

A Buyer's Guide to Sourcing Wood Heating Fuel in the Northeastern U. S.

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Introduction

The wood heating market is likely to expand considerably over the next decade in the Northeastern U.S. In the face of continually rising fossil fuel heating prices, tremendous growth potential exists for larger buildings such as schools, hospitals, and even entire downtowns to be heated with woodchips. As more woodchip heating projects are proposed, decision-makers and community members typically ask three main questions:

1. How much will the fuel cost?
2. Will the supply be reliable?
3. Where specifically will the fuel come from?

This document aims to answer those questions and be a helpful tool for communities involved with a woodchip heating project by providing information on the pathways and options for sourcing woodchip fuel. This guide is aimed at anyone involved with facilities considering a woodchip fuel heating system, or to anyone involved with the sourcing of woodchip fuel for an existing facility.

People that heat with oil, propane, and natural gas do not typically ask their supplier where the fuel came from. People may feel no connection to fuel that comes from thousands of miles away, or that they have little control over how it was sourced. However, when energy is sourced from our own back yards, it often becomes more important to know where and how it was sourced.

The guide is organized in four main sections:

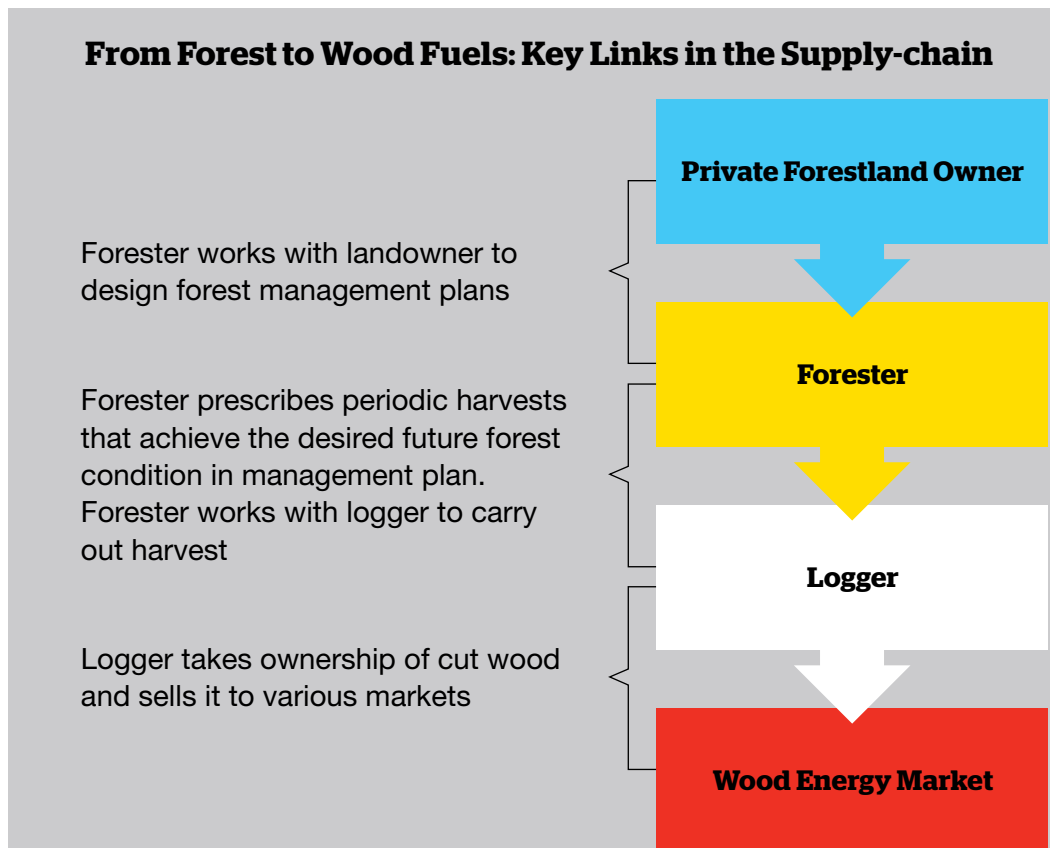
1. Where do woodchips come from?
2. What do woodchips cost and is a reliable supply available?
3. How much choice will my facility have over the origin of the wood fuel and can this be tracked?
4. Tools and templates to assist with decision-making

A short glossary is provided on the back cover to define technical terms used in the guide.

Where do woodchips come from?

