U.S. Department of Agriculture
Northeastern Area
State and Private Forestry

WERC

Wood Education and Resource Center
310 Hardwood Lane
Princeton, WV 24740
304-487-1510
www.na.fs.fed.us/werc

Preliminary Feasibility Report

Biomass Heating Analysis for United Helpers Cedars Complex

Ogdensburg, New York

Prepared by:

YELLOW WOOD associates, inc.
228 North Main Street
St. Albans, VT 05478
Phone: (802)524-6141
www.yellowwood.org

Richmond Energy Associates, LLC
2899 Hinesburg Road
Richmond, VT 05477
Phone: (802) 434-3770

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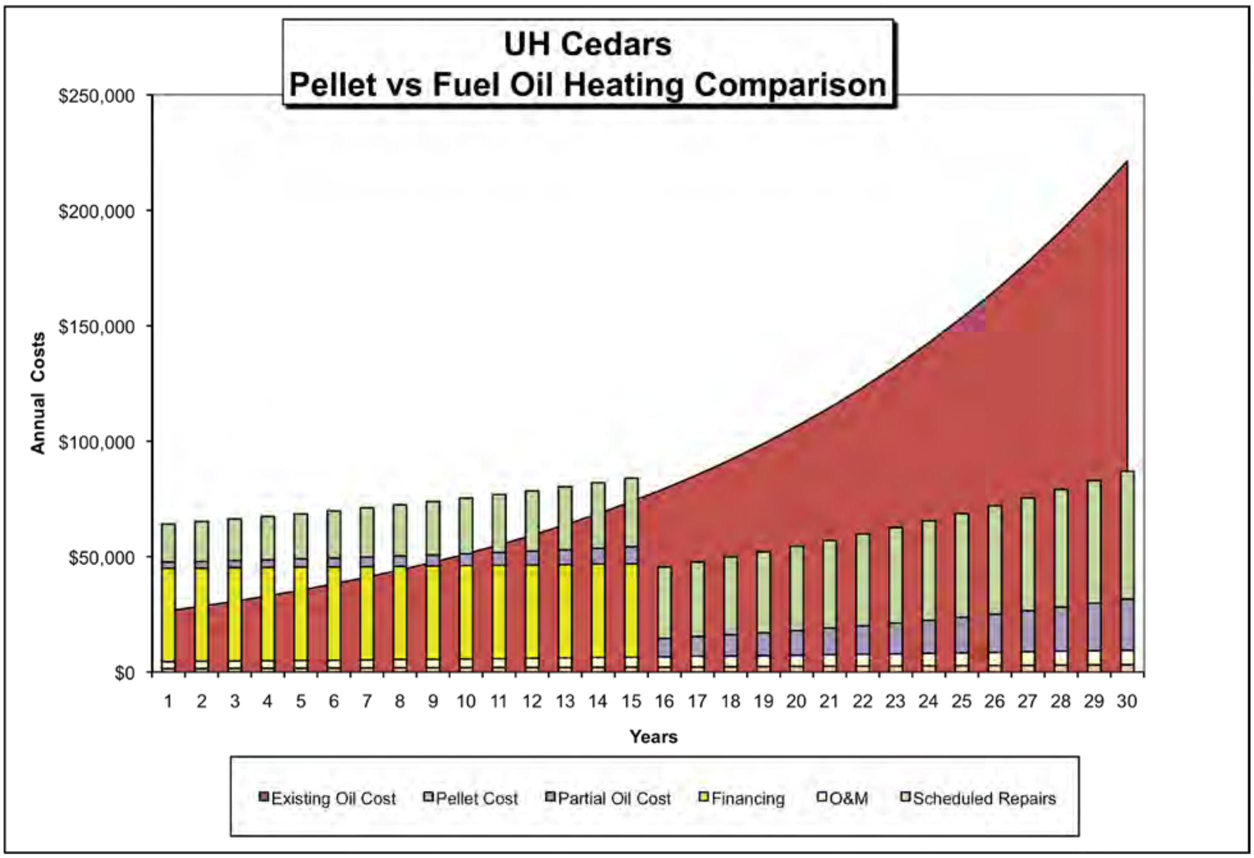
EXECUTIVE SUMMARY

United Helpers Cedars Complex (UH Cedars) is a facility housing administrative offices and day programs for adults, located in Ogdensburg, New York. The building is approximately 30,000 square feet and is heated by two hot water boilers located in a central boiler room.

