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FINAL REPORT

Developing Wood Fuel Procurement Strategies for Harwood Union High School

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October 13th, 2010

Disclaimer

It is important to note that all the wood procurement options discussed in this report are voluntary measures that should in no way be construed as comprehensive standards that wood fuel consumers must follow. This report highlights the existing supply norms and presents possible strategies that could be employed at the choice of the wood fuel purchaser.

EXECUTIVE SUMMARY

In 2008 the UVM Center for Sustainable Agriculture and its partners the Northern Forest Alliance, Vermont Family Forests, and the University of Vermont Rubenstein School of Environment and Natural Resources received a grant to assist and monitor community-based biomass energy projects in select communities of Addison County and the Mad River Valley region of Vermont. These partners assessed the natural resources in these areas, identified risks and challenges, and engaged these communities in identifying opportunities for biomass energy. As part of this larger initiative, the Biomass Energy Resource Center was tasked with examining the existing woodchip heating system and wood fuel supply for the Harwood Union Middle and High School (Harwood Union) located in Moretown, Vermont.

The following report presents an overview of the Harwood Union woodchip heating system and its current wood fuel procurement, and presents possible strategies for greater assurance of wood fuel sourcing from local and well-managed forests.

In 2007, presumably in effort to lower energy costs, area residents passed a bond vote authorizing Harwood Union to install a woodchip heating system using 90 percent state aid funds and borrowing the remainder of the project cost. The system was installed in 2008 and is about to enter its third heating season. Harwood Union burns approximately 900 green tons (roughly 30 tractor trailer loads) per heating season to cover a majority of the heating demand from the 170,000 square foot facility.

The current supplier, *Limlaw Pulpwood and Chipping*, provides "bole" chips for a price of $55 per green ton delivered to the school's heating plant. These chips are made from low-grade main stems of trees harvested from forest management or occasionally land-clearing activities. Due to limited bid responses from woodchip suppliers and a concern for alienating possible suppliers with over-burdensome contracts, bare-bones agreements were signed between Harwood Union and Limlaw Pulpwood and Chipping for both the 2008/2009 and 2009/2010 heating seasons.

Woodchip suppliers such as *Limlaw Pulpwood and Chipping* conduct a wide range of wood harvesting activities—from clearing woods for development or agriculture, to integrated harvesting as prescribed by consulting forester. Currently, there is no formal tracking of where the wood fuel comes from and what forest management activities are yielding wood fuel for Harwood Union. A full range of options for more detailed contracting and wood fuel source disclosure and verification are presented in the body of this report.

Numerous options for greater assurance of sourcing locally and from well-managed forests were explored and these include: establishing a self-designed (and enforced) procurement standard, soliciting wood source information from prospective suppliers as part of the bidding process, requiring more detailed delivery slips detailing the wood source location and activity, pursuing third-party certification for the forest management (FM), the point of harvest (POH), and the ensuing chain of custody (COC) through which the wood travels (FSC, SFI, and TreeFarm) before it is delivered to the school, and pre-purchasing roundwood and offering a separate contract to chip and deliver the material.

It is recommended that Harwood Union do three things toward establishing a better understanding of where its wood comes from.

1. Incorporate the wood procurement matrix into woodchip bid requests;
2. Explore Point of Harvest (POH) third-party certification with suppliers (www.masterloggercertification.com); and
3. Pursue basic forest heath monitoring program through Harwood Union science program using assistance from project partners.

After reading this report, a follow up meeting should be held to further discuss options and potential for implementing a more substantial procurement program for the school.

1.0 INTRODUCTION

1.1 Project Overview

The University of Vermont's Center for Sustainable Agriculture and its partners (Northern Forest Alliance, Vermont Family Forests, and the Rubenstein School of Environment and Natural Resources at the University of Vermont) received a Northeastern States Research Cooperative grant to assist and monitor community-based biomass projects in select towns in Addison County and in the Mad River Valley. This initiative, entitled "enhancing the sustainability of community-based biomass production and use for local energy through university-community partnerships" has three main goals:

1. Improve understanding and effectiveness of renewable local wood biomass production and use in Northern Forest communities.
2. Develop a model for consensus-based, community identification and implementation of sustainable, local wood biomass projects.
3. Create a foundation for improved collaborative learning among universities and forest communities to increase the impact of sustainability initiatives in the Northern Forest.

In an effort to create tangible progress towards these goals, the Harwood Union Middle and High School (Harwood Union) is the only woodchip-heated facility located in the Mad River Valley and was therefore identified as a good opportunity for exploring wood fuel sourcing. The Biomass Energy Resource Center (BERC) was hired to evaluate the school's existing woody biomass fuel supply and to assist the school with developing wood fuel procurement strategies. These strategies should meet the initiative's objectives of localness and sustainability, while also meeting the school's objectives of reliability and cost-effectiveness in their fuel supply. If further action is taken towards these goals, Harwood Union could serve as an example to dozens of other wood-heated facilities in the State.

1.2 Project Partners

1.2.1 Northern Forest Alliance - www.northernforestalliance.org

The mission of the Northern Forest Alliance is to secure the economic and ecological future of the Northern Forest and its communities. Formed in 1990, it is a coalition of conservation, recreation, and forestry organizations united in commitment to the Northern Forest.

1.2.2 University of Vermont Center for Sustainable Agriculture - www.uvm.edu/~susagctr

The Center for Sustainable Agriculture was established in 1994 to cultivate understanding and innovative practices and policies to advance sustainable food and farming. The Center does this by supporting farmers and communities through learning and research, integrating scientific and practical knowledge, linking key people, building capacity, and sharing learned lessons.

1.2.3 Vermont Family Forests - www.familyforests.org

Vermont Family Forests (VFF) is a non-profit family forest conservation organization that promotes the conservation of forest community health, and when appropriate, promotes careful cultivation of local family forests for community benefit. VFF believes that the three great conservers of family forests are well-informed forest stewards, sound economic returns from ecological forestry, and a community-

shared land ethic. VFF promotes management which provides for human needs while preserving the forest's capacity to maintain itself as a healthy, natural ecosystem.

1.2.4 UVM - Rubenstein School of Environment and Natural Resources- www.uvm.edu/forestcarbon
The Rubenstein School of Environment and Natural Resources (RSENR) is one of several colleges within the University of Vermont. The Rubenstein School's goal is to generate and broadly disseminate knowledge and challenge its students, colleagues, and citizens to acquire knowledge, skills, and values to become innovative, environmentally responsible, and accountable leaders. Their emphasis on the integration of natural science and cultural perspectives reflects the interdisciplinary context in which ecosystem management, resource planning, and environmental concerns must be addressed. The Forest Carbon and Communities Research Group within RSENR participated in this project.

1.2.5 Forest Guild - www.forestguild.org
The Forest Guild is a national professional organization of forest stewards, associated natural resource professionals, and affiliates who are passionate about restoring and sustaining the integrity of our forests while meeting the needs of the communities that rely on them.

1.2.6 Biomass Energy Resource Center – www.biomasscenter.org
The Biomass Energy Resource Center (BERC) is a national nonprofit organization based in Montpelier, Vermont. Its mission is to achieve a healthier environment, strengthen local economies, and increase energy security across the United States through the development of sustainable biomass energy systems at the community level. BERC uses its expertise in institutional and community-scale wood-energy systems to assist industries, schools, institutions, and others in initiating and constructing biomass projects for their heating and power needs. In the short time since its inception in 2001, BERC has established itself as a national leader in biomass heating and power generation using sustainable forest and agricultural resources.

2.0 SCOPE OF WORK AND METHODS

The scope of work for this project was to review and assess current woodchip fuel sourcing and develop several sample wood fuel procurement documents for Harwood Union that would help facilitate the procurement and verification of locally harvested and processed woodchips from well-managed forests. There are numerous efforts underway in Vermont and the surrounding region to assess the usefulness of biomass harvesting and procurement standards (both voluntary and regulatory) for the growing wood energy sector. The Forest Guild has recently released their proposed voluntary biomass harvesting standards. In addition, the Vermont legislature has recently created a biomass energy study committee to evaluate creating and adopting biomass harvesting and procurement standards.

BERC personnel toured the school's woodchip heating plant with Harwood Union maintenance staff, reviewed the school's purchasing documents, and interviewed the school's principal and head of maintenance. BERC representatives met with Harwood Union's current suppliers, Bruce Limlaw and his son Bryce Limlaw, and reviewed their operations and discussed their current wood sourcing and

standard harvesting practices. BERC then developed a framework for either self-designing a target procurement standard or requesting wood sourcing information from wood fuel suppliers as part of the bid process. BERC also developed example documents that could be used as is or modified and used by the facility.

3.0 HISTORY OF HARWOOD UNION'S WOODCHIP HEATING SYSTEM

Harwood Union's school board decided to install a woodchip-fired heating system in the fall of 2007. It appears the decision to install a woodchip heating system was driven largely by the availability of generous state cost share funds and the potential for significant annual fuel savings. After determining that the project's economics were favorable on a life-cycle cost analysis basis, and once the bonding was approved by the local voters, state cost-share funds were secured from the Vermont Department of Education equal to 90 percent of the capital project costs. While the driving factor behind the decision to install the woodchip heating system was largely financial, it is common for local voters to approve such projects based on the additional benefits of switching to a renewable fuel, keeping dollars in the local economy, and supporting the forest products industry. The extent that community members envisioned and even expected the wood fuel to be sourced from local, well-managed forests when they voted to approve bonding is unknown.

The woodchip heating system was installed during the summer construction season of 2008 and the system was first fired in October of 2008. The system has been reliably heating the 170,000 square foot facility since that time. The heating system, manufactured and installed by Messersmith Manufacturing, consists of a chip bin, conveyance equipment, metering bin, stokers, combustion chamber, 180 horse power boiler, multi-cyclone for fly ash collection, and an exhaust stack. This system is housed within a 40- by 50-foot brick building located to the rear of the Harwood Union campus.

