PRELIMINARY BIOMASS HEATING ANALYSIS

Onteora Central School District

Boiceville, New York

Prepared by

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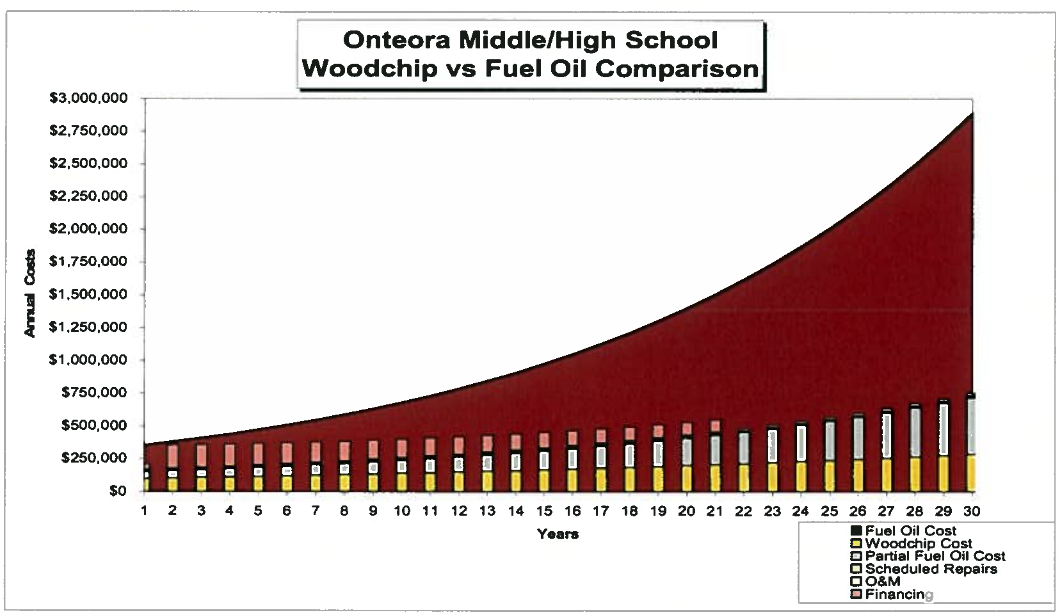
EXECUTIVE SUMMARY

This preliminary biomass heating analysis was prepared by Richmond Energy Associates, LLC. The project was funded by the Watershed Agricultural Council (WAC). The WAC is funded by the New York City Department of Environmental Protection, the U.S. Department of Agriculture and other federal foundations and private sources.

Both Bennett Elementary School and Onteora Middle/High School are located in Boiceville, New York. The schools have approximately 47,500 and 175,000 square feet of conditioned building space respectively. The biomass scenario analyzed for this report envisions building a stand-alone woodchip boiler house and chip storage facility up near the Bennett School building and piping hot water for heating to both schools via underground insulated piping.

Together both schools consume about 132,700 gallons of #2 fuel oil each year on average. At the average price paid last year of $2.67 per gallon, the school can expect to pay more than $350,000 in fuel oil costs next year to heat these two buildings. The existing boilers for the middle high school are fully depreciated. As such the district will likely be eligible for 31%state school construction aid for a biomass boiler project.

The analysis indicates the Onteora Central School District would need to spend $2,619,844 for a woodchip boiler plant but that it could save nearly $8 million in operating costs over 30 years in today's dollars even including the cost of financing equipment and installation. The analysis shows more than $188,000 in fuel savings in the first year alone. Moreover, the district should obtain a positive cash flow from the first year of operation.



Assumptions for this chart can be found in the pellet scenario cost effectiveness analysis section beginning on page 4

The woodchip biomass scenario evaluated for this report appears very cost effective. Richmond Energy recommends the district take the following steps to investigate this opportunity further:

1. Hire an engineering firm to help refine the project concept and to obtain firm local estimates on project costs. Lists of A&E firms with biomass experience and biomass vendors are included in the appendices to this report.
2. The district should identify any heating system improvements it planned to undertake and include 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. Specifically, the district should seriously consider converting the existing steam heating distribution system at the middle/high school to hot water whether it wants to consider biomass or not. If the district decides to move forward with a biomass option, the design team should evaluate how to configure a district heating system for the entire campus and may want to consider eliminating the boiler equipment in the middle/high school all together.
3. The school 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. It is apparent from this study that the middle/high school is consuming a good deal more heating fuel than average for a school in this climate. The New York State Energy and Research Authority (NYSERDA) and/or the New York Power Authority (NYPA) should be engaged to develop comprehensive energy efficiency recommendations and proposals for incentives for efficiency upgrades. This should be done regardless of whether or not the district moves ahead with a biomass project at this time. Information on energy efficiency programs and incentives are included in the ***Biomass and Green Building Resources*** Binder accompanying this report.
4. In order to effectively measure progress toward energy efficiency goals historical energy consumption data should be collected and updated frequently. There are many tools to help the district accomplish this. One such tool is the EPA Energy Star *Portfolio Manager* software. It is free public domain software that helps facility managers track energy and water use. This software can be downloaded at:
   http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager
5. It is Richmond Energy's understanding that the district is engaged in a master planning process. The biomass scenario included in this report would fit well within that process. The district may want to consider combining a biomass project with an extensive energy efficiency upgrade and present it to voters as a comprehensive energy initiative.
6. Concurrent with the design of a biomass project, the district should cultivate potential biomass fuel suppliers. District staff should work with the Watershed Agricultural Council staff to identify potential woodchip fuel suppliers and begin discussing fuel pricing. A list of potential woodchip fuel suppliers is included in the appendices at the end of 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 constructively used 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 Onteora Central School District has all of these characteristics.

This preliminary feasibility study was funded by the Watershed Agricultural Council (WAC). The WAC is funded by the New York City Department of Environmental Protection, the US Department of Agriculture and other federal foundations and private sources. The study was prepared by Jeff Forward of Richmond Energy Associates, LLC. Richmond Energy is a professional consulting firm with extensive experience in wood energy systems. Mr. Forward provides analysis and project management on specific biomass projects and he works with state, regional and federal agencies to develop initiatives to promote biomass utilization around the country.

In January 2009, Mr. Forward went to Boiceville to tour the school. This report summarizes Richmond Energy's findings and makes specific recommendations on how the district can proceed with a wood energy option.

ANALYSIS

Life Cycle Cost Methodology

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 equipment and operating 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 increases in operation and maintenance costs.