The facility currently uses over 9,800 gallons of fuel oil on average each year. At the average price of $2.70 per gallon (this is the average price paid by the facility over the past two years) the facility will spend about $26,500 on fuel costs this coming year.

The analysis in this report shows that UH Cedars would actually lose money over the next 30 years by installing a wood pellet heating system. Annual fuel savings are projected to be more than $2,700 per year in the first year and should increase over time as fuel oil prices continue to climb. But debt service on the capital cost would offset those savings by a wide margin.



Several things could change the results of this analysis. If UH Cedars were able to obtain significant grant funding for the project, then obviously the return on investment could improve. Similarly if UH Cedars was able to obtain a lower interest loan, then again the return could be better. Potential tax credits and depreciation benefits were also not included in the analysis but could have a significant impact on the results. UH Cedars might want to check with their tax advisors about whether an investment in a renewable energy project like biomass might have a positive impact on their tax liability. Yellow Wood could run the analysis again if UH Cedars would like to change any of the assumptions used in the analysis.

Unless grant funding or tax incentives can be used to substantially decrease the capital costs of a biomass project, Yellow Wood does not recommend moving forward with a biomass project at this time. On the other hand, there may be energy efficiency opportunities that UH Cedars could investigate that could offer very good rates of return. To investigate these energy efficiency opportunities, Yellow Wood recommends taking the following actions:

1. The New York State Energy Research and Development Authority (NYSERDA) should be engaged to develop comprehensive energy efficiency recommendations and proposals for incentives for efficiency upgrades before undertaking a major building project. This should be done regardless of whether or not the facility moves ahead with a biomass project at this time. Information on energy efficiency programs is included in the *Biomass and Green Building Resources* binder accompanying this report.
2. 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 facility 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.
3. Grants that helped offset project costs, or lower interest loans to finance the project, would obviously improve the economics of the project. There is a section in the report that highlights several potential funding sources. There are also a number of funding resources identified in the *Biomass and Green Building Resources* binder accompanying this report.

This preliminary feasibility study was prepared by Yellow Wood Associates in collaboration with Richmond Energy Associates, LLC for the United Helpers Cedars Complex. Both Yellow Wood and Richmond Energy have extensive community economic development experience and Richmond Energy specializes in biomass energy projects. This study was funded by the Wood Education and Resource Center, Northeastern Area State and Private Forestry, U.S. Department of Agriculture.

INTRODUCTION

There is a significant volume of low-grade biomass in the United States that represents a valuable economic and environmental opportunity if it 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.

This report is a pre-feasibility assessment specifically tailored to the United Helpers Cedars Complex outlining whether or not wood pellet heating makes sense for this facility from a practical perspective. In June 2010, staff from Yellow Wood Associates traveled to Ogdensburg, NY 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.

The study was funded by the U.S. Department of Agriculture Wood Education and Resource Center.

This preliminary feasibility study was prepared by Yellow Wood Associates and Richmond Energy Associates, LLC.

ANALYSIS ASSUMPTIONS

DESCRIPTION OF THE EXISTING HEATING SYSTEM

United Helpers Cedars Complex is a nursing facility that currently houses administrative offices and adult day programs in Ogdensburg, New York. The 30,000 square foot facility is heated by a central boiler room that includes two hot water boilers that use #2 fuel oil. The facility uses an average of 9,800 gallons of fuel oil to heat the building annually.

DESCRIPTION OF THE PROPOSED BIOMASS SYSTEM

The pellet scenario that was analyzed for this facility envisions adding a containerized 500,000 Btu wood pellet boiler to the facility's existing heating system and interconnecting with the existing heating system in the facility via underground insulated piping. It was assumed that the pellet boiler would provide 90% of the annual heating needs for the facility. Included in the proposed capital costs are costs for a separate stack for the pellet boiler, costs for a thirty-ton silo to store wood pellet fuel, an electrostatic precipitator pollution control device and an allowance for interconnecting with the existing heating distribution system. It was assumed that the existing boilers would be used for back-up and supplemental heat during the coldest months and that they would cover 10% of the annual heating load.