During the 2008/2009 heating season, Harwood Union burned 905.18 green tons of woodchips, replacing the need to burn an estimated 35,000 gallons of heating oil[1]. The table below summarizes heating fuel use at Harwood Union.

[1] Oil contains 0.139 million Btu per gallon and wood contains 9.9 million Btu per green ton (before combustion)

Comparison of Heating Fuels Used at Harwood Union[2]				
Heating Season	**Heating Fuel Type**	**Units Used**	**Cost per Unit**	**Heating Cost**
2007 – 2008	Oil (primary)	40,000	$3.29	$131,600
2008 – 2009	Wood (primary)	905 green tons	$70	$63,350
	Oil (back up)	5,000	$2.79	$13,950
	2008-2009 Total			**$77,300**
Calculated Savings for 2008-2009 Heating Season				**$34,300**

As the table above clearly indicates, even at the relatively high cost of $70 per green tons (price dropped in 2009-2010 heating season to $55/ton) the school is realizing considerable savings. Heating costs and estimated savings for the most recent 2009-2010 heating season was not available at the time of the release of this report.

4.0 WOOD FUEL SOURCE OPTIONS

Schools heated with woodchips have some options, and therefore choices, when it comes to procuring wood fuel supply. Chips can be made from many different types and parts of trees coming from many different activities. Historically, chips have been supplied to wood heat users by sawmills looking to sell their by-product chips left over from making square boards out of round logs. But sawmill activity is on the decline, and by-product material is increasingly limited in supply as the remaining sawmills look to improve efficiency and produce less waste. Today, most facilities source woodchips from in-woods harvesting and chipping operations, or from suppliers who operate small chip yards. An overview of a few potential sources is given below, including sawmills, in-woods chipping, and chip yards, followed by a description of Harwood Union's current fuel supplier's operation.

4.1 Sawmills

The business of sawing round logs into dimensional lumber produces a significant amount of by-product wood. The slabs and off-cuts from lumber production at larger sawmills are typically chipped and shipped to regional pulpmills, biomass power plants or woodchip-heated facilities. Wasted wood from sawmills is commonly chipped on a continual basis as logs are sawn and chips are blown directly into dedicated box trailers. When the trailers are full they are shipped to the various markets and an empty trailer is set in its place.

These "mill" or "paper" chips are the best suited for use as fuel in biomass heating systems; they tend to be the highest quality chips available for woodchip-fueled heating systems. This is because mill chips are very clean and have relatively low ash content, due to the logs being debarked before sawing. Mill chips are also commonly screened to remove over-sized stringers and fines, leaving the resulting fuel evenly sized making it easier to convey in the fuel handling system.

[2] The numbers presented in the table above are estimates based on information provided by Harwood Union school staff.

4.2 In-woods

Commercial harvesting of sawlogs and pulpwood removes the main stem or bole of the tree from the woods and leaves the severed tops and limbs either scattered in the woods near the stump or in a large pile at the log landing. Whole-tree harvesting, which is mechanized harvesting where entire trees - as opposed to just the log - are dragged (skidded) from the stump to the central log landing, requires the tops and limbs be removed and piled at the log landing. This leftover wood can be chipped into biomass fuel commonly known as whole-tree chips. In some cases entire trees, not just the tops and limbs, are fed to the chipper to also produce whole-tree chips. It is common practice for the wood to be chipped in the woods at the log landing into box trailers which are transported directly to large users like biomass power plants and pulpmills that are equipped with trailer tippers to unload the chips from the box trailers.

The main drawback to using whole-tree chips for wood heating is that they often contain long slender sticks that pass uncut through the chipper. These long sticks or "stringers" can jam the fuel handling system's augers, thereby presenting some problems with using this fuel. Whole-tree chips also produce more ash due to the higher concentrations of foliage and bark.

4.3 Chip Yards

"Bole" chips can be produced in the woods but are most commonly produced at chip yards from low-grade roundwood (commonly referred to as "pulpwood"). These chip yards are used to aggregate and store harvested roundwood throughout the year. Periodically, a mobile chipper can be brought into the yard to chip stored wood into trailers for final delivery. The difference between whole-tree chips and bole chips is that bole chips do not include the branches or foliage. When the trees are harvested, the limbs are removed and the slash is left on the ground in the woods or at the log landing (depending on where the tree is de-limbed). While bole chips can make for higher quality fuel and help forest soil health by returning a portion of the biomass and nutrients to the soil (only when bole chips are produced as result of stem only harvesting), they are significantly more expensive than sawmill chips and whole-tree chips which are both by-products.

In the past, sawlog prices were high enough that low-grade wood could be extracted at the same time as sawlogs and still be profitable for the logger and pay the landowner stumpage. With recent price drops in the sawlog market, however, low-grade wood like pulp, chips and firewood can no longer rely to the same extent on sawlog profitability: this low-grade wood must increasingly pay its own way out of the woods. This trend has resulted in somewhat increased costs for bole chips.

Bole chips can be produced by chipping roundwood at the log landing where the wood was harvested, at a remote yard used by the logging/chipping contractor, or at the energy plant's wood storage yard.

Most bole chips produced for the heating market are unscreened and have not been debarked prior to chipping. However, there are several chip mills in New Hampshire that produce paper grade chips from pulpwood by debarking logs, chipping, and screening the chips. Unfortunately, these chip mills are too far from Moretown, Vermont to consider as a local source.

5.0 CURRENT SUPPLIER OPERATIONS OVERVIEW

Harwood Union contracted Limlaw Pulpwood and Chipping of Topsham, Vermont to supply woodchips to its heating system in the 2008/2009 heating season (Harwood Union's first year of heating with wood). Due to record-high pulpwood and firewood prices, wet conditions in the woods, and high diesel costs leading into the 2008/2009 heating season, Limlaw supplied Harwood Union's wood fuel for $70 per green ton. This was slightly higher than typical wood prices seen by schools in Vermont in an average year. (Please see the discussion on Factors Affecting Wood Fuel Pricing for more information.)

Over the previous summer, Harwood Union representatives contacted several woodchip suppliers and solicited price quotations to secure its 2009/2010 heating season supply of woodchips. Only two responses were received: one from Limlaw and the other from Lathrup Forest Products based in Bristol, Vermont. On June 17th 2009, the Harwood Union Board of School Directors voted unanimously to award the 2009/2010 woodchip contract to Limlaw for woodchips at $55 per green ton. The supply for the 2009/2010 heating season is secured with a very simple one page signed agreement.

Limlaw uses mechanical harvesters to fell trees

Grapple skidders are used to drag felled trees to a central staging area or "landing"

Limlaw Pulpwood and Chipping utilizes two mechanical harvesting crews operating harvesters, grapple skidders, slashers (for cutting out roundwood products), and chippers. These mechanical harvesting crews employ whole-tree harvesting, meaning the entire tree is dragged to a landing where the stem or log portion is cut out and the top and limb portion of the tree is piled for chipping. The high-quality sawlogs are separated from the lower-quality pulpwood and eventually all of these logs are trucked to the various markets for roundwood (sawmills, pulpmills, chip yards, and firewood processors). The piles of tops and limbs are chipped at the landing, blown into box trailers, and shipped to regional power plants. A small portion of the pulpwood is trucked to Limlaw's chip yard in Topsham where it is stored for eventual chipping for the school heating market.

Limlaw owns three Morbark chippers—two are used in the woods to produce whole-tree chips for the power plant chip market and the third chipper is used at the chip yard primarily to process stored pulpwood for the local heating market, such as the woodchips sent to Harwood Union. In this case, Limlaw uses walking floor trailers to deliver the woodchips.

Limlaw typically conducts harvesting jobs within a 50-mile radius of his home base in Topsham, Vermont. Harvest jobs can span a wide spectrum of purposes, from land-clearing for development and creating pastures, to integrated commercial harvests in accordance with sound silvicultural practices, to selective thinning for sugar bushes. Limlaw frequently bids on harvests marked and supervised by professional foresters, but also works directly with landowners if requested. Most harvest jobs have management plans (this is mostly due to the high rate of current use enrollment in Vermont where enrolled forest parcels are required to submit a 10-year forest management plan that is reviewed and approved by the county forester), but Limlaw reports that there are times when there is no management plan to guide the harvest. Because Limlaw frequently sells whole-tree chips to the Ryegate Power Plant, a large percentage of his harvests are inspected by both Ryegate's on-staff foresters and by the State of Vermont as part of the *Policy for Whole-tree Harvesting in Vermont* (see Attachment A). This policy requires harvest jobs where woodchips will be sold to a Vermont power plant to:

Tree tops and limbs are severed from the log portion and sorted into piles at the landing

- follow US Forest Service silvicultural guidelines;
- comply with all Vermont Accepted Management Practices (AMPs) and the Heavy Cut Law [3]; and
- secure approval from State Wildlife biologists that harvesting does not occur in deer yards, wetlands or buffers, or adversely impact habitat of endangered species.

Low-grade roundwood is trucked from harvest sites to Limlaw's storage yard where it is periodically chipped into trailers for final delivery

While these requirements laid out in the *Policy for Whole-tree Harvesting in Vermont* are basic and not overly stringent, it should be noted that they are the most rigorous regulatory harvesting standards in use in Vermont today. These standards apply only to whole-tree harvesting operations in Vermont that produce wood fuel to be supplied to Vermont power plants. Other woodchips users, including schools, are not currently held to such standards by the State of Vermont.

In addition to the wood supplied by Limlaw's own harvesting activities, he also purchases roundwood delivered to his chip yard in Topsham from other loggers. This material is added to the log piles stored in the yard and eventually chipped into trailers for delivery to woodchip-heated facilities. Limlaw reports that he pays approximately $20 to $30 per green ton for this roundwood.

