Preliminary Feasibility Report

Biomass Heating Analysis for Margaretville Hospital

Margaretville, NY

November 2009
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Biomass and Green Building Resources Binder

Financial Resources
- Easy Access to Energy Improvement Funds in the Public Sector – Energy Star
  - Municipal Leasing Consultants information
  - Native Energy Information & Brochure
  - USDA Brochures and Information

Efficiency Resources
- EnergySmart Hospitals – U.S. Department of Energy
- Othello Community Hospital - Case Study
- NYSERDA Flexible Technical Assistance Information
- St. Peters Hospital – FlexTech Case Study
- Energy Star Portfolio Manager Quick Reference Guide
- NYPA Information

Biomass Equipment Vendors
- Advanced Recycling/Challenger
- BioFuels Technologies
- Chiptec
- KOB
- Messersmith Manufacturing

Biomass Energy Resources
- Benefits of Biomass
- North Country Hospital Biomass Combined Heat and Power Demonstration Project
- Carbon Dioxide and Biomass Energy - BERC
- Air Emissions from Modern Wood Energy Systems - BERC
- RSG Memo on Air Quality Permitting for the Catskill Region
- Sample Woodchip Specification – BERC

Books
- Directory of Primary Wood-Using Industry in New York
- Directory of Wood Products Industries in the Catskills State

CDs
- Green Guide for Health Care Version 2.2
- Green Guide Operations Section Version 2.2 2
- Green Community Technologies, Yellow Wood Associates
EXECUTIVE SUMMARY

This preliminary feasibility study was prepared by Yellow Wood Associates in collaboration with Richmond Energy Associates. Both firms have extensive community economic development experience and Richmond Energy specializes in biomass energy projects for public buildings. The study was funded by the Wood Education and Resource Center, U.S. Department of Agriculture with support from the Watershed Agricultural Council. Margaretville Memorial Hospital is a 15-bed critical access hospital located adjacent to Route 28 in the Delaware County town of Margaretville, New York. An active member of the community, Margaretville Memorial Hospital has been providing a wide range of healthcare services to residents and visitors to the region for more than 75 years. Adjacent to the hospital is Mountainside Care Center, an 85 bed residential care facility. The two building campus has approximately 93,000 square feet of conditioned building space which is heated by two 40 year old steam boilers located in the hospital and two 15 year old hot water boilers in the nursing home building. The existing boilers appear to have been well maintained and are in good working condition, but the hospital boilers are reaching the end of their expected useful life. The hospital is in the preliminary stages of a capital project and wanted to evaluate the costs and potential savings of incorporating biomass into the project.

According to hospital staff, the hospital’s average consumption of fuel oil is about 76,000 gallons per year for the hospital and 55,000 gallons per year for the nursing home. They are projecting the price of fuel oil at $2.20 per gallon for this upcoming heating season. At that rate the hospital will spend nearly $300,000 in fuel oil next year.

The analysis indicates that the Margaretville Hospital could save over $3.7 million in today’s dollars in operating costs over the next 30 years by installing a woodchip heating system even if the hospital financed the entire cost of the system. Annual fuel savings alone are projected to be more than $130,000 per year in the first year and will increase over time as fuel oil prices continue to climb.

Assumptions for this chart can be found in the cost effectiveness analysis section beginning on page 6.
The Margaretville Hospital appears to be a good site for a fully-automated woodchip heating system. The preliminary cost effectiveness analysis for adding a biomass heating plant to the hospital’s heating system looks quite favorable. There is a workable location to place a biomass boiler and wood chip storage bin and, better yet, a biomass energy project could fit well with the hospital’s capital planning. The existing boiler systems could work well to provide back-up and supplemental heat in combination with a wood fired boiler. It also appears that the existing heating distribution systems could be readily adapted to accommodate an additional heating source such as a woodchip boiler. If Margaretville Hospital decides to move forward with this concept, we recommend taking the following next steps:

1. The hospital is undergoing a capital planning process. In order to accommodate a biomass boiler house and chip storage facility, careful design and site modifications will need to be made. It is almost always less expensive to incorporate a biomass energy project into a larger building renovation or new construction project. Design, permitting and general conditions can be spread over a larger project and the logistics of construction can be managed more efficiently. There may also be opportunities to reconfigure the site and buildings to better accommodate a biomass boiler house and chip storage facility. The hospital should consider incorporating the biomass boiler project into their capital project. A list of architectural and engineering (A&E) firms with biomass experience is included in the appendices to this report. As a part of that process, the hospital should identify any heating system improvements it plans to undertake in the foreseeable future and consider including those projects with the biomass project. It will be more cost effective to implement boiler room upgrades and heating distribution improvements at the same time a new boiler system is installed than it would be to postpone those improvements for a later time. We recommend including a mechanical engineer who is familiar with biomass and steam boilers on the master planning team to help refine the project concept and to obtain firm local estimates on project costs.

2. The hospital should consider energy efficiency improvements simultaneously with boiler upgrades. The efficiency of the building envelope and ventilation equipment need to be considered when sizing new boiler equipment. NYSERDA should be engaged to develop comprehensive energy efficiency recommendations and proposals for incentives for efficiency upgrades before undertaking a major building project. Information on energy efficiency programs and incentives are included in the Resource Binder accompanying this report.

3. Concurrently with the design of a biomass project, the hospital should cultivate potential wood chip fuel suppliers. Hospital staff should work with the Watershed Agricultural Council to identify potential wood chip suppliers and to tailor wood chip fuel specifications to the equipment that is ultimately selected. A list of potential wood chip fuel suppliers and a sample wood chip specification are included in the Resource Binder accompanying this report.
INTRODUCTION

There is a significant volume of low-grade biomass in the Northeastern United States that represents a valuable economic and environmental opportunity if that biomass can be used constructively to produce energy. Commercially available biomass heating systems can provide heat cleanly and efficiently in many commercial applications. Biomass heating technologies are being used quite successfully in over 40 public schools in Vermont alone and the concept of heating institutions with wood is catching on in several other areas of the United States and Canada. Good candidate facilities for biomass energy systems include those that have high heating bills, those that have either steam or hot water heating distribution systems, and those that have ready access to reasonably priced biomass fuel.

The Margaretville Memorial Hospital appears to have many of the characteristics that could make for a good candidate site for biomass energy. It has relatively high heating bills, it has hydronic heating systems in both of its facilities, and the Watershed Agricultural Council and the US Forest Service are working hard to develop markets for low grade wood in the Catskill region which makes for excellent biomass fuel.

Ironically the hospital installed a biomass boiler back in the 1980’s and had a bad experience. They wound up removing the biomass boiler because of numerous mechanical failures and inconsistent fuel quality. However, times have changed and the hospital is in the preliminary stages of planning for a capital project. The hospital wanted to understand if the technology has improved since their previous experience and they wanted to see how much money they might be able to save on operating costs if they included biomass in their future capital project. In August 2009, the hospital submitted an application to the Watershed Agricultural Council for a preliminary biomass feasibility study under a program the Council is sponsoring to evaluate biomass energy opportunities. The application was approved as one of seven site assessments performed for the Watershed Agricultural Council under their biomass energy initiative.

