

BUILDER'S GUIDE TO ENERGY EFFICIENT HOMES IN LOUISIANA: WATER HEATING - PART 2

by
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The Builder's Guide to Energy Efficient Homes in Louisiana (Builder's Guide) is being updated to reflect new code requirements. This is the thirteenth in a series of articles that will summarize the information in the guide and highlight updates.

Energy efficient retrofits to water heating systems generally follow three strategies.

1. Reducing hot water usage
2. Reducing standby losses from storage tanks and pipes
3. Reducing distribution losses through pipes and fittings

Repairing leaks in fixtures or pipes is the first priority for hot water energy conservation. Low flow shower heads also save energy by limiting hot water use in the shower and are one of the most cost effective energy conservation projects for homes. Insulating the hot water pipes can usually save 50 to 150 kWh per year in single family homes. Designing the system to reduce the length and diameter of the piping is the most effective way to minimize distribution losses in new water heating systems.

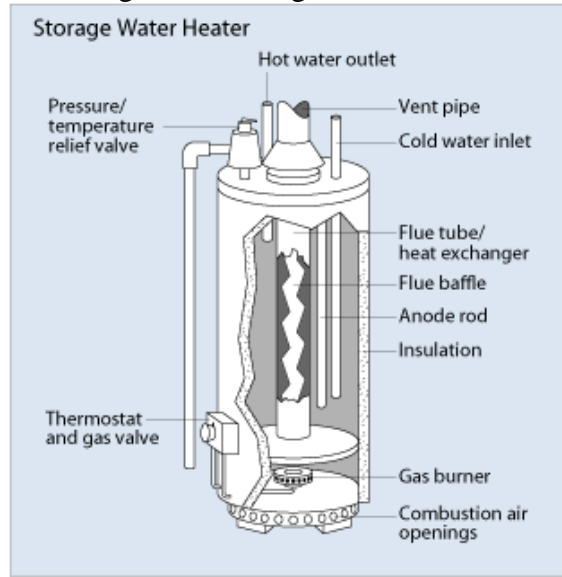
As fossil fuel costs continue to escalate, less energy waste in water heating is a very desirable goal. Conventional gas water heaters waste a greater percentage of energy than electric hot water heaters because of the design of the burner and venting system (Figure 1). Every molecule of air flowing out of the chimney carries wasted heat with it. Improved gas and oil water heaters reduce the losses by restricting the airflow through the flue and chimney and by eliminating the draft diverter (or barometric draft control). Two examples of improved combustion water heaters are:

1. Induced Draft Water Heater – uses a draft fan to pull the combustion gasses through the flue at the center of the hot water heater storage tank. The draft fan regulates the air that passes through the burner thus minimizing the excess air during combustion and also limits airflow during the “off” cycle
2. Sealed Combustion Water Heater – uses a combustion and venting system that is totally sealed from the home.

Storage hot water heaters dominate the single-family housing market in the United States, but indirect hot water heaters are common in multifamily housing facilities. An indirect water heater is a heat exchanger that derives its heat from a boiler, a solar collector, a heat pump or an air conditioner. A boiler is the most common heat source for indirect water heating systems (Figure 2). Indirect water heaters can have significant advantages over direct water heaters.

1. They eliminate the need for a chimney and the associated chimney losses.
2. An indirect water heater can surpass a direct water heater's efficiency if it is well insulated and linked to a boiler that provides space heating.

Figure 1. Storage Water heater

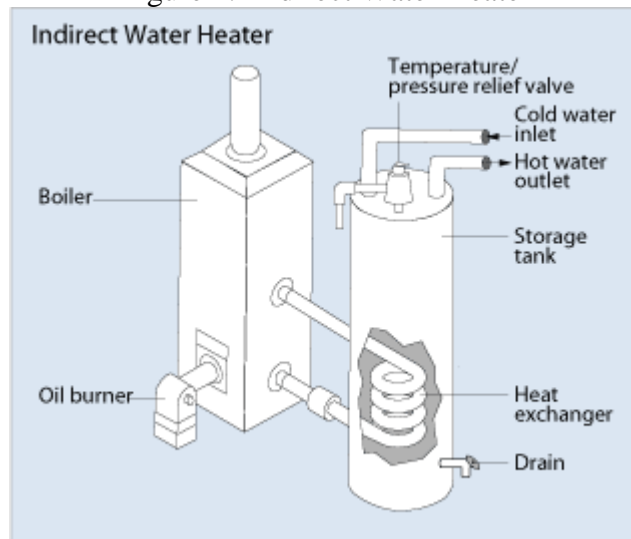


SOURCE: http://www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=12760

The two most common types of indirect water heaters are the immersed coil and the tankless coil water heaters. Immersed coil water heaters have a coil immersed in a tank of water with boiler water or solar heated water circulating through the coil. Tankless coils are heat exchangers installed inside a large boiler that are used for heating domestic water for a separate storage tank near the boiler.

Tankless water heaters (Figure 3), also called demand or instantaneous water heaters, provide a continuous flow of hot water at a specific flow rate and temperature. However, they might not adequately serve the needs of two or more fixtures. Demand hot water heaters offer a reasonable alternative when hot water use is moderate, space is limited and fuel is expensive. Tankless electric units are often used at remote fixtures far from the main water heater and in vacation homes.

