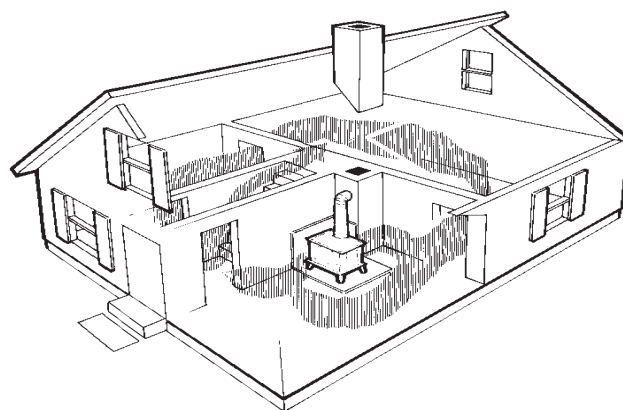


What Size Woodstove?

Making a decision about what size wood stove you need can be as simple or as complex as you'd like to make it. The main factors that should be considered are (1) space, (2) heat loss, and (3) fuel. In other words, how large an area are you trying to heat, how well insulated is your home, how cold is your climate, and what is the quality of your wood supply? The final factor, though more difficult to define, is your expectation of the stove's performance. In other words, are you a shorts and t-shirt person, or are you happy wearing sheepskin slippers and a warm sweater while puttering around the house?



Locating a stove in the center of the house will allow for easy air flow between rooms and maximize comfort.

1. How Much Space?

When you shop for a wood stove, you'll find that most stoves list the square footage they are designed to heat. Choosing a stove on that basis is the easiest, though not necessarily the most accurate, way to go. That being said, it is a good idea to know the total square footage of your home. The simplest way to arrive at this figure is to measure the length and width of your home and multiply those two figures to get the square footage. Don't forget to add any additions or ells if they are open to the heated space.

Next, consider your ceiling height. Most stove companies list an area heated assuming the space has 8 foot high ceilings. If your ceilings are higher than 8 feet, you can still use the area heated listed by simply converting it to a cubic measurement. If you multiply the square footage listed as "area heated" by 8, you will come out with the cubic space the stove can heat. Then multiply your own square footage by your own ceiling height and compare the two cubic areas. Cathedral ceilings are in their own category and deserve special consideration because heat can collect above the living area and get trapped where it is of little use. Paddle fans can be installed for rooms with cathedral ceilings to move warm air down to the level where it's most needed.

The final factor in evaluating your heating area is to consider where the stove will be located. If your goal is to heat the whole house, the best location for the stove would be in the central part of the house. Wood stoves are radiant heaters. The closer you get to them, the warmer you are. Heat will flow easily to adjacent rooms and up stairways, but will not easily find its way down narrow hallways and into back rooms. Heat tends to dam up behind door headers until enough has accumulated at the ceiling to spill down through the doorway. A small box fan in the upper corner of the header can facilitate getting heat from room to room.

You might want to size your stove to heat a given area *within* your home, rather than sizing it to heat your entire home. If the area you'd like to heat is largely closed off from the rest of the house, you will want to select a stove that will not overheat the space. If the area has open access to the rest of the house - you'll need to consider that heat will naturally "spill over" into the rest of the house. A small stove may work fine for a small room, but if the room opens onto the rest of the house and air flows freely - your heat will dissipate over the larger area. This will reduce the heat you feel in the room you intended to heat. Of course you can impact how the heat moves in the house by opening or closing doors around the house. For example, you'll feel more heat in the downstairs area if you close doors upstairs.

2. How Much Heat Loss?

Knowing the heating area of your house is one part of the sizing equation. The other part is how much heat you actually need, or, to put it another way, how much heat your home loses over a given period of time. In theory, a structure can be built so you could heat it with a light bulb. But in the real world, heat loss is just a fact of life. Whether you use oil, gas, electricity or wood, factors such as climate, wind, solar gain, and how your home is built and insulated play a very large role in determining the heating demand of your home.

