

A NEW LOOK AT AN OLD FUEL SOURCE

HOME HEATING FUEL

Wood Pellets or Firewood

The increase in home heating costs from the traditional energy sources—electricity, fuel oil, natural gas and propane—has created renewed interest in the use of wood as a fuel.

Heating accounts for about one-half of the energy use in the typical residential home: approximately 100 to 150 million British Thermal Units¹ (BTU) of energy.

This means the selection of the home heating energy source can have a big impact on your budget as well as costs to the environment for the production and delivery of the fuel.

The technology for using wood as a home heating fuel has come a long way in the last several decades. Until the 1970s, the processing and utilization of wood as a fuel had not changed much over the centuries. Back then, wood fuel was typically split logs burned in a fireplace or wood stove. While this is still a common means of using wood as a heating fuel, the use of wood pellets is gaining in popularity.

Whether wood as a fuel is in the form of firewood or wood pellets, it can provide a number of important benefits to you, the local economy and the environment.

Why Wood?

It is renewable.

There is a finite limit to the extractible fossil fuel resources but, with proper management, wood can provide an indefinite supply of fuel. Currently in South Dakota, the growth of our forests far exceeds the harvest.

It is another use for forest wood waste.

The common source of the wood processed into fuel-as-wood—pellets—is a by-product of wood utilization. The tree is harvested for wood products and the unused wood and sawdust is processed into wood pellets. The processing of wood pellets can also be done from the smaller diameter trees that were cut as part of a thinning. As an added benefit, removing the smaller diameter trees in a forest will allow others to grow better.

It is regionally produced and processed.

The transport of this fuel can be a much smaller footprint than that created by natural gas, propane and fuel oil. Furthermore, the money spent on the harvesting and processing of wood fuel stays in our state and the surrounding ones.

Its cost is more stable than other fuels.

The price fluctuation of wood, either as a pellet or firewood, does not have the price volatility of other energy sources.

It is environmentally sound.

The harvest, processing and use of wood for heating can result in lower emissions of greenhouse gases in comparison to other fuels. Trees are an efficient means of capturing CO₂ from the atmosphere; the carbon is bonded into the wood and not released until the wood is consumed for heating.

It allows independence.

And finally, the use of wood allows us to decrease our imports of energy from other countries. We have abundant forest resources in South Dakota and the United States. Properly managed, these forests can provide a steady supply of wood as a fuel.



Wood Pellets as a heating fuel

Wood fuel is typically thought of as a fireplace or wood stove that burns split logs. Times have changed and pellet stoves are beginning to dominate the wood-as-fuel market. Today, more than one-half million homes in the United States use wood biomass pellets for their heating source, either as the primary source or as a supplemental source.

Wood Pellets

Pellets are compressed and dried wood biomass. The biomass can come from the waste wood at the mills (sawdust, for example). This wood is dried to a moisture content of 5% to 10% and has a heating value of about 8,200 BTU/pound or 16.5 million BTU/ton. The end product is a low-moisture fuel that is energy efficient and has low emissions.

Pellet Stoves

Pellet stoves are most commonly used as zone heating, meaning the heat is directly produced in a room. But wood biomass can also be used as a furnace or boiler in a centralized heating system. The stoves or furnaces can be automated with a bin that holds the pellets. Pellets are commonly available in 40-pound bags throughout the state.

Pellet stoves can be highly efficient and emit less particulate matter than wood stoves. The U.S. Environmental Protection Agency (EPA) certifies stoves that meet or exceed their requirements for emission reduction.

Pros and Cons of wood pellets

While pellet stoves can be easy to operate and can reduce energy costs, there are also some other considerations to keep in mind.