The analysis performed for this facility compares 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 that both the Bennett Elementary School and the Onteora Middle/High School will continue to use the existing fuel oil fired boilers essentially as they are now being used. The alternative biomass scenario envisions installing a new biomass boiler and fuel storage structure that would serve both school buildings. The biomass scenario includes all ancillary equipment and interconnection costs. Under the biomass scenario, the existing fuel oil boilers would still be used to provide supplemental heat during the coldest days of the year if necessary and potentially for the warmer shoulder season months when buildings only require minimal heating during chilly weather.

The analysis then projects current and future annual fuel oil heating bills and compares that cost against the cost of operating a biomass 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 dollar value of net cash flows over time. It is a standard method for using the time value of money to compare the cost effectiveness of long-term projects.

Description of Existing Heating Systems

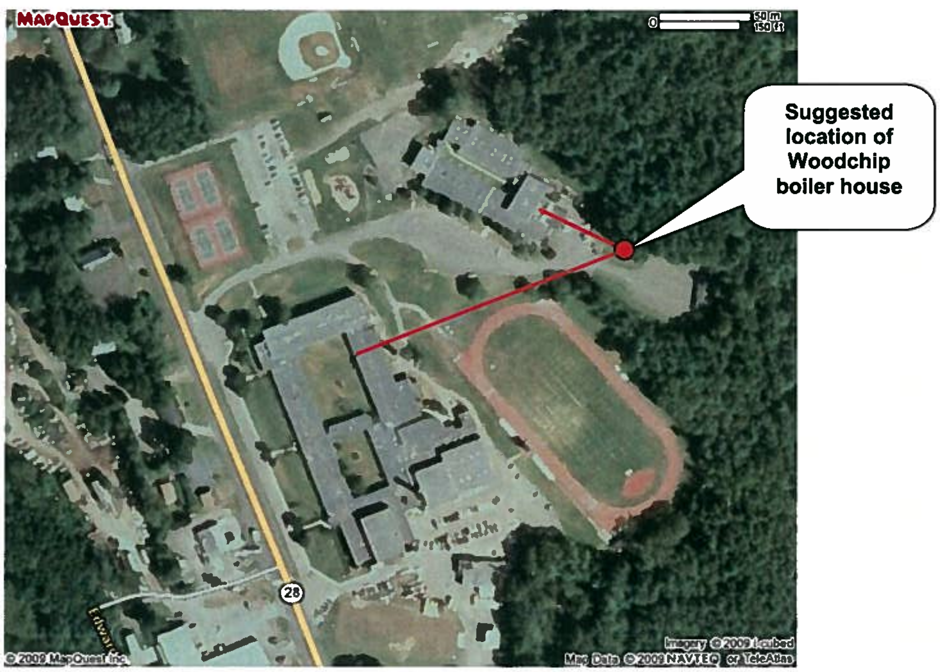
The Onteora Middle/High School and the Bennett Elementary School are located on the same campus in Boiceville, NY. Presently the elementary school building houses approximately 350 in grades K-6 and the Onteora Middle/High School building houses about 1,150 students in grades 7-12. The school buildings themselves are about 47,439 square feet and 175,000 square feet respectively. The middle/high school is heated by three 4.3 MBtu low pressure steam boilers, all of which were installed in 1990. The Bennett Elementary School has two 2.7 MBtu hot water boilers which were recently installed.

Capital Cost Assumptions for Woodchip Scenario

It was not the intent of this project nor was it in the scope of work to develop detailed cost estimates for a biomass boiler facility. It is recommended that for a project of this scale, the district hire a qualified design team to refine the project concept and to develop firm local cost estimates. Therefore the capital costs used for the biomass scenario are generic estimates based on Richmond Energy's experience with similar scale projects.

The woodchip scenario envisions building a 2,500 square foot stand-alone boiler house and chip storage facility which would house a 9.0 MBtu woodchip hot water boiler and include woodchip fuel storage and fuel handling equipment to feed the boiler automatically. The scenario assumes the existing boilers would remain to provide back-up heat for the shoulder seasons and supplemental heat during the coldest nights of the year if necessary. Below is the suggested boiler house location.

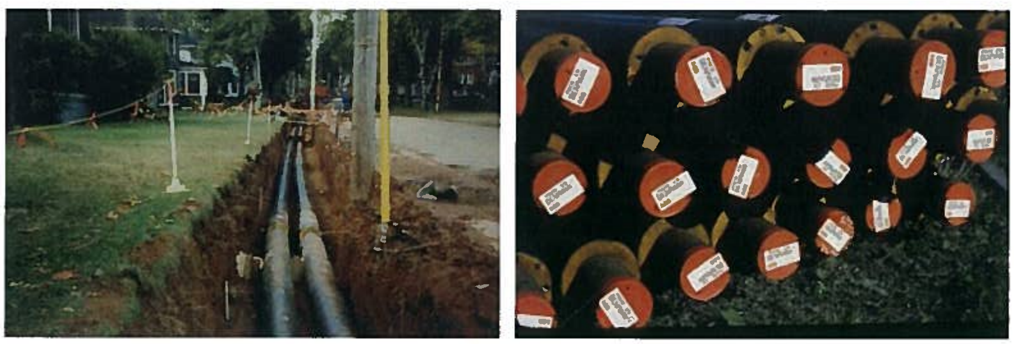
Figure 1 Suggested Biomass Boiler Location



Hot water from the woodchip boiler house would be tied into the existing boiler rooms and heating distribution systems via 750 feet of underground insulated piping. Costs for a 70-foot stack were included to ensure good emissions dispersal. Costs for an underground woodchip storage bin were included, as below grade chip storage bins are less likely to freeze in the coldest winter weather and chip delivery using self unloading trailers into below grade bins is fast and easy. A healthy construction contingency, standard general contractor mark-up and professional design fees were also included. Below are examples of the type of recommended building and buried insulated piping.

Figure 2 Burlington, VT High School Woodchip Boiler Plant

Figure 3 Underground insulated district energy piping[1]



It should be noted that the cost of converting the middle/high school building from steam to a hot water heating distribution system was not included in the capital cost estimates for the biomass scenario. The existing steam distribution system is quite old and inefficient. Current best practice for most schools is hot water distribution and indeed the Bennett Elementary School was built with a hot water distribution system that would be relatively simple to hook up to a district energy system. Whether or not the district moves ahead with a biomass project, it should consider converting the existing steam heating distribution system at the middle/high school to hot water.

