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Basics of Heating with Firewood

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Introduction

Wood heating was the predominant means for heating in homes and businesses for several decades until the advent of iron radiators, forced air furnaces and improved stoves. More recently, a census by Energy Information Administration, EIA, has placed fuelwood users in the USA at 2.5 million as of 2012.

Despite the widespread use of central heating systems, many Arkansans still have fireplaces in their homes, with many others actively using wood heating systems. A considerable number of Arkansans tend to depend on wood fuel as a primary source of heating due to high-energy costs, the existence of high-efficiency heating apparatuses and extended power outages in rural areas.

Apart from the usual open fireplaces, more efficient wood stoves, fireplace inserts and furnaces have emerged. In ideal conditions, current wood burning equipment functions at 50 percent efficiency as opposed to old box stove designs (30 percent) and open front fireplaces (<10 percent).

Wood is among the cheapest, most available renewable energy sources in North America for individual families. It is a relatively clean fuel because of its lower net carbon dioxide emissions relative to other fuels. Landowners can also improve their woodlands by cutting firewood. Using wood as a fuel in Arkansas provides an opportunity for consumers and landowners alike. However, wood fuel is not recommended as the heating source in multiple family residences or downtown cores of large cities. It is further recommended that wood be used as a fuel in small towns outside cities with lower population densities and with typically cheap wood.

Most importantly, responsible wood heaters must burn adequately seasoned wood and seek to yield little or no smoke. Many options of secure, wood combustion stoves, fireplaces, furnaces and boilers are available in the market. EPA certified fireplaces, furnaces and wood stoves with no visible smoke and 90 percent less pollution are among alternatives. Additionally, wood fuel users should adhere to sustainable wood management and environmental sustainability frameworks.

Burning wood has been more common among rural families compared to families within urban jurisdictions. Burning wood has been further incentivized by more extended utility (power) outages caused by wind, ice and snowstorms. Furthermore, liquefied petroleum gas, their alternative fuel, has seen price increases over recent years.

Numerous consumers continue to have questions related to the use of firewood. An important question is what type of wood can be burned for firewood? How to store firewood? Can a citizen cut firewood from his/her woodlands? What are the safety issues with burning wood? The answers to these questions will help consumers and landowners make the right decisions about using wood as a heat source.

Many homeowners fail to recognize the danger associated with an improperly installed or poorly managed wood heating system. A commitment to safety must accompany the decision to heat with wood. Inspection, maintenance and cleaning are mandatory for safe operation. The need to save a few dollars by heating with wood should not place any home or family in a dangerous environment. This fact sheet, therefore, seeks to elucidate the basics of heating with wood, storage, safety precautions, and the economics of heating with wood.

Fire Wood and Its Measures

What Are the Best Tree Species for Firewood?

Generally, any wood type will burn.

Different types of trees have different properties related to fuel use. The possible heat content, burning properties and overall usefulness as firewood vary widely across tree species. Of these characteristics, the heating value or the amount of heat generated by burning the wood is the most important when selecting firewood.

The heating value of wood is a function of its density and moisture content. The drier and more dense or heavier the wood, the more heat is released when adequately burned. It should be mentioned that hardwood trees tend to be denser than softwood trees. Examples of hardwood trees with dense wood are hickory, most oaks and black locust (Figure 1). Examples of softwood trees with less dense wood are loblolly pine, sweetgum and willow (Figure 2). The table below lists the fuel values of several common tree species in Arkansas. Relative fuel values are measured in British thermal units, BTUs. A BTU is the standard measure of heat such that one BTU is equal to the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit. The fuel value of wood is based on the average weight of a standard cord of each species and assumes a value of 8,600 BTU per pound of oven-dry wood.