This report is a pre-feasibility assessment specifically tailored to Margaretville Hospital outlining whether or not biomass heating makes sense for this facility from a practical perspective. In October 2009, Jeff Forward of Richmond Energy Associates and Collin Miller from the Watershed Agricultural Council visited Margaretville Hospital to tour the facility. This assessment includes site specific fuel savings projections based on historic fuel consumption and provides facility decision-makers suggestions and recommendations on next steps to take based on site visits, data collection and interviews with stakeholders.

The study was funded by the Wood Education and Resource Center, U.S. Department of Agriculture with support from the Watershed Agricultural Council.
This preliminary feasibility study was prepared by Yellow Wood Associates and Richmond Energy Associates, LLC.

**WHO WE ARE**

**Yellow Wood Associates**
Yellow Wood Associates (Yellow Wood) is a woman-owned small business specializing in rural community economic development since 1985. Yellow Wood has experience in green infrastructure, program evaluation, business development, market research, business plans, feasibility studies, and strategic planning for rural communities. Yellow Wood provides a range of services that include measurement training, facilitation, research, and program management.

**Richmond Energy Associates**
Richmond Energy Associates was created in 1997 to provide consulting services to business and organizations on energy efficiency and renewable energy program design and implementation. Richmond Energy has extensive experience in wood energy systems. Jeff Forward provides analysis and project management on specific biomass projects and works with state, regional and federal agencies to develop initiatives to promote biomass utilization around the country. In addition to his own consulting business, he is also a Senior Associate with Yellow Wood.

**Wood Education and Resource Center**
The Wood Education and Resource Center (WERC) is a USDA Forest Service facility with offices, training facilities, and a rough mill. The WERC mission is to facilitate interaction and information exchange with the forest products industry to enhance opportunities for sustained forest products production in the eastern hardwood forest region of the United States.

**Watershed Agricultural Council**
The Watershed Agricultural Council (WAC) is a nonprofit organization with the mission to support the economic viability of agriculture and forestry through the protection of water quality and the promotion of land conservation in the New York City watershed region.
DESCRIPTION OF EXISTING HEATING SYSTEM

Margaretville Memorial Hospital is a 43,000 square foot 15-bed critical access hospital located adjacent to Route 28 in the Delaware County town of Margaretville, New York. An active member of the community, Margaretville Memorial Hospital has been providing a wide range of healthcare services to residents and visitors to the region for more than 75 years. The hospital campus also includes a 50,300 square foot 82-bed skilled nursing facility, Mountainside Residential Care Center, located adjacent to the hospital. Each facility has its own boiler plant. The hospital is heated with two 4.2 Million Btu Cleaver Brooks low pressure steam boilers that are now over 40 years old. The nursing home facility was built in 1994 and is heated with two 1.6 Million Btu Burnham hot water boilers. All of these boilers appear to have been well maintained and are in good working condition, although the Cleaver Brooks boilers are reaching the end of their expected useful life.

DESCRIPTION OF BIOMASS SCENARIO

The biomass scenario that was analyzed for this report includes installing a 6.0 Million BTU steam wood chip boiler. This boiler plant should cover at least 85% of the hospital’s annual heating needs.

The biomass scenario envisions building a 2,000 square foot stand-alone boiler house and chip storage facility on the west side of the hospital adjacent to the hospital’s existing boiler room (see figure 2).

Figure 1. Williamstown, VT High School Woodchip Boiler Plant

Steam from the biomass boiler house would be piped directly into the hospital boiler room and interconnect with the existing heating distribution system. A heat exchanger would be included to convert some of the steam heat into hot water which would then be piped underground across the
parking lot and tied into the existing boiler room at the nursing home facility. A 60 – 70 foot tall stack should be included to ensure good emissions dispersal. Underground wood chip storage is recommended as below grade chip storage bins are less likely to freeze in the coldest winter weather and chip delivery is much easier and faster using self unloading trailers into below grade bins than it is to load chips into above grade silos.

Under this scenario it is envisioned that the existing boiler plants would remain as is to provide heat during low demand periods of the year and to provide supplemental heat energy during the coldest days if necessary. However it should be noted that the Cleaver Brooks boilers are reaching the end of their useful life and it would be worthwhile to consider replacing one or both of these boilers at the time of construction for a biomass energy project. If the hospital decides to move forward with a biomass project, the design engineers should evaluate all of the existing heating systems and determine if any upgrades should be included.

Figure 2. Suggested Biomass Boiler House Location
COST EFFECTIVENESS ANALYSIS

LIFE CYCLE COST METHODOLOGY AND ASSUMPTIONS

Decision makers need practical methods for evaluating the economic performance of alternative choices for any given purchasing decision. When making a choice between mutually exclusive capital investments, it is prudent to compare all measure related costs spent over the life of the longest lived alternative in order to determine the true least cost choice. The total cost of acquisition, fuel costs, operation and maintenance of an item throughout its useful life is known as its “life cycle cost.” Life cycle costs that should be considered in a life cycle cost analysis include:

- Capital costs for purchasing and installing equipment
- Fuel costs
- Inflation for fuels, operational labor and major repairs
- Annual operation and maintenance costs including scheduled major repairs
- Salvage costs of equipment and buildings at the end of the analysis period.

In addition, it is useful for decision makers to consider the impact of debt service if the project is to be financed in order to get a clearer picture of how a project might affect annual budgets. When viewed in this light, equipment with significant capital costs may still be the least cost alternative. In some cases, a significant capital investment may actually lower annual expenses if there are sufficient fuel savings to offset debt service and any incremental increased operation and maintenance costs.

The analysis performed for this facility compares two different scenarios over a 30 year horizon and takes into consideration life cycle cost factors. A 30 year time frame is used because it is the expected life of a new boiler. The base case scenario assumes the hospital will continue to use the existing fuel oil fired boilers as they are now being used. The alternative woodchip scenario envisions installing a new woodchip boiler and chip storage facility and includes all ancillary equipment and interconnection costs.

Under the woodchip scenario, the existing fuel oil boilers would still be used to provide supplemental heat during the coldest days of the year if necessary and for the warmer shoulder season months when boilers typically provide only a little heat during the chilly weather. The average annual wood utilization for wood heated schools in Vermont is 85% with the remaining 15% of heating needs covered by back-up fossil fuel boilers. Therefore for this analysis, we are assuming replacing 85% of fuel oil usage with wood and the having the remaining 15% of the facility’s heating needs come from using the fuel oil boilers.
The analysis then projects current and future annual fuel oil heating bills and compares that cost against the cost of operating a woodchip system plus debt service for the entire cost of new equipment over a 30 year horizon. Savings are presented in today’s dollars using a net present value calculation. Net present value (NPV) is defined as the present value of net cash flows. It is a standard method for using the time value of money to appraise long-term projects.

**Capital Cost Assumptions**

It was not our intent nor was it in our scope of work to develop detailed cost estimates for a biomass boiler facility. We recommend that, for a project of this scale, the hospital hire a qualified design team to work with hospital staff to refine the project concept and to develop firm cost estimates. Therefore the capital costs used for the woodchip scenario are estimates based on our experience with similar installations.