[3] http://www.vtfpr.org/regulate/documents/Timber_Harvest09_web.pdf

Once low-grade roundwood is delivered to the chip yard in Topsham, it is stored in outdoor piles until it is necessary to chip and deliver the material. When a chip customer requires a load of chips, Limlaw chips a batch of several loads of bole chips to be delivered with self-unloading ("live-bottom") trailers. The smaller Morbark chipper used at the bole chip yard does not have a grapple arm to feed the chipper and therefore a separate truck-mounted log loader is used to feed the chipper that is positioned to blow chips directly into the back of the trailer. On average the woodchip fuel supplied by Limlaw has already traveled from 20 to 50 miles from where it was harvested to the chip yard in Topsham. From here the tractor trailer hauls the chips (in the case of Harwood Union the haul distance is about 36 miles, see the map below) to the customer. At Harwood Union, the woodchips are unloaded directly into the heating plant's below-grade chip storage bin.

Chips are unloaded from trailers into chip storage bins

Woodchips travel approximately 36 miles from the Limlaw chip yard in Topsham, Vermont to Harwood Union Middle and High School in Moretown, Vermont. (Number 1 indicates Limlaw's wood yard in Topsham and Number 2 indicates Harwood Union in Moretown.)

In the end, it is very difficult to characterize the wood fuel supplied by Limlaw as being sustainable or not sustainable. The source and quality of forest management feeding wood fuel to Harwood Union varies from job to job and on a week-to-week basis. In most cases, logging and chipping contractors are not the ones deciding what trees to cut and what ones to left behind. Ideally, foresters are the experts who help their landowner clients by writing the forest management plan, mark the harvest, layout the logging roads, and oversee the harvesting in effort to minimizing the impacts on soil, water quality, wildlife habitat, and regeneration. Foresters decide how the harvesting actually happens and are responsible for its ecological impact. Loggers are responsible for harvesting the wood as prescribed by the forester, carefully, safely, and efficiently.

6.0 VARIABLES AFFECTING WOODCHIP PRICING

Woodchip prices can vary widely—the range in Vermont is between $25 and $80 per ton. In its first season of operation, Harwood Union's woodchip heating system was fueled with woodchips purchased for $70 per green ton. This heating season's (2009-2010) price is $55 per green ton. These differences in each year's price reflect changes in markets, diesel prices, and harvest conditions. In general, the price of wood is affected by numerous factors, but the primary ones are:

- **Wood source and production costs.** This varies widely depending on whether the wood is a by-product of some more lucrative activity.
- **Strength of the sawlog market.** Higher prices paid for sawlogs can help lower prices for pulpwood and chips. Conversely, if they have to "pay their way out of the woods" prices for fuel grade wood would increase.
- **Regional balance of supply and demand for low-grade wood.** Increased demand from other markets like pulpmills, power plants, and pellet mills can influence prices of low-grade 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 feedstock is heavily dependent on the cost to transport the material; this cost rises with higher diesel prices and with greater trucking distances.
- **Amount and seasonality of demand.** Facilities requiring larger amounts of fuel can often leverage slightly lower prices than facilities needing smaller amounts of chips. Also facilities that purchase chips continually year-round are at a price advantage over seasonal consumers.

6.1 Wood Production Costs

The table below gives both an itemized range and average costs for the various steps involved in producing bole chips[4].

Itemized Production Cost of Bole Chips from Low-Grade Roundwood[5]		
	Cost Range (per green ton)	**Average Cost (per green ton)**
Stumpage (fee paid to landowner)	$0.50 - $5.00	$4.00
Cost to fell, skid, and process at landing	$15.00 - $25.00	$18.00
Cost to haul to mill	$5.00 - $20.00	$12.00
Chipping	$3-$9.00	$7.00
Cost to haul to facility	$5.00 - $20.00	$12.00
Total Cost	**$27.50 - $79.00**	**$53.00**

The table above uses approximate costs because the costs to harvest, process, and haul pulpwood changes from harvest job to harvest job and depends widely on dozens of variables such as volumes harvested, layout of skidding roads, skid distances, equipment used, terrain, distance to the mill, etc. These calculations also assume the pulpwood is harvested as part of an integrated harvest where some sawlogs are removed at the same time. If pulpwood were harvested without any sawlogs, the costs presented in the table above would be higher, since the economic gains from harvesting sawlogs can help to "subsidize" the cost of removing low-grade wood. Harvesting low-grade wood is often a break-even cash flow booster whereas most loggers achieve their profit margin in the sawlog harvest.

An important consideration in sourcing wood from outside of the Mad River Valley procurement area factored here is the increase in price that will come from trucking the material further distances. When wood is transported over greater distances, not only does the cost per ton paid by the facility increase, but the energy requirements (and carbon emissions) also increase.

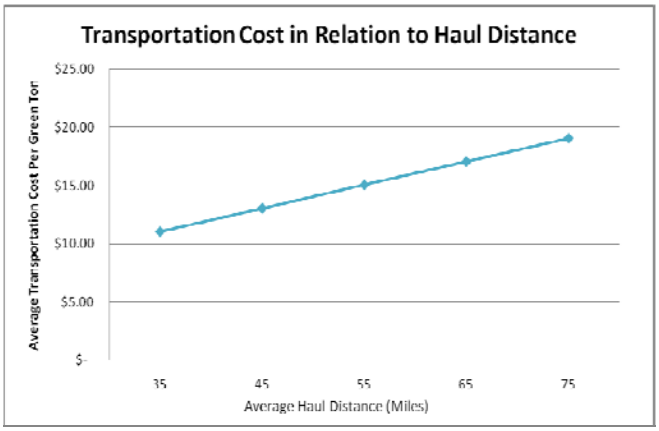
6.2 Sawlog Market Influence

As mentioned above, sawlogs are the most profitable portion of the timber harvest for both landowners and loggers. If sawlog markets are strong and sawlog prices are high it can stimulate more harvesting and feed more low-grade wood into the pulp and biomass markets. However, when sawlog markets are weak many landowners hold off harvesting and wait for the market to rebound. This can reduce the flow of wood to the other markets.

[4] Some profit margin has been factored into the costs presented for the landowner, logger, and trucker.
[5] The costs presented in the table above are based on frequent discussions with wood resource economists and actual wood fuel suppliers in the Northeastern US.

6.3 Regional Balance of Supply and Demand

Elemental macroeconomics are at play in the wood markets. When supply exceeds demand, prices drop. When demand exceeds supply, prices rise. Changes in global markets and currency exchange rates can influence wood demand (especially pulpwood) on a day to day basis. Similarly, weather and other factors can influence supply on a day to day basis.



6.4 Transportation

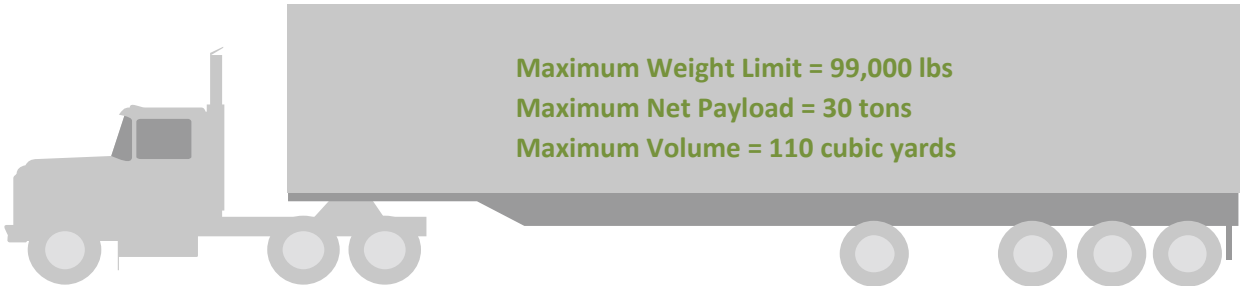
In theory, for every mile wood is transported, the delivered price to the receiving facility increases. At today's diesel fuel prices, transporting 22 to 28 ton loads (a trailer load) of woodchips costs between $2.50 and $3.00 per mile. As this graph shows, longer trucking distances will only slightly increase the purchase cost of the wood fiber. Typically, it is advisable to keep trucking distances to a minimum, but $5 more per green ton for wood hauled an extra 10 to 15 miles is a small price to pay for greater assurance of sufficient supply.

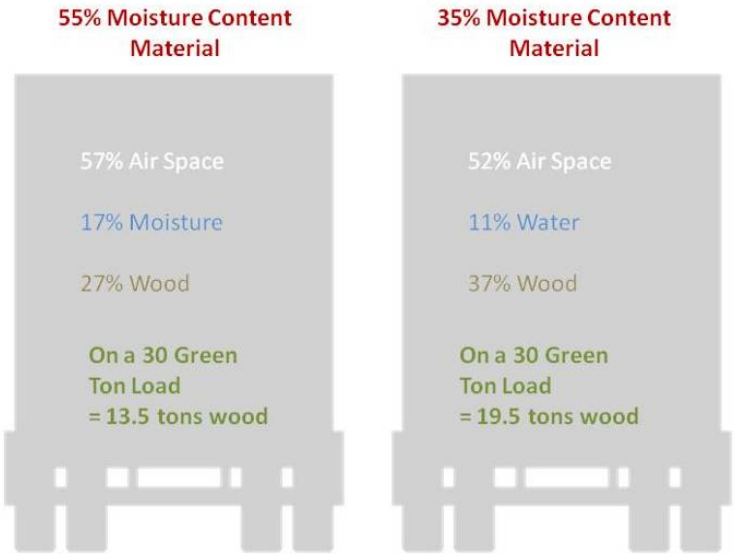
Additionally, the cost of wood fuel will be affected by diesel prices, since this will affect trucking costs. As diesel fuel prices escalate, the delivered cost per ton will also increase.