Different wood properties are also essential to consider when deciding which firewood to use in homes. How easily can the wood be split? It is essential, because large pieces of firewood will not burn as efficiently as smaller, split pieces. Splitting the wood exposes more surface area and allows the wood to dry faster. Elm is an excellent example of wood that is very difficult to split (Table 1). The wood fibers in elm are arranged horizontally, and splitting a piece of wood vertically is almost impossible without a hydraulic splitter. The wood's fragrance and tendency to smoke or throw sparks are also vital, especially when burned

Table 1. Characteristics of Arkansas Trees

SPECIES	EASE OF SPLITTING	POP OR THROW SPARKS	SMOKE	COALING	OVER ALL RATING
Hickories	medium	few	low	excellent	excellent
Black Locust	difficult	few	low	excellent	excellent
Oaks, red: southern red, blackjack, willow	medium	few	low	excellent	excellent
Oaks, white: post, swamp chestnut	easy	few	low	excellent	excellent
Honeylocust	easy	few	low	excellent	excellent
American Persimmon	easy	few	low	excellent	very good
Ash, white	medium	few	low	good	very good
Elm	difficult	few			
Soft Maples (red & silver)	medium	few	low	excellent	good
Pine	easy	few	heavy	poor	fair
Eastern Red Cedar	easy	many	moderate	poor	fair
Cottonwood	easy	moderate	low	poor	poor
Willow	easy	moderate	moderate	poor	poor

*Data compiled from USDA FS. Leaflet No. 559

Figure 1. Dense Firewood Trees

Hickory Oak Black Locust

Figure 2. Less Dense Firewood Trees

Pine Sweetgum Willow

in a fireplace. Sparks from an open fireplace can be a fire hazard. Pine tends to spark more than oak because of its high resin content and is therefore not recommended for use as firewood.

Firewood Cord

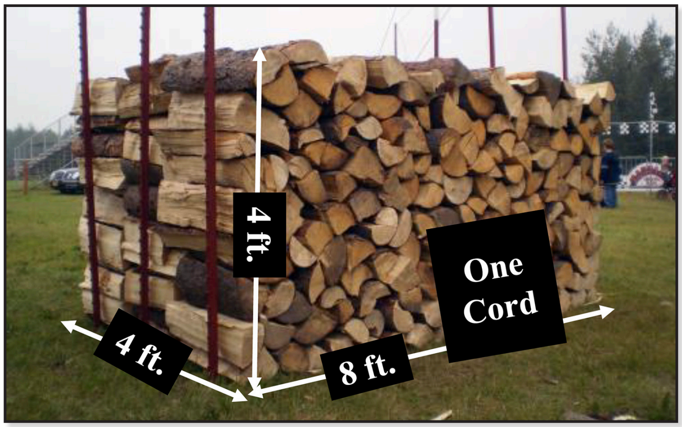
Although people are familiar with buying or selling firewood in several different ways, including the truckload or the rick, the only allowed standard way is the cord. Additionally, a fraction of a cord or cubic meter is allowed. Arkansas approved a law in 2001 that adopted the Uniform National Standards. It states that firewood can only be sold by the cord, a fraction of a cord or cubic meter.

By law, a cord must equal 128 cubic feet. To be sure to have a cord, stack the wood neatly by placing the wood in a line making sure the wood is compact and has minimum gaps. Proceed to measure the dimensions of the stack. Determine the volume of the stack (length x width x height). Divide the results by 128 to convert the results to the cord.

A cord is often defined as a stack of wood measuring four feet wide x four feet high x eight feet long (Figure 3). The problem with this definition is that firewood measuring four feet long is seldom, if ever, used. Generally, a cord of wood means that there are two stacks of wood that are combined to equal four feet x four feet x eight feet. The length of a piece of firewood varies based on the size that a fireplace or wood-burning stove can accommodate. Typical firewood lengths range from 15 to 24 inches. A standard length is a length from the elbow to the fingertips of the firewood cutter or about 18 inches. This means that the standardized measurement of firewood can be difficult. Consumers need to understand what and how much they are buying.

Additionally, the law states that the seller must provide a delivery ticket or sales invoice to the

Figure 3: One cord



purchaser whenever any stacked or non-packaged fireplace or stove wood is sold. Firewood vendors are also required to inform consumers about the species of wood they are buying, the quantity, the price and the name and address of the vendor. The information must be on the delivery ticket or sales invoice.

