

## THE HEAT PUMP WATER HEATER

### Why do we need new water heater technology?

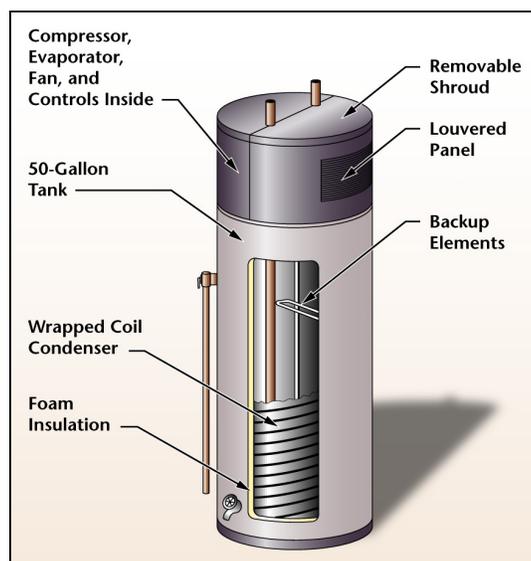
- Water heating accounts for 17% of the energy used in a typical household.
- Conventional electric resistance water heaters have just about reached their efficiency limit, at 95% efficiency.
- New technologies, not just improvements to existing ones, are needed.

### ORNL's new "drop-in" heat pump water heater (HPWH) could reduce U.S. energy consumption by 1%

ORNL's Buildings Technology Center (BTC), in partnership with private industry, has developed a "drop-in" residential HPWH that has an efficiency of 240%—2.60 times that of the best conventional electric water heater. The key to this impressive performance is a small heat pump located on the top of the water tank that consumes a relatively small amount of electricity to extract heat from the air surrounding the water heater. As a side benefit, the HPWH can also provide cool, dehumidified air.

### The specifics on the new HPWH

- Designed as a drop-in replacement for a conventional 50- or 80-gallon unit
- Can be installed by a plumber without any specific training for HPWH installation
- Installed cost is \$375–400 more than for a conventional water heater, but energy savings yield a 2-year simple payback
- Has proved durable for more than 3,000 compressor cycles in laboratory testing; tests to subject the design to the equivalent of 10 years of real-world use (7,000 cycles) are continuing
- Saves 5–10 kWh of electricity each day, depending on hot water consumption, the equivalent of \$130–260 annual savings for homeowners at average electricity rates
- National field demonstration study initiated in summer 2001



*The drop-in heat pump water heater developed at ORNL.*

### An even faster investment payback: the "hot-rod" HPWH can be used in your existing tank

The BTC is now developing—and received a May 2001 patent for—an advanced HPWH design that is even simpler to install and readily adaptable to a standard electric storage water heater. The hot-rod HPWH consists of a small packaged heat pump system that contains a bayonet condenser (the hot rod) that can be inserted through the threaded fitting at the top of a conventional water tank. The hot rod, heated by a small but efficient heat pump, transfers heat to the water inside the tank. This design allows easy conversion of a conventional resistance water heater into a HPWH.

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