Figure 1: ACTbioenergy Containerized Pellet Boiler System

A thermal hot water storage tank was included in the capital cost estimate for this study. Thermal storage can increase the efficiency and overall ease of operation of biomass hot water heating systems. At times of low heat demand by the building, heat is diverted to a heat storage tank that is full of water. This allows the boiler to operate in a high fire state at peak efficiency through the entire burn cycle. Heat exchangers in the tank then allow that heat to be distributed throughout the building when there is demand. When the thermal storage tank is subsequently depleted of useable heat, the boiler is re-fired.

Thermal storage allows the boiler to be run hot for longer periods of time. Biomass boilers burn most efficiently and cleanly when they are burned hot. It also allows operators to use the biomass boiler more effectively during the warmer spring and fall months. In some cases a biomass boiler with thermal storage might even be used during the summer if there is substantial hot water demand.

Figure 2: Proposed Biomass Boiler Location

A woodchip heating system scenario was not analyzed for this report. While woodchip fuel is roughly half the cost of pellet fuel on a cost/Btu basis, the infrastructure is considerably more costly. It was felt that the current fuel use at the facility and the price they pay for fuel oil was too low to make a woodchip system economic and therefore a woodchip scenario was not worth analyzing for this report.

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.

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 analysis projects current and future annual fuel oil heating bills and compares that cost against the cost of operating a biomass system. 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. This is a standard method for using the time value of money to compare the cost effectiveness of long-term projects.

It is not the intent of this project, nor was it in the scope of work, to develop detailed cost estimates for a biomass boiler facility. If UH Cedars were to move ahead with a biomass project, it is recommended that they 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 our experience with similar scale projects.

FUEL OIL COST ASSUMPTIONS

Fuel bills provided by United Helpers indicate that the UH Cedars Complex uses an average of 9,800 gallons of fuel oil per year to heat the facility building being considered in this analysis. This is the assumed annual fuel consumption used for the base case in the analysis. Over the past two years, UH Cedars paid an average of $2.70 per gallon for fuel oil. At that price, UH Cedars will spend about $26,500 for fuel oil to heat this building next year.

WOOD PELLET FUEL COST ASSUMPTIONS

Pellet fuel is a manufactured product that competes directly with fossil fuels. Consequently pellet fuel prices track more closely to fossil fuels than other biomass fuel. Pellets prices also fluctuate more dramatically than woodchips and the cost has risen sharply over the past year. However, pellets are still a relatively local product so they won't likely have the same geopolitical pressures as fossil fuels. After consulting with the NY Department of Environmental Conservation Forests and Lands staff, we are projecting a first year cost of $225 per ton for pellets which is equivalent to about $1.88 per gallon for fuel oil. This price is then inflated at 4.25% per year, higher than general inflation, but less than fossil fuel inflation.

The pellet scenario assumes the facility will meet 90% of its winter heating needs with pellets and therefore consume 74 tons of pellets per year at $225 per ton in the first year. The costs for supplemental fuel oil and pellets are then adjusted for inflation each year over the thirty 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.

We looked retrospectively over the last 20 years (1990 – 2009) using US Energy Information Agency data and found that the average annual increase for fuel oil in New York was 7.6 % per year. The analysis projects this average inflation rate for fuel oil forward over the thirty-year analysis period. UH Cedar's fuel rate of $2.70/gallon was used for the first year of the analysis and then inflated each year at 7.6%.

Pellet fuel pricing tends to track that of fossil fuels fairly closely for two reasons. First it takes a considerable amount of energy to produce pellets. Woodchip and sawdust feedstock need to be dried, which requires energy, and then it also takes considerable energy to compress the feedstock into pellets. Second, wood pellet fuel is used almost exclusively as a heating fuel. It competes directly with fossil fuels used for heat. While it is true that wood pellet fuel tends to be produced relatively locally and therefore has less geopolitical volatility than fossil fuels, there does appear to be a link between pellet fuel prices and fuel oil prices. The Biomass Energy Resource Center uses 4.25% as an inflation factor for pellet fuel. This is somewhat more than the average rate of inflation for woodchip fuel over the past twenty years but less than fuel oil. For this analysis it was assumed that wood pellet fuel would inflate at 4.25% per year.