The amount of solid wood in a cord varies depending on the size of the pieces; but for firewood, it averages about 85 cubic feet. The rest of the cord volume is airspace.

Other terms, such as face cord, stove cord or furnace cord are sometimes used to describe a stack of wood measuring four feet high and eight feet long with a piece length shorter than four feet. A typical firewood piece length is 16 inches or one-third of a full cord, but other lengths are also available.

Because a winter's supply can cost several hundred dollars, homeowners do not want to be confused when they are purchasing firewood. If they want to compare prices from some suppliers, they may take a tape measure to the dealers' yards and measure the average piece length. If the dealer does not price the wood in the standard full cord measure, convert the price to this basic unit. Here are some examples to illustrate the conversion.

Assume that a dealer sells face cord, stove cord and furnace cord for $75, $60 and $85, respectively. Determine the price of a cord for each case. A face cord is a pile of 4 feet high and 8 feet long with an average piece length of 16 inches. Therefore, divide this length (16 inches) into the full cord length of 48 inches (48 ÷ 16 = 3).

To determine the price of the cord, multiply the number by the price (3 x $75) = $225. Similarly, divide the length of the cord (48 inches) by the length of the stove cord (12 inches) or the length of the furnace cord (18 inches) then multiply the results by the price. The price of the stove cord and furnace cords are $240 and $227, respectively.

Table 2: Yearly Savings Accrued For Each $100 Spent On Equipment Cost

ANNUAL INTEREST	5-YEAR PAYBACK	10-YEAR PAYBACK	15-YEAR PAYBACK
8%	$24.36	$14.64	$11.52
10%	$25.56	$15.96	$12.96
12%	$26.76	$17.28	$14.52
14%	$27.96	$18.72	$16.08

Green Wood versus Seasoned Wood

Any product labeled as "green" seems to imply "better than average" these days. That is not the case with firewood. Green firewood is freshly cut wood from living trees. The high moisture content in green wood is very high, as much as 50 percent by weight. This moisture prevents the wood from "starting" or burning, produces lots of smoke and can create soot or creosote deposits in your wood stove.

If homeowners buy firewood and want to use it soon, they have to make sure that they buy seasoned firewood. The term "seasoned" refers to letting the wood dry to reduce the moisture content. Firewood should be dried to 20 percent moisture content or less. To season firewood, it can take from six to nine months depending upon the moisture content of the wood when it was cut. Trees that were dead standing have lower moisture content than standing live trees and therefore will not require as much time to season. A simple method to determine if firewood is dry is to strike two pieces of wood together. A sharp cracking sound means that the wood is reasonably dry. Dry wood will also display cracks or "checks" in the end grain along the cut surface. A dull thud, however, means that the moisture content is still high.

Economics of Burning Wood

The economics of wood heating are presented in Table 2. Included are annual energy savings necessary to pay for equipment over 5, 10 and 15-year periods. Cumulative dollar values and interests are also shown. Table 2 should help to calculate the opportunity cost of alternative fuel sources such as gas, including equipment purchase, and should help to factor repayment duration or break even point (the point where you recoup your investments).

Annual Savings Required

For example, if a homeowner chooses a 10 percent interest rate for a system that should pay for itself in 5 years, then it follows that the equipment shall save at least $25.56 annually for every $100 spent. For instance, if $800 were spent, the annual savings would be 8 x 25.56, which is equal to $204.48. It must be noted that two additional costs must be added to the amount: a surcharge on homeowner's insurance premium for given heating equipment and the annual cost of flue cleaning.