The capital costs include the installed costs for the heating equipment, construction costs for a 2,500 square foot boiler house and chip storage bunker, a new 6.0 Million BTU wood chip boiler, a fully-automated woodchip fuel handling system, a 70 foot smoke stack, a multi-cyclone pollution control device, costs for interconnection with the existing heating system (including costs for adding underground hot water lines to connect to the Mountainside Care Center), a healthy construction contingency and standard general contractor mark-up and professional design fees. It is envisioned that woodchips would be stored in an underground storage bunker adjacent to the new boiler room and fed automatically to the boiler when the building calls for more heat. The boiler house and chip storage building is assumed to be of basic construction and finishes.

**Woodchip Fuel Cost Assumptions**

For this study, annual monthly heat loads for the hospital were not available. However, frequently, operators of institutional woodchip systems don’t fire up their biomass boilers until there is constant demand for building heat. During the fall and spring, fossil fuel boilers are often used as they are easier to start up and turn down. Woodchip boilers are then typically used in place of fossil fuel boilers for the bulk of the winter heating season. In Vermont, where there are over 40 schools that heat with wood, the average annual wood utilization is about 85%. The woodchip scenario in this study assumes the facility will meet 85% of the winter heating needs for both buildings with woodchips and therefore consume 1,791 tons of chips per year. The remaining 15% of the heating needs were then assumed to be provided by fuel oil boilers consuming about 19,650 gallons of fuel oil. The costs for fuel oil and woodchips are then adjusted for inflation each year over the 30-year horizon.
Inflation Assumptions

Estimating future fuel costs over time is difficult at best. Over the past few years, it has become even more difficult as fuel prices have fluctuated dramatically. Nevertheless, in order to more accurately reflect future costs in a 30 year analysis, some rate of inflation needs to be applied to future fuel costs.

For this analysis, the last 20 years (1989 – 2009) of fuel prices in New York were evaluated using US Energy Information Agency data. The average annual increase for fuel oil in New York over that period was 6.1% per year. The analysis projects this average inflation rate for fuel oil forward over the 30 year analysis period.

The cost of woodchips used for heating fuel tends to increase more slowly and has historically been much more stable in price over the past two decades than fossil fuels. In Vermont for example, the statewide average woodchip fuel price for institutional biomass heating systems rose from $25/ton to $55/ton in the period between 1989 and 2009. The average annual increase during this period was about 3.6% annually\(^1\) with the greatest increases happening recently. Because woodchip fuel is locally produced from what is generally considered a waste product from some other forest product business, it does not have the same geopolitical pressures that fossil fuels have. Over the past twenty years, woodchip fuel costs have been far less volatile than fossil fuels.

Figure 3. Woodchip and Fuel Oil Inflation

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\(^1\) Extrapolated from Vermont Superintendent Association School Energy Management Program data
The starting price for fuel oil in year one of the analysis was based on NY Office of General Services net fuel prices for #2 fuel oil in Delaware County. Yellow Wood averaged the price on the first day of the month for every month from April 1, 2008 – April 1, 2009. The average fuel price for Delaware County during this period was $2.94 per gallon. This fuel price was then inflated each year at 6%. Since a portion of the winter heating needs for each biomass scenario is assumed to come from fuel oil, the same inflation assumptions were used for the fuel oil portion in the biomass scenario as well.

After consulting with the Watershed Agricultural Council who spoke with potential local woodchip fuel providers and the NY Department of Environmental Conservation (DEC) Forests and Lands staff, Yellow Wood is projecting a first year cost of $55 per ton for woodchips which is equivalent to about $.85 per gallon for fuel oil. For this analysis, $55 per ton was the assumed first-year woodchip fuel cost, and that price was inflated each year at 3.6% annually.

The overall Consumer Price Index for the period between 1988 and 2008 increased an average of 2.8% annually. This is the annual inflation rate that was used in projecting all future labor costs, operations and maintenance costs and scheduled major repair costs for the biomass scenario.

**Operation and Maintenance Assumptions**

Modern biomass energy technology has come a long way over the past twenty years. Boilers have much more sophisticated controls, and fuel handling equipment has become much more reliable. The consequence is that institutional biomass heating systems operate cleanly and efficiently with very little daily maintenance. It is typical for operators of fully-automated woodchip heating systems of this size in Vermont public schools to spend 15-30 minutes per day to clean ashes and to check on pumps, motors and controls. To be conservative, labor costs were estimated by assuming on-site staff would spend on average approximately one hour per day in addition to their current boiler maintenance for 180 days per year at a loaded labor rate of $35/hr which equals $6,300. An additional $3,700 in annual operational costs is assumed for electricity to run pumps and motors.

Another operations and maintenance cost that is included in the analysis is periodic repair or replacement of major items on the woodchip boiler such as the furnace refractory. It is reasonable to anticipate these types of costs on a 10-15 year cycle. For this analysis, $25,000 of scheduled maintenance was anticipated in years 10, 20 and 30 and then annualized at $2,500 per year to simulate a sinking fund for major repairs. This $2,500 was then inflated at the general annual inflation rate.
Table 1. Analysis Assumptions

### Capital Cost Assumptions

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
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<tbody>
<tr>
<td>6.0 MBTu wood boiler system including installation</td>
<td>$650,000</td>
</tr>
<tr>
<td>Boiler house and chip storage building @$250/SF 2,500 SF</td>
<td>$625,000</td>
</tr>
<tr>
<td>70 ft. Stack</td>
<td>$35,000</td>
</tr>
<tr>
<td>Interconnection with existing heating systems</td>
<td>$150,000</td>
</tr>
<tr>
<td>Underground insulated hot water lines at $250/ft 175 LF</td>
<td>$43,750</td>
</tr>
<tr>
<td>Multi-cyclone pollution control device</td>
<td>$75,000</td>
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<tr>
<td>Construction contingency at 15%</td>
<td>$236,813</td>
</tr>
<tr>
<td>GC markup at 15%</td>
<td>$272,334</td>
</tr>
<tr>
<td>Design at 10%</td>
<td>$181,556</td>
</tr>
<tr>
<td><strong>Total estimated project costs</strong></td>
<td><strong>$2,269,453</strong></td>
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### Financing Costs

<table>
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<th>Description</th>
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<tbody>
<tr>
<td>Financing, annual interest rate</td>
<td>5.0%</td>
</tr>
<tr>
<td>Finance term (years)</td>
<td>20</td>
</tr>
<tr>
<td>1st year loan payment</td>
<td>$264,770</td>
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### Fuel Cost Assumptions

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
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</thead>
<tbody>
<tr>
<td>Current annual fuel oil use (gal)</td>
<td>131,000</td>
</tr>
<tr>
<td>Fuel oil price in 1st (per gal)</td>
<td>$2.20</td>
</tr>
<tr>
<td>Projected annual fuel oil bill at $2.20/gallon</td>
<td>$288,200</td>
</tr>
<tr>
<td>Fuel oil (gal)/chip (ton) ratio</td>
<td>62</td>
</tr>
<tr>
<td>Wood price, 1st year (per ton)</td>
<td>$55</td>
</tr>
<tr>
<td>Projected 1st year wood fuel bill</td>
<td>$98,502</td>
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<tr>
<td>Projected 1st year supplemental fuel oil bill</td>
<td>$43,230</td>
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### Inflation Assumptions