The overall Consumer Price Index for the period between 1990 and 2009, the last year for which full data is available, increased an average of 2.6% 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

Pellet boilers require very little maintenance in comparison to woodchip boilers. For this biomass scenario it was assumed that existing on-site staff would spend on average approximately one hour per week in addition to their current boiler maintenance for 26 weeks per year and 20 hours during the summer months for routine maintenance. At a loaded labor rate of $25/hr, this equals $1,150 annually. An additional $1,850 in annual operational costs is assumed for electricity for the electrostatic precipitator and 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 pellet boiler such as the furnace refractory. It is reasonable to anticipate these types of costs on a 10-15 year cycle. For this analysis, $15,000 of scheduled maintenance was anticipated in years 10, 20 and 30 and then annualized at $1,500 per year to simulate a sink.

Under any biomass scenario, a case could be made that the existing heating units will require less maintenance and may last longer since they will only be used for a small portion of the heating season. However, all heating equipment should be serviced at least annually no matter how much it is used. Additionally it is very difficult to estimate how long the replacement of the existing units 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 United Helpers 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 facility decision makers a sense of how this project may impact their annual budget. It was assumed that UH Cedars would be able to obtain a 15 year loan for the capital costs for the biomass project at an interest rate of 7%. The loan payment schedule that was used has fixed principal and interest payments. Other financing schedules could create more favorable cash flows depending on how much of the project costs are financed and how the remaining financing is structured.

BIOMASS SCENARIO ANALYSIS

The analysis shows that UH Cedars would actually lose money over the next 30 years by installing a wood pellet heating system. Annual fuel savings are projected to be more than $2,700 per year in the first year and should increase over time as fuel oil prices continue to climb. But debt service on the capital cost would offset those savings by a wide margin.

Several things could change the results of this analysis. If UH Cedars were able to obtain significant grant funding for the project, then obviously the return on investment could improve dramatically. Similarly if UH Cedars was able to obtain a lower interest loan, then again the return could be better.

Potential tax credits and depreciation benefits were also not included in the analysis but could have a significant impact on the results. UH Cedars might want to check with their tax advisors about whether an investment in a renewable energy project like biomass might have a positive impact on their tax liability.

Table 1 shows the assumptions used in this analysis, Figure 3 graphs annual costs under the current fuel oil heating scenario and the wood pellet scenario, and Table 2 presents the actual spreadsheet analysis tool. Yellow Wood could run the analysis again if UH Cedars would like to change any of these assumptions.

Table 1: Wood Pellet Scenario Analysis Assumptions

UH Cedars			
Capital Cost Assumptions			
500,000 Btu/hr containerized pellet hot water boiler system including installation			$150,000
30 ton pellet storage silo			$15,000
Thermal Storage 500 gallon			$5,000
Pex piping to boiler room	50 LF	$100 /LF	$5,000
Interconnect to existing boiler system			$10,000
Pollution control equipment			$100,000
GC markup at 10%			$28,500
Construction contingency at 15%			$47,025
Design at 12%			$43,263
Total estimated project costs			**$403,788**
Financing Costs			
Financing, annual interest rate			7.00%
Finance term (years)			15
1st full year debt service			$44,334
Fuel Cost Assumptions			
Current annual fuel oil consumption in gallons			9,800
Assumed fuel oil price per gallon			$2.70
Projected annual fuel oil bill			$26,460
Assumed pellet price in 1st year (per ton)			$225
Projected 1st year pellet fuel bill			$16,553
Projected 1st year supplemental fuel oil bill			$2,646
Inflation Assumptions			
General inflation rate (twenty year average CPI)			2.6%
Fuel oil inflation rate (Average increase for New York Residential Fuel Oil from 1991 - 2009 - US EIA)			7.6%
Pellet inflation rate (Estimate from Biomass Energy Resource Center)			4.25%
O&M Assumptions			
Annual pellet O&M cost, including electricity for additional pumps and motors and staff time for daily and yearly maintenance			$3,000
Major repairs (annualized)			$1,500
Savings			
Net 1st year fuel savings			**$2,761**
Total 30 year NPV cumulative savings			**($78,436)**