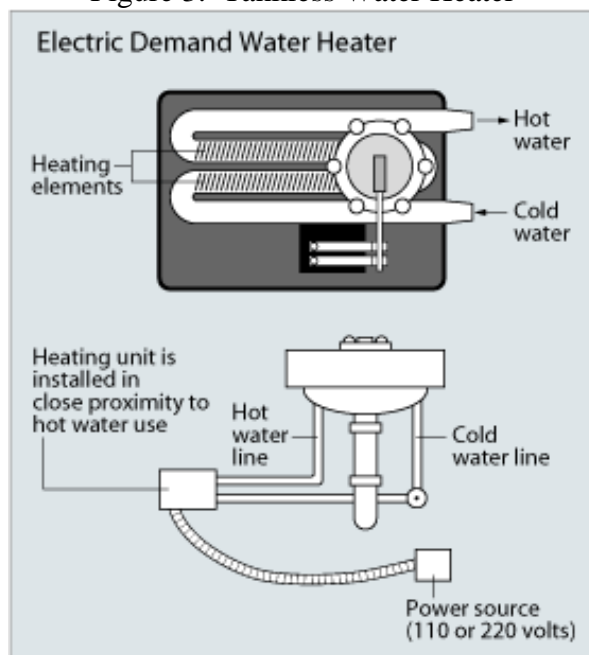
Figure 2. Indirect Water Heater



SOURCE: http://www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=12760

Solar hot water heating equipment is initially expensive, but it has a competitive life cycle cost with hot water heating storage units where hot water demand is high. Solar water heaters are classified as active (Figure 4) or passive (Figure 5) depending on whether or not they use a pump to circulate the water. Active solar water heating systems circulate water using pumps. They need freeze protection in temperate climates because their collectors become even colder than the outdoor air due to radiation losses into the night sky. Solar water heaters that circulate domestic hot water through the collector employ an automatic valve to drain the water back to the storage tank. Other solar water heating systems circulate a water antifreeze mixture through the collectors for protection from freezing. Antifreeze systems circulate the water-antifreeze mixture through the collector then through a heating coil inside a water storage tank. Solar water heaters are usually connected to back up water heaters in case of cloudy weather. Thermosiphoning solar water heaters are passive solar water heaters. They move water from the collector to a storage tank on top of the collector using only the buoyancy of the hot water.

Figure 3. Tankless Water Heater

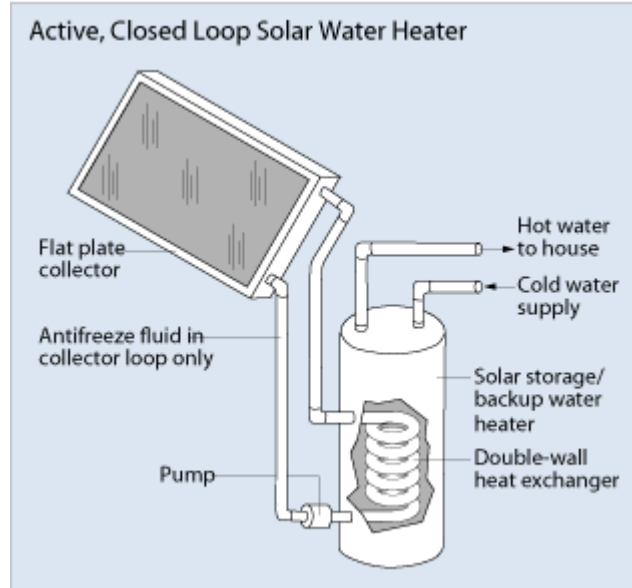


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This information was summarized from *Residential Energy: Cost Savings and Comfort for Existing Buildings* by John Krigger and Chris Dorsi.¹ More information on energy savings features, and the full text of the *Builder's Guide*, can be found on the DNR Technology Assessment Division website at URL: <http://www.dnr.louisiana.gov/tad> and click on the *Builder's Guide* link.

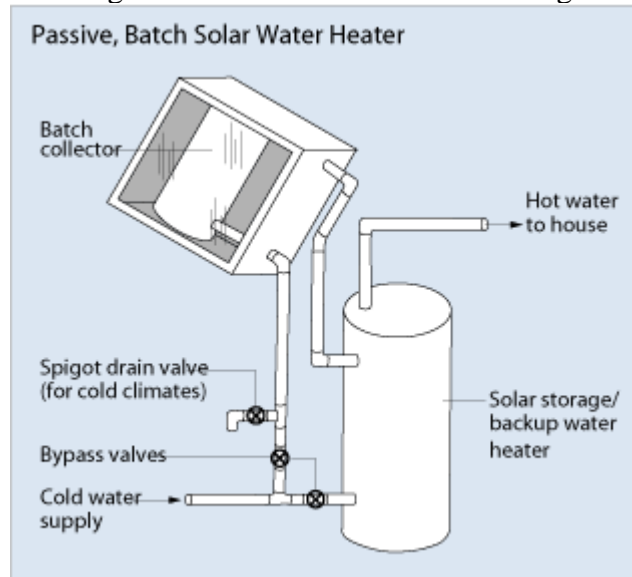
¹ John Krigger and Chris Dorsi, *Residential Energy: Cost Savings and Comfort for Existing Buildings*, Saturn Resource Management, Inc., Montana, 2004.

Figure 4. Active solar water heating



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Figure 5. Passive Solar Water heating



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