

Sustainability of Residential Wood and Pellet Heating

The Alliance for Green Heat's mission is to promote cleaner and more efficient wood and pellet heating. While our primary focus is on the technology and the regulatory environment around combustion, the sustainable supply and use of firewood and pellets is also paramount to our mission.

The most pressing sustainability issue is excessive wood smoke in many neighborhoods and rural areas from wood stoves and wood boilers that are not being used properly, or the technology is so poor that they cannot be used without creating excessive smoke. Advanced combustion wood and pellet stoves, furnaces and boilers can produce renewable residential heat with minimal amounts of air pollution, compared to the alternative environmental impacts caused by the extraction, transport, refining and use of electricity, gas and oil heating appliances.

Generally, there are not major sustainability issues facing the supply of firewood and pellets for the U.S. domestic residential heating market. Deforestation of the eastern and central US was rampant in the 1700 and 1800's, peaking around 1900, due to clearing forest for agriculture, building development, industrial energy, home heating, cooking, etc. The advent of coal use and later oil and gas lead to dramatic reductions in the use of wood for energy. Use of wood for heating homes went from nearly 100% in the early 1800s, to 22% in 1940 when the



US Census started tracking it and continued its rapid decline as fossil fuels were enthusiastically embraced through the 1950s and 60s. By 1970 only 1.3 % of the country heated primarily with wood. By 1990, after heating oil prices rose, 3.9% of the country heated primarily with wood, and today the number rests at about 1.5% of the population, concentrated in northern and mountainous wooded areas.

Firewood

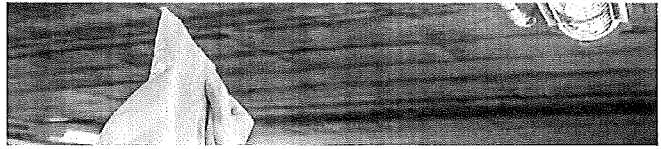
The nation's firewood supply is very sustainable for a number of reasons. The reverse is true in many developing world countries where firewood demand vastly outstrips supply. In the US, firewood collection is marked by the following trends:

1. Studies find that 50 – 70% of firewood is cut or collected by the homeowners that use it, indicating extremely local and small-scale firewood collection.
2. Homeowners typically cut or collect wood in ways that are low impact on the neighborhood or forest.
3. The firewood industry is dominated by mom-and-pop businesses that engage in very small scale, decentralized harvesting of trees, not utilized for higher value products (at larger scales, both homeowner and commercial firewood harvesting could lead to sustainability issues in certain ecosystems).
4. A large portion of commercially sold firewood in urban and suburban areas is from arborists tree services that took down trees for other reasons.

Three firewood surveys conducted by the State of Minnesota in 2003, 2007 and 2013 provide some of the most detailed state level data about firewood usage and harvesting. The 2013 survey found that 80% of residential firewood was harvested by households and no wood vendor in Minnesota has over 1% of the market. Vermont, the state with the highest per capita wood heating and many larger institutional heating systems also conducted a study in 2018 that found "sufficient material available to keep adding to our already impressive portfolio of wood energy systems without risking forest health or sustainability." Other states such as New Hampshire have also conducted studies, noting that the demand firewood has steadily decreased since its height in 1983. At the height of US firewood use in 1983, a US government report found that 71% of "residential fuelwood was self-cut by the user; the rest was obtained from mill residues or purchased."

Part of the nation's firewood supply comes from larger commercial harvesting practices. Typically, the firewood

comes from trees with defects that make them unusable for milling into higher value products or from trees too small to be milled. If there is no market for these trees, often they are left to rot or are piled and burned to reduce wildfire risk.



In the last few years, over a dozen states have developed additional guidelines to protect ecosystem services provided by forests, like water quality, wildlife, soil productivity, and others while harvesting wood for energy (“biomass”). Some regional guidelines have also been developed.

The sustainable use of firewood also involves responsible transport so that firewood users do not help move invasive insects and diseases to new areas. The [Don't Move Firewood](#) campaign provides a vital role educating homeowners about this issue, which most frequently involves transporting wood for recreational campfires.

Pellets

In terms of sustainable levels of emissions, [pellet heating](#) is typically much cleaner than chunk wood, although [masonry heaters](#), can be as clean and efficient as pellet heat when they are used properly.

Even the cleanest pellet heating will not be as clean as gas, oil or propane at the point of combustion. But in a full life-cycle analysis, when harvested sustainably, pellet heating likely has far less negative environmental impacts than fossil fuel heating.

In terms of wood supply, over the past three decades, since residential pellet heating has taken off in the United States, the overwhelming majority of wood to make pellets has been sawdust from sawmills, furniture factories and other wood processing companies. The stream of fiber for domestic pellet heating has been sustainable because the sawdust from those factories was often considered a waste product.

More recently, sawdust has become more valuable and today it is sold for a variety of uses, from particleboard to animal bedding to pulp and paper. As dry sawdust has become more valuable and more competitive, and demand for pellets has risen, more pellet producers are using [low quality pulp wood](#) and wood chips traditionally used in the pulp and paper industry to make pellets. Wood chips and logs increase production expenses because they have to be ground up and dried, so they are the last resort for pellet producers.