<table>
<thead>
<tr>
<th>Description</th>
<th>Rate</th>
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</thead>
<tbody>
<tr>
<td>General inflation rate (twenty year average CPI)</td>
<td>2.8%</td>
</tr>
<tr>
<td>Oil inflation rate (twenty year average EIA)</td>
<td>6.3%</td>
</tr>
<tr>
<td>Wood inflation rate (Average increase in VT from 1988 - 2008)</td>
<td>3.8%</td>
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### O&M Assumptions

<table>
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<th>Description</th>
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<tbody>
<tr>
<td>Annual Wood O&amp;M cost, including labor</td>
<td>$10,000</td>
</tr>
<tr>
<td>Major repairs (annualized)</td>
<td>$2,500</td>
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### Savings

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
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<tbody>
<tr>
<td>Net 1st year fuel savings including increased O&amp;M</td>
<td>$133,968</td>
</tr>
<tr>
<td>Total 30 year NPV cumulative savings</td>
<td>$3,748,708</td>
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No additional annual maintenance, scheduled repair or planned replacement costs for the existing fuel oil boilers were taken into consideration as these are considered costs that the hospital would
have paid anyway. The costs included in the woodchip scenarios are all assumed to be incremental additional costs.

**Financing Assumptions**

Financing costs were included in the analysis to give hospital decision makers a sense of how this project may impact their annual budget if it is financed. Non-profit institutions typically have access to long-term, tax exempt financing. It was assumed that Margaretville Hospital will be able to obtain a 20 year loan for the capital costs for the woodchip project at a tax exempt interest rate of 5% which may be available through tax exempt bonding. The bond payment schedule that was used has fixed principal payments and declining interest payments. Other financing schedules could create even more favorable cash flows depending on how much of the project costs are financed and how the remaining financing is structured. If the hospital were to forego financing and pay for the project outright, the annual savings would be considerably greater.

**Analysis Results**

This preliminary analysis is intended to provide hospital decision makers with enough information to decide whether or not a woodchip heating system is worth considering. Below is a graph that shows the hospital’s annual cash flow for 30 years, including 20 years of debt service. The analysis indicates that the Margaretville Hospital could save over $3.7 million in today’s dollars in operating costs over the next 30 years by installing a woodchip heating system even if the hospital financed the entire cost of the system. Annual fuel savings alone are projected to be more than $130,000 per year in the first year and will increase over time as fuel oil prices continue to climb. The spreadsheet used to create the above graph is included on the following page.
Margaretville Hospital Biomass Feasibility Report

Figure 4. Annual Cash Flow Graph

Margaretville Hospital
Wood chip vs Fuel Oil Comparison

Annual Costs

$0
$200,000
$400,000
$600,000
$800,000
$1,000,000
$1,200,000
$1,400,000
$1,600,000
$1,800,000
$2,000,000
$2,200,000

Years

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Fuel Oil Cost
O&M
Scheduled Repairs
Partial Fuel Oil Cost
Woodchip Cost
Finance costs
### Table 2. 30 Year Cash Flow Spreadsheet

#### Preliminary Life Cycle Cost Estimate

**Wood Chip - Heat Only**

| Local Share: | $2,269,453 |
| Financing: | 5.0% |
| Fuel Oil: | 121,000 |
| Fuel Oil Price: | $2.20 |
| Woodchip: | 1,791 |

### Wood Chip Price: $55

- **BTU ratio (net basis):** 85%
- **General Inflation:** 2.8%
- **Fuel Oil:** 131,000 annual Gallons #4 fuel oil at 103,500.00 net BTU/Gal.
- **Woodchip:** 2,191 tons at 85% utilization 2107 annual tons if 100% Woodchip utilization

#### Woodchip Cost

- **Woodchip Partial Scheduled Annual Cumulative Cost Total:**
  - Year 1: $288,200
  - Year 2: $306,357
  - Year 3: $325,657
  - Year 4: $346,173
  - Year 5: $367,982
  - Year 6: $391,165
  - Year 7: $415,809
  - Year 8: $442,005
  - Year 9: $469,851
  - Year 10: $499,452
  - Year 11: $530,917
  - Year 12: $564,905
  - Year 13: $599,920
  - Year 14: $637,715
  - Year 15: $677,891
  - Year 16: $720,598
  - Year 17: $765,995
  - Year 18: $815,089
  - Year 19: $865,551
  - Year 20: $920,081
  - Year 21: $978,046
  - Year 22: $1,038,653
  - Year 23: $1,105,162
  - Year 24: $1,174,787
  - Year 25: $1,248,798
  - Year 26: $1,327,473
  - Year 27: $1,411,103
  - Year 28: $1,500,003
  - Year 29: $1,594,503
  - Year 30: $1,694,957

#### Fuel Oil Cost

- **Fuel Oil Cost Total:** $2,402,431
- **Fuel Oil + Woodchip Contingency Cost:** $1,342,431

#### 30 Yr. NPV at 5% Discount Rate

- **Fuel Oil:** $9,898,600
- **Fuel Oil + Woodchip System & O&M:** $2,486,953
- **Contingency Allowance / Year:** $2,394,091
- **Woodchip Fuel + O&M + Contingency:** $1,484,790
- **Annual Savings:** $23,726
- **Local Share Cost:** $1,122,356
- **Simple Payback (yrs):** 17
ADDITIONAL ISSUES TO CONSIDER

ENERGY MANAGEMENT

In order to effectively manage energy use and to identify efficiency opportunities in buildings, it is very important to track energy usage. Unless energy consumption is measured over time, it is difficult or impossible to know the impact of efficiency improvements or renewable energy investments. The US Environmental Protection Agency (EPA) developed a public domain software program called Portfolio Manager that can track and assess energy and water consumption across an entire portfolio of buildings. Portfolio Manager can help building owners set efficiency priorities, identify under-performing buildings, verify efficiency improvements, and receive EPA recognition for superior energy performance. Yellow Wood recommends that the hospital input several years’ worth of energy and water use data for both of its facilities into Portfolio Manager as soon as it can. The EPA Portfolio Manager software can be downloaded at the following address: http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager

ENERGY EFFICIENCY

From the Watershed Agricultural Council application, it appears that the hospital has engaged the New York State Energy Research and Development Authority (NYSERDA) to provide them with some guidance on energy efficiency opportunities. The New York Power Authority (NYPA) also has some energy efficiency programs for which the hospital may be eligible. Both can help with the evaluation of energy efficiency opportunities and provide cash incentives to upgrade and improve equipment efficiencies. If the hospital decides to move forward with a biomass energy project, it should notify whomever they are working with at NYSERDA or NYPA that they are considering a boiler upgrade and discuss with them what other projects might be useful to consider at the same time.