Historically, woodchips have been supplied to wood heat users by sawmills looking to sell their by-product chips. However, sawmill activity in the Northeast has declined in recent years and as a result, by-product material is increasingly limited in supply. Today, most woodchip heated facilities source their fuel either directly from local timber harvesting and chipping contractors or via woodchip brokers.

This new woodchip fuel supply-chain begins with managed forestland that undergoes periodic harvesting. In the Northeast, around three-quarters of forestlands are privately owned. In a typical commercial timber harvest, a forester prescribes silvicultural treatments that balance improving the health of the forest with providing economic value to the private landowner, logger, wood buyer, and on up the supply chain. Unhealthy, low-quality trees can be harvested for wood fuel and other products, leaving the growing space (air, water, sunlight) for healthier, better-formed trees. Forests can be made healthier and more economically viable for private landowners when there are local markets for this low-quality wood. Once the forester has decided what trees should be cut, a logger then goes in and cuts the trees selected by the forester. When foresters are not involved in the process, loggers make the decisions of which trees to cut.



Harvests typically yield a range of timber products including sawlogs, pulpwood, firewood, and wood to be processed into chips or pellets. While harvesting low-quality wood can be good for the forest, it is a lot of work for relatively low economic returns. In most commercial timber harvests, therefore, low-quality wood is harvested as part of a suite of other, more valuable, forest products.

Woodchips used for heating fuel can be made from many different tree species, components of trees, and can be produced by a variety of harvesting methods. The traditional harvesting of sawlogs and pulpwood removes the main stem (or bole) of the tree and leaves the severed tree tops and branches scattered in the woods. By contrast, whole-tree harvesting removes the main stem with attached tops to a central landing where the wood is processed and sorted. The resulting pile of top wood can be chipped into a wood fuel commonly known as whole-tree chips. It is common practice for that wood to be chipped at the log landing into box trailers, which are transported directly to large users such as power plants.

(Image courtesy of Forest Energy Portal)



“Bole” chips are the most commonly used type of heating fuel woodchips and are produced by chipping just the stem (or bole) of low-quality trees. They can be produced in the woods, but are most commonly produced at chip yards from low-quality roundwood (alternatively used as pulpwood). Once low-quality roundwood is delivered to the chipyard, it is stored in outdoor piles until it is necessary to chip and deliver the material to the various local heating plants. Chip yards aggregate and store harvested roundwood throughout the year. The wood in these piles may come from a number of harvest jobs and suppliers, each with different forest management goals. When a chip customer requires a load of chips, the distributor chips a batch of several loads of roundwood, which are then delivered by tractor-trailers.



What do woodchips cost and is a reliable supply available?

Price is often a primary consideration for those considering woodchip heating. Compared to fossil fuels used for heating, woodchips are an inexpensive fuel source – often considerably less than half the cost of oil and propane. Woodchip quality and prices can vary widely, but the cost of quality woodchips commonly used for heating ranges between \$45 and \$65 per green ton. The price of woodchip fuel is generally affected by several key factors, including:

- Wood source and production costs: This varies widely depending on whether the woodchips are a by-product of more lucrative activities (such as milling lumber) or an intentionally produced commodity fuel.
- Strength of the sawlog market: Increased demand and higher prices paid for sawlogs can help reduce prices for lower-quality wood used to produce chips and pellets. Conversely, decreased demand and prices for sawlogs can cause the prices for low-grade wood to increase because sawlog harvesting frequently subsidizes the harvesting of low-grade wood products.
- Regional balance of supply and demand for low-grade wood: Increased demand from other markets such as pulpmills, power plants, and pellet mills

can influence prices of low-quality roundwood and chips. Similarly, shortages in supply can raise prices. For example, exceptionally wet years can limit harvesting activities, thereby increasing prices.

- Trucking distance from point of generation to end market: The price paid per ton of wood fuel is heavily dependent on the cost of transporting the material.
- Amount and seasonality of demand: Facilities requiring larger amounts of fuel and facilities that purchase chips continually year-round can often leverage slightly lower prices.
- Woodchip quality: Dry chips, chips screened to remove long twigs (which may jam the auger), and chips with fewer impurities (e.g. soil, green material) generally cost more.

Woodchip prices are not directly connected to the world fossil energy market and are less volatile. In addition, wood is a locally produced renewable fuel. For these reasons, the price of woodchip fuel can be expected to increase less in the future than other fuel prices. For example, woodchip prices in Vermont have increased gradually at about 2% per year over the last fifteen years.

