

Why would you heat a home with electricity?

Heating with electricity is expensive, right? If you utilize your cooperative's load management programs, electric resistance heat is competitive with other fuel sources and an affordable way to heat your whole home or areas that are hard to keep warm. Electric heat also provides a clean, safe and consistent form of heat. No flames!

Energy cost comparison

When comparing energy costs, consider the efficiency of the heating equipment. The following charts compare three efficiencies of electric heat versus propane and natural gas at 92 percent efficiency and fuel oil at 70 percent efficiency.

Electric resistance heat

(100 percent efficient)

Electric baseboard heat, electric boilers, radiant floor heating systems, cove heat, electric plenum heaters, electric thermal storage and space heaters have efficiency ratings of 100 percent.

Electricity per kWh	Gallon Propane	Gallon Fuel Oil	Natural Gas/Therm
6.0¢	\$1.48	\$1.72	\$1.62
7.0¢	\$1.73	\$2.01	\$1.89
9.0¢	\$2.22	\$2.58	\$2.43
11.0¢	\$2.72	\$3.16	\$2.97
13.0¢	\$3.21	\$3.73	\$3.50

For example, if you choose to heat with electric resistance heat and your cooperative's load management electric rate is 7 cents per kWh, that is comparable to paying \$1.73 per gallon for propane for a 92 percent efficient propane heating system, \$2.01 per gallon for heating with a 70 percent efficient fuel oil heating system and \$1.89 a therm to operate a 92 percent efficient natural gas heating system.

Air source heat pumps (ASHP)

(200 percent efficient = 6.8 HSPF)

The efficiency level of an ASHP ranges from 150 to 300 percent. Lower efficiencies typically occur during the coldest of winter days.

Electricity per kWh	Gallon Propane	Gallon Fuel Oil	Natural Gas/Therm
6.0¢	74¢	86¢	81¢
7.0¢	86¢	\$1.00	94¢
9.0¢	\$1.11	\$1.29	\$1.21
11.0¢	\$1.36	\$1.58	\$1.48
13.0¢	\$1.48	\$1.72	\$1.62

For example, heating with an ASHP and a cooperative's load management electric rate of 7 cents per kWh is comparable to paying 86 cents per gallon for propane for a 92 percent efficient propane heating system, \$1 gallon for heating with a 70 percent efficient fuel oil heating system and 94 cents a therm to operate a 92 percent efficient natural gas heating system.

Geothermal heat pumps

(400 percent efficient = 4.0 COP)

The efficiency level of a geothermal heat pump can exceed 400 percent.

Electricity per kWh	Gallon Propane	Gallon Fuel Oil	Natural Gas/Therm
6.0¢	37¢	43¢	40¢
7.0¢	43¢	50¢	47¢
9.0¢	55¢	65¢	61¢
11.0¢	68¢	79¢	74¢
13.0¢	80¢	93¢	88¢

For example, heating with a geothermal heat pump on a cooperative's load management electric rate of 7 cents per kWh is comparable to paying 49 cents per gallon for propane for a 92 percent efficient propane heating system, 57 cents per gallon for

heating with a 70 percent efficient fuel oil heating system and 54 cents a therm to operate a 92 percent efficient natural gas heating system.

How does load management work?

Load management programs are designed to save you and the cooperative money. There are two ways load management can make heating your home competitive with other fossil fuels.

- **Dual fuel:** On winter days, due to electric power market conditions, a signal is sent to your heating system to automatically switch to a backup non-electric heat source.
- **Heat storage:** If your electric heating system is able to store heat (i.e. in-floor heat submersed in a bed of sand or an electric heat system that utilizes ETS technology), your system "charges" during off-peak hours when electrical demand is low and then stores the heat energy so it is available when the thermostat calls for heat.



This information is brought to you by your local electric cooperative

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Electric plenum heater

Whole house electric heating and the ability to alternate between electricity and fossil fuel heating at the flip of a switch



An electric plenum heater can convert an existing natural gas, propane or oil furnace into a dual fuel system. Electric plenum heaters allows members to take advantage of low-cost load management electric rates and the flexibility to use the most cost-effective source at any time. Both a fossil fuel furnace and electric plenum heater utilize the same thermostat and ductwork. Electric plenum heaters may be installed in conjunction with central air conditioning and air source heat pumps.