General information on NYSERDA and NYPA programs is included in the Biomass and Green Building Resources binder accompanying this report.

CAPITAL PLANNING

It is our understanding that Margaretville Memorial Hospital is engaged in a capital planning process that will evaluate expansion and infrastructure needs for the entire campus. The biomass energy project described in this report would fit well into that larger planning process. It is always less expensive to incorporate a biomass energy project into a larger building renovation or new construction project than it is to initiate a project just for building a biomass boiler house and chip storage facility. Design, permitting and general conditions can be spread over a larger project and the logistics of construction can be managed more efficiently.
The hospital should use this study and consider biomass energy alternatives within the context of their capital planning process. Design engineers should evaluate the condition of the existing heating and distribution systems and develop recommendations for improvements, replacements and upgrades. A biomass energy project would fit well within this context and there are several engineering firms referenced in the appendices to this report that can help the hospital evaluate how a biomass energy project could compliment necessary infrastructure improvements identified in the capital planning process.
PROJECT FUNDING POSSIBILITIES

CARBON OFFSETS

While fossil fuels introduce carbon that has been sequestered for millions of years into the atmosphere, the carbon dioxide emitted from burning biomass comes from carbon that is already above the ground and in the carbon cycle. Biomass fuels typically come from the waste of some other industrial activity such as a logging operation or sawmill production. The carbon from this waste would soon wind up in the atmosphere whether it was left to decompose or burned as slash. There are few measures Margaretville Hospital could undertake that would have a greater impact on reducing its carbon footprint than to switch from #4 heating fuel to wood chips.

Figure 5. Carbon Cycle Illustration²

Carbon offsets help fund projects that reduce greenhouse gases emissions. Carbon offset providers sell the greenhouse gas reductions associated with projects like wind farms or biomass projects to customers who want to offset the emissions they caused by flying, driving, or using electricity. Selling offsets is a way for some renewable energy projects to become more financially viable. Buying offsets is a way for companies and individuals to compensate for the CO₂ pollution they create.

For a biomass heat only project, it is assumed a BTU-for-BTU displacement of fuel oil (based on historic purchase records) will be displaced by the project’s thermal energy output, over the project’s

² Illustration taken from a handout produced by the Biomass Energy Resource Center
assumed operating life. CO₂ avoidance is based on the emissions profile (Lbs. CO₂ /btu) of the displaced fuel. The US EPA calculates that 22.2 lbs. of CO₂ is produced from each gallon of fuel oil consumed. We are projecting that Margaretville Hospital can offset approximately 110,000 gallons of fuel oil per year by replacing that heat using biomass. This is equivalent to about 1,200 tons of CO₂. The market value of this type of offset is probably between $3/ton and $5/ton. These offsets can be negotiated as either a lump sum offset for up to 10 years or can be paid out as an annual payment. This could equal annual payments of $3,600 - $6,000 or a lump sum up front payment of as much as $36,000 - $60,000.

There are a number of companies that are interested in contributing to the construction of new sources of clean and renewable energy through carbon offsets. Information about NativeEnergy, a nationally recognized company that buys and sells carbon offsets, is included in the Resource Binder accompanying this report.

MUNICIPAL LEASE / PURCHASE

As a non-profit entity, Margaretville Hospital may be eligible for a municipal lease/purchase arrangement to finance the anticipated project costs for a biomass heating system. A municipal lease is a contract that has many of the characteristics of a standard commercial lease, with at least two primary differences:

- In a municipal lease, the intent of the lessee is to purchase and take title to the equipment. The financing is a full payout contract with no significant residual or balloon payments at the end of the lease term.
- The lease payments include the return of principal and interest, with the interest being exempt from Federal income taxation to the recipient. Because the interest is exempt from federal tax, a tax-exempt lease offers the lessee a significant cost savings when compared to conventional leasing.

There are a number of companies that provide municipal leases. Information from one such company, Municipal Leasing Consultants, is included in the Resource Binder accompanying this report.
PERMITTING

Modern biomass boiler technology is both clean and efficient. Controls moderate both the biomass fuel and air to create either a small hot fire or a large hot fire depending on heat demand from the building. Under full load, modern biomass boilers routinely operate at steady state efficiencies of 70% – 75%. Operating temperatures in commercial scale biomass boilers can reach up to 2,000 degrees Fahrenheit and more, completely eliminating creosote and the need to clean stacks. The amount of ash produced from a 25 ton tractor trailer load of green hardwood chips can fit in a 25 gallon trash can, is not considered a hazardous waste and can be used as a soil amendment on lawns, gardens and playing fields.

However, as with any combustion process, there are emissions from biomass boilers. In comparison with #2 distillate fuel oil, biomass is considerably better in terms of sulfur dioxides and CO₂ and roughly equivalent in nitrogen oxide emissions.

Table 3. Comparison of Boiler Emissions Fired by an Uncontrolled Wood Boiler and a Distillate Oil³ Boiler

<table>
<thead>
<tr>
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<th>Uncontrolled</th>
<th>Distillate Oil</th>
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<tr>
<td>PM₁₀</td>
<td>0.1</td>
<td>0.014</td>
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<td>NOx</td>
<td>0.165</td>
<td>0.143</td>
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<tr>
<td>CO</td>
<td>0.73</td>
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<td>0.0242</td>
<td>0.0039</td>
</tr>
<tr>
<td>CO₂</td>
<td>gross 220 (net 0)</td>
<td>159</td>
</tr>
</tbody>
</table>

The pollutant of greatest concern with biomass is particulates (PM₁₀). Biomass boilers clearly generate more particulates than their fossil fuel counterparts. That is why it is important to install appropriate pollution control equipment. But the emissions from a modern biomass boiler are much less than most people think. One of the most common misconceptions about institutional biomass energy systems comes from the experience people have with residential wood stoves and outdoor wood furnaces. In general, an institutional-scale wood energy system emits only one fifteenth (seven percent) the PM₁₀ of the average wood stove on a Btu basis. Over the course of a year, a large, wood-heated building (150-200,000 square feet) in a northern climate like New York may have the same particulate emissions as four or five houses heated with wood stoves.

³ Data excerpted from the paper *An Evaluation of Air Pollution Control Technologies for Small Wood-Fired Boilers* prepared by Resource Systems Group, Inc. White Rive Jct., VT for the Vermont Department of Public Service and others, Revised September 2001
However, in order to install any new boiler, Margaretville Hospital will likely still need an air quality permit or an amendment to their existing permit if they have one. For a biomass boiler, the permit will likely include requirements for pollution control equipment, such as a multi-cyclone, along with a requirement for a tall stack to help with dispersion. Costs for a multi-cyclone and a 70 foot tall stack are included in the cost estimates for the analysis in this report.

Other permit conditions might include testing for emissions and efficiency, keeping records of fuel consumption and test results, and making periodic submittals to regulatory agencies. On the plus side, a biomass boiler should reduce the hospital’s SOx emissions substantially since fuel oil consumption will be significantly reduced.