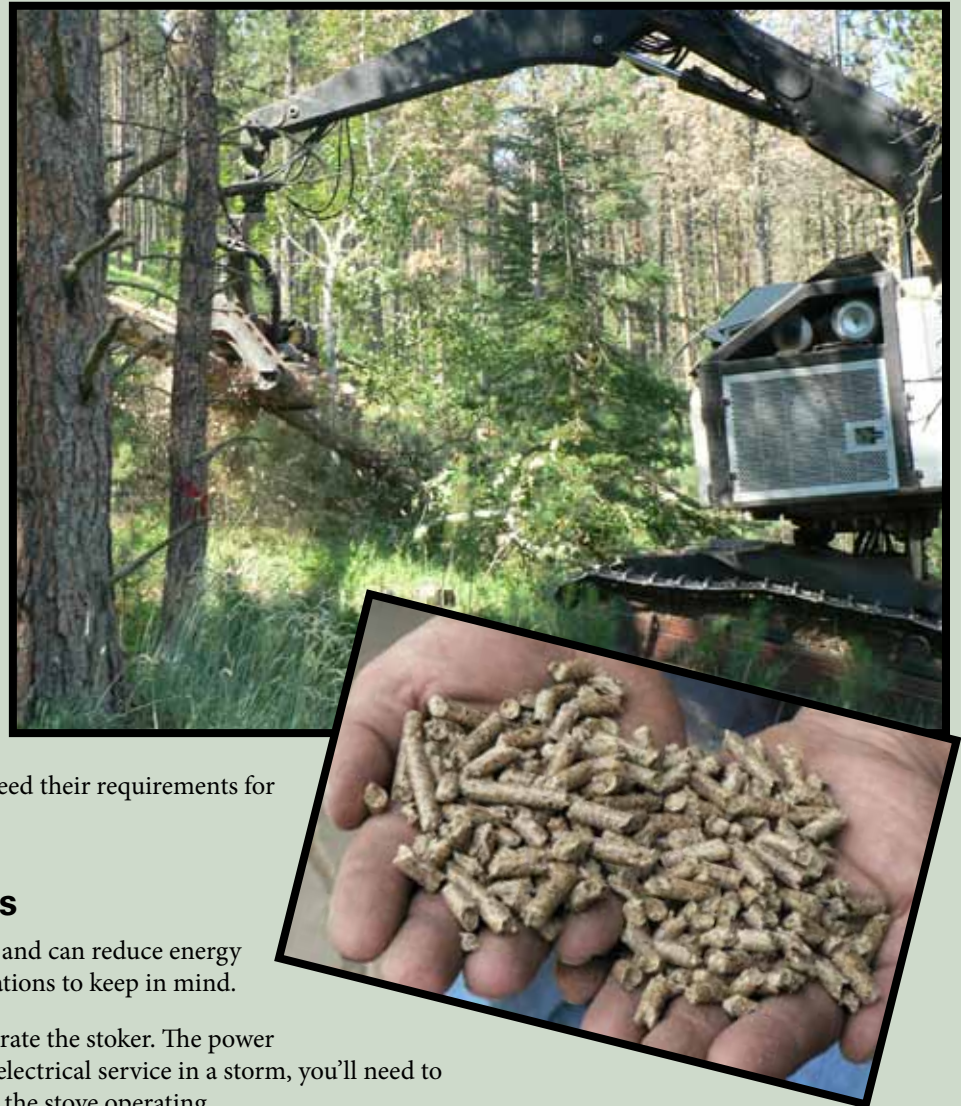
- Pellet stoves require electricity to operate the stoker. The power requirements are low, but if you lose electrical service in a storm, you'll need to have a battery backup system to keep the stove operating.
- The stoves also require cleaning and maintenance to keep the exhaust tube clean. Ash must be cleaned out of the stove. However, the ash production and cleaning requirements are far less than those of a stove that burns firewood.
- Pellets should be stored in a dry environment. If the pellets become wet, they can expand and become useless.
- At current prices and heating efficiency of the average stove or furnace, pellets are comparable to natural gas in cost and about half the cost of heating from propane, fuel oil or electricity.

Seasoned Firewood as a heating fuel

One in four homes in South Dakota has a fireplace or woodstove, though about one out of six actually use them. The typical home uses wood as a back-up source of heat or burns for pleasure rather than as the primary source of heat or cooking. Most fireplaces are for show, not heating.

If wood is being used to heat the home, wood stoves or furnaces are the better option.

The new stoves and furnaces are designed to meet the EPA regulations to increase efficiency and reduce emissions. Wood stoves that meet these EPA emission limits will have a certification label.



Pros and Cons of seasoned firewood

- Stoves and furnaces that burn firewood may increase the cost of insuring the home against fires. Check with your insurance agent before installing a stove to determine any requirements or limitations.
- You should also check to determine any local building codes for the use of wood.
- Chimneys need to be inspected and cleaned annually to reduce the possibility of a fire.
- The wood must be carried and placed into the stove; there are no automated feeders as is common with pellet stoves.
- Wood stove or furnaces generally burn small logs or even cordwood.
- Not all wood is the same in regard to heating value. You may have added expense in locating the best seasoned firewood for your stove or furnace.
- Operating costs of these stoves, however, can be much less expensive as the wood can often be obtained locally. You can save even more if you split the wood yourself.