However, estimating the cost of a hot water distribution system is beyond the scope of this project. The biomass scenario may not be cost effective or recommended if steam needed to be piped from the biomass boiler house to the middle/high school. It would make much more sense to convert the middle/high school to hot water and then pipe hot water from the remote boiler house to the middle/high school building.

[1] Photos excerpted from *Heating Communities with Renewable Fuels* published by Natural Resource Canada.

State School Construction Aid

Biomass boilers are generally eligible for New York state school construction aid[2]. However, the New York Facilities Planning Division for the State Department of Education (SED) does not like to fund new boilers until the existing boilers are fully depreciated. SED generally considers boilers fully depreciated after fifteen years although they do recognize that boilers can last a good deal longer. Since the boilers at the Middle/High School were installed in 1990, they are considered fully depreciated and the district will likely be eligible for state aid reimbursement. For the analysis in this report, it was assumed that this project would receive the same state aid reimbursement that the district would receive for any other capital improvement project.

It is Richmond Energy's understanding that the Onteora Central School District is eligible for 31% state school construction aid for capital improvement projects. For this analysis it was assumed that 31% of the project costs would be covered by state school construction aid and that the local share would be financed through a 20-year bond.

Fuel Oil Cost Assumptions

During the 2006-2007 and 2007-2008 heating seasons, the last for which full consumption data is available, the Onteora Middle/High School used an average of 100,800 gallons of #2 fuel oil and the Bennett Elementary School used an average of 31,900 gallons. The combined total of 132,700 gallons of #2 fuel oil per year was the assumed annual fossil fuel consumption used for the base case in the analysis. The average institutional price paid for fuel oil in Ulster County over the past twelve months was $2.67 per gallon according to the NY Office of General Services. At that price, the district will spend more than $350,000 to heat both buildings next year.

Woodchip Fuel Cost Assumptions

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 schools with woodchips and therefore consume 1,601 tons of chips per year. The remaining 15% of the heating needs were then assumed to be provided by fuel oil boilers consuming about 19,905 gallons

[2] The district should consult with state officials about any planned construction project and get their determination on state aid directly from SED. The contact at SED is Carl Thurnau and he can be reached at (518) 474-3906 or emscfp@mail.nysed.gov .

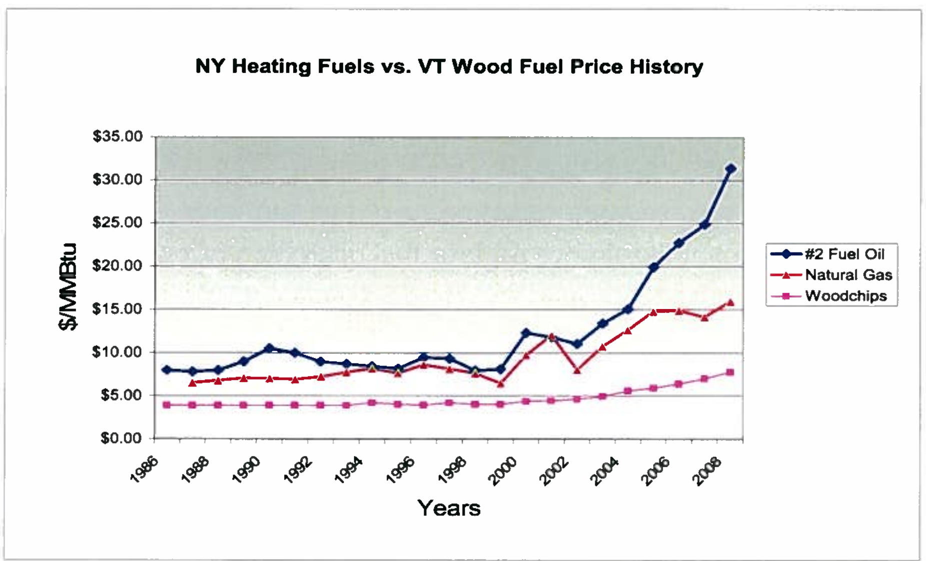
of fuel oil. The costs for fuel oil and woodchips are then adjusted for inflation each year over the 30-year horizon.

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 thirty year analysis, some rate of inflation needs to be applied to future fuel costs.

Richmond Energy looked retrospectively over the last 20 years (1988 – 2008) using US Energy Information Agency data and found that the average annual increase for fuel oil in New York was 7.5% per year. The analysis projects this average inflation rate for fuel oil forward over the thirty year analysis period.

Figure 4 Woodchip and Fuel oil Inflation



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 $45/ton in the period between 1987 and 2007. The average annual increase during this period was about 3.7% annually[3] 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

[3] Extrapolated from Vermont Superintendent Association School Energy Management Program data

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.

The starting price for fuel oil in year one of the analysis was based on the NY Office of General Services net fuel prices for #2 fuel oil in Ulster County. Richmond Energy 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 Ulster County during this period was $2.67 per gallon which was the price used for year one of the analysis. This fuel price was then inflated each year at 7.5%. 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 DEC Forests and Lands staff, Richmond Energy 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 3.7% annually.

The overall Consumer Price Index for the period between 1988 and 2008 increased an average of 2.9% 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

It is typical for operators of fully automated woodchip heating systems of this size to spend 15-30 minutes per day to clean ashes[4] and to check on pumps, motors and controls. For a system of this size, it is likely that a bag house pollution control device would also be necessary to meet air quality regulations. Such a device may require an additional hour per week to remove collected fly ash. For the woodchip scenario, it was assumed that existing on-site staff would spend on average approximately one hour per day in addition to their current boiler maintenance for 150 days per year and 20 hours during the summer months for routine maintenance. At a loaded labor rate of $25/hr, this equals $4,250 annually. An additional $4,250 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 boiler such as the furnace refractory. It is reasonable to anticipate these types of costs on a 10-15 year cycle. For this analysis, $50,000 of scheduled maintenance was anticipated in years 10, 20 and 30 and then annualized at $5,000 per year to

[4] Wood ash is generally not considered a hazardous material in most states and can be landfilled or land applied as a soil amendment by farmers or on-site maintenance staff.

simulate a sinking fund for major repairs. This $5,000 was then inflated at the general annual inflation rate.

Under any biomass scenario, a case could be made that the existing fossil fuel boilers will require less maintenance and may last longer since they will only be used for a small portion of the heating season. However, all boilers should be serviced at least annually no matter how much they are used. Additionally it is very difficult to estimate how long the replacement of the fuel oil boilers might be delayed. For these reasons, 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 school would have paid anyway. It was assumed that all costs for the operation and maintenance of a biomass boiler are incremental additional costs.