Table 4. Particulate Emissions

- Excerpted from a handout produced by the Biomass Energy Resource Center
CONCLUSIONS AND RECOMMENDATIONS

The Margaretville Hospital appears to be a good site for a fully-automated woodchip heating system. The preliminary cost effectiveness analysis for adding a biomass heating plant to the hospital’s heating system looks quite favorable. There is a workable location to place a biomass boiler and wood chip storage bin and, better yet, a biomass energy project could fit well with the hospital’s capital planning. The existing boiler systems could work well to provide back-up and supplemental heat in combination with a wood fired boiler. It also appears that the existing heating distribution systems could be readily adapted to accommodate an additional heating source such as a woodchip boiler. If Margaretville Hospital decides to move forward with this concept, we recommend taking the following next steps:

1. The hospital is undergoing a capital planning process. In order to accommodate a biomass boiler house and chip storage facility, careful design and site modifications will need to be made. It is almost always less expensive to incorporate a biomass energy project into a larger building renovation or new construction project. Design, permitting and general conditions can be spread over a larger project, and the logistics of construction can be managed more efficiently. There may also be opportunities to reconfigure the site and buildings to better accommodate a biomass boiler house and chip storage facility. The hospital should consider incorporating the biomass boiler project into their capital project. A list of A&E firms with biomass experience is included in the appendices to this report. As a part of that process, the hospital should identify any heating system improvements it planned to undertake in the foreseeable future and consider including those projects with the biomass project. It will be more cost effective to implement boiler room upgrades and heating distribution improvements at the same time a new boiler system is installed than it would be to postpone those improvements for a later time. We recommend including a mechanical engineer who is familiar with biomass and steam boilers on the master planning team to help refine the project concept and to obtain firm local estimates on project costs.

2. The hospital should consider energy efficiency improvements simultaneously with boiler upgrades. The efficiency of the building envelope and ventilation equipment need to be considered when sizing new boiler equipment. NYSERDA should be engaged to develop comprehensive energy efficiency recommendations and proposals for incentives for efficiency upgrades before undertaking a major building project. Information on energy efficiency programs and incentives are included in the Resource Binder accompanying this report.

3. Concurrently with the design of a biomass project, the hospital should cultivate potential wood chip fuel suppliers. Hospital staff should work with the Watershed Agricultural Council to identify potential wood chip suppliers and to tailor wood chip fuel specifications to the equipment that is ultimately selected. A list of potential wood chip fuel suppliers and a sample wood chip specification are included in the Resource Binder accompanying this report.
APPENDICES

DISCUSSION OF BIOMASS FUELS

Purchasing wood fuel is a different exercise than purchasing fuel oil. While fuel oil is delivered to the site with little interaction from facility managers, biomass fuel suppliers will need to be cultivated and educated about the type of fuel needed, its characteristics and the frequency of deliveries. Concurrently with designing a wood-energy system, the district should also be cultivating potential biomass fuel suppliers.

Potential wood fuel suppliers include sawmills, loggers, chip brokers and large industrial users such as paper mills or power plants. Many of these forest products producers already make woodchips for pulp and to reduce waste, but may not have much experience dealing with the needs of smaller volume customers. Woodchips produced for institutional biomass boilers have more stringent specifications than those produced for large industrial customers. And woodchip fuel may need to be delivered in different trailers.

When talking to potential woodchip fuel suppliers, it is important to have the wood fuel specification in mind. A one to three inch square chip is ideal. If possible, woodchips for institutional biomass systems will come from logs that are debarked prior to chipping because bark produces more ash which translates into a little more daily maintenance. Pieces or small branches that are six inches or longer can jam augers and conveyors which will interrupt the operation of automated fuel handling equipment. Institutional scale biomass boiler systems in the Northeast are typically designed to operate with wood fuel that is within a 35% and 45% range for moisture content.

Typically institutional biomass systems of this scale have limited chip storage capacity which means they may need deliveries on relatively short notice. Woodchip fuel suppliers will need to be within a 100 to 150 mile radius or so of the user, the closer the better, as transportation costs will affect price. Chip deliveries are typically made in “live bottom” trailers that will self unload into below-grade chip storage bins. Therefore, potential suppliers must have access to a self-unloading trailer for deliveries.

It is possible to design a wood-energy system that uses any one of a variety of biomass fuels, but green hardwood chips make the best fuel. If it is readily available, it should be the fuel of choice. In addition, users should focus on reliability of supply and consistency of the fuel rather than just lowest cost. The goal should be to minimize maintenance and optimize system performance.
Whichever fuel is used, the fuel type needs to be part of the combustion system design process, and the wood system should be operated using the fuel it is set up to use. Ideally, sample fuel chips should be sent to the manufacturer of the biomass heating equipment so that they can design the fuel handling equipment around the type of fuel and calibrate the system properly when setting the system up. No system handles widely varying fuel types at the same time very well. A system can be re-calibrated for a different fuel type, but the most practical approach is to stick with one fuel type, at least for a given heating season. If, for some reason, that fuel type becomes unavailable, the manufacturer of the equipment should be consulted to help reconfigure or retune the system for another fuel.

It is best to try to locate several potential suppliers. By doing so, the hospital will have the security of knowing there will be back-up in case of an interruption from their primary supplier. This will also generate some competition. A list of relatively local potential fuel suppliers is included in the appendices. For help identifying other potential wood-fuel suppliers, the hospital may want to contact the Watershed Agricultural Council. A Directory of Wood Products in the Catskills is also included in this appendix.

The bottom line is that both the hospital and fuel suppliers need to clearly understand the characteristics of fuel needed for their particular system. Consistent particle size and moisture content is particularly important for institutional customers, and the hospital should insist on the quality of the chip. A sample fuel specification is included in the Biomass and Green Building Resources binder to give an idea of the types of characteristics to look for in woodchip fuel. Below is a description of the advantages and disadvantages of different types of biomass fuels in order of preference.

**Green Hardwood Chips**

A consistent green hardwood chip is the easiest fuel for institutional scale automated biomass heating systems to handle. Rarely will they jam an auger or conveyer. Green chips burn somewhat cooler than most other biomass fuels making it easier to control the combustion. With proper controls, they burn very cleanly with minimal particulate emissions and little ash. They have less dust than other biomass fuels so they are less messy and safer to handle. Ideally moisture content will be between 35% and 45% on a wet basis. Green hardwood chips can come from sawmill residues or timber harvest operations.

**Mill Residues vs. Harvest Residues**

Woodchips can be produced at sawmills or other primary wood products industrial sites as part of their waste wood disposal process. Mill residues are typically the most desirable source of fuel woodchips. Mills can produce a bark-free chip with few long pieces or branches that can jam augers
and fuel conveyors. A mill supplier can easily calculate trucking costs and can negotiate dependable
delivery at a consistent price.

Another potential type of wood fuel is whole tree chips which are produced as part of tree
harvesting. Whole tree chips tend to be a dirtier fuel than sawmill residues and may contain small
branches, bark, twigs and leaves. The longer pieces can jam the relatively small augers of an
institutional scale biomass system and can add to the daily maintenance because they produce more
ash.

