



# FUEL TYPES

Selecting heating  
and cooling systems

While the price of everything seems to be increasing, using electricity is still the best value for your money. Electric cooperatives work hard to keep electricity as a great value, even as the cost of other commodities increase.

Even so, there are several variables to consider when selecting a system for your home's heating and cooling needs. Your monthly electric bill is a primary one. The initial cost of the system is another. Also, consider the lifetime maintenance costs.

Calculating the relative cost of fuels is simple. First calculate the cost of one Btu of each fuel type. This is done by dividing the utility rate or price per gallon, cord, etc., by the Btu heat content in that amount of fuel. Next divide this result by the efficiency of the heating appliance. Without including efficiency in your calculation, you cannot make a fair comparison. An electric water heater is nearly 100 percent efficient while a gas water heater is only about 80 percent efficient. Therefore it will take five units of gas energy input to accomplish the same work as four units of electric energy.

## Typical heat contents for common fuels

- Natural gas: 1,025 Btu/cubic foot
- Oil: 138,700 Btu/gallon
- Propane: 91,000 Btu/gallon
- Electricity: 3,414 Btu/kilowatt-hour
- Firewood: 22,000,000 Btu/cord
- Corn: 448,000 Btu/bushel

## Typical efficiencies

- Heating oil furnace: 55–65%
- Old gas/propane furnace: 60–70%
- New gas/propane furnace: 80–85%
- Electric heat: 99%
- Heat pump (air source): 200–250%
- Heat pump (ground source): 300–350%

In many areas, geothermal heat pumps are the least expensive to operate because they tap into the natural heat in the ground. Their drawback is a significantly higher installation cost.

During mildly cold weather, the heat pump is less expensive to operate than the furnace. As the outdoor temperature drops and the heat pump becomes less efficient, the gas or oil furnace takes over. A contractor can adjust the changeover temperature based on the relative local cost of gas/oil and electricity.

## Btu (British thermal unit)

A Btu is the amount of energy that will heat one pound of water by 1 degree Fahrenheit. It is approximately equal to the heat content available from one wooden match.



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## Geothermal heat pump

Geothermal heat pumps operate like air-to-air heat pumps, moving rather than creating heat; however, they use the ground or water as a heat source and heat sink, rather than outside air. And, because the ground or water temperatures are much more constant year-round (warmer in winter and cooler in summer) geothermal heat pumps operate more efficiently than air-to-air heat pumps.

Geothermal heat pumps are becoming increasingly popular due to their heating and cooling energy efficiency, and related environmental and ownership benefits, especially where ground water is available or soil conditions are favorable.

In the heating mode, a geothermal heat pump typically extracts two-thirds (or more) of the needed energy from the earth or water loop and moves it indoors. Only one-third of the energy needed is purchased power, primarily used to run the compressor. In the summer, geothermal heat pumps move heat from indoors into the relatively cool earth or water loop.

Geothermal heat pumps have lower operating, maintenance, and life-cycle costs, increased reliability, and provide greater comfort than other heating and cooling systems.

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### Sources

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