Arkansas residents are advised to do a comparative advantage analysis before buying wood burning equipment (Table 3). Among the negative aspects of wood burning are frequent equipment maintenance, labor costs, frequent cleaning of soot and ashes,

Table 3: Alternative Fuel Heat Equivalent Values

SPECIES	[1]HEAT YIELD PER CORD, AIR-DRY (MILL BTU'S)	[2]NATURAL GAS (1,000 CU FT)	[3]ELECTRIC RESISTANCE FURNACE (KWH)	[4]ELECTRIC HEAT PUMP (KWH)	[5]LP GAS (GAL)	[6]SOFT COAL (TONS)
Cottonwood	8.002	10.7	2,728	1,315	116	0.47
Elm, American	9.983	13.3	3,404	1,641	145	0.59
Hackberry	10.548	14.1	3,596	1,733	153	0.62
Hickory, shagbark	14.230	19.0	4,852	2,339	206	0.84
Locust, black	13.662	18.2	4,658	2,245	198	0.81
Oak, red	12.248	16.3	4,176	2,013	178	0.72
Oak, white	12.813	17.1	4,369	2,106	186	0.76
Persimmon	14.794	19.7	5,044	2,431	214	0.88
Sweetgum	9.983	13.3	3,404	1,641	145	0.59
Sycamore	9.699	12.9	3,307	1,594	141	0.57
Willow	7.437	9.9	2,536	1,222	108	0.44

[1]Wood + bark, 20% moisture content, standard cord - 4' x 8' x 4'. Available heat, adjusted for moisture content, of 6,604 Btu/lb of wood and 5,724 BTU/lb of bark. At 50% burning efficiency, delivers 3,302 BTU/lb and 2,862 BTU/1b, respectively.
[2]Available heat = 1,000,000 BTU/1,000 cu ft. Yield at 75% efficiency = 750,000 BTU/100 cu ft.
[3]Yield = 2,933 BTU/KWH. Assumes 15% loss in ducts and furnace cabinet.
[4]Yield = 6,085 BTU/KWH
[5]Available heat = 92,000 BTU/gal. Yield at 75% efficiency = 69,000 BTU/gal.
[6]Available heat = 13,000 BBTU/lb. Yield at 65% efficiency = 8,450 BTU/lb.

permeating smoke, creosote and odor within residences. All factors held constant, we need to consider how much a person can spend on the wood heating system and get back his money in energy savings. Specific characteristics of different wood species are highlighted in Table 3.

Annual Savings Possible

Consider a red oak which provides as much heat as 4,176 kWh of electricity from an electric furnace. Supposing that electricity costs 10 cents per kWh at the winter rate, then the red oak is replacing $417.60 (0.10 x 4,176) worth of electricity. Consider that oak is valued at $50 for every cord, then each cord burnt produces equivalent savings of about $367.60 ($417.60 - $50.00). Furthermore, consider that an electric heat pump uses about 2,013 kWh (2,013 x 0.10 = $201.30) to produce similar heat as one cord of red oak. Therefore its savings in comparison to red oak will be $163.30 ($213.30 - $50) for every cord of red oak burned.

Annual Wood Consumption

On average, most Arkansans use three to five cords of wood every winter. It is, therefore, more comfortable for individuals to estimate the ballpark figures relative to their wood-related heating by studying their electrical or gas utility bills and comparing them with figures in Table 3.

How to Avoid Paying Too Much for One Cord

If possible, avoid buying firewood in units that cannot be related to the standard full cord. Station wagon loads, pickup truck loads and other units are difficult to compare and can conceal a high price per cord measure.

Avoid buying firewood by telephone without going to see the wood at the supplier's yard. Other factors that can make a given volume of firewood more expensive, and yet possibly more valuable include:

- Shorter lengths usually cost more because of more cutting and handling.
- Firewood cut in consistent lengths is more convenient to use and may cost more because the dealer gives greater attention to detail.
- More finely split pieces usually cost more per cord because of increased labor.
- Drier wood costs more because it has been stored longer and under better conditions.
- Cleaner firewood is more valuable than dirty wood. Sand or mud in the bark makes the wood less pleasant to use.

It takes some experience to gain confidence in the ability to judge good firewood for heaters.