Figure 3: Annual Cash Flow Graph for Wood Pellet Scenario

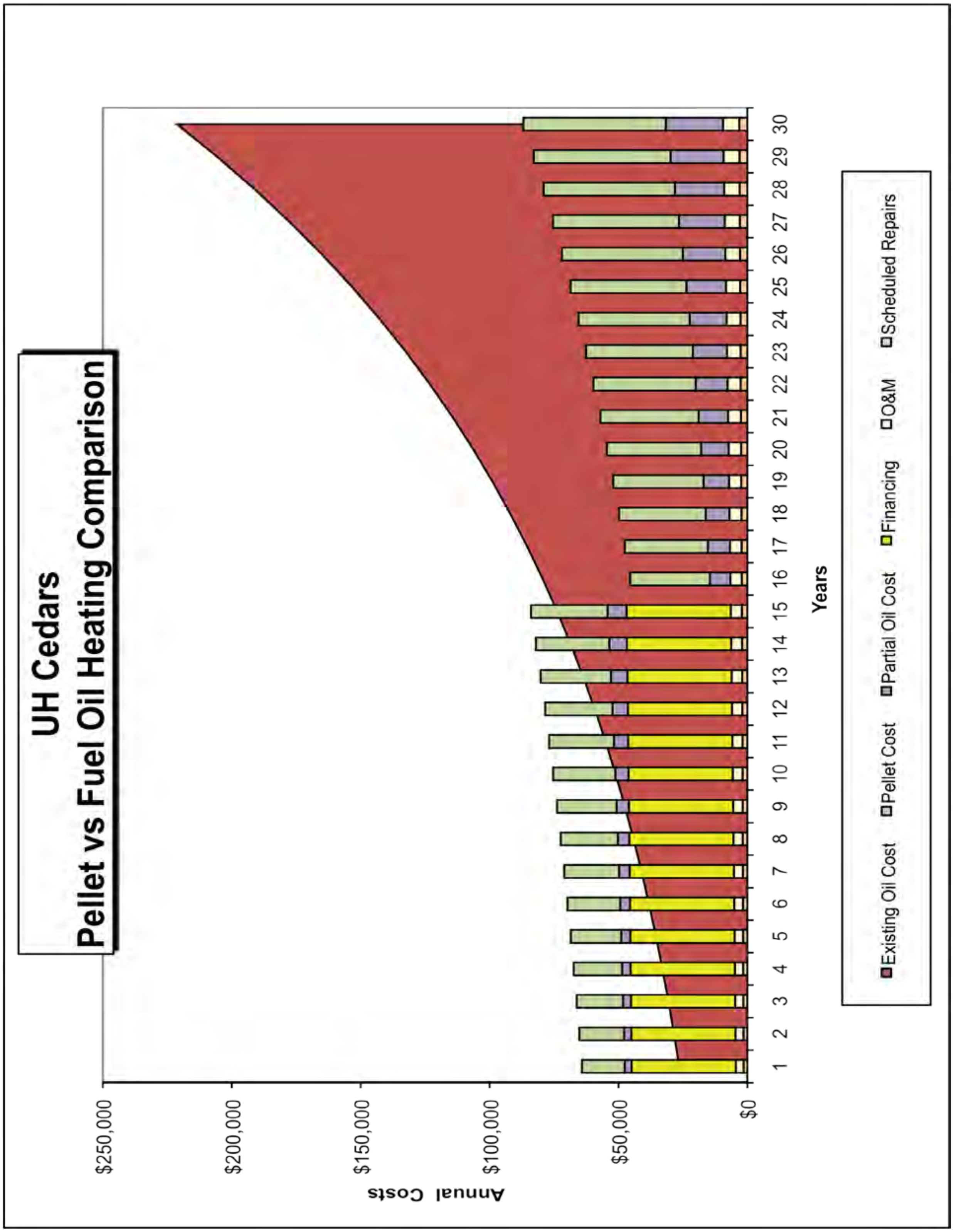


Table 2: 30-Year Life Cycle Analysis Spreadsheet for Wood Pellet Scenario

UH Cedars — **Preliminary Life Cycle Cost Estimate** — ***Pellets - Heat Only***

Total estimated construction costs	*$403,788*				
Financing:	7.0%	*Assumed interest rate each year, 15 years*			
Oil heat consumption	9,800	10% oil =	980 gallons	82 tons if 100% pellets for oil	120 gal. / ton of pellets
Oil heat price	$2.70				
Oil heat cost	$26,460				
Estimated pellet utilization	90%		*Percentage of total annual heating needs met using biomass*		
Projected pellet consumption	74	tons			
Estimated 1st year pellet price	$225	/ ton Year 1			
Projected 1st year pellet cost	$16,553				
Projected 1st year partial fuel oil cost	$2,646				
General Inflation:	2.6%	annually	*Twenty year average annual US Labor Dept. Consumer Price Index increases*		
Oil Inflation	7.6%		*Average increase for New York Residential Fuel Oil from 1991 - 2009 (US EIA)*		
Pellet Inflation:	4.25%	annually	*Estimate from Biomass Energy Resource Center*		
O & M.:	$3,000	in Year 1 $	*Estimate of additional electricity for feed system motors and additional maintenance staff time*		
Major Repairs:	$1,500		*Contingency for major repair (e.g. refractory replacement) at Years 10, 20 and 30 annualized*		

