By country the breakdown is as follows:

- 50% of households in Greece
- 35% of households in Sweden
- 13% of households in Finland
- 6% of households in the Netherlands
- 2% of households in Belgium
- 1% of households in the United Kingdom

Only in Finland is the number of instantaneous electric heaters expected to rise over the next decade.

What's Needed: More Research, Testing, Demonstrations

A few co-ops have put their toes in the water. "We have one or two tankless water heaters that we're collecting data on," says Debbie Marcum, Alabama Electric Cooperative's marketing support manager. "We popped meters on them when they first went in, getting in on the front end. We have six months of data, and need another six months."
So far, however, there isn't a lot of research—or test results—to support an informed decision on the part of electric co-ops.
Some of the research that has examined energy savings and water-heating costs is presented below.

- In 1992, the Army Corps of Engineers Construction Engineering Research Lab in Champaign, Ill., published a report on a water heater technology study involving the installation of tankless water heaters in Army family housing units at Fort Sill, Okla. American-made gas and electric tankless water heaters were laboratory tested, and five units of each type were installed in 10 similar residences. Five new conventional gas water heaters and five new conventional electric units were installed in another 10 residences for comparison. According to the report, "The tankless electric water heater provided a safe, sustained hot water supply, but the flow rate was lower than desirable. The average energy cost for the tankless unit was about 26% lower than for the conventional electric water heater. However, the tankless electric water heater required a costly electric service upgrade for each residence in which it was installed, and one unit malfunctioned early in the demonstration."
- Oak Ridge National Laboratory Report ORNL/CON-437 (PDF 10.9 MB) (Download Acrobat Reader), dated February 1998 and entitled "Review of Water, Lighting, and Cooling Energy Efficiency Measures for Low-Income Homes Located in Warm Climates," contains a section on tankless water heaters. The report says:

  "Hot water heating comprises 17% to 39% of the energy consumed by low-income homes in warm climates. Retrofit measures such as tank wrapping, heat traps, timed and reduced temperature setback, and low-flow showerheads are inexpensive and well-established techniques for reducing water-heating energy consumption. While other measures, including solar water heating, tankless water heaters, and heat pump water heaters, have proven savings potential, issues such as first cost, maintenance requirements, and customer inconvenience often inhibit implementation. Regardless, priority should be placed on installation of the less-expensive measures first, as significant savings can be achieved from these measures."

  The report lists tankless water heaters among the energy saving measures whose installation may be inhibited by first cost, maintenance requirements, and customer inconvenience. The report goes on to say that "Standby losses can be completely eliminated through the use of tankless, or demand, water heaters; however, delivery rates are low and electric units are likely to be discouraged by electric utility's [sic] interested in demand reduction." The report shows installation costs of tankless water heaters to be $795 (1998) with first-year operational savings of 315 kWh to 790 kWh. The calculated savings is $25 to $63, based on a price of 8 cents per kWh for electricity. Average annual savings are estimated in the report to be 10% to 15%, but the savings-to-investment ratio is low (0.32 to 0.80) because of the cost of tankless water heaters and installing them.
- The National Association of Home Builders Research Center published a report for the National Renewable Energy Laboratory (NREL) in April 2002 titled "Domestic Hot Water System Modeling for the Design of Energy Efficient Systems" (PDF 627 KB) (Download Acrobat Reader). The following is from page 41 of the report:

- “Simply replacing a tank heater with a demand heater resulted in an annual hot water energy savings of about 10% (538 kWh) for the high use home and 24% (550 kWh) for the low use home. By moving the demand heater to a central location in the home, the savings in the high use home increased to about 13% (719 kWh) and to 29% (685 kWh) for the low use home. When further changing the hot water plumbing to a parallel piping system, the savings for the high use home are further increased to 17% (920 kWh) and to 35% (817 kWh) for the low use home. These results, based on variable hot water demand for the same plumbing system, indicate that significant savings are expected for all homes switching to demand heaters, regardless of average daily hot water consumption.”

  

  Dennis Wease, manager of member services for Callaway Electric Co-op in Fulton, Mo. reviews interval meter data for a tankless water heater.
  Source: Callaway Electric Co-op

  The report goes on to note that “there is little published independent test data available on the performance of demand water heaters.” The report contains valuable information on average hot water consumption in gallons per day and has an extensive bibliography on documents of relevance.
- In July 2003, the Partnership for Advancing Technology in Housing (PATH)—a HUD-supported program—published an Interim Report for Field Evaluation of PATH Technologies on a tankless water heater project by Carl Franklin Homes in Kensington Park, Dallas, Texas. A Microtherm/Seisco RA-28 was placed in a test house. The unit was centrally located between the bath, kitchen, and laundry areas. The location was a short distance from all hot water taps in the compact house. The RA-28 was judged by the builder to be adequate for the needs of the Kensington Park homes.

