

RENEWABLE AND ALTERNATIVE ENERGY FACT SHEET

Wood Heat for Your Home: Does It Pay Off?

Introduction

With economic uncertainty and high fuel prices, many people in Pennsylvania are considering switching to wood heat—either cordwood for a high-efficiency wood stove, or wood pellets for a pellet stove. The main reason people do this is to save money. But, how much can you expect to save? The answer is not always that easy to figure out. This fact sheet takes a look at what kind of savings you can expect if you switch to wood.

The Key: Dollars per Joule

The challenge to analyzing the cost of wood heat is that cordwood is sold by the cord (that's 132 cubic feet of stacked wood), pellets are sold by the bag or the ton, natural gas is sold by the therm, and fuel oil by the gallon. And let's not forget electricity, which is sold by the kilowatt-hour (KWH).

If you want to make sense of all those confusing units, you need to convert it all to a common measure: the cost per gigajoule (GJ) of useful heat (a gigajoule is about the same as a million BTUs). To do that, you need to take into account how many gigajoules of heat there are in a cord, ton, gallon, or KWH of fuel, and also factor in the efficiency of the stove, boiler, or heater you are using. When you work that all in, you can get a true picture of how much you can save by switching from one heating fuel to another.

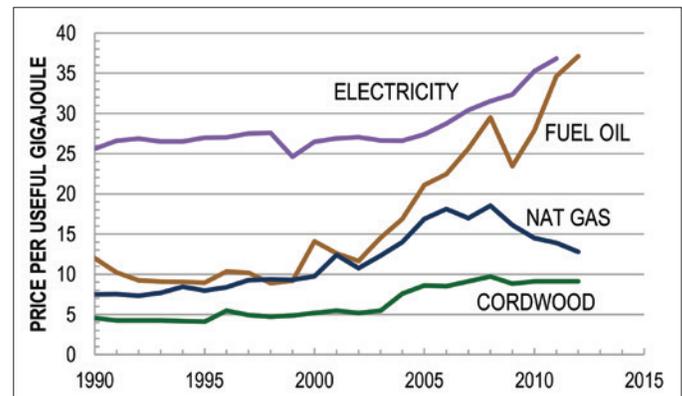


Stacked fuel wood is a common wintertime sight throughout Pennsylvania.

Wood Versus Other Fuels

When we calculate the cost of heating fuel using this “dollars per useful joule” approach, we can accurately compare and see which fuel is truly the least expensive. The U.S. Department of Energy

publishes average prices for natural gas and heating oil in the region, but not for cordwood. So, we looked up advertised prices for firewood (by the cord, cut, split, and delivered) in a Pennsylvania newspaper over the past twenty years as a way of providing a representative price for cordwood. Here are the results:



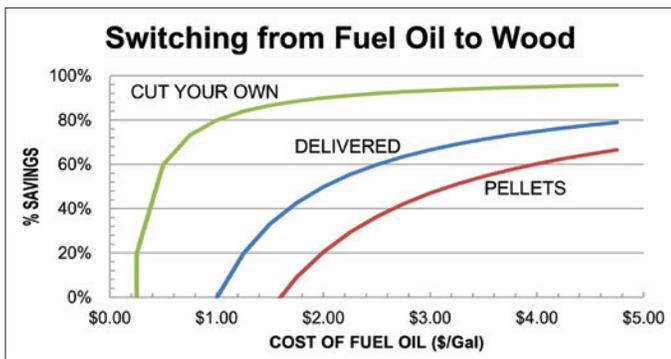
As you can see, cordwood is the least expensive heating fuel for Pennsylvanians, and has been for the past twenty years—even with the recent drop in natural gas prices. Not only that, but wood fuel prices are pretty stable over time, whereas oil and natural gas tend to jump around a bit. Electricity and fuel oil are especially expensive when compared to cordwood in Pennsylvania.

Keep in mind that we're not talking about fireplaces (very inefficient) or even old wood stoves, but rather newer, high-efficiency wood stoves and pellet stoves that put more heat in your home and less up the chimney.