Yr.	Oil Cost	Total	Financing	Pellet Cost	Partial Oil Cost	O&M	Scheduled Repairs	Total	Annual Cashflow	Cumulative Cashflow
1	$26,460	$26,460	$44,334	$16,553	$2,646	$3,000	$1,500	$68,033	-$41,573	-$41,573
2	$28,471	$28,471	$44,334	$17,257	$2,847	$3,078	$1,539	$69,055	-$40,584	-$82,157
3	$30,635	$30,635	$44,334	$17,990	$3,063	$3,158	$1,579	$70,125	-$39,490	-$121,647
4	$32,963	$32,963	$44,334	$18,755	$3,296	$3,240	$1,620	$71,245	-$38,282	-$159,929
5	$35,468	$35,468	$44,334	$19,552	$3,547	$3,324	$1,662	$72,419	-$36,951	-$196,880
6	$38,164	$38,164	$44,334	$20,383	$3,816	$3,411	$1,705	$73,649	-$35,486	-$232,366
7	$41,064	$41,064	$44,334	$21,249	$4,106	$3,499	$1,750	$74,939	-$33,875	-$266,241
8	$44,185	$44,185	$44,334	$22,152	$4,419	$3,590	$1,795	$76,290	-$32,105	-$298,346
9	$47,543	$47,543	$44,334	$23,094	$4,754	$3,684	$1,842	$77,708	-$30,165	-$328,511
10	$51,156	$51,156	$44,334	$24,075	$5,116	$3,780	$1,890	$79,194	-$28,038	-$356,549
11	$55,044	$55,044	$44,334	$25,099	$5,504	$3,878	$1,939	$80,754	-$25,709	-$382,258
12	$59,228	$59,228	$44,334	$26,165	$5,923	$3,979	$1,989	$82,390	-$23,162	-$405,420
13	$63,729	$63,729	$44,334	$27,277	$6,373	$4,082	$2,041	$84,107	-$20,378	-$425,798
14	$68,572	$68,572	$44,334	$28,437	$6,857	$4,188	$2,094	$85,910	-$17,338	-$443,136
15	$73,784	$73,784	$44,334	$29,645	$7,378	$4,297	$2,149	$87,803	-$14,019	-$457,155
16	$79,391	$79,391		$30,905	$7,939	$4,409	$2,204	$45,458	$33,934	-$423,221
17	$85,425	$85,425		$32,219	$8,543	$4,524	$2,262	$47,546	$37,879	-$385,343
18	$91,918	$91,918		$33,588	$9,192	$4,641	$2,321	$49,741	$42,176	-$343,167
19	$98,903	$98,903		$35,015	$9,890	$4,762	$2,381	$52,048	$46,855	-$296,312
20	$106,420	$106,420		$36,504	$10,642	$4,886	$2,443	$54,474	$51,946	-$244,366
21	$114,508	$114,508		$38,055	$11,451	$5,013	$2,506	$57,025	$57,483	-$186,883
22	$123,210	$123,210		$39,672	$12,321	$5,143	$2,571	$59,708	$63,503	-$123,380
23	$132,574	$132,574		$41,358	$13,257	$5,277	$2,638	$62,531	$70,044	-$53,336
24	$142,650	$142,650		$43,116	$14,265	$5,414	$2,707	$65,502	$77,148	$23,812
25	$153,492	$153,492		$44,948	$15,349	$5,555	$2,777	$68,630	$84,862	$108,674
26	$165,157	$165,157		$46,859	$16,516	$5,699	$2,850	$71,923	$93,234	$201,907
27	$177,709	$177,709		$48,850	$17,771	$5,847	$2,924	$75,392	$102,317	$304,224
28	$191,215	$191,215		$50,926	$19,121	$5,999	$3,000	$79,047	$112,168	$416,392
29	$205,747	$205,747		$53,091	$20,575	$6,155	$3,078	$82,898	$122,849	$539,240
30	$221,384	$221,384		$55,347	$22,138	$6,315	$3,158	$86,959	$134,425	$673,666
Totals	$2,786,170	$2,786,170	$665,006	$968,140	$278,617	$133,827	$66,914	$865,747	$673,666	
30 Yr. NPV at 7% Discount Rate	$805,469	$805,469	$403,788	$326,316	$80,547	$48,836	$24,418	$883,905	-$78,436	