6.5 Moisture Content during Transport

Another factor affecting wood fuel transport costs on a dry-weight basis is the moisture content of the material. Weight is the limiting factor for truck transport of woodchips due to the weight of water—a tractor trailer will typically reach its legal load limit before it reaches the volume holding capacity of the trailer.

Historically, in Vermont, chip trucks were limited to a gross weight (the weight of the truck plus the weight of the load its carrying) of 80,000 pounds on the interstate highways (or a load of about 22 tons when the weight of the truck is subtracted) and 99,000 pounds (or about a 30-ton load) on back roads. A recent, but temporary, increase to the interstate limit in Vermont was made to match the limit on the back roads, meaning trucks in Vermont can currently carry a maximum of 30 tons on both classes of roads. In New Hampshire, the maximum load they can carry is 99,000 pounds, or 30 tons.





If chips were drier, more volume could be carried before reaching either the legal weight limit or the volume capacity of the trailers, improving transport economics. The illustration to the left depicts how drier material can translate into more tons of wood for the same cost of transport—thereby lowering the per unit cost of woodchip transport.

It is important to note that while moisture content has a dramatic impact on wood fuel value and the economics of transporting the fuel there are few effective strategies for reliably drying wood prior to transport. Given the wet and humid climate in the northeastern United States, drying is minimal between the time wood is cut green to when it is loaded onto trucks. Many efforts have been explored over the years to dry woodchips but none have proven cost effective.

6.7 Biomass Crop Assistance Program (BCAP)

The BCAP program has recently had a large, though probably short-term, influence on market conditions and prices of biomass fuel. BCAP is a USDA program administered by the Farm Service Agency (FSA) that provides matching payments to suppliers of eligible material delivered to qualified biomass facilities.

Large-scale matching payments to wood suppliers under BCAP began in late 2009. The program was initiated as part of the 2008 farm bill and is slated to expire in September of 2012. However, there has been a pause in the program since April of 2010 while new program rules are presented for public comment and a congressional review. The Farm Service Agency does not anticipate that the program will resume until late summer of 2010 at the earliest.

The BCAP program has had the unintended outcome of many power plants and pellet mills lowering their gate prices because wood suppliers are enjoying the government matching payments. Even with reduced gate prices the wood suppliers are often getting the equivalent of $40.00 to $45.00 per green ton for their chips when they combine the gate prices with the government matching payments for their wood. This bonus in pay has had the unintended consequence of flooding wood yards with inventory as suppliers have increased production of chips in order to take advantage of the matching payments—thereby further dropping market prices.

It appears that when BCAP resumes later this year the new rules will be more stringent and less wood suppliers will be eligible to participate, which will greatly reduce the influence of the program on wood prices and markets. It also appears that funding for the program will be more limited in light of recent pressures in Washington to rein in costs. Regardless, the program is set to expire on September 30th of 2012 and should be viewed as a temporary occurrence.

6.8 Future Wood Fuel Prices

Historically, prices have oscillated slightly (based on the influence of the factors described earlier), the mean price has risen at a rate below general inflation. It is not expected for this trend to continue. Given the recent decline in regional sawmill production (generating less residue and calling for less harvesting) a price increase has been experienced as wood fuel transitions from a by-product of commercial harvest and lumber production and becomes a commodity resource. All things being equal, woodchip prices are expected to continue to oscillate slightly with the mean price escalating at or near the rate of general inflation. However, if sawlog demand strengthens in the coming years, woodchip fuel prices may remain steady. On the other hand, if demand for sawlogs remains weak and demand for fuel chips increases, prices will rise faster than general inflation.

If in the future, more stringent harvesting guidelines and/or standards are put in place and wood buyers adopt procurement standards with certain sourcing and tracking criteria, it is not known to what extent, if at all, woodchip fuel prices would be impacted.

7.0 STRATEGIES FOR WOODCHIP FUEL SUPPLY SOLICITATION AND CONTRACTING

In general, the best initial strategy for securing woodchip fuel supply is to cast as broad a net as possible when soliciting bids. The more suppliers to receive a request for proposals (RFP), the greater the likelihood is of receiving multiple competitive bids (see Attachment B for a full list of known woodchip suppliers in Vermont). It is recommended that Harwood Union use the contact information included in that attachment to contact as many of the potential suppliers as possible.

There are numerous provisions that can be written into supply contracts. Woodchip purchasing in the northeast ranges from verbal agreements sealed with a handshake to overly ornerous contracts. The following contract provision discussion highlights possible requirements based on review of numerous

chip fuel supply agreements. Specific suggested language is included within the sample RFP (see Attachment C).

7.1 Chip Shipment and Receiving

Woodchips are typically delivered in self-unloading trailers. The location of the plant and configuration of truck access at Harwood Union will accommodate standard 48-foot trailers and the storage bin has the capacity to store 70 tons of chips (or two-and-a-half truck loads). This information should be provided in the RFP to allow the proposing supplier to understand whether they will be capable of supplying, given their equipment and Harwood Union's infrastructure. Harwood Union may also wish to specify the timing of chip fuel deliveries, so that traffic conflicts can be minimized or to ensure that a staff person is on-site to verify chip quality and quantity. In this section of the RFP, any requirements for chip fuel handling should also be included, such as requiring that all loads be tarped (if an open top trailer is used) in transit to reduce spillage or exposure to the elements. Additionally, Harwood Union may wish to specify that all gross vehicle weights comply with the legal load limits.

7.2 Chip Shipment Inspection

A representative of Harwood Union should plan to be present at the time of all chip fuel deliveries, and this should be explained in the RFP and contract. This representative should inspect loads prior to unloading and will supervise the actual unloading of chips. This gives Harwood Union the opportunity to refuse a load of chips that is determined to not meet the standards of quality. It is suggested that Harwood Union include language in the RFP that allows the School to reject the delivery at its sole discretion, requiring the supplier to replace the sub-quality chips with chips that meet the standard.

7.3 Primary and Backup Supplier Status

To ensure a sufficient and reliable supply of chip fuel, Harwood Union should secure contracts with both a primary and alternate supplier. Both suppliers can be selected from the total pool of proposals received from the fuel supply RFP. In doing this, Harwood Union sets up a system that allows continuous supply of chips even if, for some reason, the primary supplier is temporarily or permanently unable to meet their obligations to supply chips to Harwood Union. In this instance, the alternate supplier would be notified and would commence supplying chips. Even if the back-up supplier charges considerably higher price per ton, it is still better than being forced to burn heating oil. Numerous woodchip heated facilities in Vermont have a back-up supplier on call and willingly pay $10-15 per green ton more than they pay their primary supplier.

7.4 Supply Contract Term

The selected suppliers (both primary and alternate) should sign a contract with Harwood Union at the proposed prices. The terms and conditions given in the RFP and the selected vendors' responses become part of the agreed-upon contract. The proposed pricing structure will be locked in at this time. In general, it is recommended that Harwood Union seek a minimum 12-month supply contract but offer a longer term contract option (a 2- to 4-year price option). This extends the opportunity for multi-year

supply contracts, possibly giving the school greater price security and the supplier better security for longer-term business planning. Many woodchip heated public facilities in Vermont sign multi-year supply agreements.

7.5 Diesel Fuel Surcharges

A significant amount of off-road diesel is used in harvesting wood: mechanical harvesters, skidders, de-limbing equipment, and chippers all burn off-road diesel fuel. Additionally, log trucks and tractor trailers used for delivering chips also burn significant amounts of on-road diesel fuel. Woodchip suppliers committing to fixed-price supply agreements need to be able to apply fuel surcharges in the event that diesel prices rise over certain price points to cover their costs. At the same time these surcharges should not be determined arbitrarily by the chip supplier. A mutually agreed-upon fuel surcharge schedule needs to be established and integrated into the supply agreement. The following table provides an example fuel surcharge schedule based on an assumed starting cost of diesel fuel of $2.90 per gallon.

Diesel fuel prices	Amount of fuel surcharge
Up to $3.00 gallon	$0.00 ton
$3.01 - $3.25 gallon	$0.50 ton
$3.26 - $3.50 gallon	$1.00 ton
$3.51 - $3.75 gallon	$1.50 ton
$3.76 - $4.00 gallon	$2.00 ton
$4.01 - $4.25 gallon	$2.50 ton
$4.26 - $4.50 gallon	$3.00 ton
$4.51 - $4.75 gallon	$3.50 ton
$4.76 - $5.00 gallon	$5.00 ton

By providing a specific schedule for diesel fuel surcharges, both the supplier and the chip purchaser are protected. This mutually agreed-upon schedule also eliminates the possibility of surcharges being applied that are disproportionate to the actual rise in cost to the supplier.

8. 0 POTENTIAL FOR ADOPTING VOLUNTARY PROCUREMENT STANDARDS

When school decision-makers and community voters decide to install a woodchip heating system, they consider all the various pros and cons of such a project, from the economic and operational to environmental. During the deliberation of whether or not to install such a system, the desire to source the wood fuel from local, well-managed forests is often discussed. While the primary motivation for the Harwood Union school board was financial savings, wood fuel sourcing from local well-managed forests is often the community's shared vision when the decision to install is made.

In reality, woodchips can come from a wide range of sources: byproduct from sawmills, land-clearing for development, land-clearing for agriculture, liquidation timber harvests, small clear-cuts for wildlife habitat improvement, selective harvests, and so on.

Although the vision of sourcing wood from local, well-managed forests may have been front and center at the time the decision to install was made, by the time the system gets built and the facility needs to purchase woodchip fuel, this intent often falls to the wayside. In this way, buying woodchips is no different than the approach used to purchase heating oil—does anyone ask their local fuel dealer specifically whether they are buying Iraqi, Venezuelan, Canadian, Russian, or Saudi oil? While buying oil is how we are accustomed to purchasing, a different approach is needed for buying wood.