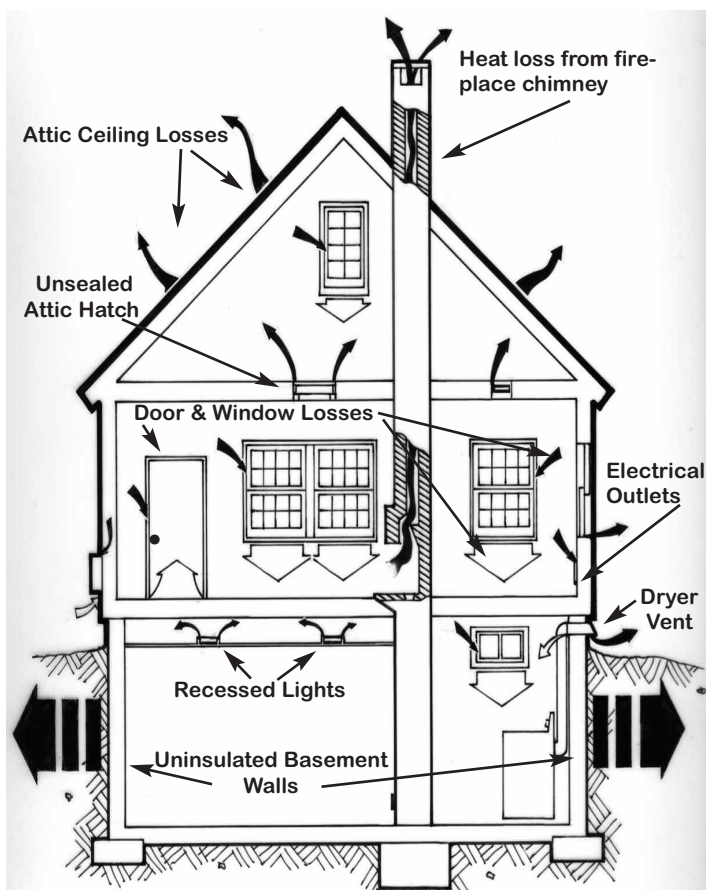
The single most important factor affecting heat loss is the difference in temperature between the inside and the outside of the building. As you'd expect, the greater the difference, the greater the heat loss. If you are building a new home, you can compensate for heat loss by (1) siting the house to take advantage of passive solar gain, and (2) using building materials to absorb and store that heat.

You might also be able to site the structure to protect it from wind. Wind accelerates heat loss. It also can infiltrate your home through cracks around windows, doors, electrical outlets, and other wall and roof penetrations.

Existing homes can always be made more energy efficient by adding or improving insulation, sealing up cracks, and improving the quality of windows and doors. Trees and shrubs can be planted to serve as windbreaks.

A. Calculate Your Heat Loss

For a truly accurate picture of how many BTU's you'll need to heat your house, you need to identify how much heat you lose. This is not always an easy figure for the average homeowner to come up with. Heating and cooling engineers have developed fairly accurate methods for determining building heat loss by measuring the net area of wall, window, and roof surfaces and calculating their heat transfer coefficients. Design temperatures for a particular geographical site are included in the calculations to come up with the heat loss for the building in question. Many gas and electric utility companies will do an energy audit at no cost, but they may be reluctant to do it unless you're planning on installing a conventional heating appliance.



Heat loss occurs through windows, doors, electrical outlets, uninsulated walls and ceilings, recessed lighting, and other unsealed building penetrations.

Short of calling in an energy auditor, you can get a good idea of the BTU's you'll need to offset your own heat loss by comparing your home to "The Average New Home". Calculations based on an EPA study show that an average 1600 square foot home in the colder northern climates of the United States requires from 24,000 BTU/HR up to a high of 48,000 BTU/HR during a typical winter. This result is based on an "average" new home. It is a single-story wood frame house with 8 foot ceilings, double-paned windows, 3 1/2 inches of insulation in the walls, 9 inches in the ceiling, and six inches in the floor. (R-11, R-30, and R-19 respectively). If your home is poorly insulated and drafty, you will have to increase your result by 20, 30, or even 50 percent, depending on how it compares to the sample home. If your home is super-insulated, with tight construction and energy-efficient windows and doors, you will have to deduct a percentage from the sample home. We've included some information below to help you evaluate where your home stands compared to "The Average New Home".

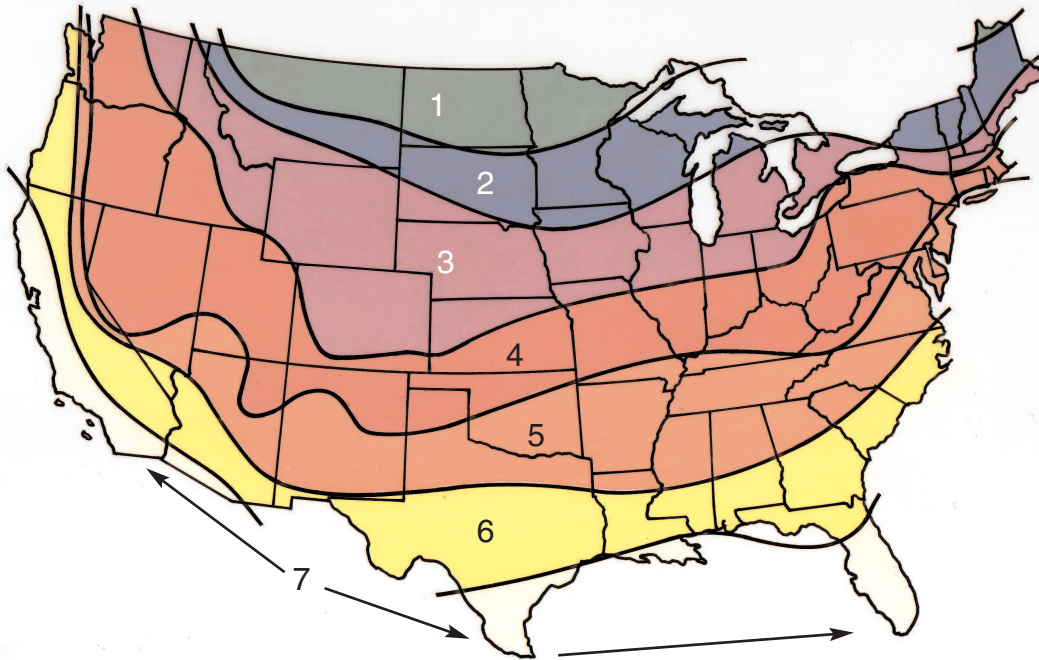
R-value of Common Building Materials:

R-value of 8" concrete block.....	1.11
R value of 8" poured concrete:.....	0.64
R-value of 4" brick.....	0.80
R-value of 1/2" sheetrock.....	0.45
R-value of 1/2" plywood.....	1.25
R-value of single pane glass.....	0.91
R-value of 8" log wall.....	11.00

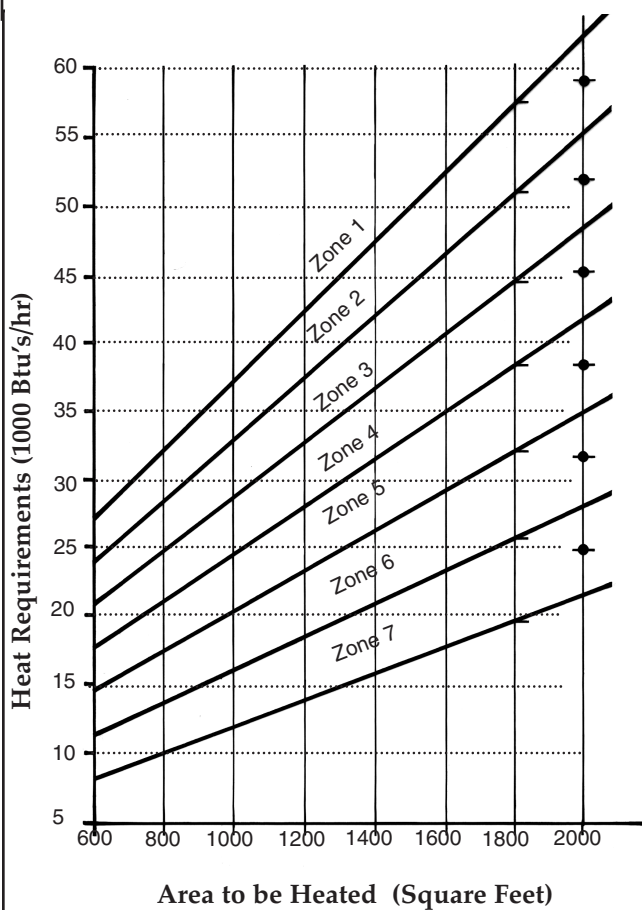
R-Value Of Common Insulating Materials

R-value of 3-1/2" Fiberglass Batt.....	11.00
R-value of 6" Fiberglass Batt.....	19.00
R-value of 6" Blown-in Cellulose.....	19.00
R-value of 1/2" Polyisocyanurate Foil-Faced Foam (Thermax™).....	3.30
R-value of 2" of Expanded Polystyrene (beadboard).....	8.00
R-value of 2" of Extruded Polystyrene (Stryfoam™, blueboard).....	10.00

Determining how your home compares to the "average" home is basically an educated guess. You will have to compare the insulation values in your walls and ceilings to the sample home, and also allow for window and door area and the relative tightness or draftiness of your house. If your walls and ceilings have R-8 and R-19, respectively, you should figure that your home will need about 25% more BTU's than "The Average New Home". If your home has R-19 walls and passive solar gain, you'll probably want to scale your BTU's down about 25% from "The Average New Home". Once you've got a sense of how your house compares to "The Average New Home", you can use refer to the Climate Map and Heat Requirements Table on the next page.



Step 1: Find the zone for your home on the Climate Map above



Step 2: Use your home's square footage and your climate zone to determine Heat Requirements (on the vertical axis).

B. Determine your BTU's needed

The Climate Map above and the Heat Requirements Table on the left were designed by the EPA to show BTU requirements for "The Average New Home" in different parts of the country. You can use these tools for determining BTU requirements for your own home by scaling the BTU's needed up or down based on how your home compares to "The Average New Home". For example, the high BTU need within Zone 1 can vary from 27,000 for a tight, well-insulated home to 67,000 for a poorly insulated, drafty home. By finding where you are located on the Climate Zone Map, you can determine the heat requirements in btu's for the Average New Home by referring to the Heat Requirement Calculations in the table. Then just scale that number up or down based on how your house compares to "The Average New Home".