Total Annual Heating Costs	Pellet Fuel /Year	Partial Fuel Oil First Year	Pellet System O&M /yr	Contingency Allowance / Year	Pellet + Fuel + O&M + Contingency	Annual Fuel Cost Savings	30 Yr. NPV Savings
$26,460	$16,553	$2,646	$3,000	$1,500	$23,699	$2,761	($78,436)

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 Environmental Protection Agency 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 set efficiency priorities, identify under-performing buildings, verify efficiency improvements, and receive EPA recognition for superior energy performance. It is recommended that the facility input several years' worth of energy and water use data 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

Whether UH Cedars converts to biomass or stays with fuel oil, the facility should use its heating fuel efficiently. The New York State Energy Research and Development Authority (NYSERDA) and/or the New York Power Authority (NYPA) can help identify and prioritize appropriate energy efficiency projects that will improve the facility's infrastructure and save money. Both of these agencies can help with the evaluation of energy efficiency opportunities and provide financial incentives to upgrade and improve equipment efficiencies. If the facility decides to move forward with a biomass energy project, it should work with one of these agencies to identify other efficiency projects that could be completed at the same time.

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

COMMISSIONING

Commissioning of a new system provides quality assurance, identifies potential equipment problems early on and provides financial savings on utility and maintenance costs during system operations. A recent study of 224 buildings found that the energy savings from commissioning new buildings had a payback period of less than five years. Additional benefits of commissioning include: improved indoor air quality, fewer deficiencies and increased system reliability. If UH Cedars moves forward with a biomass project, it is recommended that they work with an independent, third-party, commissioning agent during the design and construction of a biomass heating system. See the *Biomass and Green Building Resources* binder for more information on commissioning.

PROJECT FUNDING POSSIBILITIES

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.

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 median household income and the population of the community where the project is located.

These grants and loans are 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.

FEDERAL TAX INCENTIVES

MACRS Accelerated Deprecation

Under the federal Modified Accelerated Cost-Recovery System (MACRS), businesses may recover investments in certain property through depreciation deductions. The MACRS establishes a set of class lives for various types of property, ranging from three to 50 years, over which the property may be depreciated. For certain biomass property, the MACRS property class life is seven years. Eligible biomass property generally includes assets used in the conversion of biomass to heat or to a solid, liquid or gaseous fuel, and to equipment and structures used to receive, handle, collect and process biomass in a waterwall, combustion system, or refuse-derived fuel system to create hot water, gas, steam and electricity.

For more information on Federal tax incentives, see the Database of State Incentives for Renewable Energy Website at:
http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US06F&re=1&ee=1.

THERMAL

At the time this report was written, there were no tax credits available for commercial installation of thermal biomass heating systems. However there is legislation pending in Congress that could change this situation. The Biomass Thermal Energy Council (BTEC) does a good job of keeping up-to-date on all biomass-related legislation, including tax credits. You can visit their website for the most up-to-date information: http://www.biomassthermal.org/legislative/. The following bills are pending:

S. 3188 – American Renewable Biomass Heating Act of 2010

This bill would establish a corporate tax credit equal to 30% of the installed cost of biomass heating systems for commercial or industrial applications, with no maximum credit. To qualify for the credit, boilers and furnaces would be required to operate at greater than 75% efficiency and provide thermal energy for space heating, air conditioning, domestic hot water, or industrial process heat.

S. 1094 – REAP Act

This bill would amend the Renewable Energy Alternative Production (REAP) Act to include a credit for the production of non-electric renewable energy, including thermal energy.