Financing Assumptions

Financing costs were included in the analysis to give school decision makers a sense of how this project may impact their annual budget. Public institutions typically have access to long-term, low interest bond financing. It was assumed that Onteora Central School District will be able to obtain a 20-year bond for their share of the capital costs for a biomass project at an annual interest rate of 5%. The bond payment schedule that was used has fixed principal payments and variable 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.

BIOMASS SCENARIO ANALYSIS RESULTS

The analysis shows that the Onteora Central School District could save nearly $8 million in today's dollars in operating costs over the next 30 years by installing a woodchip heating system even including debt service on the local share cost of the system. Annual fuel savings alone are projected to be more than $188,000 per year in the first year and will increase over time as fuel oil prices continue to climb. The district would see a positive cash flow from the very first year of the project.

Table 1 Woodchip Scenario Analysis Assumptions

Capital Cost Assumptions	
9.0 MBTU wood hot water boiler system including installation	$750,000
2,500 square foot boiler house and chip storage building @$250/SF	$625,000
70 ft. Stack	$35,000
Interconnection with existing heating systems	$100,000
Buried underground insulated pipe to existing boiler room 750 ft @ $250/LF	$187,500
Baghouse pollution control device	$125,000
Construction contingency at 15%	$273,375
GC markup at 15%	$314,381
Design at 10%	$209,588
Total estimated project costs	$2,619,844
Fuel Cost Assumptions	
Current annual oil use (gal)	132,700
Assumed oil price in 1st (per gal)	$2.67
Projected annual fuel oil bill at $2.67/gallon	$354,815
Oil (gal)/chip (ton) ratio	62
Assumed wood price in 1st year (per ton)	$55
Projected 1st year wood fuel bill	$99,780
Projected 1st year supplemental fuel oil bill	$53,222
Inflation Assumptions	
General inflation rate (twenty year average CPI)	2.9%
Oil inflation rate (twenty year average EIA)	7.5%
Wood inflation rate (Average increase in VT from 1987 - 2007 is 3.7%)	3.7%
O&M Assumptions	
Annual Wood O&M cost, including labor	$8,500
Major repairs (annualized)	$5,000
Savings	
Net 1st year fuel savings including increased O&M	**$188,313**
Total 30 year NPV cumulative savings	**$7,923,342**