Forests cover roughly three-quarters of the land area in Northern New England and are predominantly privately owned and managed. These forests routinely grow more wood annually than is currently harvested and in many locales there is a surplus of low-grade wood that could be used to responsibly fuel the expanded use of wood heating in the region. In addition, harvesting levels for traditional low-grade wood markets, such as pulpmills, have declined dramatically over recent years — thereby freeing up regional forest resource capacity to further expand the use of wood heating.

As demand for quality woodchip heating fuel has grown in the last few years, an increasing number of logging and chipping contractors have made considerable investments in equipment to provide the growing woodchip heating market with a high-quality, reliable supply of fuel. For example, a handful of woodchip suppliers in the region have recently invested in screening equipment to produce a higher quality, more consistent, bole woodchips.



A woodchip screener used to remove over-sized woodchips and fine dust from the bole chips before they are loaded into a trailer for delivery to a woodchip heated facility.

While segments of the forest products industry are making investments to meet the growing demand for woodchips, the number of local suppliers and the type of infrastructure they have in place varies widely throughout the region. For new wood heating projects, it is important to research potential suppliers and their capacity early in the planning process.

How much choice will my facility have on the origin of the wood fuel and can wood sources be tracked?

Woodchip heating fuel is typically purchased from logging and chipping contractors who carry out the timber harvesting, yet generally do not dictate the forest management. Also, the wood energy market is built on the use of relative low-quality and low-value wood and therefore holds minimal sway over decisions private landowners make in managing their forestland. Timber harvests can span a wide spectrum of purposes ranging from land-clearing for development or pastures to harvests designed to improve a woodlot's health and productivity. Wood fuel may be a product of any type of timber harvest.



When wood fuel is shipped directly from the forest harvest location to the final destination, such as a heating plant, documenting and tracking the source can be done simply and effectively. However, tracking wood fuel is often far more complicated: imagine wood is harvested from multiple woodlots, hauled to a chip yard, aggregated into one large stock-pile, eventually chipped, and finally delivered to the heating plant and other destinations. The source and quality

If requested, many logging and chipping contractors can track the type of management activity associated with a load of wood, but this extra effort will result in additional costs.

of forest management supplying wood to a fuel distributor varies from job to job and is dependent on seasonality, market conditions, and the performance standards of the forester and logger. A worksheet template can be found on the last page of this guide to assist you if you wish to work with your supplier to establish a system to track that information.

It is important to note that if requested, many logging and chipping contractors can track the type of management activity associated with a load of wood, *but this extra effort will result in additional costs*. Financial incentives for special sourcing requirements can be negotiated with your supplier to help ensure that these requirements will be met. For example, a bonus of X% per green ton above a supplier's price would help the supplier cover the added costs of any comprehensive record-keeping, certification, or other quality assurances.



For buyers who want to have more choice in where their wood fuel comes from, verification can help ensure that the supply meets specific sourcing criteria, and verification starts with record keeping. The current common practice for woodchip fuel deliveries is for the supplier to provide the facility with a delivery slip containing two basic pieces

of information: the date of the delivery and the number of green tons delivered. A more rigorous verification system would require greater detail to be recorded for each load of chips delivered to a facility; for instance, where and when the wood was harvested, whether a forester was involved, whether there was a management plan, or whether the harvest job complied with all requirements. It should be expected that there will be an additional cost associated with tracking this information

Various verification or certification systems can be used to ensure the supply meets set criteria:

First-party verification: The *wood fuel supplier (logger)* self-verifies compliance with a given sourcing requirement.

Second-party verification: Compliance is verified by the *wood fuel consumer*. Facilities can request that their wood fuel supplier provide records disclosing the source of the wood. This allows the facility to periodically assess the extent to which their own wood suppliers meet the facility's requirements.

Third-party verification: Compliance verification is done by a *party with no vested interest in the wood fuel transaction*.

While third-party certification systems are widely considered the most rigorous, they can prove difficult to implement. In general, there are no price premiums paid by primary users (sawmills, pulpmills, etc.) for third-party certified wood. In addition, maintaining on-going certification can be expensive for small landowners and wood-using businesses. Third-party forest certification provides the highest (and costliest) level of accountability. Certification is already prevalent enough in the Northeast that most woodchip heating systems could draw some material from certified forestlands, but currently it would be difficult to use certified wood exclusively in a medium to large woodchip heating project.