3. What Are You Burning?

Oil, Gas, and Electric appliances burn at a set rate because of the type of fuel they use. A gallon is a gallon, a therm is a therm, a kilowatt is a kilowatt. And the unit is either on or off. When evaluating the heat output of a woodstove, you'll have to consider two factors: 1) the different BTU potential of different types of wood, and 2) the inherent rise and fall cycle of a wood fire.

The heat content of wood varies from one species to another, and in moisture content from one armload to another. Burning dry, seasoned hardwoods can minimize

most of the irregularities of fuel wood, but there will always be variations in heat output throughout the heating season. In fact, this is part of the appeal of wood burning for many stove owners. Keeping the home fires burning is an organic process. It requires getting to know your wood supplier, or, in many cases, your own wood lot. Picking the right trees to cut (or finding a trustworthy supplier), splitting the wood, and storing it in a way that it can season and stay dry until you load up the stove can be a very satisfying experience.

Whether you buy wood or cut your own, you'll want to know what to expect in terms of meeting your heating requirements and what type and size stove you will need to accomplish that. Below are some examples to show you just how much the type of wood and the moisture content can affect your heat output.

**TABLE 2.
HEATING CHARACTERISTICS OF DIFFERENT WOODS**

SPECIES	FUEL VALUE	MILLION BTU'S PER CORD	DENSITY LB/CU.FT AT 20% H ₂ O
ASH	High	20	43.4
SUGAR MAPLE	High	21.3	44.2
RED OAK	High	21.3	44.2
AMERICAN ELM	Medium	17.2	35.9
WHITE PINE	Low	12	26.3

Every woodburner is intimately familiar with the cycle of a wood fire. The blaze of start up, the glow of a mature fire, and finally the bed of ash and hot coals at the end of a burn cycle. This cycle is part of the magic and allure of a real wood fire, but it makes the production of constant heat levels difficult over the course of a burn. A stove that is rated at 50,000 BTU/hr may drop to one-tenth of that amount toward the end of a burn cycle, and will probably average an output of about 25,000 BTU per hour over the course of one burn cycle. When shopping for a stove, be sure to check the stove's overall BTU/hr range, not just for high heat output. Woodstock Soapstone's Fireview is EPA rated at a low of 14,100 to a high of 55,000 BTU/HR. The Keystone and Palladian stoves are rated at 11,000 to 45,000 BTU/HR. These are the BTU's produced over the course of one complete burn cycle (typically 8-12 hours for a Woodstock Soapstone stove).

How Dry is Dry?

In the firewood industry, wood is usually sold as green, seasoned, or kiln-dried. Knowing the difference and buying the right wood can mean the difference between a great heating season and a miserable one.

Green wood is freshly cut and contains 35-65% moisture on average. Most of the energy in a fire made with green wood goes into driving the moisture out of the wood, with very little left over for usable heat! Seasoned wood has usually been allowed to dry outdoors for at least six months. The best seasoned wood has been allowed to dry - split, stacked, and covered on top - for 6 to 12 months. On average, seasoned wood will contain between 20 to 30% moisture. Kiln-dried firewood is wood that has been split and dried in a kiln by moving 150° air over it for hours on end. Kiln-dried wood contains 15 to 20% moisture. Super kiln-dried wood (used for furniture) is dried to just 6% moisture content. This wood is not suitable for a wood stove because it burns too hot and short for heat to be captured effectively.

The higher the moisture content, the less heat produced since energy is used to burn off the water in the wood. In addition, wood with higher moisture content burns cooler, resulting in more creosote in your stove and chimney. Moisture content for heating fuel should be between 15 to 25% with the low end of the range being most ideal.

In general, if the mid-range of a stove will fulfill your BTU needs, you are in good shape. If you buy a stove that will produce the BTU's you need only at the top of its range, you should expect to fill the stove more often in order to keep the fire at the high end of the burn cycle. This will reduce your burn time (time between loads) and increase the amount of wood that you burn.

If you have additional questions about wood stove sizing, woodburning, or other installation questions, please let us know. Our Customer Service reps help stove buyers choose the right size stove every day. By having an estimate of your home's size, its construction and insulation quality, and, most importantly, your expectations, we can help you select the right size stove for your home. We are available by phone at 800-866-4344 from 9-5 ET Monday - Saturday. E-mail us anytime at info@woodstove.com. Or stop by our factory, take a tour, and look at our bulletin board filled with photos from stove owners.



The heat content of your fuel wood varies from one species to another and the amount of moisture in the wood.