Figure 5 Annual Cash Flow Graph for Woodchip Scenario

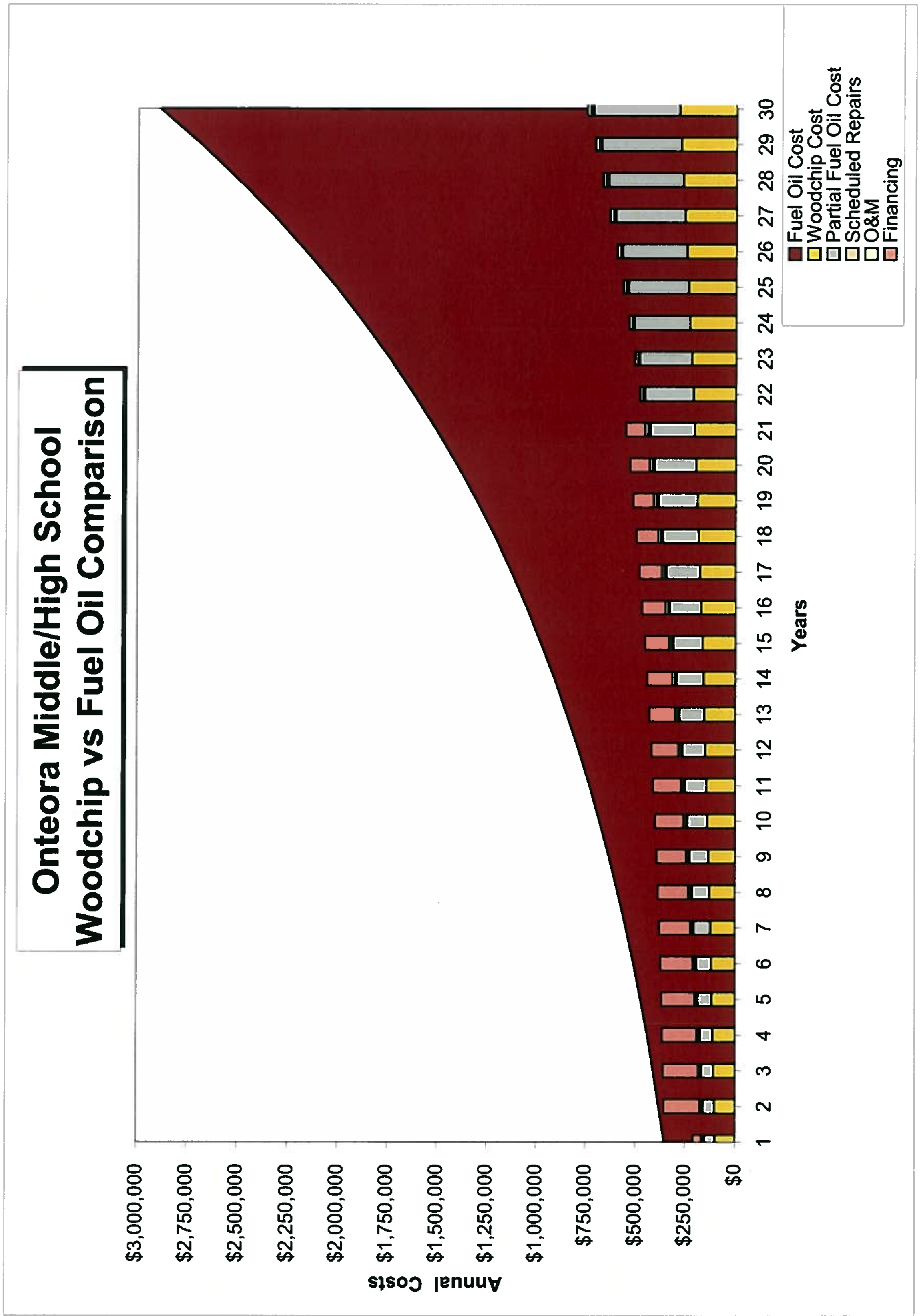


Table 2 30-Year Cash Flow Spreadsheet for Woodchip Scenario

Onteora Middle/High and Bennett Preliminary Life Cycle Cost Estimate

Wood Chip - Heat Only

Local Share:	$1,807,692	if	31.0%	obtained through State School Construction Aid		$2,619,844
Financing:	5.0%	Assumed rate each year, 20 years.				
Fuel Oil:	132,700	annual Gallons.	Average for last three years	103,500.00	net BTU/Gal.	13,734,450,000 net BTU
Fuel Oil Price:	$2.67	/ Gal. Yr. 1	*Average for County 2008-09*	62	gal. / ton.	
Woodchip:	1,814	tons at	85% utilization	2134	annual tons if 100% Woodchip.utilization	
Woodchip Price:	$55	/ ton Year 1.	*High end of range, 2007-2008*	6,435,000	net BTU / Ton.	
BTU ratio (net basis)	85%	Woodchip	15% Fuel Oil =	19,905	Gallons	
General Inflation:	2.9%	annually.	*Twenty year average annual US Labor Dept. Consumer Price Index increases*			
Fuel Oil inflation:	7.5%	annually.	*Average increase for #2 Distillate Fuel from 1988 - 2008 (US EIA)*			
Woodchip Inflation:	3.7%	annually.	*Average increase for wodchips for schools in Vermont from 1987 - 2007 is 3.7%. (VSA)*			
O. & M.:	$8,500	in Year 1 $.	*Estimate of additional electricity for feed system motors and additional maintenance staff time.*			
Major Repairs:	$5,000		*Contingency for major repair (e.g. refractory replacement) at Years 10,20 and 30 annualized*			

Yr.	Fuel Oil Cost	Total	Financing	Woodchip Cost	Partial Fuel Oil Cost	O&M	Scheduled Repairs	Total	Annual Cashflow	Cumulative Cashflow
1	$354,815	$354,815	$45,192	$99,780	$53,222	$8,500	$5,000	$211,695	$143,121	$143,121
2	$381,426	$381,426	$180,769	$103,472	$57,214	$8,747	$5,145	$355,347	$26,080	$169,200
3	$410,033	$410,033	$176,250	$107,301	$61,505	$9,000	$5,294	$359,350	$50,684	$219,884
4	$440,786	$440,786	$171,731	$111,271	$66,118	$9,261	$5,448	$363,828	$76,958	$296,842
5	$473,845	$473,845	$167,212	$115,388	$71,077	$9,530	$5,606	$368,811	$105,034	$401,875
6	$509,383	$509,383	$162,692	$119,657	$76,407	$9,806	$5,768	$374,331	$135,052	$536,927
7	$547,587	$547,587	$158,173	$124,084	$82,138	$10,090	$5,936	$380,421	$167,166	$704,093
8	$588,656	$588,656	$153,654	$128,675	$88,298	$10,383	$6,108	$387,118	$201,538	$905,630
9	$632,805	$632,805	$149,135	$133,436	$94,921	$10,684	$6,285	$394,461	$238,344	$1,143,975
10	$680,266	$680,266	$144,615	$138,374	$102,040	$10,994	$6,467	$402,490	$277,776	$1,421,750
11	$731,286	$731,286	$140,096	$143,493	$109,693	$11,313	$6,655	$411,250	$320,036	$1,741,786
12	$786,132	$786,132	$135,577	$148,803	$117,920	$11,641	$6,848	$420,788	$365,344	$2,107,130
13	$845,092	$845,092	$131,058	$154,308	$126,764	$11,979	$7,046	$431,155	$413,937	$2,521,067
14	$908,474	$908,474	$126,538	$160,018	$136,271	$12,326	$7,251	$442,404	$466,070	$2,987,137
15	$976,609	$976,609	$122,019	$165,938	$146,491	$12,683	$7,461	$454,593	$522,016	$3,509,153
16	$1,049,855	$1,049,855	$117,500	$172,078	$157,478	$13,051	$7,677	$467,785	$582,070	$4,091,224
17	$1,128,594	$1,128,594	$112,981	$178,445	$169,289	$13,430	$7,900	$482,044	$646,550	$4,737,773
18	$1,213,239	$1,213,239	$108,462	$185,047	$181,986	$13,819	$8,129	$497,443	$715,796	$5,453,569
19	$1,304,232	$1,304,232	$103,942	$191,894	$195,635	$14,220	$8,365	$514,056	$790,176	$6,243,745
20	$1,402,049	$1,402,049	$99,423	$198,994	$210,307	$14,632	$8,607	$531,964	$870,085	$7,113,830
21	$1,507,203	$1,507,203	$94,904	$206,357	$226,080	$15,057	$8,857	$551,255	$955,948	$8,069,778
22	$1,620,243	$1,620,243		$213,992	$243,036	$15,493	$9,114	$481,636	$1,138,607	$9,208,385
23	$1,741,761	$1,741,761		$221,910	$261,264	$15,943	$9,378	$508,495	$1,233,266	$10,441,651
24	$1,872,393	$1,872,393		$230,121	$280,859	$16,405	$9,650	$537,034	$1,335,359	$11,777,010
25	$2,012,823	$2,012,823		$238,635	$301,923	$16,881	$9,930	$567,369	$1,445,454	$13,222,463
26	$2,163,784	$2,163,784		$247,465	$324,568	$17,370	$10,218	$599,620	$1,564,164	$14,786,627
27	$2,326,068	$2,326,068		$256,621	$348,910	$17,874	$10,514	$633,919	$1,692,149	$16,478,776
28	$2,500,523	$2,500,523		$266,116	$375,078	$18,392	$10,819	$670,405	$1,830,118	$18,308,894
29	$2,688,062	$2,688,062		$275,962	$403,209	$18,926	$11,133	$709,230	$1,978,833	$20,287,726
30	$2,889,667	$2,889,667		$286,173	$433,450	$19,474	$11,456	$750,553	$2,139,114	$22,426,841
Totals	$36,687,690	$36,687,690	$2,801,923	$5,323,809	$5,503,154	$397,903	$234,061	$14,260,850	$22,426,841	
	30 Yr. NPV at	5%	Discount Rate							
	$14,557,351	$14,557,351	$1,764,652	$2,393,566	$2,183,603	$183,971	$108,218	$6,634,009	$7,923,342	

Fuel Oil Cost Only	Fuel Oil + Woodchips	Woodchip System O&M	Contingency Allowance / Year	Woodchip Fuel + O&M + Contingency	Annual Savings	Local Share Cost	Simple Payback (yrs)
$354,815	$153,002	$8,500	$5,000	$166,502	$188,313	$1,807,692	10

ADDITONAL 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. Richmond Energy recommends that the school input several years' worth of energy and water use data for all of its schools 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

Regardless of whether the district moves forward with a biomass project, the district should engage the New York State Energy Research and Development Authority (NYSERDA) and/or the New York Power Authority (NYPA). Both have well-developed energy efficiency programs and both could help with the evaluation of energy efficiency opportunities. NYSERDA and/or NYPA can perform an energy audit on the school and they can provide cash incentives to upgrade and improve equipment efficiencies.