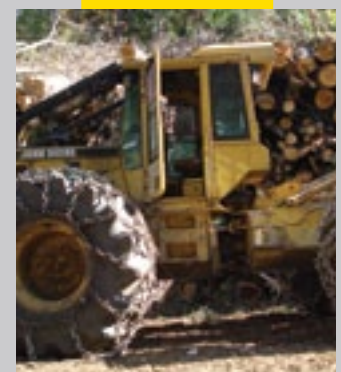
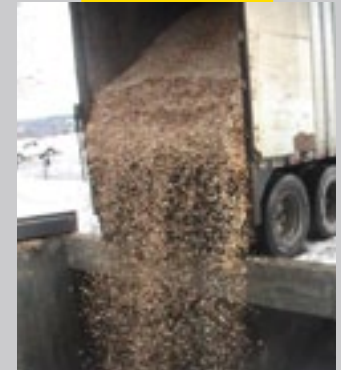
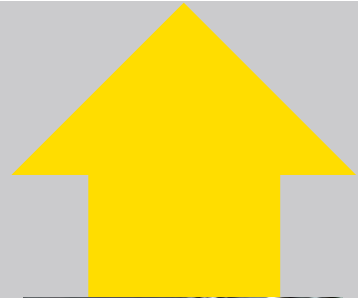
Featured Supply Chain: Woodchip Fuel for an Office Building

In 2009, when National Life Group decided to install a woodchip heating system at their 500,000-square foot headquarters in Montpelier, Vermont, they immediately began exploring their options for securing long-term woodchip fuel supply. Tim Shea, National Life's VP of operations, contacted the Biomass Energy Resource Center (BERC), who helped them identify prospective woodchip fuel suppliers and their capacity to reliably supply National Life. Bids were evaluated on price, chip quality, the supplier's reputation, and the typical sources of harvested wood used to make chips. The first year's contract was awarded to Limlaw Pulpwood & Chipping and has been each year since.

Limlaw Pulpwood & Chipping based in Topsham, Vermont is one of the leading suppliers of wood fuel to woodchip heating buildings in Vermont and New Hampshire. Bruce Limlaw started logging with his father in the late 1950's using horses to skid timber out of the woods. Today, Bruce and his son Bryce run the family logging business, operating three mechanical harvesting crews. They supply a wide range of sawlogs, pulpwood, firewood, and chips to regional markets. Along with its own cutting and processing of timber, the business buys wood from about 50 small-scale independent loggers each year. This wood typically comes to their yard from within 50 miles.

To keep their equipment busy and their staff employed, the Limlaws work on a wide range of harvest jobs — everything from selective thinning of sugarbush to landclearing for housing or agriculture. A large majority of the wood cut or purchased by the Limlaws to make woodchip fuel is from forestlands under a management plan and overseen by a professional forester. Only a small percentage of the annual supply comes from third-party certified (FSC, SFI, or Tree Farm) forest management because only a small percentage of the forestland in Vermont and New Hampshire is enrolled in these programs.

To date, National Life has been very happy with the quality and sources of their fuel supply. While National Life would like to see more certified sources of woodchip fuel, they recognize that they have little influence on the decisions private forest landowners make.



What could facilities considering a wood heating system do to learn more about the potential fuel supply source?

Some steps can be taken to ensure local sourcing from well-managed forests, for example:

1. Contact your county or state forestry agency to get a list of known local woodchip suppliers.
2. Make contact with potential suppliers to gauge their willingness and ability to supply the desired volume and quality of fuel.
3. Determine a) if knowing the source of your wood fuel is important to you, and b) what the highest priorities are.
4. Start communicating your objectives with prospective woodchip suppliers early in the process. Discuss financial costs and incentives for meeting sourcing objectives.
5. Consider talking to local foresters and other institutions with experience in sourcing wood for heat. A large majority of facilities buy wood fuel without sourcing requirements, but several institutions are adopting their own voluntary wood fuel sourcing requirements (for example, Green Mountain College in Vermont and Colby College in Maine).¹
6. If desired, solicit wood source information from prospective suppliers as part of the bidding process (using the example wood fuel sourcing worksheet provided on the next page).
7. If you want a more rigorous verification system, you can, in collaboration with your potential supplier, design one that is verifiable, affordable, and tailored to your specific case.
8. Explore verification options for the forest management, point of harvest, and the ensuing chain of custody through which the wood travels before it is delivered to the facility. Explore what those options may cost. For instance, you might request delivery slips detailing the wood source location and harvest activity.
9. Consider other options as needed; for instance, pre-purchasing roundwood and offering a separate contract to chip and deliver the material.

