

# Wood Pellets

## An Introduction to their Production and Use

David Jones  
Mississippi State University

David Harper & Adam Taylor  
University of Tennessee



## What's Inside...

- Page 2 **Advantages of Wood Pellets**  
Green, clean,  
and convenient
- Page 3 **How Pellets Are Made**  
Turning wood waste into  
premium fuel
- Page 4 **How Pellets Are Used**  
From home heating to  
industrial boilers
- Page 4 **Markets for Pellets**  
Heating up!

## Introduction

Wood pellets are compressed wood particles that are used as fuel. Pellets are already commonly used in some areas of the country, and in other areas they are growing in popularity as primary fuel costs increase and concerns about global climate change build.

This fact sheet is a short introduction to wood pellets and will be helpful to those who are interested in using or producing wood pellet fuel. The advantages of wood pellets are discussed, as well as how pellets are made and used.



## Wood Pellet Stoves

Wood pellet stoves are very efficient and are capable of capturing almost 95 percent of the heat produced from burning the pellets.

# Advantages of Wood Pellets

Because wood pellets are made from wood, they have the same advantages as wood: local, abundant, renewable, and low-cost.

In addition, wood pellets are very low in moisture (water) and ash content, so they burn hot and cleanly. Fuel pellets are limited to 1 percent (premium-grade) to 3 percent (standard) ash. Regular firewood has more ash because of the bark.

Wood pellets also are small and easy to handle. They are generally available in 40-pound bags, but in some areas they are available in bulk. There is very little dust and no bark.

Many wood pellet-burning stoves have hoppers with feed screws that feed the pellets into the fire when fuel is needed. Larger furnaces are available that have large storage silos that also automatically feed fuel into the furnace when needed.

Both systems require little maintenance because the pellets burn so cleanly.

Pellets have a number of “environment-friendly” attributes. Pellets usually are made from wood-processing byproducts (sawdust, for example), so they are making a valuable product from a potential waste material. More recently, low-quality trees from forest thinnings and salvage operations have been used.

Pellets contain much less water and are denser than firewood, so they are more efficient to transport. Wood and wood pellets are “carbon-neutral” in terms of their contribution to global climate change: all the carbon dioxide that is released

when wood is burned was captured from the atmosphere when the wood was grown in the tree. This is an important advantage, especially in some countries in Europe where restrictions on carbon emissions are growing.

Wood also is less expensive than most other fuel options. Pellets are more expensive than some other forms of wood fuel (sawdust or firewood), but they usually are cheaper than oil, natural gas, or electricity. The following table shows the approximate fuel value of pellets compared with other fuels. Currently, pellets sell for about \$200 to \$250 per ton.

## 1 ton of pellets is equal to

120 gallons of heating oil

16,000 ft<sup>3</sup> of natural gas

170 gallons of propane

4,775 kilowatt hours of electricity

# How Pellets Are Made

## Raw Material

The production of wood pellets begins with the generation of the raw material. In most cases, this raw material is a byproduct of some other wood processing operation. Hardwood flooring mills are one good example: they produce large quantities of clean, dry sawdust and small blocks in their operations. This makes an ideal raw material for pellet production; however, as the interest in pellet production grows, some mills are generating pellet-making raw materials from “round wood.”

## Drying

The pellet raw material must be uniformly dried to a low moisture content (below 4 percent on a dry-weight basis). Because of the high temperatures and pressures in the manufacturing process, excess moisture can cause problems. However, this low moisture content is also one of the reasons that wood pellets burn so well.

## Processing Material

Once the feedstock has been dried, it is fed into a hammer mill that makes the wood particles a consistent size. This helps make the pellets a consistent density so that they provide a consistent heating value.

## Formation of the Pellets

Pellets are extruded, or formed, using special dies. High pressures (45,000 PSI) and temperatures (200 °F) are generated in this process, which softens components of the wood (the lignin) and binds the material in the pellet together. No additional adhesives are required.