The middle/high school building is aging and uses more fuel oil per square foot than one would expect. At 175,000 square feet and an average of about 100,000 gallons of fuel oil per year, the school consumes about .57 gallons per square foot. The average fuel consumption for schools in a northern climate is about .4 gallons per square foot. No matter whether the district converts to biomass or stays with fuel oil, the district should use its heating fuel efficiently. NYSERDA can help identify and prioritize appropriate energy efficiency projects that will improve the schools infrastructure and save money.

A Case Study for the NYSERDA Energy Smart Schools Program and general information on NYSERDA and NYPA programs is included in the *Biomass and Green Building Resources* binder accompanying this report.

CONVERT FROM STEAM HEATING DISTRIBUTION SYSTEM TO HOT WATER

Whether or not the district moves ahead with a biomass project, it should consider converting the existing steam heating distribution system at the middle/high school to hot water. Best practice for most schools now is hot water heating distribution. The building is over 50 years old and the existing heating distribution system is reaching the end of its useful life. Richmond Energy recommends investigating the costs and the potential energy savings that might be gained from upgrading this basic infrastructure system before investing in a biomass energy system.

MASTER PLANNING AND A SCHOOL ENERGY INITIATIVE

It is Richmond Energy's understanding that the Onteora Central School District is engaged in master planning process that is evaluating the infrastructure needs for the entire district. 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.

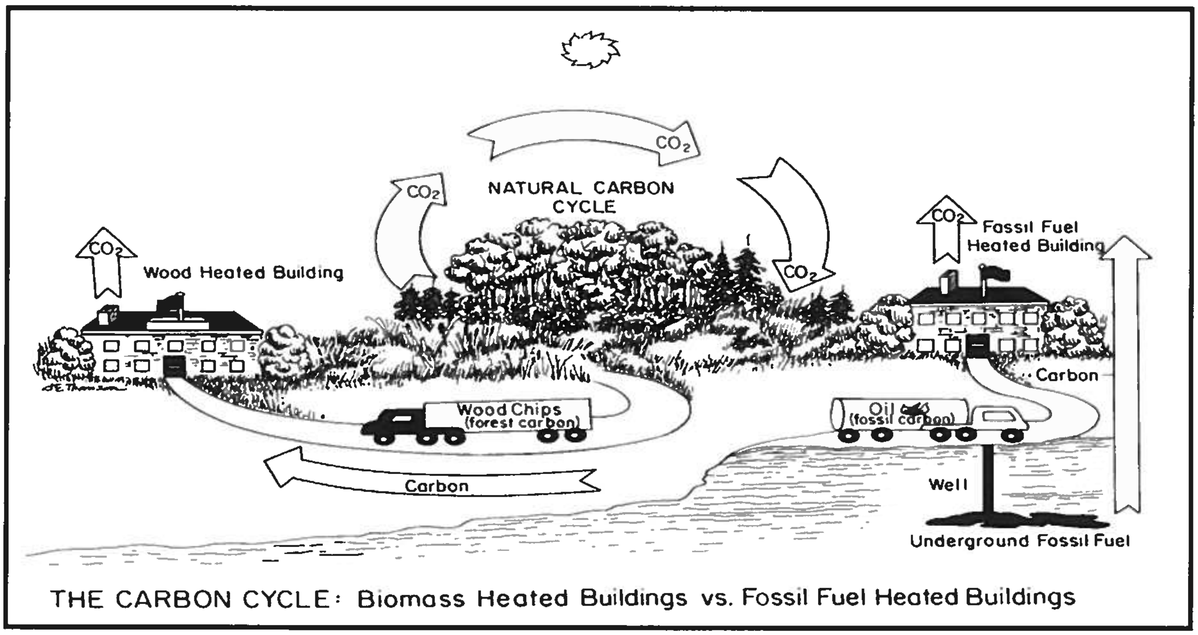
If NYSERDA identifies energy efficiency improvements that require significant capital investments, the district may want to consider incorporating a biomass project into a larger energy initiative to put before voters. Such an "Energy Bond" could combine multiple projects that improve the energy efficiency of many of the district's buildings. The savings from a biomass energy project will more than offset its costs and it could help to leverage other energy improvement projects.

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 from sawmill production. The carbon from this waste would soon wind up in the atmosphere whether it was left to decompose or if it were burned as slash. There are few measures Onteora Central School District could undertake that would have a greater impact on reducing its carbon footprint than to switch from #2 heating fuel to a biomass fuel.

Figure 6 Carbon Cycle Illustration[5]



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 CO_2 pollution they create.

[5] Illustration taken from a handout produced by the Biomass Energy Resource Center

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 assumed operating life. CO_2 avoidance is based on the emissions profile (Lbs. CO_2 /BTU of the displaced fuel. The US EPA calculates that 22.2 lbs. of CO_2 is produced from each gallon of fuel oil consumed. It is projected that the Onteora Central School District 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 CO_2. The market value of this type of offset is 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 mean annual payments of $3,000 - $6,000 or a lump sum up front payment of as much as $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 Native*Energy*, a nationally recognized company that buys and sells carbon offsets, is included in the *Biomass and Green Building Resources* Binder accompanying this report.

ENERGY SERVICE COMPANIES AND PERFORMANCE CONTRACTING

A performance contract is an agreement between a building owner and an energy service company (ESCO). The ESCO identifies, designs and installs energy conservation measures and guarantees their performance. Under performance contracting, project financing is often arranged by the ESCO and the payments are recovered from the energy cost savings those measures create. A performance contract may be appropriate for projects that capture reliable, significant and long-term energy related cost savings.

Since finance costs through a performance contract may be higher than traditional interest rates available to school districts, the district should evaluate carefully whether this type of financing is worthwhile. The district should also carefully review the terms and conditions of a proposed performance contract to make sure they understand which entity is responsible for what costs. However, if the district is reluctant or unable to go to voters for a significant capital expense, then a performance contract through a reputable energy service company may be an attractive option. More information about energy service companies, performance contracting and alternative financing is included in the *Biomass and Green Building Resources* binder accompanying this report.

MUNICIPAL LEASE / PURCHASE

As a municipal entity, Onteora Central School District 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 municipal lease offers the lessee a significant cost savings when compared to conventional leasing.