  In order to fairly compare the performance of a tank and tankless water heater, a side-by-side configuration was run in an occupied house built by Carl Franklin Homes in Plano, Texas. A controller/data logger was installed to alternate the flow of water through the tank and tankless water heaters on a weekly basis, and to record temperatures, water flows, and energy consumption. The tankless water heater consistently showed lower energy consumption than the tank water heater because of the reduced standby losses and the reduced reaction time of the tankless unit. Even though the hot water delivery requirements were nearly identical for both systems, the tankless system used 13.5% less energy. The experiment resulted in a 95.1% efficiency rating for the tankless heater and 83.8% for the conventional heater. In the “Impressions” section of the report, the four occupants of the test house were generally pleased with the performance of the tankless water heater and were usually not able to determine which hot water system was in use.

Carl Franklin Homes installed more than 50 of the tankless units in homes over a period of three years. Their overall impression of the technology was good. However, because of several call-backs, Carl Franklin Homes determined that tankless water heaters may not be a desirable product for the first-time home buyer market. They have discontinued use of tankless heaters, but are willing to reconsider them in the future. Seisco has addressed several of the issues related to call-backs, including an automatic reset to the unit, which had been vulnerable to power surges. The company also modified its mold for the heating chamber, which had experienced some pinhole leaks.

The report concludes, "The Research Center has observed multiple installations of tankless water heaters. The technology has many positive aspects to offer: its compact size, lower energy usage, and potential for endless hot water. On the other hand, whole-house tankless water heaters are somewhat sophisticated appliances requiring computer-like processors to control temperature."

- CEPC's Hoskins compared demand figures for two houses in Missouri that had tankless water heaters installed. Each house showed spikes of 16 kW to 18 kW when the tankless water heaters operated. Although the units were rated at 28 kW, no more than two of the elements came on at one time during the data collection period. In one case, the meter recorded demand every 15 minutes and in the other case, every 5 minutes. However, sufficient data were collected to show the tremendous impact that tankless water heaters can have on demand.

  Hoskins says he would like to see someone do an actual same-household type study—operating a tank-type water heater for, say, a year and then installing a tankless water heater and operating that for a year. "Then we could compare the two in the same house." An alternative would be to find two homes that are the same, and operate the two technologies.

Operating costs for tankless water heaters have been shown to be lower than conventional water heaters, but there is not enough research that evaluates the lifecycle cost of this technology and its potential impact on electricity demand.

The most pressing need for research seemingly centers on the electrical demand requirements of tankless water heaters. The only information found on coincidental demands of tankless heaters was provided in the Seisco presentation to Alabama Power and involved Crane Creek Senior Apartments in Florida. The complex has 127 apartments, each with 14-kWh tankless water heaters, and a central kitchen with a 28-kWh tankless heater—a potential total water heating load of 1,806 kW. The highest billing demand shown in 23 months of Florida Power and Light billing history for the complex was 108 kW. The coincidental demand could have been higher at times, however, because most demand meters register the average demand over a 15-minute interval. Instantaneous demand was probably much higher but for short periods of time.

Data showing actual amperage draw on tankless water heaters in typical installations should be collected on short time intervals (one minute or less), which would give a more accurate picture of the potential impact on system demand. From that base data, projections could be run that would indicate the impact of larger numbers of tankless water heaters on a co-op's facilities and rates. Actual cost for demand and ratchet charges could be calculated for several theoretical but possible situations. Such research would benefit co-ops at both the G&T and distribution levels.

Other Resources and Web Sites

A presentation about tankless water heaters (PDF 12 KB) Download Acrobat Reader.

DOE Energy Savers, a page on tankless water heaters that leads to a tankless water heater fact sheet that provides tips for selecting one, as well as figures on costs and an extensive bibliography.

Energy Efficiency and Renewable Energy, DOE has several links to government reports about tankless water heaters.
National Association of Home Builders Research Center offers a PATH summary about tankless water heaters that includes some benefits and costs, links to field evaluations, and some contacts.
Partnership for Advancing Technology in Housing has links to several articles about tankless water heaters.
Seisco tankless water heaters
Seisco cost comparison tables
Toolbase Services, the homebuilding industry's technical information resource.

Water Heater Manufacturers:

Envirotech tankless water heaters
Tankless Inc. water heaters
Water Heaters Mall

Fact Sheets

Technology Fact Sheet, "Water Heating" (PDF 835 KB), Office of Building Technology, State and Community Programs, Energy Efficiency and Renewable Energy, U. S. Department of Energy, August 2001
Selecting a New Water Heater (PDF 149 KB), Energy Efficiency and Renewable Energy Clearinghouse, DOE/GO-10095-064, FS 205, January 1995. Download Acrobat Reader.
"Future of Water Heating Could Be Tankless," Atlanta Business Chronicle, May 28, 2004

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