The following section outlines some possible strategies for adopting self-designed, voluntary procurement standards in effort to provide greater assurance the wood fuel is sourced from local and well-managed forests.

There is a very broad spectrum of possible strategies for wood source requirements and for providing verification that the requirements are being met. Some strategies represent the absolute bare minimum while others represent approaches that set the bar high. Here are just a few possible strategies:

- Require that a percentage (anywhere from 0-100) of wood fuels are from commercial harvests that have been overseen by a professional forester
- Require that a percentage (anywhere from 0-100) of wood fuels are from commercial harvests conducted by (a) trained, professional logger(s)
- Require that a percentage (anywhere from 0-100) of wood fuels are from managed forests with minimum 10-year management plans to reduce wood procured from land conversion and timber liquidation sales
- Require that a percentage (anywhere from 0-100) of wood fuels are from third-party certified sources including but not limited to FSC[6], SFI[7], and Tree Farm[8]
- Require that a percentage (anywhere from 0-100) of wood fuels are from loggers who have gone through an accreditation program such as LEAP[9], Master Logger[10], or Smart Logging[11]
- Require that a percentage (anywhere from 0-100) be sourced from within a certain radius of the facility (ex. 25-50 miles) to reduce importation of cheaper wood fuel from longer distances

The table on the following page shows a matrix of options for wood fuel source requirements. This matrix is designed to be an aid for decision-making about the right level of sourcing requirement for Harwood Union. Administrators can use this matrix to help determine from where on the spectrum within each category their woodchip fuel should be sourced in order to meet Harwood Union's

[6] Forest Stewardship Council - http://www.fscus.org/
[7] Sustainable Forestry Initiative - http://www.sfiprogram.org/
[8] Tree Farm - http://www.treefarmsystem.org/cms/pages/26_19.html
[9] LEAP - http://loggertraining.com/vt-leap.htm
[10] MasterLogger - http://www.masterloggercertification.com/
[11] SmartLogging - http://www.rainforest-alliance.org/forestry/documents/smartlogging.pdf

objectives. One approach to using this matrix is for the school to determine their desired set of requirements and then ask suppliers to meet these requirements. However, this approach could potentially alienate possible suppliers.

Another approach is to use the matrix as part of the bid solicitation and review process. By asking potential suppliers, in an open-ended way, where on the matrix their sources fall, it allows the school to review the wood source and choose a supplier based on more than just price.

The matrix is also included on the sample RFP form (Attachment D) as one of several optional ways to collect information from potential suppliers. It is recommended that this matrix be used as an open-ended questionnaire for potential suppliers. The information collected can be used to determine which of the suppliers will help the school meet their fuel supply objectives, as opposed to telling the suppliers what Harwood Union's objectives are.

It is also possible and even recommended that an incremental approach be taken—initially set the bar fairly low and gradually, over a period a few years, ratchet up the standards in effort to reach the desired sourcing.

Wood Fuel Procurement Decision-Making Matrix

Wood Fuel Sourcing Criteria[12]	0%	1-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%
From landclearing activity for development											
From landclearing jobs for agriculture											
From forest management harvesting											
From forest management harvesting with a management plan											
From forest management harvesting with a management plan written/approved by a professional forester											
From forest management harvesting conducted in accordance with any and all state laws and BMPs or AMPs											
From forest management harvesting conducted in accordance with Forest Guild biomass retention guidelines											
From forest management harvesting marked and overseen by a professional forester											
From forest management harvests conducted by a professional certified by MasterLogger											
From forest management harvests using whole-tree removal											
From forest management harvests using stem only removal											
From Third-Party certified sources including but not limited to FSC, SFI, or Tree Farm											
From within ___ miles of the facility											

[12] The various sourcing criteria listed above are examples and can be used as is or substituted with others.

Should Harwood Union be interested in designing and adopting a voluntary wood procurement standard, the project partners (UVM, Northern Forest Alliance, BERC, Vermont Family Forests, and the Forest Guild) would be available to assist the school through the process.

9.0 POTENTIAL STRATEGIES FOR VERIFICATION OF VOLUNTARY PROCUREMENT STANDARD

If voluntary wood fuel procurement requirements are established (either by setting them yourself or surveying the suppliers), some level of verification may need to be established to ensure the requirements are being met. Without some form of documentation and verification (periodic review of supply documentation to determine whether the actual supply met the agreed upon standards) any voluntary standards are somewhat meaningless.

When wood fuel is shipped directly from the forest harvesting location to the final destination, in this case a heating plant, documenting and tracking the source can be done simply and effectively. However, when wood is harvested and hauled to a chip yard where wood from multiple sources is aggregated and mixed into one large stock-pile and then eventually chipped and delivered to the heating plant, tracking where the wood comes from becomes more complicated.

Verification starts with record keeping. 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: date of the delivery and the number of green tons delivered. If a verification system is to be implemented more detail needs to be recorded for every load of chips delivered to a facility. Basic details such as where and when the wood was harvested, whether a forester was involved, whether there was a management plan, whether the harvest job complied with all AMP's and existing guidelines for quality forestry practices should be recorded. An example of a more detailed fuel delivery ticket can be found attached to the end of this report (Attachment E). This example ticket could serve as the basis on which a basic tracking and verification program could be established.

In general, should a standard be adopted, there are four basic options:

1. No verification
2. Self-verification by supplier
3. Self-verification by school
4. BERC verification program
5. Third-party certification programs

9.1 No Verification Option

While it is not recommended, Harwood Union could choose to adopt a procurement standard, but take no action toward periodic verification of whether those standards are being met. However, adopting a standard without any form of verification is somewhat pointless.

9.2 Self-Verification by Supplier

If Harwood Union adopts their own voluntary procurement standard, Harwood Union can request that the woodchip fuel supplier "self verify" by requiring the supplier to keep their own records disclosing the source of the wood and to provide the School with a periodic assessment of the extent that the supplier met the standard. If the supplier determined they did meet/exceed the standard for a period of time, nothing happens. If, however, the supplier determined that they did not meet the standard, a decision would need to be made as to what the consequence would be.

9.3 Self-Verification by School

If Harwood Union adopts a voluntary procurement standard, they can also choose to require the supplier to keep on-going records and provide this information for each load of fuel received. These delivery records would be periodically reviewed by the school personnel and compared against the standard to determine whether the supply is in accordance with the pre-set standard.

9.4 BERC Verification Program

Another option is for BERC to conduct an annual review of the supply source records to determine whether the supply is in accordance with the standard. BERC is an independent, not-for profit organization. While BERC supports community-scale biomass energy, it can provide unbiased review of fuel sourcing records to determine whether the actual supply met the desired standard. BERC is in the progress of designing and offering this basic service as part of the Vermont Fuels for Schools Program. One limitation is that it does not probe any deeper than reviewing the records. There would be no further investigation of whether the records are truthful or accurate. It is also important to note that BERC's services would be to verify the sources of the wood fuel and audit the records to determine whether the actual supply complies with the standard. This would not go as far as determining the in-woods impacts of actual harvests.

Should Harwood Union desire to go beyond merely auditing the fuel's supply chain and basic sourcing, further efforts to monitor and assess in-woods impacts of wood harvesting could be pursued. If the school wants to explore this option further, discussions with the project partners (UVM, Vermont Family Forests, and the Forest Guild) should be pursued.

9.5 Traditional Third-Party Certification Programs

There are several existing third-party certification programs used commonly in the forest products industry that could possibly be used by Harwood Union. Both the Forest Stewardship Council (FSC) and the Sustainable Forestry Initiative (SFI) have standards that cover in-woods management and harvesting (FM certification) as well as the movement of harvested wood through the supply chain (Chain of Custody certification).

While third-party certification systems such as the FSC standard are widely considered the most rigorous they may prove difficult to implement, and maintaining on-going certification is expensive for small landowners and wood using businesses.

Another possibly more realistic option would be to pursue verification services from an organization such as the Rain Forest Alliance. Their SmartWood program, in addition to their services for certifying forestland owners and businesses to the FSC standard, offer verification services to standards other than FSC.[13]

More locally, Vermont Family Forests (VFF) offers a certified eco-forestry program for woodland owners in Vermont.[14] While this program is geared towards certifying the forestland and its management - not the wood harvested from it - a procurement standard could include a percentage of wood from forestland managed to this standard.

9.5 Point of Harvest Certification

Another interesting option for consideration is the relatively new "point of harvest" certification system called "SmartLogging" introduced by the SmartWood program of Rainforest Alliance.[15] This program does not certify the forest management or the corresponding chain of custody through which harvested wood products move toward their final markets, rather it certifies the performance of the loggers who harvest the wood. In the northeastern United States a non-profit organization called the Trust to Conserve Northeastern Forestland operates a program called MasterLogger certification[16]. This MasterLogger certification program has been accredited to the "SmartLogging" standard. Currently in Vermont, there are several entities who own existing woodchip heating systems and several under development that are exploring this option to better document their fuel supply.

10.0 POTENTIAL STRATEGIES FOR SOURCING LOCALLY HARVESTED WOOD FUEL

A majority of woodchips supplied to Vermont schools comes from wood harvested in Vermont. Many may consider wood harvested within the State to be local, however further efforts to source wood fuel more locally are possible.

Supply contracts for schools are most often structured as a single supplier contract, meaning the full contract is awarded to a single supplier who aggregates the wood, and then chips and delivers the material as needed. However, another option exists: two separate contracts can be offered. The first contract would be to purchase delivered roundwood to a set location and the second contract would be

[13] http://www.rainforest-alliance.org/forestry.cfm?id=legal_verification
[14] http://www.familyforests.org/ecoforestry/
[15] http://www.rainforest-alliance.org/forestry.cfm?id=smart_logging
[16] http://www.masterloggercertification.com/

to store the roundwood, chip it, and deliver it to the heating plant. The contract for delivered roundwood can be sole-sourced or even offered to several suppliers. There are no chip contractors currently located in the Mad River Valley, but there are numerous loggers who could cut and deliver roundwood to a local wood yard—thereby opening up the opportunity for local loggers to supply wood to Harwood Union that would otherwise not have access to that market. This two step sourcing is more common for larger facilities like power plants, pellet mills, and big heating plants—it is not commonly used by schools in Vermont at this time.