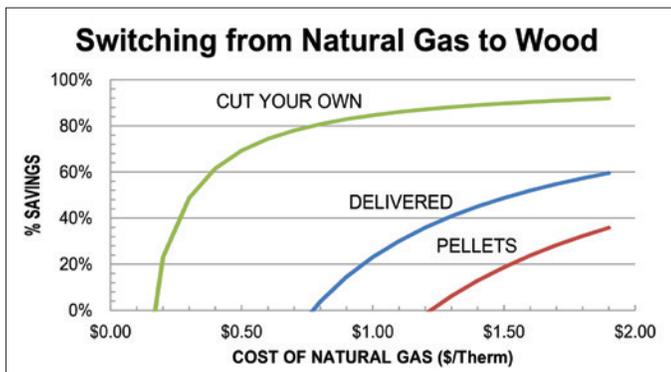
These are average prices for the state or region, so they may not be accurate for where you are located. How can we figure out expected savings from wood heat for various fuel costs? Read on.

What If Your Costs Are Not Average?

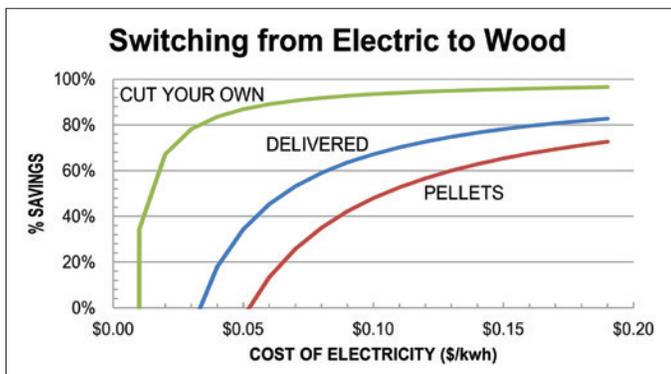
The following three figures use the “dollars per joule” analysis to calculate annual fuel cost savings from switching to wood heat. The first graph shows the savings from switching from fuel oil. The three lines on each graph show the savings for (1) if you cut your own cordwood (estimated at \$50 per cord), (2) if you buy the cordwood delivered (\$150 per cord), and (3) if you use wood pellets instead (\$200 per ton). You will need to find out how much heating fuel costs in your area (check your bills for that), and plot it out on the graph below to see how much you could save from switching to wood.



As you can see, pellets and cordwood will both result in pretty sizeable savings, relative to fuel oil, in your heating bill. Pellets give the lowest savings, and “cut your own” cordwood gives the greatest savings because it costs the least.



Savings for switching from natural gas are not as great as for fuel oil. Currently, many Pennsylvanians are paying pretty low prices for gas. However, chances are that natural gas will not stay at these very low levels in the long term.



Depending on what you pay for electricity, wood heat can be a very cost-effective alternative. For example, if you are paying \$0.10 per KWH for energy charges plus delivery charges, fees, and taxes, wood pellets would save you about 50 percent on your heating bill, and cordwood would save even more.

Hidden Costs of Wood Heat

Even in these days of low-cost natural gas, wood is still a good bet for cost-effective heat. However, before you rush off to switch over to wood heat, you need to realize that there are some “

nonmonetary” costs associated with wood heat. First, you need to recognize that there will be some labor involved—loading the stove, starting the fire, cleaning out the ashes. If you decide to cut and split your own wood, you’ll find that there’s a lot of effort involved (and make sure you’re properly trained in the safe cutting of wood before you start). Second, carrying wood around the house tends to track in a bit of bark and dirt. In general, wood pellets and pellet stoves are less labor or mess, but the pellets themselves are also more expensive—it’s a tradeoff between price and effort. Third, wood heat requires a bit of attention—checking the fire and adding fuel as needed. Gas and oil are usually automatic.

Hidden Benefits of Wood Heat

While there are hidden costs, there are also hidden benefits of wood heat. One of the best is that wood heat provides a toasty warm spot in the house that is absolutely perfect when you come in from the cold. Also, if you have a glass door on your stove, it can be a very attractive addition to your home (even better than cable TV, some would say). Lastly, wood heat is renewable, and there’s something good about knowing that the fuel for your wood heat is growing back on an annual basis.

If you’d like to play around a bit with the numbers, try Penn State Extension’s “Energy Selector,” an interactive tool that shows the equivalent price of different heating fuels (extension.psu.edu/energy/energy-use/making-decisions/comparison-charts).

For more information visit Penn State Extension’s Renewable and Alternative Energy website at extension.psu.edu/natural-resources/energy and click on “Energy Use and Efficiency.”



Assumptions in this analysis: cordwood has 27.4 GJ per cord, pellets have 17.3 per ton. Wood stove efficiency = 60%, pellet stove = 80%, gas furnace = 80%, oil boiler = 80%.

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