¹ <http://www.biomasscenter.org/database>

Tools and Templates:

Wood sourcing worksheet

This worksheet illustrates the wide range of forest management activities and categories. It is intended to be an aid for decision-makers to consider their fuel sourcing mix and to initiate a conversation with their perspective or existing supplier. It should be used with the long-term averages for wood supply in mind (e.g. annual average) rather than for each and every load delivered. The sourcing criteria listed are examples and can be used as is or substituted with others.

Criteria Category	Wood Fuel Sourcing Criteria	0%	1-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%
Goal of Timber Harvest	From land clearing activity <i>for development</i>											
	From land clearing jobs <i>for agriculture</i>											
	From forest management harvesting <i>not associated with land clearing</i>											
Residue Management	From forest management harvests using <i>whole-tree</i> removal											
	From forest management harvests using <i>stem only</i> removal											
Type of Management Plan	From forest management harvests with a <i>management plan</i>											
	From forest management harvesting conducted in accordance with <i>all state laws and BMPs or AMPs</i>											
	From forest management harvesting conducted in accordance with a management plan written by a <i>professional forester</i> and overseen by a forester											
	From forest management harvesting conducted in accordance with <i>Forest Guild biomass retention guidelines</i>											
	From forest management harvests conducted by a professional <i>certified by Master Logger</i>											
Third Party Certification	From <i>third-party certified</i> sources such as FSC, SFI, or Tree Farm											
Travel Distance	From within ___ miles of the facility											

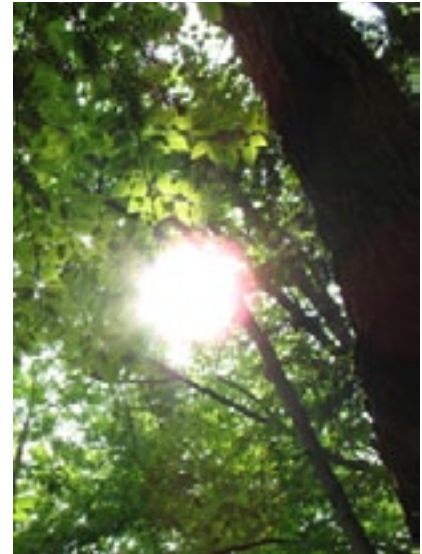
Glossary:

Sawlog: grade of log that will be processed for lumber for products such as construction or furniture. Sawlogs are wider, straighter and have fewer knots than pulpwood.

Pulpwood: lower grade of log that is suitable to be processed for paper manufacturing.

Roundwood: a general term for logs of varying grades.

Bole: main tree stem, exclusive of branches and leaves.



Further Information:

General Information:

- Woodchip Heating Systems, A Guide For Institutional and Commercial Biomass Installations: www.biomasscenter.org/pdfs/Wood-Chip-Heating-Guide.pdf
- BERC video on fuel sourcing: http://www.youtube.com/watch?v=YDRmhpy_qe0
- Community roadmap to Renewable Woody Biomass Energy: <http://www.nhrcd.net/pages/communityroadmap.html>
- Example of the benefits of good forestry for wildlife: <http://vt.audubon.org/foresters-birds>

Forest Management Practices:

- Comprehensive overview of **forestry best management practices**: <http://extension.unh.edu/goodforestry/index.htm>
- The North East State Foresters Association Review of Biomass Harvesting **Best Management Practices Guidelines**: <http://www.nefainfo.org/publications.html>
- Forest Guild's voluntary **biomass retention guidelines** for the Northeastern United States: <http://www.forestguild.org/Publications.html#RP>

Third-party Certification Systems:

- The Northeast **Master Logger Certification** Program offers third-party independent certification of explicit performance standards: www.masterloggercertification.com
- The **American Tree Farm System** (ATFS) is a network of family forest owners practicing sustainable forestry that meets third-party certification standards: www.treefarmssystem.org
- Standards that cover forest management certification as well as the movement of harvested wood through the supply chain:
 - **The Forest Stewardship Council** (FSC): www.fscus.org
 - **The Sustainable Forestry Initiative** (SFI): www.sfiprogram.org