Tips for buying seasoned firewood

The average home burns about 1.35 cords per year. In South Dakota, the most common wood we burn is ash, about 22,000 cords a year, followed by elm at 18,600 cords and cottonwood at 15,000 cords. We also burn about 15,000 cords of pine annually. You can find advertisements offering firewood anywhere from \$100 to \$300 or more a load, but a few things determine the true value in terms of heating:

- How is the load measured?
- Is the wood seasoned?
- What is the species of wood?

Buy firewood by the cord (or as a fraction of a cord)

When you buy firewood by the cord, you are purchasing a known quantity of wood. If you buy by the pick-up load or face cord, you are getting a range of possibilities and it will be difficult to make comparisons among sellers. A pick-up load may sound like the better bargain since it is cheaper, but keep in mind: you are getting about three to five times the amount of wood when you purchase a cord.

A cord is a stack of wood 4-ft. wide, 4-ft. high and 8-ft. long, containing 128 cubic feet of space and about 70 to 80 cubic feet of solid wood.

Most pick-ups with a 6-ft. bed hold about one-fourth or one-fifth of a cord while an 8-ft. bed may hold one-third of a cord. A face cord usually contains about one-fourth to one-third of a cord, but this can vary among sellers. You can find pick-up loads of wood being advertised for around \$100, while a cord may cost \$300 or even more depending upon the species.



Buy seasoned firewood

This is wood that has been split and stored off the ground and protected from the elements for about nine months. After this time, it will have a moisture content of less than 28% so it should burn long and hot rather than steam and smoke in the fireplace.

Buy firewood from local sources

The most likely potential source of emerald ash borer, an invasive insect already responsible for the loss of more than 30 million ash trees across the Midwest, is from out-of-state firewood. Purchasing firewood that has been harvested within the state is one of the best means of preventing the introduction of this insect to our state's forests.

Differences among species as fuelwood

Tree species differ in the heat value of their wood as well as the color of the flame, fragrance, and amount of sparks. Crabapple and apple have one of the prettiest flames and maple one of the smokiest, while cottonwood goes to ash fairly quickly. Pine and spruce produce a lot of sparks. Apple has a nice fragrance but some woods, such as catalpa, can even have an unpleasant odor.

The most important factor you should consider when heating a home is not the color or fragrance, but the heat. It takes about 100 to 200 million BTUs of energy to heat the average South Dakota home for a winter. In the box below, see the ranking of firewood in million BTUs per cord of seasoned wood.

SPECIES	BTUs ¹ (MILLION PER CORD)	SMOKE	SPARKS
Bur oak	25	Low	Few
Mulberry	25	Moderate	Many
Honeylocust	24	Low	Few
Sugar maple	24	Heavy	None to Few
Black walnut	22	Low	None
Apple and Crabapple	21	Low	Few
Birch	21	Moderate	Few
Redcedar/Rocky Mt Juniper	21	Moderate	Many
Green ash	20	Low	Few
Hackberry	20	Low	Few
American elm	19	Moderate	Few
Boxelder	17	Moderate	Few
Willow	17	Low	Few
Spruce	16	Low	Many
Ponderosa pine	15	Moderate	Moderate
Aspen	14	Moderate	None to Few
Cottonwood	14	Moderate	Few
Basswood	13	Moderate	Few

¹ BTU stands for British thermal unit, the unit of energy required to increase the temperature of one pound of water from 60° to 61°F. A gallon of propane is the equivalent of 100,000 BTUs so, for example, a cord of green ash has the heat equivalent of about 200 gallons of propane.

For further comparisons in net heating value of wood pellets, seasoned fuelwood and other fuels such as natural gas, propane, fuel oil and electricity, go to the USDA Forest Service Forest Products Laboratory website and look up "Fuel Value Calculator."
<http://www.fpl.fs.fed.us/documnts/techline/fuel-value-calculator.pdf>

As you can see from the list, oak is going to generate almost twice the heat as basswood or cottonwood, so you can expect to pay much more for oak. Sales of 'mixed hardwood' often contain mostly cottonwood with a little ash—it's mostly go'fer wood . . . meaning you are always "going for" more as it burns quickly! Cottonwoods are best for kindling as they burn readily, but to keep the fire going, oaks and honeylocust are among the best.

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This brochure was produced with funding support from the South Dakota Department of Agriculture, South Dakota Bureau of Administration, and federal support from the U.S. Department of Energy.