

Why would you choose to heat a home with electricity?

Heating with electricity is expensive, right? If you utilize your cooperative's load management programs, electric resistance heat is very competitive with other fuel sources and is a very affordable way to heat your whole house or areas that are hard to keep warm. Beyond being affordable, electric heat provides a clean, safe and consistent form of heat.

Energy cost comparison

When comparing energy costs it is important to 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

(200 percent efficient = 6.8 HSPF)

The efficiency level of an air source heat pump 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, if you choose to heat with an air source heat pump and your cooperative's load management electric rate is seven cents per kWh, that 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)

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¢

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

For example, if you choose to heat with a geothermal heat pump and your cooperative's load management electric rate is seven cents per kWh, that 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 electric thermal storage technology) your system "charges" during off-peak hours when electrical demand is low and then stores the heat energy so it is available whenever the thermostat calls for more heat.

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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 are possible with the electric plenum heater.

An electric plenum heater can convert your existing natural gas, propane or oil furnace into a dual fuel system. An electric plenum heater gives you the ability to take advantage of low cost load management electric rates and the flexibility to use the most cost effective source at any time. Both your fossil fuel furnace and the 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 heating 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 for 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

Kitchens, bathrooms, basements and hard to heat areas with high ceilings work well with radiant floor heat.

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



Electric thermal storage (ETS)

Electric thermal storage offers a menu of heating options from individual rooms to whole house heating.

ETS is a technology that stores heat during off-peak hours for heating 24 hours a day and utilizes your cooperative's lower load management electric rates. Room sized ETS storage units are an ideal option 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 even greater efficiencies and lower operating costs. A hydronic unit may be added to provide radiant floor heating.

Electric heat pumps

A heat pump is an electric device that 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
One of the most efficient ways to both heat and cool your home, the air source heat pump will need a backup heat source for those extremely cold days.

An air source heat pump transfers heat between your house and the outside air. It can deliver one and a half to three times more heat energy than the electrical energy it consumes, making it efficient and economical to operate. During the summer air source heat pumps cool your home like a central air conditioning unit. During the cooler months it also provides heat. When outdoor temperatures dip below freezing, 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 air source heat pumps for load management electric rates.

The split system is a version of air source heat pump 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.



You will notice how much the air source heat pumps resemble central air conditioning units—and with the off-peak dual fuel rate, you'll see the real difference in how much lower your cooling and heating bill is with the air source heat pump.

• 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.