One potential drawback to note is that this approach could possibly alienate the primary chip supplier by moving from a full supply agreement to only a store-chip-deliver agreement. If the chip supplier welcomes this arrangement, it may be worth exploring further. If the chip contractor does not like the idea it may not be worth the risk. Another drawback to this approach is that it is more expensive and cumbersome to manage multiple contracts versus just one.

11.0 SUMMARY

By installing a wood heating system, Harwood Union has been successful in achieving several of its goals—they have dramatically lowered their use of heating oil and have realized considerable savings in their energy costs. The school's woodchip fuel supply comes from a logging and chipping contractor based in eastern Vermont that cuts wood from a broad spectrum of harvest jobs. When woodchips are delivered to the school, the only information provided by the supplier is the date of delivery and the number of green tons on the truck. Without further information and reporting it is difficult to gauge the extent to which the wood fuel is helping the school lower its carbon footprint and the extent to which the fuel is sourced from local, sustainable forestry. Moving forward, there are several steps the school could choose to take to assure local sourcing of wood fuel from well managed forests.

In summary, Harwood Union can:

1. Consider more detailed fuel supply solicitation and contracting in the next heating season using the RFP template found in Attachment C.
2. Consider adopting a voluntary procurement standard.
3. Consider strategies for verifying that wood fuel sourcing complies with any standard adopted.
4. Consider adopting a forest health monitoring program to be incorporated into the school's science curricula.
5. Contact the project partners (UVM, NFA, the Forest Guild, Vermont Family Forests, or BERC) to discuss these options further.

Numerous options for greater assurance of sourcing wood locally and from well-managed forests were explored and these include: establishing a self-designed (and enforced) procurement standard, soliciting wood source information from prospective suppliers as part of the bidding process, requiring more detailed delivery slips detailing the wood source location and activity, pursuing third-party certification for the forest management (FM), the point of harvest (POH), and the ensuing chain of custody (COC)

through which the wood travels (FSC, SFI, and TreeFarm) before it is delivered to the school, and pre-purchasing roundwood and offering a separate contract to chip and deliver the material.

It is recommended that Harwood Union do three things toward establishing a better understanding of where its wood comes from.

1. Incorporate the wood procurement matrix into woodchip bid requests;
2. Explore Point of Harvest third-party certification with suppliers (www.masterloggercertification.com); and
3. Pursue basic forest heath monitoring program through HU science program using assistance from project partners.

Efforts in the Mad River Valley are underway to explore the feasibility of developing a local wood aggregation, storage, and processing yard to make better use of locally harvested wood by the local markets such as Harwood Union. It is recommended that Harwood Union representatives meet with community members to discuss this concept further.

Burlington Electric Department

Harvesting Policy for Whole Tree Chipping Operations in Vermont

It will be the policy of Burlington Electric Department to accept delivery of whole tree chips only from harvesting operations in Vermont certified by a professional forester as meeting the criteria of "good forestry practice" as outlined below. Burlington Electric Department foresters or their authorized agents will conduct periodic on-site inspections to insure compliance with the following practices. Unresolved violation of these practices will result in the termination of chip purchase from the offending producer.

1. The use of necessary and applicable erosion and sedimentation control practices will be required. Every harvesting contractor will become familiar with the publication Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont. Contractors will be required to implement procedures outlined in the guide to the satisfaction of Burlington Electric Department foresters.
2. Consideration for visual quality will be required.
   a. All refuse will be removed from the landing/logging site prior to termination of the operation. Wood waste will be removed or buried and brush piles leveled to the extent possible.
   b. Appropriate techniques will be used adjacent to major hiking trails to protect the integrity of the trail and the hiking experience. Trail treadways will be kept clear of logging debris. Crossing of trails by logging vehicles will be at right angles and kept to the minimum number necessary. Cutting within 50 feet of either side of major trails will be limited to the removal of high risk trees or the removal of less than 30% of the basal area of existing trees greater than 5 inches DBH, whichever is less.
   c. Landings will be laid out so as to reduce adverse visual impact. Newly constructed landings along public highways will be screened by a strip of undisturbed vegetation at least 25 feet wide when such vegetation exists. Where open areas or abandoned landings are

suitable for use as landings, they will be so used in spite of the lack of a buffer strip, so as to reduce the amount of area cleared for such use.

3. Wildlife and fisheries will be given consideration in harvest planning.

   a. Landowners will be made aware of any negative impacts to wildlife or fisheries relating to a proposed chip harvest operation on their property.

   b. For all sites within Vermont from which wood fuel will be purchased by Burlington Electric, a Burlington Electric forester will visit the site with the landowner and/or harvesting contractor and confer in developing a harvesting procedure which meets the forester's approval. In turn, the forester will develop a "Whole Tree Chip Harvest Notification" to be sent to the appropriate Vermont Department of Fish and Wildlife habitat biologist. This notification will include: a map showing the location of the proposed operation; information regarding the nature of the harvest (including type of cut and acreage); name of prospective contractors and approximate dates during which the harvest will be conducted. The habitat biologist will have fifteen days in which to respond to the BED forester with an approval or modification of the proposed operation. If the habitat biologist determines that a modification of the harvest plan will be necessary in order to protect deer wintering areas, wetlands or the habitat of rare and endangered species, such modification will be included in the response to the BED forester within the fifteen day time period. No harvesting operation will begin before approval by the district habitat biologist or the Vermont Public Service Board.

   c. When landowner goals require silvicultural manipulation for wildlife management purposes, guidance may be sought from the Vermont Department of Fish and Wildlife or other qualified source as well as the publication A Landowner's Guide to Wildlife Habitat Management for Vermont Woodlands by the Vermont Department of Fish and Wildlife.

   d. Protection of fisheries resources will be provided through the use of acceptable erosion and sedimentation control practices including the use of filter strips and protection of streamside shade.

Harvesting contractors will be required to implement applicable procedures outlined in the publication Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont to the extent specified by Burlington Electric Department foresters.

4. Burlington Electric Department foresters will seek guidance in protecting significant archeological sites. Such guidance will be provided by the Vermont Division for Historic Preservation in the form of State-sponsored training to aid in on-the-ground identification of such sites and/or in the form of guidance from the Division of Historic Preservation in the determination of the likelihood of occurrence of significant archeological deposits within areas scheduled for harvesting. Burlington Electric Department will require the modification or termination of harvesting in areas thought to be archeologically significant by the Division of Historic Preservation until such time as examination of the area has been completed. Burlington Electric will also make the landowner aware of significant archeological sites on his property and aid him in adjusting his management decisions to protect such sites.

5. Timber Harvesting

   a. The development of management goals will involve consideration of:

      1) The objectives of the landowner and alternatives available to him or her.

      2) The characteristics of the site and forest stand.

      3) The impacts on related resources (water quality, wildlife, scenic quality, recreation).

   b. The landowner or land manager and/or the harvesting contractor will confer with a professional forester representing Burlington Electric Department in developing a harvesting procedure which meets the forester's approval. In all cases, harvesting will incorporate, to the extent reasonably possible, the protection of residual trees, minimization of waste and assurance of rapid and adequate regeneration. Every effort will be made to put harvested products to their most valuable use. In developing specific silvicultural techniques for meeting management goals, reliance will be placed on a combination of the forester's professional judgement and recognized silvicultural guides, including, but not limited to:

1) A Silvicultural Guide for Northern Hardwood Types in the Northeast by Leak, Solomon and DeBald.

2) A Silvicultural Guide to White Pine in the Northeast by Lancaster and Leak.

3) A Silvicultural Guide for Spruce-Fir in the Northeast by Frank and Bjorkhom.

4) A Silvicultural Guide for Developing a Sugarbush by Lancaster, Walters, Laing and Foulds.

5) Uneven-Aged Management of Northern Hardwoods in New England by Leak and Filip.

6) A Landowner's Guide to Wildlife Habitat Management for Vermont Woodlands by Vermont Fish and Game Department.

7) Manager's Handbook for Red Pine in the North Central States by North Central Forest Experiment Station, U.S.D.A. Forest Service.

8) A Guide to Hardwood Timber Stand Improvement by U.S.D.A. Forest Service, Northeastern Area State and Private Forestry.

9) Establishing Even-Age Northern Hardwood Regeneration by the Shelterwood Method - A Preliminary Guide by North Central Forest Experiment Station, U.S.D.A. Forest Service.

c. Specific types of cutting will include, but not be limited to:

1) The Selection System - A silvicultural system involving the removal of trees of all sizes singly or in groups, at regular intervals resulting in an uneven-aged stand. This system involves a continuous forest cover and favors shade-tolerant species.

2) The Seed Tree System - A silvicultural system involving the retention of a very light stocking of selected trees after an initial cut. The role of the residual trees is to furnish seed for the next crop. This system results in an even-aged stand.

3) The Shelterwood System - A silvicultural system that involves the removal of the overstory in several stages. The partial overstory removal provides favorable conditions for the establishment of regeneration. The residual overstory is removed after the new stand is well-established. Shelterwood cutting also results in an even-aged stand.

4) The Clearcutting System - A silvicultural system which involves the harvesting in one cut of all trees larger than 2 inches in diameter on an area and results in an even-aged stand. The size and configuration of the cut area is variable (even to as small as a fraction of an acre). Clearcutting is recognized to be useful in certain silvicultural and wildlife management situations. However, due to public sensitivity, only modified forms of clearcutting will be allowed by BED (narrow progressive strips and small blocks up to 25 acres in size). Land clearing operations involving land use conversions may employ larger clearcut openings. However, the objective in such cases is not future timber production. For land use conversion clearing operations, the landowner must submit a letter of intent to BED stating number of acres to be cleared, name of harvesting contractor and the purpose of the clearing.