Like any industry, the logging industry has some rogue operators and companies that skirt or bend regulations, and it is possible that some of the wood that they cut gets into the pellet fuel supply. Bad actors may be more prevalent in states with weaker regulations or enforcement, and this would impact the stream of fiber for sawlogs, pulp and paper and every other use of wood.

The fiber supply for pellets produced in the Southeastern US for export to Europe is different and more complex and is currently independent from domestic residential use.

We advocate for policies that promote efficient use of wood. Heating and combined heat and power are typically in the 60 – 80% efficiency range, whereas it is in the 20 – 30% range for electricity alone.

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New standards for wood-burning stoves and boilers



October 13, 2020

Shopping for a new wood stove? Remember that new stoves and outdoor boilers must be certified to new 2020 emission standards to be sold or installed in Minnesota.

Wood smoke is a significant source of fine particles — a harmful pollutant. We can breathe fine particles into our lungs, and they can enter our bloodstream. Air pollution contributes to small annoyances such as coughing or itchy eyes. It can also cause or worsen many diseases involving the lungs and breathing, leading to hospitalizations, cancer, or even premature death.

With the EPA's backing, Minnesota has been a leader in lowering fine-particle pollution by requiring manufacturers of wood-burning stoves and boilers to produce more efficient products.

As of May 2020 in Minnesota:

- Only wood-burning appliances that are 2020-certified by the manufacturer can be advertised, offered for sale, sold, or installed in Minnesota. Dealers selling models that aren't certified are violating the law.
- All 2020-certified units must have an approved, permanent label that is visible when installed.

Some facts about wood burning in Minnesota:

- Minnesotans burn about 1.45 million cords of wood in a year, enough to completely fill U.S. Bank Stadium.
- Nearly half of Minnesota households burn wood in either a heating appliance or recreational fires.
- There are an estimated 288,000 wood-burning units such as stoves, furnaces, and boilers in the state. About a third of them are pre-1989, which pollute much more than those certified to the 2020 standard.
- About 7 percent of households burn wood for primary heat; 46 percent of wood burned in Minnesota is for primary heat.

[Minnesota residential wood combustion survey report \(May 2017 – April 2018\)](#)
(aq-ei4-47).

See the [EPA web site](#) for more information on wood burning.

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Minnesota

Updated: February 2024

Regulations

No state-wide regulations on wood or pellet stoves that we are aware of at the moment. Check with your local authority on building codes to be sure.

Incentives

No state-wide incentives on wood and pellet stoves that we are aware of at the moment.

Change-out Programs

Project Stove Swap | Northeastern Minnesota

Website: <https://environmental-initiative.org/our-work/project-stove-swap/>

Status: Currently not accepting new applicants due to high demand as of November 2023

Location: Aitkin, Beltrami, Carver, Cass, Carlton, Cook, Crow Wing, Dakota, Goodhue, Hennepin, Hubbard, Itasca, Koochiching, Lake, LeSueur, Morrison, Otter Tail, Pine, Rice, Scott, Stearns, St. Louis, Todd, and Wadena counties

Eligible fuels: Wood (pre-1992) -> Wood (certified, high-efficiency), pellet (certified, high-efficiency), natural gas (EnergyStar), hydronic (certified), forced air furnaces (certified)

Notable Feature: There are income-qualified incentives which significantly raise the incentive amount available to low-to-moderate income households.

Incentive Amounts

Minnesota residents can qualify for discounts ranging from \$325 to \$10,000 when swapping out their old wood stoves with a new energy-efficient heating system, including switching to new wood stove and pellet equipment. Residents can receive up to \$750 for switching to an EPA certified energy efficient wood stove or up to \$1,500 for an EPA certified wood pellet stove. These incentives increase for income-qualified households to up to \$3,000 for an EPA certified wood stove or \$3,500 for an EPA certified pellet stove.

Program Duration

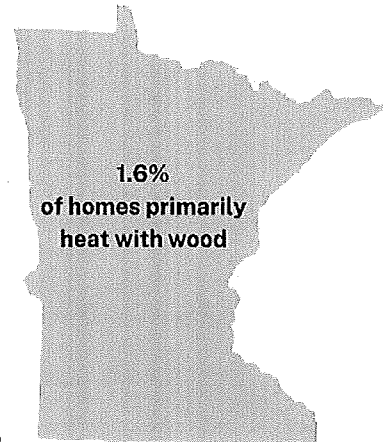
The program is ongoing until funds are depleted. The program is looking to expand to the rest of the state. Due to high demand, the program is currently not accepting new applicants.

Procedure

First, check your eligibility by completing the [Stove Swap Signup Form](#). Once this is submitted, the project staff will review your information and provide you further details on your eligibility and next steps. Qualified vendors will assist you in choosing your new heating equipment from a list of [eligible devices](#). After an accredited installer performs the installation, the Project Stove Swap incentive will be added to your vendor's invoice.

Requirements

The wood stove being replaced must have been manufactured before 1992. It also must be used as a primary/major heat source in the home, consuming at least two cords of wood annually. Equipment qualifying includes: wood stoves and fireplace inserts, pellet stoves and inserts, forced air furnaces, and hydronic heaters. The old wood stove being replaced must be destroyed or recycled.



More Information

For more information, please visit the [program website](#) or contact Alli Mueller at amueller@environmental-initiative.org.

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