It may be possible to negotiate a more favorable payment schedule with a tax-exempt lease than with a conventional general obligation bond and tax-exempt leases tend to have lower transaction costs.

There are a number of companies that provide municipal leases. Information from one such company, Municipal Leasing Consultants, is included in the *Biomass and Green Building Resources* binder.

USDA FUNDING OPPORTUNITIES

2008 Farm Bill

The 2008 Farm Bill has a number of provisions that may help rural communities consider and implement renewable energy and energy efficiency projects.

- **Section 9009** provides grants for the purpose of enabling rural communities to increase their energy self-sufficiency.
- **Section 9013** provides grants to state and local governments to acquire wood energy systems.

These grants and loan guarantee programs are competitive. The rules governing the program and the application dates have not yet been released. The state should check with their local USDA office to express interest and to get program roll-out updates.

Rural Community Facilities Grant and Loan Program

The USDA provides grants and loans to assist the development of essential community facilities. Grants can be used to construct, enlarge or improve community facilities for health care, public safety and other community and public services. The amount of grant assistance depends on the medium household income and the population of the community where the project is located.

These grants and loans are also competitive. Highest priority projects are those that serve small communities, those that serve low-income communities and those that are highly leveraged with other loan and grant awards.

For more information about USDA programs and services, contact your local USDA office. Information on programs and contact information is provided in the *Biomass and Green Building Resources* binder.

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 woodchip boilers routinely operate at steady state efficiencies of 70% – 75% efficiencies. Operating temperatures in commercial scale biomass boilers can reach up to 2,000 degrees 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.

Table 3 Comparison of Boiler Emissions Fired by Woodchips and Distillate Oil[6]

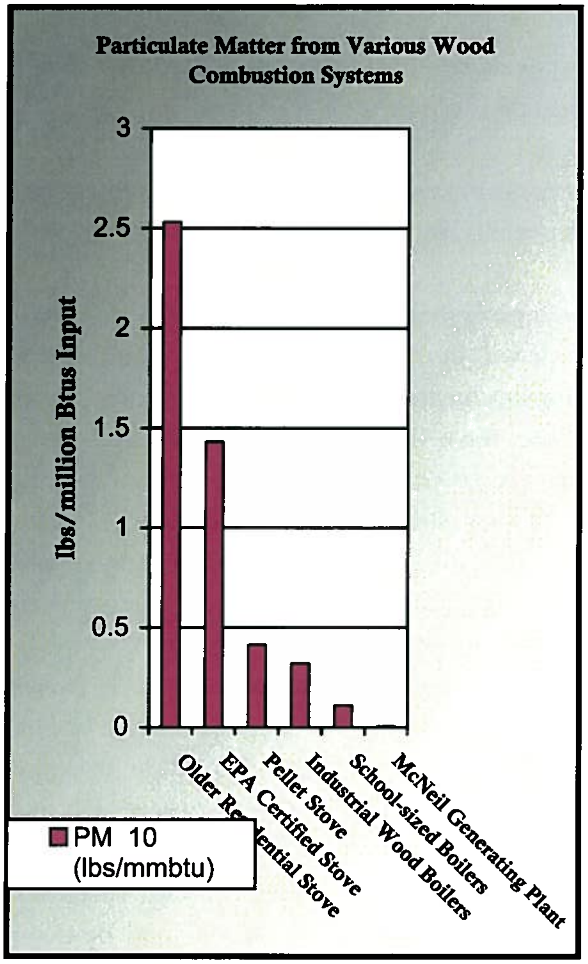
	Wood	Distillate Oil
	(Pounds per million BTu output)	
PM_{10}	0.1	0.014
NO_X	0.165	0.143
CO	0.73	0.035
SO_2	0.0082	0.5
TOC	0.0242	0.0039
CO_2	gross 220 (net 0)	159

As with any combustion process, there are emissions from biomass boilers. The pollutant of greatest concern with biomass is particulates (PM_{10}). While biomass compares reasonably well with fuel oil, biomass boilers clearly generate more particulates. That is why it is important to install appropriate pollution control equipment. But the emissions from a modern woodchip 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 boilers. In general, an institutional-scale wood energy system emits only one fifteenth (seven percent) the PM_{10} of the average wood stove on a BTU basis. Over the course of a year, a large, woodchip heated school in a northern climate like New York may have the same particulate emissions as four or five houses heated with wood stoves.

[6] 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 New York Department of Public Service and others, Revised September 2001.

Table 4 Particulate Emissions[7]



However, in order to install a new woodchip boiler, Onteora Central School District may still need an air quality permit or an amendment to their existing permit if they have one. For a woodchip boiler, the permit will likely include requirements for pollution control equipment, such as a bag house along with a requirement for a tall stack to help with dispersion. Costs for a bag house and a 70 foot tall stack are included in the cost estimates for the woodchip scenario 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.

If the district needs to obtain an air quality permit, it is advisable to retain a professional consulting firm that has experience with permitting institutional scale biomass boilers. Resource Systems Group (RSG) in White River, Vermont is one such consulting firm. As part of this project RSG prepared a report summarizing existing air quality permitting regulations for institutional scale woodchip boilers in New York. Their report and additional information on air quality permitting and pollution control devices is included in the *Biomass and Green Building Resources* Binder accompanying this report.

[7] Excerpted from a handout produced by the Biomass Energy Resource Center

CONCLUSIONS AND RECOMMENDATIONS

The woodchip biomass scenario evaluated for this report appears very cost effective. Richmond Energy recommends the district take the following steps to investigate this opportunity further:

1. Hire an engineering firm to help refine the project concept and to obtain firm local estimates on project costs. Lists of A&E firms with biomass experience and biomass vendors are included in the appendices to this report.
2. The district should identify any heating system improvements it planned to undertake and include 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. Specifically, the district should seriously consider converting the existing steam heating distribution system at the middle/high school to hot water whether it wants to consider biomass or not. If the district decides to move forward with a biomass option, the design team should evaluate how to configure a district heating system for the entire campus and may want to consider eliminating the boiler equipment in the middle/high school all together.
3. The school 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. It is apparent from this study that the middle/high school is consuming a good deal more heating fuel than average for a school in this climate. The New York State Energy and Research Authority (NYSERDA) and/or the New York Power Authority (NYPA) should be engaged to develop comprehensive energy efficiency recommendations and proposals for incentives for efficiency upgrades. This should be done regardless of whether or not the district moves ahead with a biomass project at this time. Information on energy efficiency programs and incentives are included in the ***Biomass and Green Building Resources*** Binder accompanying this report.
4. In order to effectively measure progress toward energy efficiency goals historical energy consumption data should be collected and updated frequently. There are many tools to help the district accomplish this. One such tool is the EPA Energy Star *Portfolio Manager* software. It is free public domain software that helps facility managers track energy and water use. This software can be downloaded at:
   http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager
5. It is Richmond Energy's understanding that the district is engaged in a master planning process. The biomass scenario included in this report would fit well within that process. The district may want to consider combining a biomass project with an extensive energy efficiency upgrade and present it to voters as a comprehensive energy initiative.
6. Concurrent with the design of a biomass project, the district should cultivate potential biomass fuel suppliers. District staff should work with the Watershed Agricultural Council staff to identify potential woodchip fuel suppliers and begin discussing fuel pricing. A list of potential woodchip fuel suppliers is included in the appendices at the end of 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 school 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 school may want to contact Collin Miller with the Watershed Agricultural Council. He can be reached at (607) 865-7790 ext. 112 or collinmiller@nycwatershed.org. A Directory of Wood Products in the Catskills is also included with the *Biomass and Green Building Resources* binder accompanying this report.

The bottom line is that both the school 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 school 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 conveyor. 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/

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

Bast and Rood Architects
P.O. Box 220
Hinesburg, Vermont USA 05461
Bus: (802) 482-5200
Bus Fax: (802) 482-3953
http://www.bastroodarchitects.com/

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

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

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
e-mail: areinc@alltel.net

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

Fink Machine Inc. (KOB)
PO Box 308
124 Old Vernon Road
Enderby, BC V0E 1V0
Canada
Bus: (250) 838-0077
Fax: (250) 838-0068
e-mail: fink@jetstream.net

Messersmith Manufacturing
Gailyn Messersmith
2612 F Road
Bank River, MI 49807
Work: 906-466-9010
Fax: 906-466-2843
e-mail: messersmith@uplogon.com

POTENTIAL BIOMASS FUEL SUPPLIERS

New York Woody Biomass Feedstock Suppliers and Processed Biomass Fuel Manufacturers

Catskill/Hudson Valley Region

Business Name	Address	Town	State	Zip	Contact Name	Telephone
Chip Brokers/Contractors						
Mid Hudson Forest Products, Inc.	301 Route 7	Pine Plains	NY	12567	Brian Arico	(518) 398-0060
B&B Forest Products	251 Route 145	Cairo	NY	12413	Bill Fabian	(518) 622-8019
N.E. Timberland Investments LLC	PO Box 406	Russell	MA	01071	Michael Fahey	(860) 428-2057
J&J Tree Service	1795 Route 212	Saugerties	NY	12477	Jesse Reimer	(845) 679-7034
Leatherstocking Timber Products, Inc.	359 County Highway 11	Oneonta	NY	13820	Matt Kent	(607) 436-9082
John R. Deschaine Logging Inc.	4283 Route 9	Hudson	NY	12534	John Deschaine	(518) 828-9360
Sawmills						
Andrews Forest Products	158 La Barre Street	Hancock	NY	13783	Matt Andrews	(607) 637-2236
Cannonsville Lumber, Inc.	199 Old Route 10	Deposit	NY	13754	Terry Leonard	(607) 467-3380
Cooksburg Lumber Co., Inc.	PO Box 559	Preston Hollow	NY	12469	Andrew Juliano	(518) 239-4324
J&J Log & Lumber	PO Box 1139					
McGraw Lumber Co.	589 Benton Hollow Rd	Woodbourne	NY	12788	Patrick McGraw	(845) 434-3020
Meltz Lumber	483 Route 217	Hudson	NY	12534	Jeff Meltz	(518) 672-7021
Rothe Lumber	1451 Route 212	Saugerties	NY	12477	Mike Rothe	(845) 246-5202
Waruch Lumber, Inc.	125 Upper Cherry Town Rd	Kerhonkson	NY	12446	David Waruch	(845) 626-4049
Wood Pellet & Briquette Manufacturuers						
Enviro Energy, LLC	2265 State Route 7	Unadilla	NY	13849	Bob Miller	(607) 988-9013
Catskill Craftsmen (Hearthside Wood Pellets, Ltd.)	15 West End Ave	Stamford	NY	12167	Ken Smith	(607) 652-7321

Prepared by: Watershed Agricultural Council Forestry Program (607) 865-7790 ext 112

www.nycwatershed.org

Balance of State

Business Name	Address	Town	State	Zip	Contact Name	Telephone
Chipping Contractors						
RWS, Inc.		Queensbury	NY		Peter Ashline	(518) 745-4222
Waters Creek Pulpwood Yard (chip mill pending)		Hampton	NY		David Waters	(518) 222-6009
PA Pellet and Chipping		Ulysses	PA		Luke Watson	(814) 848-9944
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)						
Woodchip Brokers						
Ecostrat		Toronto	Ont., Canada		Maria Naccarato	(416) 968-8884
Green Energy Resources					Joe Murray	(631) 375-7921
Chenango Renewable Energy	158 Growers Lane	Sherburne	NY	13460	Peter Babich	(315) 559-2242
Tree Source Solutions LLC	7107 Snell Road	Lowville	NY	13367	Jack Santamour, CF	(315) 323-4882
Mesa Reduction Engineering & Processing, Inc.	6030 East Lake Road	Auburn	NY	13021	Matt McArdle	(315) 704-0004
Wood to Fuel, LLC		Buffalo	NY		Teresa Reile	(716) 440-8900
Leatherstocking Timber Products, Inc.	359 County Highway 11	Oneonta	NY	13820	Matt Kent	(607) 436-9082
Wood Pellet & Briquette Manufacturers						
New England Wood Pellet,LLC - Schuyler	172 Diamond Drive	Schuyler	NY	13340	Gabe Vincelette	(315) 724-7166
Excelsior Alternative Fuels, Inc. (Briquettes)	19 Prospect Ave	Amenia	NY	12501	Kenneth Lango	(845) 373-4234
Woodstone Pellets	350 Lincoln St., Suite 2260	Hingham	MA	02043	Justin Moran	(781) 741-8090
Dry Creek Pellets		Arcade	NY			(585) 492-2990
InstantHeat Pellets		Addison	NY		Kevin Chilson	(607) 359-2270
Associated Harvest		Lafargeville	NY		Coleen Walldroff	(315) 658-2926
Curran Renewable Energy		Massena	NY		Pat Curran	(315) 769-5970

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