5) Improvement Cut - An improvement cut is an intermediate cut which can be prescribed by a forester as part of either of the previously mentioned silvicultural systems and can be carried out at various times during the rotation (in even-aged stands) or as part of the regeneration cut (in the Selection System). The objective of an improvement cut is the reduction of low-value and low-potential-value stand components through the removal of poorly formed stems and less valuable species.

6) Thinning - Thinning is an intermediate cut prescribed by a forester to reduce the level of tree stocking to a recommended level in order to concentrate tree growth on fewer but selected stems.

It should be noted that due to variability in forest stands as a result of site conditions and past treatment, it will often be necessary to incorporate more than one of the above-mentioned types of cutting within a single woodlot. In addition, dependent upon the intensity of past high-grading, it will often be necessary to leave numerous poor quality trees uncut in order to maintain recommended stocking levels.

6. Harvesting contractors will be expected to abide by all applicable local, State and federal regulations including but not limited to:
   a. Occupational safety and insurance coverage.
   b. Forest fire prevention and control.
   c. Protection of property of others.
   d. Water quality protection.
   e. Harvesting and transportation of forest products.
7. Landowners will be made aware of the desirability of having a stumpage sale contract outlining the details of the harvest operation. If the landowner elects to utilize such a document, the harvesting contractor will be required to meet the terms of that contract in addition to the above harvesting policy.

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WOOD CHIP SUPPLIERS FOR VERMONT

Business Name	Address	Town	State	Zip Code	Contact Name	Telephone	Business Type	Fuel Produced
A Johnson Lumber	995 South 116 Road	Bristol	VT	05443	Dave Johnson	(802) 453-4884	Hardwood Sawmill	Mill Chips
AB Logging	35 Hodge Road	Lancaster	NH	03584	Allen Bouthillier	(603) 788-3255	Logging & Chipping Contractor	Whole-tree & Bole
Allard Lumber Company	354 Old Ferry Road	Brattleboro	VT	05301	Clifford Allard	(802) 254-4939	Hardwood Sawmill	Mill Chips
Ames True Temper	PO Box 249	Wallingford	VT	05773	Joe Phillips	(802) 446-2601	Hardwood Sawmill	Mill Chips
Asa Wilson	804 Jay Road	Richford	VT	05476	Asa Wilson Jr.	(802) 848-3571	Logging & Chipping Contractor	Whole-tree & Bole
S&S Forest Products	3007 Winhall Hollow Road	S. Londonderry	VT	05155	Seth Howe	(802) 379-1293	Logging & Chipping Contractor	Whole-tree & Bole
Barrups Farms	PO Box 328	Derby	VT	05829	Kevin Barrup	(802) 334-2331	Chip Broker	All
Britton Lumber Company	PO Box 38	Fairlee	VT	05045	Doug Britton	(802) 333-4388	Softwood Sawmill	Mill Chips
Carl Bogie	1342 Stone Road	South Ryegate	VT	05069	Carl Bogie	(802) 584-3868	Logging & Chipping Contractor	Whole-tree & Bole
Cersosimo Lumber	1103 Vernon St.	Brattleboro	VT	05301	Dan Harrison	(802) 254-4508	Hardwood Sawmill	Mill Chips
Clifford Lumber	PO Box 150	Hinesburg	VT	05461	Lynn Gardner	(802) 482-2325	Hardwood/softwood Sawmill	Slabs
Colton Enterprises Inc.	PO Box 688	Pittsfield	VT	05762	Ray Colton	(802) 746-8033	Chip Broker	Mill Chips
Columbia Forest Products	PO Box 605	Newport	VT	05855	Aaron French	(802) 334-6711	Hardwood Veneermill	Veneer Chips
Cousineau Forest Products	42 Old Concord Rd.	Henniker	NH	03242	John Baker	(603) 428-7155	Chip Broker	All
Currier - 3D Logging	459 Main St.	Gorham	NH	03581	Phil LaBlanc	(603) 466-2757	Logging & Chipping Contractor	Whole-tree & Bole
Cyr Lumber	215 Poor Farm Road	Milton	VT	05468	Jean-Paul Cyr	(802) 893-4448	Softwood Sawmill	Mill Chips
Dave Ducharme	718 Main	Greensboro	VT	05841	Dave Ducharme	(802) 533-9897	Sawmill/Chip Broker	All
Eagle Lumber	PO Box 880	Stamford	VT	05352	Larry Potvin	(802) 694-1747	Hardwood Sawmill	Mill Chips
Fortin Transport	Newport Road	Derby	VT	05829	Gerald Fortin	(802) 766-2247	Chip Broker	All
Gagnon Lumber, Inc	89 Stevens Rd.	Pittsford	VT	05763	Joe Gagnon	(802) 483- 6550	Hardwood/softwood	Mill Chips
George Denagy	PO Box 41	Topsham	VT	05076	George Denagy	(802) 439-5478	Logging & Chipping Contractor	Whole-tree & Bole
Goodridge Lumber	PO Box 515	Albany	VT	05820	Colleen Goodridge	(802) 755-6298	Softwood Sawmill	Mill Chips
Green Mt. Chipping, Inc.	P.O. Box 266	Underhill	VT	05489	Dave Villeneuve	(802) 899-1239	Logging & Chipping Contractor	Whole-tree & Bole
Green Mtn Forest Products	PO Box 162	Highgate	VT	05459	Brian Rowell	(802) 868-2306	Logging & Chipping Contractor	Whole-tree & Bole
Greenwood Mill Inc.	PO Box 1348	Lydonville	VT	05851	Jane Carrier	(802) 626-0800	Softwood Sawmill	Mill Chips
Heath Bunnell	523 Littleton Road	Monroe	NH	03771	Heath Bunnell	(802) 793-6594	Logging & Chipping Contractor	Whole-tree & Bole
Jim Cloud	6131 Route 106	Reading	VT	05062	Jim Cloud	(802) 484-4946	Logging & Chipping Contractor	Whole-tree & Bole
Johnson Lumber	1613 Chelsea Road	Bradford	VT	05033	Steve Johnson	(802) 439-5402	Hardwood Sawmill	Mill Chips
Keith Wolstenholme	PO Box 6	Thetford	VT	05074	Keith Wolstenholme	(802) 785-2912	Logging & Chipping Contractor	Whole-tree & Bole
LaBranche Lumber Co	1059 VT RT 105	Coventry	VT	05855	JP LaBranche	(802) 334-7944	Hardwood Sawmill	Mill Chips
Lamell Lumber	82A Jericho Road	Essex Jct.	VT	05452	Ron Lamell	(802) 878-2475	Softwood Sawmill	Mill Chips
Larry Brown	PO Box 27	Granby	VT	05840	Larry Brown	(802) 328-2671	Logging & Chipping Contractor	Whole-tree & Bole
Lathrop Forest Products	P.O. Box 268	Bristol	VT	05443	Jim Lathrop	(802) 453-3606	Logging & Chipping Contractor	Whole-tree & Bole
Lawrence White Construction	1187 US Route 7	Danby	VT	05739	Nancy Brown	(802) 293-5290	Logging & Chipping Contractor	Whole-tree & Bole
Limlaw Pulp Wood	Rt 25 Box 10 W.	Topsham	VT	05076	Bruce Limlaw	(802) 439-5387	Logging & Chipping Contractor	Whole-tree & Bole
Longview Forest Contracting	PO Box 1202	Charlestown	NH	03603	Jack Bell	(603) 826-4030	Logging & Chipping Contractor	Whole-tree & Bole
Lou Caldwell	1054 Chamberlin Hill Rd	Vershire	VT	05079	Lou Caldwell	(802) 685-3070	Logging & Chipping Contractor	Whole-tree & Bole
Lussier's Sawmill	4161 Watertower Road	Enosburg Falls	VT	05450	Anthony Lussier	(802) 933-5357	Softwood Sawmill	Mill Chips
M. Piette & Sons	6th 26	Irasburg	VT	05845	Denis Piette	(802) 754-8876	Softwood Sawmill	Mill Chips
MCE Trucking			VT		Robbie	(802) 777-1612	Chip Broker	All
Mill River Lumber LTD.	PO Box 100	N Clarendon	VT	05759	Frank Cecot	(802) 775-0032	Softwood Sawmill	Mill Chips
North Country Procurement	450 Main St	Rumney	NH	03266	Jamie Damon	(603) 786-2289	Chip Broker	All
Northeast Wood Products	PO Box 36	Pownal	VT	05261	Rob Kobelia	(802) 823-7365	Hardwood Sawmill	Mill Chips
O.E.M. Timber Buyers	23 Lower Quarry Rd	Newport	VT	05855	Skip Goslin	(802) 334-5484	Chip Broker	All
P&R Lumber	6231 VT RT 15	Wolcott,	VT	05680	Guy Patoine	(802) 472-6636	Softwood Sawmill	Mill Chips
Plumb Lumber Co.	181 Pettengill Rd	Andover	VT	05143	Alan Plumb	(802) 875-3630	Hardwood Sawmill	Mill Chips
Roberts Brothers Lumber	1450 Spruce Corner Road	Ashfield	MA	01330	Leonard Roberts	413-628-3333	Mixed Sawmill and Chipmill	Mill Chips & Bole
Scott Fisk	Flanders Brook Road	Bradford	VT	05033	Scott Fisk	(802) 535-4793	Logging & Chipping Contractor	Whole-tree & Bole
Stanley Tool Inc.	PO Box 929	Pittsfield	VT	05762	Tom Patterson	(802) 746-8330	Hardwood/softwood Sawmill	Mill Chips
Steve Montgomery	126 North St	Bethel	VT	05032	Steve Montgomery	(802) 291-2167	Logging & Chipping Contractor	Whole-tree & Bole
Trees Unlimited	613 Hidden Valley Rd	Pownal	VT	05261	Dave Chesney	(802) 823-5365	Logging & Chipping Contractor	Whole-tree & Bole

* Last Updated - 6/22/09

Harwood Union Middle/High School
Home of the Highlanders

REQUEST FOR PROPOSALS

for

WOODCHIP HEATING FUEL

Due Date: _____

Submit all official bids to:

By US Postal Service:

Harwood Union School
Box 458 VT Route 100
Moretown, Vermont 05660
Attention: Tracy Holden

By Fax:

(802) 882-1199
Attention: Tracy Holden

By email:

holdent@harwood.org

Overview

Harwood Union Middle and High School, located in Moretown, Vermont is seeking to establish purchasing agreements with one or more woodchip suppliers for fueling the School's woodchip-fired heating system. Harwood Union's woodchip heating system provides heat and domestic hot water for its 170,000 square foot facility. The total chip use for the 2008-09 heating season was 906 green tons. Harwood Union estimates needing chips for the woodchip heating system first fire in the first week of November and throughout the duration of the heating season. Harwood Union wishes to develop a long-term relationship with (a) woodchip fuel supplier(s) to ensure the availability and reliability of their fuel supply.