Electric boiler

Zoning for supplemental and whole house heating are both possible with an electric boiler system

One of the most popular heating systems for residential and commercial applications is the electric boiler combined with a radiant tubing system. Electric boilers heat your home by heating water that circulates through tubing installed in the floor or in hot water baseboard heaters. Electric boilers can be zoned to provide the necessary heating requirements of most residential and commercial applications. If a floor installation boiler system has a backup heat source or if the tubing is submerged in sand to store heat, it can qualify for lower load management electric rates. Hot water baseboard heaters must have a backup heat source to qualify for load management electric rates.



Electric radiant floor heat

Ideal for kitchens, bathrooms, basements and hard-to-heat areas with high ceilings

Radiant floor heating systems provide a room with comfortable, even heat. The heat is distributed through tubing, electric cables or electric mat systems. Because the heat transfers directly from the floor rather than into the air, you feel warm even though the thermostat is at a lower setting. If the tubing, cables or mat system are submerged in sand, they can qualify for lower load management electric rates because heat can be stored in the sand. If the area does not allow a heat storage application, a backup heat source is necessary to qualify for load management electric rates.



Electric thermal storage (ETS)

ETS offers heating options from individual rooms to the whole house

ETS stores heat during off-peak hours for heating 24 hours a day, and utilizes the cooperative's lower load management electric rates. Room-sized ETS units are ideal for homes without a central duct system. They consist of specially designed bricks stored inside a cabinet. Electricity heats the bricks during off-peak hours when electric rates are lowest. When the thermostat calls for heat, a fan blows air across the heat-storing bricks to distribute heat throughout the room. A centrally ducted ETS system can be used as a furnace or can be combined with a heat pump to offer greater efficiencies and lower operating costs. A hydronic unit may be added to provide radiant floor heating.



Electric heat pumps

An electric heat pump captures the heat that occurs naturally in the air or in the ground. Heat pumps offer an energy-efficient alternative to standard furnaces and air conditioners. Like your refrigerator, heat pumps use electricity to move heat from a cool space into a warm space, making the cool space cooler and the warm space warmer. Because they move heat rather than generate heat, heat pumps can provide up to four times the amount of energy they consume.

• Air source heat pump (ASHP)
One of the most efficient ways to both heat and cool your home, an ASHP will need a backup heat source for extremely cold days

An ASHP transfers heat between your home and the outside air. It can deliver 1.5 to 3 times more heat energy than the electrical energy it consumes, making it efficient and economical to operate. In the summer, an ASHP cools your home. During cooler months, it also provides heat. On extremely cold days, most heat pumps have a balance point where supplemental heat kicks in to maintain the thermostat setting in your home. Having a non-electric backup heat source qualifies ASHPs for load management electric rates.



The split system is a version of ASHP that functions with indoor and outdoor components, transferring heat from the house to be evaporated outdoors in the summer, and transferring warmth from the outdoors to heat the house during the heating season.

Aesthetically, ASHPs resemble central air conditioning units. With the off-peak dual fuel rate, the difference is realized with lower cooling and heating bills.



• Geothermal heat pump
The most efficient heating and cooling system available, the geothermal heat pump will meet 100 percent of a home's heating and cooling year-round. Some systems also provide water heating.

A geothermal heat pump is the highest efficiency heating and cooling system available because it uses a renewable energy source: the earth. Geothermal heat pumps use the constant temperature of the earth to heat and cool. This allows the system to reach high efficiencies (above 400 percent) even on the coldest winter nights. A network of durable plastic coils is buried in the ground which absorb the earth's energy. A heat pump, connected to the coils, extracts that energy and converts it into heat. At the flip of a switch, the process can be reversed to cool your home.

Ground source heat pump coils can be installed vertically or horizontally. Some can also utilize ponds or groundwater.