The bole of a tree is the de-limbed trunk or stem. Chips made from boles are in-between the quality
of a sawmill chip and a whole tree chip. Bole-tree chips tend to have fewer twigs and long stringers
than whole tree chips. Both bole-chips and whole-tree chips can be potentially good sources for
biomass fuels, although they have a greater likelihood of including oversized chips and they will
produce somewhat more ash, compared to mill residues.

**Softwood Chips**

Green softwood chips will generally have less energy and more water content per truckload, and
therefore they will be more expensive to transport than hardwood chips. As long as the combustion
and fuel handling equipment is properly calibrated for softwood chips, an automated woodchip
heating system can operate satisfactorily with softwood chips. Softwoods tend to have higher
moisture contents and can range up to 60% moisture on a wet basis. The best biomass fuel will
have less than 50% moisture. One species to avoid altogether is white pine. It has a very high
moisture content and therefore relatively low bulk density. The experience in Vermont schools with
white pine is that it is a poor biomass fuel for institutional-scale woodchip systems.

**Dry Chips vs. Green Chips**

Dry chips (less than 20% moisture on a wet basis) burn considerably hotter than green chips and
typically have more dust. The increased operating temperature can deteriorate furnace refractory
faster increasing maintenance costs slightly. The dust can make for a somewhat dirtier boiler room
which will be a problem for some maintenance staff. Dry chips are also easier to accidentally ignite
in the fuel storage bin or fuel handling system. If dry chips are used, the combustion equipment
needs to be carefully calibrated to handle these higher temperatures. Dry chips are not generally
recommended for institutional settings.

**Bark**

Bark has a high energy value, but it also comes with significant maintenance costs. It produces a
considerable amount of ash that needs disposal; it can create more smoke than green chips; and it
can cause other routine maintenance problems such as frequent jamming of augers from rocks. Bark can be an inexpensive fuel, but the additional maintenance costs make it unattractive for institutional biomass systems.

**Sawdust and Shavings**

Sawdust and shavings should be ruled out for the institutional wood heating market. Dry sawdust can be dusty to handle and raises fire safety and explosion issues. Shavings are also dusty and easily ignited and are difficult to handle by typical fuel handling equipment. This fuel type can work fine in an industrial setting, but institutions typically do not have the maintenance staff that can provide the supervision that these fuels need.
ARCHITECTURAL AND ENGINEERING FIRMS WITH BIOMASS EXPERIENCE

Banwell Architects
PO Box 830
16 State St
Montpelier, VT 05602
(802) 223-5551
http://www.banwell-architects.com/

Black River Design Architects
73 Main St Room 9
Montpelier, VT 05602
(802) 223-2044
http://www.blackriverdesign.com/

CSArch
40 Beaver St
Albany, NY 12207
(518) 463-8068
http://www.csarchpc.com/

Kohler & Lewis Engineering
27 Mechanic St
Keene, NH 03431
(603) 352-4841
http://www.kohlerandlewis.com/

M/E Engineering
10 Airline Drive, Suite 201
Albany, NY 12205
(518) 533-2171
http://www.mengineering.com/

Salem Engineering
4066 Shelburne Rd
Shelburne, VT 05482
(802) 985-8722
http://www.salemengineering.com/contact.html

Truex Cullins & Partners Architects
209 Battery St
Burlington, VT 05401
Tel: (802) 658-2775 or (800) 227-1076
Fax: (802) 658-6495
http://www.truexcullins.com/welcome.php
BIOMASS ENERGY VENDORS

Bio-Fuel Technologies
Bob Rice
PO Box 41
Beaverton, PA 17813
570-658-7491
ricerc@ptd.net

Biomass Combustion Systems
Charlie Carey
16 Merriam Rd
Princeton, MA 01541
Work: 508-393-4932
Fax: 978-464-5980
E-Mail: info@biomasscombustion.com

Biomass Energy Concepts/Advanced Recycling
850 Washington Rd
St. Mary's, PA 15857
Work: 800-611-6599
Fax: 814-834-3483
c-mail: areinc@alltel.net

Chiptec
Bob Bender
48 Helen Avenue
So. Burlington, VT 05403
Work: 800-244-4146
FAX: 802-660-8904
c-mail: BobBender@Chiptec.com

Viessmann Boilers. (KOB)
Steve David,
45 Access Road
Warwick RI 02886
Work: (401) 732-0667
Fax: (401) 732-0590
E-mail: Dav@viessmann.com

Messersmith Manufacturing
Gailyn Messersmith
2612 F Road
Bank River, MI 49807
Work: 906-466-9010
Fax: 906-466-2843
c-mail: messersmith@uplogon.com
# Potential Biomass Fuel Suppliers

## Catskill/Hudson Valley Region

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<thead>
<tr>
<th>Business Name</th>
<th>Address</th>
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<th>State</th>
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<tr>
<td>Mid Hudson Forest Products, Inc.</td>
<td>301 Route 7</td>
<td>Pine Plains</td>
<td>NY</td>
<td>12567</td>
<td>Brian Arico</td>
<td>(518) 398-0060</td>
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<tr>
<td>B&amp;B Forest Products</td>
<td>251 Route 145</td>
<td>Cairo</td>
<td>NY</td>
<td>12413</td>
<td>Bill Fabian</td>
<td>(518) 622-9019</td>
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<tr>
<td>N.E. Timberland Investments LLC</td>
<td>PO Box 406</td>
<td>Russell</td>
<td>MA</td>
<td>01071</td>
<td>Michael Fahey</td>
<td>(860) 428-2057</td>
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<tr>
<td>J&amp;J Tree Service</td>
<td>1795 Route 212</td>
<td>Saugerties</td>
<td>NY</td>
<td>12477</td>
<td>Jesse Reimer</td>
<td>(845) 679-7034</td>
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<tr>
<td>Leatherstocking Timber Products, Inc.</td>
<td>359 County Highway 11</td>
<td>Oneonta</td>
<td>NY</td>
<td>13820</td>
<td>Matt Kent</td>
<td>(607) 436-9082</td>
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<tr>
<td>John R. Deschaine Logging Inc.</td>
<td>4283 Route 9</td>
<td>Hudson</td>
<td>NY</td>
<td>12534</td>
<td>John Deschaine</td>
<td>(518) 828-9360</td>
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<tr>
<td>Rancourt Tree LLC</td>
<td>42 Palmer Circle</td>
<td>Paughquag</td>
<td>NY</td>
<td>12570</td>
<td>Claude Rancourt</td>
<td>(845) 206-1260</td>
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<td>Tremson Corporation</td>
<td>21 Branch Road</td>
<td>Brewster</td>
<td>NY</td>
<td>10509</td>
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<td>(845) 278-9383</td>
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<tr>
<td>Schaefer Logging</td>
<td>315 Old Route 10</td>
<td>Deposit</td>
<td>NY</td>
<td>13754</td>
<td>Larry Schaefer</td>
<td>(607) 467-4990</td>
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## Sawmills