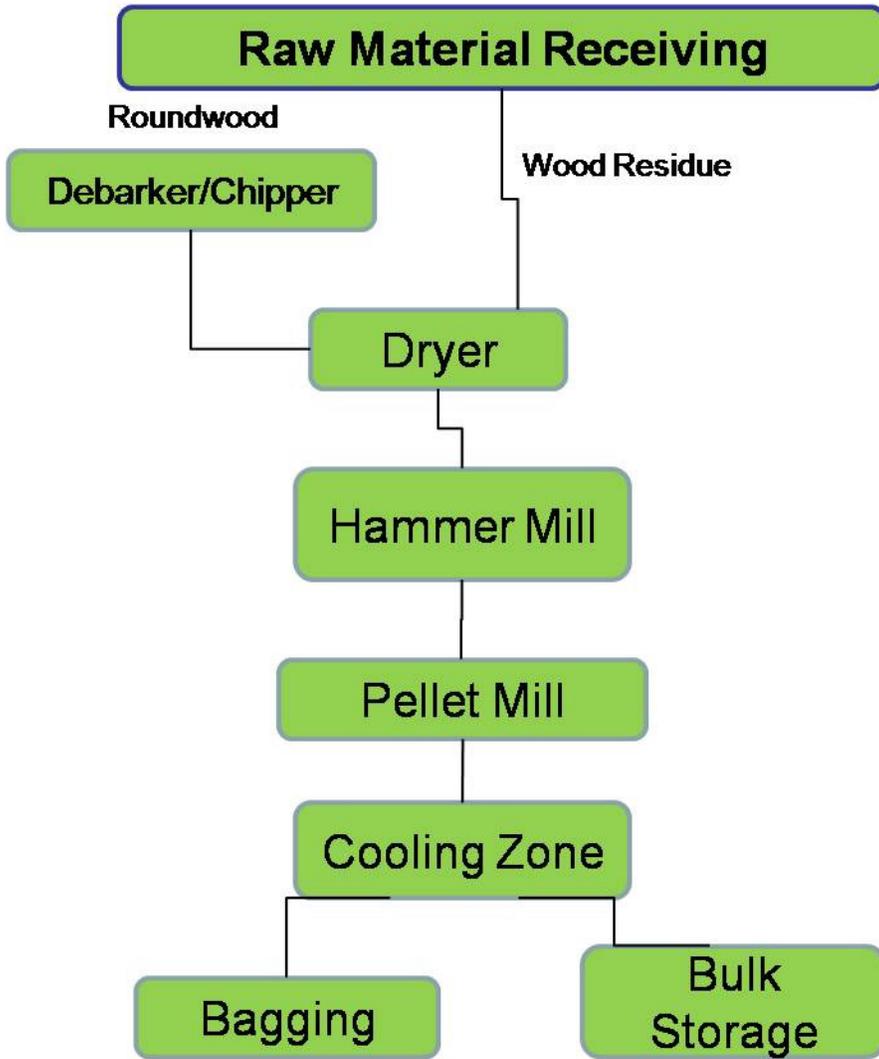
## Bagging and Storage

Once the pellets are formed and cooled, they can be packaged in bags or stored in bulk. Most people buy pellets by the ton (a pallet of fifty 40-pound bags), or they buy in bulk and a delivery truck places them in small silos outside of the home. Pellets can be stored indefinitely, but they must be kept dry to prevent deterioration.



Large electric motors are used to power pellet mills, which compact wood particles and extrude them as pellets through small openings in steel dies.

Pelletizing machines are not terribly expensive (about \$50,000) and can produce 5 to 10 tons of pellets per hour. However, complete manufacturing facilities can cost more than \$1 million and require considerable operating expenses and labor inputs.



Wood pellet production flow chart.

## How Pellets Are Used

Wood pellets are burned for heat. The stoves to burn pellets can range from large commercial boilers to small residential heaters. Many pellet-burning stoves have hoppers (storage bins) and thermostat-controlled augers that push pellets into the fire automatically. These stoves have to be loaded less frequently than traditional firewood-burning appliances.

Once the pellets are burned, the remaining ash must be removed periodically from the stoves, generally once a week. The amount of ash is lower than that of traditional firewood that has bark. Well-formed pellets will create very little dust or debris. All these factors make burning wood pellets a clean and convenient way to heat.

In many European countries, wood pellets are used in cogeneration: steam is produced to turn turbines that produce electricity, and the steam is then redistributed to homes and offices, where it is used for heating.

## Markets for Pellets

The Pellet Fuels Institute, an industry association, reports that over 80 pellet mills in North America currently produce more than 1 million tons of pellets annually. Markets for wood pellets are well-established, especially in the northeast of the United States.

Rising prices for fossil fuels such as fuel oil and natural gas are leading to increased interest in wood pellet heating. Concern over global climate change is also stimulating interest in wood pellets and other “carbon-neutral” energy sources.

**For more information, visit the following Web sites:**

The Pellet Fuels Institute

[www.pelletheat.org/2/index/index.html](http://www.pelletheat.org/2/index/index.html)

The Hearth, Patio, and Barbecue Association

[www.hpba.org/](http://www.hpba.org/)