PERMITTING

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. Many modern types of emission control equipment, capable of reducing particulate matter emissions from 50-99 percent, are commercially available in the US. The most common emission control equipment technologies are baghouses, cyclones, multi-cyclones, electrostatic precipitators, and wet scrubbers. Appropriate emission control equipment technologies should be identified in consultation with local air quality regulators.

Pellet boilers have not had as much emissions testing as woodchip boilers in the United States so there is less concrete data about performance and emissions. However, pellet fuel boilers are much more common in Europe and testing there indicates that pellet boilers have fewer lbs/mBtu of particulate emissions than woodchip boilers.

Costs for an electrostatic precipitator (ESP) pollution control device were included in the analysis for this report. If the facility moves forward with this project, the engineering design team should determine exactly what pollution control device would be required for the particular boiler equipment selected.

New EPA Regulations

On April 29, 2010, the Environmental Protection Agency (EPA) issued a proposed rule that would reduce emissions of toxic air pollutants from existing and new industrial, commercial and institutional boilers located at area source or major source facilities. An area source facility emits or has the potential to emit less than 10 tons per year (tpy) of any single air toxic or less than 25 tpy of any combination of air toxics. The major source facility emits or has the potential to emit 10 or more tpy of any single air toxic or 25 tpy or more of any combination of air toxics.

The proposal would set different requirements for large and small boilers at the area source facilities. Large boilers have a heat input capacity equal to or greater than 10 mmBtu/hr and small boilers have a heat input capacity less than 10 mmBtu/hr. The biomass fired new boilers would need to meet limits for PM and CO. For a major source facility, EPA has identified 11 different subcategories of boilers and process heaters based on the design of the various types of units. The proposed rule would include specific requirements for each subcategory. Under the proposed EPA new Area Source Rule, a Bag House/ESP would be required.

EPA continues to review comments on the proposal. Details and updates will be posted at www.epa.gov/airquality/combustion/.

CONCLUSIONS AND RECOMMENDATIONS

Unless grant funding or tax incentives can be used to substantially decrease the capital costs of a biomass project, Yellow Wood does not recommend moving forward with a biomass project at this time. On the other hand, there may be energy efficiency opportunities that UH Cedars could investigate that could offer very good rates of return. To investigate these energy efficiency opportunities, Yellow Wood recommends taking the following actions:

1. The New York State Energy Research and Development Authority (NYSERDA) should be engaged to develop comprehensive energy efficiency recommendations and proposals for incentives for efficiency upgrades before undertaking a major building project. This should be done regardless of whether or not the facility moves ahead with a biomass project at this time. Information on energy efficiency programs is included in the *Biomass and Green Building Resources* binder accompanying this report.
2. 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 facility 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.
3. Grants that helped offset project costs, or lower interest loans to finance the project, would obviously improve the economics of the project. There is a section in the report that highlights several potential funding sources. There are also a number of funding resources identified in the *Biomass and Green Building Resources* binder accompanying this report.

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, LLC

Richmond Energy Associates, LLC 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.

APPENDICES

WOOD PELLET FUEL

Wood pellets are made from wood waste materials that are compressed into pellets under heat and pressure. Natural plant lignin holds the pellets together without glues or additives. Wood pellets are of uniform size, shape and composition making them easy to store and to burn.

Much of the pellet fuel market is geared toward supplying 40 pound bags for residential scale pellet stoves and boilers. Commercial scale systems typically have bulk storage of pellet fuel that can then be fed into the boiler automatically. Therefore pellet fuel suppliers for a commercial scale system need to have the ability to deliver in self-unloading trucks. Commercial scale pellet consumers should identify several pellet fuel manufacturers within a 200 mile radius that have the capability to deliver pellet fuel in bulk.

Figure 4: Typical Bulk Pellet Fuel Storage and Delivery[1]

It is best to secure a supplier that will guarantee supply for at least a complete heating season. Distance from the manufacturer will affect cost so generally the closer the supplier, the better the delivered price.

[1] Photo taken from *Wood Pellet Heating Guidebook* published by Massachusetts Division of Energy Resources.

BIOMASS FUEL SUPPLIERS

Active providers of pellet fuel change regularly. For the most up-to-date information on potential providers, contact the New York State Forest Utilization Program:

Sloane Crawford
Program Leader
NYS Forest Utilization Program
625 Broadway
Albany, NY 12233-4253
Phone: (518) 402-9415
Fax: (518) 402-9028
sncrawfo@gw.dec.state.ny.us