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<td>Cannonsville Lumber, Inc.</td>
<td>199 Old Route 10</td>
<td>Deposit</td>
<td>NY</td>
<td>13754</td>
<td>Terry Leonard</td>
<td>(607) 467-3380</td>
</tr>
<tr>
<td>Cooksburg Lumber Co., Inc.</td>
<td>PO Box 559</td>
<td>Preston Hollow</td>
<td>NY</td>
<td>12469</td>
<td>Andrew Juliano</td>
<td>(518) 239-4324</td>
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<tr>
<td>J&amp;J Lumber Co.</td>
<td>PO Box 1139</td>
<td>Dover Plains</td>
<td>NY</td>
<td>12552</td>
<td>Andy Watt</td>
<td>(845) 832-6535</td>
</tr>
<tr>
<td>McGraw Lumber Co.</td>
<td>589 Benton Hollow Rd</td>
<td>Woodbourne</td>
<td>NY</td>
<td>12788</td>
<td>Patrick McGraw</td>
<td>(845) 434-3020</td>
</tr>
<tr>
<td>Melitz Lumber</td>
<td>483 Route 217</td>
<td>Hudson</td>
<td>NY</td>
<td>12534</td>
<td>Jeff Melitz</td>
<td>(518) 672-7021</td>
</tr>
<tr>
<td>Rothe Lumber</td>
<td>1451 Route 212</td>
<td>Saugerties</td>
<td>NY</td>
<td>12477</td>
<td>Mike Rothe</td>
<td>(845) 246-5202</td>
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<tr>
<td>Wagner-Nineveh, LLC</td>
<td>224 County Route 26</td>
<td>Nineveh</td>
<td>NY</td>
<td>13813</td>
<td>Ed Thom</td>
<td>(607) 693-2680</td>
</tr>
<tr>
<td>Waruch Lumber, Inc.</td>
<td>125 Upper Cherry Town Rd</td>
<td>Kerhonkson</td>
<td>NY</td>
<td>12446</td>
<td>David Waruch</td>
<td>(845) 626-4049</td>
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## Wood Pellet & Briquette Manufacturers

<table>
<thead>
<tr>
<th>Business Name</th>
<th>Address</th>
<th>Town</th>
<th>State</th>
<th>Zip</th>
<th>Contact Name</th>
<th>Telephone</th>
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<tbody>
<tr>
<td>Enviro Energy, LLC</td>
<td>2265 State Route 7</td>
<td>Unadilla</td>
<td>NY</td>
<td>13849</td>
<td>Bob Miller</td>
<td>(607) 988-9013</td>
</tr>
<tr>
<td>Catskill Craftsmen (Hearthside Wood Pellets, Ltd.)</td>
<td>15 West End Ave</td>
<td>Stamford</td>
<td>NY</td>
<td>12167</td>
<td>Ken Smith</td>
<td>(607) 652-7321</td>
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Prepared by: Watershed Agricultural Council Forestry Program (607) 865-7790 ext 112

[www.nycwatershed.org](http://www.nycwatershed.org)
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<th>Address</th>
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<th>Zip</th>
<th>Contact Name</th>
<th>Telephone</th>
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<tbody>
<tr>
<td>RWS, Inc.</td>
<td>Queensbury</td>
<td>NY</td>
<td>13403</td>
<td>Peter Ashline</td>
<td>(518) 745-4222</td>
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<tr>
<td>Mohawk Valley Materials, Inc</td>
<td>Marcy</td>
<td>NY</td>
<td>13403</td>
<td>Joe Rutkowski</td>
<td>(315) 507-2538</td>
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<tr>
<td>PA Pellet and Chipping</td>
<td>Ulysses</td>
<td>PA</td>
<td>11963</td>
<td>Luke Watson</td>
<td>(814) 848-9944</td>
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<tr>
<td>King Forest Products</td>
<td>Ellington</td>
<td>NY</td>
<td>14732</td>
<td>(716) 287-2585</td>
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<tr>
<td>New Growth Resources, Inc</td>
<td>Kane</td>
<td>PA</td>
<td>16735</td>
<td>Michael Kocjanic</td>
<td>(814) 837-2206</td>
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<tr>
<td>D &amp; R Logging</td>
<td>Pine Grove</td>
<td>PA</td>
<td>17963</td>
<td>(570) 345-4632</td>
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<td>Pequignot Logging</td>
<td>Covington</td>
<td>PA</td>
<td>16917</td>
<td>(570) 659-5251</td>
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<tr>
<td>S &amp; M Logging</td>
<td>Stillwater</td>
<td>PA</td>
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Various whole tree and flail chip chipping contractors in Adirondacks/North Country region—Call for list.

Sawmills (see state sawmill directory—http://www.dec.ny.gov/lands/33306.html)

Secondary Wood Processors (see state directory—http://www.dec.ny.gov/lands/33307.html)

<table>
<thead>
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<th>Zip</th>
<th>Contact Name</th>
<th>Telephone</th>
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<tbody>
<tr>
<td>Ecostrat</td>
<td>Toronto</td>
<td>Ont., Canada</td>
<td>Maria Naccarato</td>
<td>(416) 968-8884</td>
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<tr>
<td>Green Energy Resources</td>
<td>Lowville</td>
<td>NY</td>
<td>13367</td>
<td>Peter Babich</td>
<td>(315) 323-4882</td>
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<tr>
<td>Chenango Renewable Energy</td>
<td>Auburn</td>
<td>NY</td>
<td>13021</td>
<td>Matt McArdel</td>
<td>(315) 704-0004</td>
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<tr>
<td>Tree Source Solutions LLC</td>
<td>Oneonta</td>
<td>NY</td>
<td>13820</td>
<td>Matt Kent</td>
<td>(607) 436-9082</td>
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<td>Wood Pellet &amp; Briquette Manufacturers</td>
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<td>New England Wood Pellet, LLC - Schuyler</td>
<td>Schuyler</td>
<td>NY</td>
<td>13340</td>
<td>Gabe Vincellette</td>
<td>(315) 724-7166</td>
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<tr>
<td>Excelsior Alternative Fuels, Inc. (Briquettes)</td>
<td>Amenia</td>
<td>NY</td>
<td>12501</td>
<td>Kenneth Lango</td>
<td>(645) 373-4234</td>
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<tr>
<td>Woodstone Pellets</td>
<td>Hingham</td>
<td>MA</td>
<td>02043</td>
<td>Justin Moran</td>
<td>(781) 741-3890</td>
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<tr>
<td>Dry Creek Pellets</td>
<td>Addison</td>
<td>NY</td>
<td>13550</td>
<td>Kevin Chilson</td>
<td>(607) 359-2270</td>
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<tr>
<td>InstantHeat Pellets</td>
<td>Lafargeville</td>
<td>NY</td>
<td>13840</td>
<td>Coleen Waldruff</td>
<td>(315) 638-2926</td>
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<td>Associated Harvest</td>
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<tr>
<td>Curran Renewable Energy</td>
<td>Massena</td>
<td>NY</td>
<td>13662</td>
<td>Pat Curran</td>
<td>(315) 769-5970</td>
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Prepared by: NYSDEC Forest Utilization Program (518) 402-9415
www.dec.ny.gov/lands/4963.html