Advantages and Disadvantages of Heating With Wood

Wood fuel is a carbon neutral, cheap and convenient fuel source for heating rural homes in the United States and Canada. Below are some advantages and challenges:

Advantages

- It is renewable.
- It is homely and comfortable.
- It promotes independence.
- It is critical during power outages and utility failures.
- It has excellent aesthetics of the flames.
- It promotes local plantation forest economies.

- It is inexpensive.
- The central furnace or boiler can maintain the entire house at an even temperature and keep the mess of firewood and ash out of sight in a utility room.

Challenges

- It needs management and maintenance of equipment frequently.
- It has the inconvenience of ferrying wood, handling soot and ashes.
- Odors associated with some stoves can permeate the entire house.
- There is a need to restock wood and replace consumed firewood to maintain heating continually.
- The most severe problem is air pollution, especially with older stoves, fireplaces and furnaces that cannot burn the wood completely.
- Time-consuming and costly, heating with wood means household members must be involved in managing the fire, the fuel supply and performing regular maintenance jobs like ash removal.
- Wood fuel is bulky, so a winter's supply takes up much space.
- Early seasoning of the firewood is necessary.

Preparing Wood Fuel Supply

The most common challenges of proper, efficient wood heating are burning wet wood and bad chimneys. The right moisture content of wood is therefore very critical to ensure low emissions and high fuel efficiency. The correct moisture content of adequately seasoned wood is about 20 percent. Burning wet wood can result in:

- Smoky fire with fewer flames.
- Creosote in chimneys.
- Low burning efficiency.
- Stained glass.
- Output heat reduction.
- Irritating smoke smell.
- Short burning period.
- Waste of fuelwood.

Therefore, it is recommended to properly season firewood. Below are some tips for seasoning firewood.

1. Cut wood to the ideal length. Cut the wood to the right length, about 16 inches long, because shorter pieces are easier to manage and dry a lot faster.
2. Split wood to the right size. Split wood no more than six inches measured across, because big pieces of wood do not burn efficiently.
3. Pile wood fuel in single rows exposed to the sun and wind. The sun and the wind remain the most cost-effective means of drying firewood to the right moisture, about 20 percent or below.
4. Keep the wood to dry for six months or longer. Stack firewood for six months or longer in well-arranged rows to allow for wood drying before the advent of winter.

Selecting Equipment

A lot of wood-fired heating equipment is currently available. Moreover, there is quite a price range. What to buy can be a challenging decision. The most subjective determination will probably be the type of equipment needed – airtight box, or Franklin stove; radiant or circulating design; fireplace insert or a central wood-fired furnace. The features available and price differences may be more confusing.

Cast iron or steel construction does not matter if the quality is apparent. Steel fireboxes have welded joints to ensure airtight operation. The firebox of a quality unit will be lined with firebrick, fireclay, cast iron or some type of replaceable shield to prevent burnout of the firebox. Cast iron is more resistant than steel to oxidation from high heat. It can be poured into beautiful shapes and may be available in more exciting or attractive designs than steel. However, the pieces require careful fitting and sealing for airtight construction. Moreover, if castings are not uniform, cast iron can crack when heated.

Carefully check the method of ash removal. A system designed to drop ashes from the grate or firebox area directly into an ash pan is a nice feature. Some of the latest equipment features a device called a catalytic combustor. The combustor is a ceramic or metallic disc about six inches in diameter and a couple of inches thick. It is perforated and coated with chemicals that act as a catalyst to allow the combustibles in smoke to burn at lower than usual temperatures (about 500°F. rather than 1,000°F). The result of a properly operating unit is reduced smoke, reduced creosote and increased efficiency. The disadvantages are the higher cost of the stove and a relatively short life expectancy of the combustor (about three years). The combustor is a replaceable component of the stove. Catalytic combustors must be carefully managed to operate correctly. They will not eliminate the need for annual flue cleaning and inspection although the job should be made more accessible because creosote accumulations should be less.