Contact Person

All communications concerning this request for proposal are to be addressed in writing to the attention of:

Tracy Holden, Head of Physical Plant
Harwood Union Middle & High School
Box 458 VT Route 100
Moretown, Vermont 05660

Tracy Holden is the sole contact person for this proposal.

Contract Period

The contract(s) stemming from this request for proposals will be for a period of one to four years depending on responses received from this RFP. The proposed starting date for the contract would be October 1st, 2010.

Quantity

It is expected that between 800 and 1,000 green tons of woodchips will be needed per heating season. More frequent shipments will be needed in mid-winter than the spring and fall.

Delivery

Woodchips will be delivered in self unloading (live bottom) type trailers. The woodchip heating plant site location and access will accommodate standard 40 to 48 foot trailers. Chip fuel deliveries will be received between the hours of 6 a.m. and 5 p.m. five days per week. The Harwood Union Middle and High School woodchip heating plant has in-ground bunker capacity to store 70 tons of chips or slight more than 2 loads. All loads will be tarped in transit and gross vehicle weights shall comply with legal load limits.

Chip Quality

Several types and sources of woodchips will be considered for heating fuel for Harwood Union. For a chip type and source to be considered it must meet the quality specifications listed below. The following chip types and sources will be considered:

1. Paper-grade sawmill chips derived from sawing lumber
2. Paper-grade (de-barked and screened) bole chips produced from chipping pulpwood

3. Standard (unscreened and with bark) bole chips from chipping pulpwood
4. Re-screened whole-tree chips

General Wood Chip Specifications

Parameter	Specification
Chip Size & Uniformity	Consistent size of 2-1/2" x 2-1/2" x 5/8" or smaller, allowing efficient movement through augers and mechanical systems. No extensive "stringy" wood chips (longer than permitted). Screening is preferred to ensure the size requirements above. No excessive fines.
Moisture Content	Consistent 35% to 45% moisture content (wet basis). No chips with excessive moisture (over 50%). Chips should be processed, stored, and transported in a manor which protects chips from rain, snow and ice.
Energy Value	Minimum 4,900 Btu's/green pound
Ash Content	Maximum 4.5% ash content
Cleanliness	Free of dirt, rocks, metal, paints, and all other foreign materials
Source	Hardwoods are preferred. Most softwoods, poplar, basswood should be avoided due to excessive moisture. All chips must be sourced from forestry activities or primary processing of timber. Absolutely no demolition debris is allowed.

Chip Quality Verification

A representative of Harwood Union shall inspect loads prior to unloading and supervise while trucks unload. If woodchips received are determined to not meet the standards of quality, Harwood Union may reject the delivery at its sole discretion. The chip supplier will be required to replace the sub-quality chips with chips that meet the standard. Any portion of the sub-standard chips unloaded into the Harwood Union School's storage bins will be forfeited.

Method of Ordering

Acceptable methods of ordering loads will include by schedule, telephone, or fax. Harwood Union will give as much advanced notice as possible, but chip suppliers will be expected to respond within 48 hours notice of ordering.

Pricing

Pricing of chips will be based on the green ton. All deliveries shall be scaled at a licensed truck weighing station, unless alternate methods of determining chip quantity are agreed upon. Periodic checking of bulk density and chip moisture content will be conducted by Harwood Union or a third party to ensure chips are within the acceptable limits of moisture content (as per specifications listed above).

Primary & Alternate Suppliers

Both a primary and alternate (back-up) supplier will be selected from the proposals received from this RFP. The primary supplier shall act as the exclusive supplier to Harwood Union. If for some reason, the primary supplier is temporarily or permanently unable to meet their obligations to supply chips to the School, the alternate supplier would be notified and would commence supplying chips. If you are interested in both the primary and alternate supplier positions or one and not the other, please submit your proposed pricing in the appropriate spaces on the attached proposal form.

Invoicing

Invoices shall be sent weekly or monthly and will be based on actual net weight truck scale slips (unless other arrangements are made between the supplier and Harwood Union). Copies of all scale weight slips shall be submitted with scheduled invoices.

Remittance of Payment

Terms shall be net 30 days from the time of receipt of invoice.

Contract Awards

Harwood Union Middle and High School will award two separate contracts: the primary supply contract and the alternate supply contract by the 31st of July, 2010. All respondents to the RFP will be notified of the status of the contract awards.

Contract Terms

The selected vendors will sign a contract with Harwood Union at the proposed prices. Terms and conditions from this RFP and the selected vendors' responses will become part of the contract.

The selected vendors will need to comply with all applicable local, state and federal regulations. Additionally, selected vendors shall be required to provide certificates of insurance coverage for Workers Compensation, General Liability and Property Damage in the amount of $1,000,000 per occurrence and $3,000,000 in the aggregate, and Automotive in the amount of $1,000,000.

Question and Answer Period

The question and answer period will be from June 15th – June 30th. If you have specific questions regarding the details of this RFP please call Tracy Holden at (802) 882-1107.

Proposal Submission

All proposals shall be submitted in writing and mailed via USPS, delivered via currier service, faxed, or emailed to Tracy Holden. Chip suppliers submitting their proposals to Harwood Union are asked to use the enclosed bid form as the basis of their proposal. If desired, additional materials may be submitted as part of the proposal.

Attachments

Bid Form

HARWOOD UNION SCHOOL WOODCHIP FUEL BID FORM

Company Name: _____

Contact Name: _____

Mailing Address: _____

Physical Address: _____

Business Phone: _____

Cell Phone: _____

Fax: _____

Email: _____

Please enter your proposed price per green ton for the various chip type(s) you propose supplying in the years you are willing to supply as either primary or alternate fuel supplier, or both. Also please indicate whether you are bidding on 100 percent of the estimated consumption or a portion.

Supplier Status	Chip Type	Year 1	Year 2	Year 3	Year 4
Primary Fuel Supplier	Paper-grade hardwood chips from sawmill				
	Paper-grade hardwood "bole" chips				
	Hardwood "bole" chips				
	Re-screened whole tree chips				
Alternate Fuel Supplier	Paper-grade hardwood chips from sawmill				
	Paper-grade hardwood "bole" chips				
	Hardwood "bole" chips				
	Re-screened whole tree chips				

Please indicate (check box) in the table below the estimated portion of the material you propose to supply from the various categories listed below.

Wood Fuel Source Matrix

Criteria	0%	1-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%
From land clearing activity for development											
From land clearing jobs for agriculture											
From forest management harvesting											
From forest management harvesting with a management plan											
From forest management harvesting with a management plan written/approved by a professional forester											
From forest management harvesting conducted in accordance with any and all state laws and BMPs											
From forest management harvesting marked and overseen by a professional forester											
From forest management harvests conducted by a professional logger accredited by Master Logger Program											
From Third-Party certified sources including but not limited to FSC, SFI, or Tree Farm											
From forest management harvests using whole-tree removal											
From forest management harvests using stem only removal											
From within XX miles of the facility											

Other Comments:

_____

_____

Woodchip Fuel Delivery Ticket – Sample

Delivery Ticket Number: _____

Supplier: _____ Driver: _____

Customer: _____

Date of Delivery:_____ _Time of Delivery:_____

Net Weight of Delivery: _____ Location of Truck Scale Used: _____

Type of Woodchips (please check one)

- ☐ Bole chips (with bark and unscreened)
- ☐ Bole chips (with bark and screened)
- ☐ Bole chips (debarked and screened)
- ☐ Sawmill chips
- ☐ Whole-tree chips
- ☐ Other _____

Species Mix (please check one)

- ☐ Hardwood only
- ☐ Mixed hardwood and softwood
- ☐ Softwood only

Estimated Moisture Content (please check one)

- ☐ 30-35%
- ☐ 35-40%
- ☐ 40-45%
- ☐ 45-50%
- ☐ Over 50%

Woodchip Source (please check one)

- ☐ Stock-piled roundwood at yard
- ☐ Chipped roundwood at log landing
- ☐ Tops at log landing
- ☐ Other _____

Source Activity (please check one or more)

- ☐ Forestry (Timber Stand Improvement Harvest)
- ☐ Forestry (Integrated Commercial Harvest)
- ☐ Forestry (Wildlife Habitat Enhancement)
- ☐ Landclearing for development
- ☐ Landclearing for Agriculture
- ☐ Other _____

Was there a forest management plan? ☐ Yes ☐ No ☐ Do not know

Did a forester mark and oversee the harvest? ☐ Yes ☐ No ☐ Do not know

Driver Signature:_____ Date: _____