Heating equipment is often bought because of a recommendation from a neighbor or a local business that is trusted and reputable in the community. That is not necessarily a wrong criterion for selection. However, several organizations have set standards for wood heating equipment and have listed the equipment that meets those standards. The term "LISTED" means that the equipment has been approved by one of the following organizations:

- Underwriters Laboratories, Inc. (UL)
- Underwriters Laboratories of Canada (ULC)
- International Conference of Building Officials (ICBO)
- Southern Building Code Congress International (SBCCI)
- Building Officials and Code Administrators International, Inc. (BOCA)

Any of these approvals show that the equipment has been tested, inspected or at least meets minimum standards that have been established by some unbiased authority.

Wood Heating and Safety

As the wood comes cheap as an alternative fuel, commitments to heat with wood must also have safety considerations. For safer operations of wood burning equipment, cleaning, maintenance and inspection are critical.

Choosing the Right Wood/ Availability

The best firewood is locally sourced, which tends to save on transportation and fringe costs. Determine the reason/mode of heating, whether cooking or heating and whether it will be used in an open fire or airtight wood stove. Consult widely with professionals before settling on which appliances to buy or install.

Make Sure to Burn Wood Properly

- Charcoal is the final product.
- Clear or white smoke is visible from the top of the chimney. Blue or grey smoke indicates poor combustion, low system operating temperatures and/or air pollution.
- Firebricks in the firebox should be tan and not black.
- Appliance glass door should remain clear.
- Once loaded to the fire properly, seasoned wood should ignite immediately.
- Firebox steel/cast iron parts should be light to dark brown and never shiny and black.

Components of the Safe Wood Burning System

- EPA certified stove, fireplace or furnace (Figure 4).
- Select the right location and size of the chimney for the appliance.
- A system designed that avoids safety compromises.
- Adherence to and advice on safe installation by qualified personnel.

Wood Burning and the Environment

The impact of wood burning on the environment impacts entails mainly three aspects:

1. Impacts of smoke pollution to outdoors.
2. Impacts of indoor air pollution.
3. Impacts on the health and sustainability of forests.

In a nutshell, burn seasoned wood fuel, which is both adequately processed and sustainably harvested, in an advanced stove/fireplace running up straight through the building. Below is a summary of what should be done with fuelwood to protect the environment:

- Choose an EPA-certified advanced technology stove, fireplace, furnace or boiler which reduces smoke emissions by up to 90 percent.
- Choose wood fuel appliances of the correct size, located at the right place and position for efficient heating.

Figure 4. An advanced combustion design stove (woodburnerwarehouse.co.uk)

- Correctly match and install chimney sizes to the wood fuel appliances.
- Reduce the amounts of smoke produced by up to 50 percent by avoiding smoldering appliances and using proper burn techniques.
- Strictly burn seasoned fuel wood of the right size and length. Avoid garbage, plywood, cardboards or their respective variants.
- Reduce the environmental impacts of the fuelwood by maintaining equipment efficiency.

Factors to Consider

In the last 25 years, catalytic combustion, densified pellet technology and non-catalytic combustion have been the most preferred burning systems for reduction of pollutants from wood-burning systems. Of the three, non-catalytic combustion has been the most popular regarding efficiency and widespread applications.

When Buying the Right Wood Stove

The heating area expanse and specific goals will determine the size of the wood stove to be bought and/or installed. Stove sizes must, therefore, be commensurate with the size of houses to be heated to increase heating efficiency, lower costs and reduce safety and air pollution problems. Factors to consider are the following:

- Amount of space to be heated.
- The frequency of use of the stove.
- The available budget for heating.
- The presence of hazards to the family.
- Equipment needed and its respective cost.
- The comparative advantage over other heating systems.
- Whether to buy a regular wood stove or pellet stove.

When Choosing the Type of Wood Burning Fireplace

In most cases, recreational and aesthetic wood heating is not environmentally sound. Any heating systems without heat recovery are inefficient and dirty. The following things should be considered:

- Whether to shop for a central or a space heater.
- How much it will save to consider brands with discounts during peak seasons.
- The location. Choose freestanding heating systems with easy installation instructions.
- The durability and sturdiness of the equipment screens or glass covers.
- Local air quality issues.
- Which appliances to select.
- The accessibility of heating system designs.
- Ease of use and operation.
- Fuel economy and conversion rates.
- House structure/multistory residents should avoid wood heating.
- The city ordinances. Wood heating is most suitable within the urban fringes and beyond subject to limits.

Wood Burning General Safety Tips

Burning firewood can be satisfying, but it is also dangerous. The most common problem is that burning wood causes creosote to form in stovepipes, chimneys and exhaust systems. When wood or any organic material is burned in a stove or fireplace, volatile gases and vapors are produced. These gases and vapors are carried up the stovepipe or chimney where they condense and form creosote. Creosote is combustible and can cause chimney fires if not periodically removed from inside the stovepipe or chimney. Creosote in the upper part of the chimney can ignite and set the roof on fire.

Creosote will be produced when burning any wood or organic material. Certain species, including pine, have more potential than others for producing creosote, but the amount of creosote depends more on the type of fire and the temperature of the chimney surface. A smoldering low-temperature fire will produce more creosote than a roaring high-temperature fire. Burning wet or green wood can also create more creosote. Creosote problems can be minimized by burning well-seasoned wood, making small, hot fires instead of large smoldering fires and cleaning the chimney and stovepipes frequently.

Burning firewood as supplemental heat, a primary source of heat or periodically for pleasure is possible if the homeowner exercises common sense. Make sure that it is seasoned and ready to use. Take precautions to prevent creosote problems.

To avoid chimney fires (Figure 5), burn wood efficiently and adequately and reduce carbon dioxide intrusion, the following safety tips must be adhered to:

- Ensure smoke and carbon dioxide detectors are installed and operational.
- Ensure the chimney top is not adjacent to tree branches and or leaves less than 15 feet away.
- Ensure certified chimney service technicians inspect chimneys annually to reduce creosote buildup or obstructions in the chimneys and carbon dioxide poisoning.
- Use properly seasoned fuelwood.
- Install a chimney cap to keep debris and animals out of the chimney.
- Keep all combustible material away from the wood stove or fireplace. Keep fuelwood/logs behind the fireplace on a supporting grate. Furniture should be kept at least 36 inches from the hearth.

Figure 5. A typical chimney fire (https://mffire.com/prevent-chimney-fires)

- Do not leave fires unattended. Completely extinguish fires when done the heating. Carefully watch children and pets around the fireplace.
- Do not use flammable liquids to start a fire, utilize kindling or a commercial firelighter instead.
- Add a log of wood at a time; never overload the fireplace. Never burn garbage or weird material in the fire.
- Install a screen or metal mesh in front of the fireplace to stop flying sparks that could cause secondary fires.
- Wood burns best in cycles. Never add pieces per interval in a bid to maintain constant heat.
- The sizes of wood loads should match heat demand. In winter, load wood compactly for extensive overnight burns.
- Do not leave fires to smolder. Smoldering fire will cause chimney creosote.
- Ashes should be removed frequently to allow for proper wood loading and maintaining burning efficiency.

Restrictions on Transporting Firewood

The Arkansas State Plant Board and other states' Agricultural and Forestry agencies are worried about the movement of several pests such as emerald ash borer, thousand cankers disease, Asian longhorned beetle, gypsy moth, laurel wilt disease and red imported fire ant to and from the state as well as within the state. Accordingly, Arkansas authorities advise that firewood should be bought and used locally to prevent the spread of pests into and within the state. It should be mentioned that the transportation of hardwood firewood from inside the emerald ash borer federal quarantine area (surrounding most of southern Arkansas) to outside the quarantine zone is prohibited. The southern half of Arkansas is also quarantined due to the presence of red imported fire ant, and the movement of items such as firewood that have been stored outside on the ground in contact with the soil is prohibited. Arkansas also prohibits the entry of any regulated items for thousand cankers disease of walnut (hardwood firewood is a regulated item) into the state.

Acknowledgments

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