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Executive Summary

Understanding the fact that no one has a crystal ball on the future of anything, much less future energy costs or availability, the Energy Saving Measures (ESMs) recommended in this report are predicted to result in sound financial investments. Buildings have been inspected and assessed in therms of their historic energy usage, overall performance, and risks associated with long term durability. Occupant comfort, maintenance, operations, and energy related carbon emissions have also been considered, though assigning dollar values to those factors can be an even greater challenge.

It is within that assessment context, and to the best of our ability, we have proposed 'improvement packages' which are designed to: Reduce energy costs and carbon emissions; improve comfort; address immediate term capital needs and concerns about air quality or durability. Buildings function as dynamic systems. This means that changing one thing can impact everything else. Therefore, even though the recommendations appear as individual line items, we encourage you to consider them as packages. In other words, it would be better to implement all improvements for one building, than spending the same amount of money 'cherry picking' from each list of all buildings.

Recommendations are offered in the following areas:

1. Upgrades to building envelopes. The 'envelope' of a building is the barrier between inside conditioned space and outside weather and climate. It consists of materials and assemblies designed to manage air, moisture, and heat transfer. In Brattleboro's cold and moist climate, the more effective the envelope, the less energy is needed for space heating. The amount of heating energy a building needs is also referred to as the 'demand' or 'heating load'. Reducing a building's demand or load therefore reduces the amount of energy needed to be supplied. Components of the envelope which are at the end of their service life – such as a roof membrane or windows – represents an opportunity to address a capital need as part of a thoughtful energy analysis, thereby optimizing investment dollars over the long term.

2. Mechanical equipment and controls. This is often considered the 'supply side'. The better the controls, the more efficient the equipment and distribution, the more efficiently energy sources will be used to meet the demand – also resulting in lower energy costs. Equipment which will need to be replaced in the near future represents an opportunity to satisfy a capital need as part of a thoughtful energy analysis – thereby optimizing investment dollars over the long term.

3. Converting to wood pellet heat. Replacing oil fired boilers with wood pellet boilers as the primary heating source lowers heating costs while also reducing carbon emissions, reliance on foreign or domestic oil and supports local and regional industries. Thanks to funding incentives from the Windham Wood Heat Initiative, installing wood pellet boilers in six of the buildings in this study is predicted to be a fiscally wise investment at this time.

A goal of this assessment process was to be as comprehensive a study as possible, examining all energy related aspects of each building. There are, however, two energy uses which proved impractical to include in our recommendations:

1. Lighting upgrades have been completed relatively recently, so further improvements have not been ex-

plored. That said, LED technologies have advanced so quickly in the last few years that we recommend working with Efficiency Vermont and their lighting incentive program to re-visit all buildings except the parking garage at the Transportation Center.

2. Most of the energy demand at water supply facilities has to do with pumping water. We recommend hiring an electrical engineer – with funding support from Efficiency Vermont – to conduct an energy audit specific to electric motors and pumps in the Water Treatment Plant, Retreat Wells, and all pumping stations. Though waste water facilities were not included in the scope of this Study, consider including those in that audit.

This executive summary includes a compilation of the recommendations summary in each building's report. While this report as a whole is long and perhaps burdensome to read, considerable effort was put into making the report summary's concise. Therefore, they have been collected in the next eight pages in order simply to be able re-print and distribute more easily.

The chart below presents the project costs summary analysis for all buildings in one chart.

To summarize in one sentence: investing 1.43 million dollars in energy saving measures is predicted to save $113,427 a year, yielding a 7.9% return on that investment, with a net present value payback of 11.9 years.

Wood pellet heating conversions are recommended for six buildings. The project costs listed below include the incentives from Windham Wood Heat. A more comprehensive explanation of project costs, including necessary capital expenses is presented on page

The buildings are grouped according to the Town's budgeting process.

Definitions of the column headings are on the next page.

Building	Pellet Heating	Cost	1st Yr Savings	ROI %	SIR	NPV ($)	NPV Payback
Municipal Center	Y	$237,047	$17,788	8.0%	2.5	$360,748	10.7
Brooks Memorial Library	Y	$235,691	$12,962	5.0%	2.5	$341,021	14.9
Gibson-Aiken Community Center	Y	$357,710	$25,844	7.0%	1.9	$286,843	11.9
Nelson Withington Skating Facility	N	$98,575	$7,643	8.0%	2.6	$158,931	12.3
Public Works Garage	Y	$210,121	$12,814	6.0%	2.9	$394,460	13.8
General Fund Total		**$1,139,144**	**$77,051**	**6.8%**	**2.4**	**$1,542,003**	**12.7**
Transportation Center	Y	**$151,322**	**$10,995**	**7.0%**	**2.8**	**$279,575**	**11.7**
Water Treatment Plant	Y	$77,429	$15,178	20.0%	5.1	$315,830	4.7
Retreat Wells	N	$25,761	$4,691	7.0%	3.6	$91,723	12.4
Remote Pump Stations	N	$40,465	$5,512	13.6%	3.8	$159,694	3.9
Public Works Total		**$143,655**	**$25,381**	**17.7%**	**3.9**	**$567,247**	**4.5**
Total All Buildings		**$1,434,121**	**$113,427**	**7.9%**	**2.7**	**$2,388,825**	**11.9**

Costs shown reflect final cost to the Town and include, where indicated, 25% cost sharing from Windham Wood Heat Initiative for conversion to wood pellet heating. Cost are based on estimates from contractors and industry standards and do not reflect project quotes.

ROI Return on investment is the inverse of simple payback based on constant unchanging savings. The result is a conservative estimate as the escalation of fuel costs is not considered.

SIR Savings to investment ratio, is the present value of savings divided by the cost. It is considered the most meaningful criteria for ranking measures and represents the number of times a measure will pay for itself over its life. An SIR of less than one is not cost effective unless externalities are considered.

NPV The savings for a measure over its life after it pays for itself plus interest at the discount rate. A NPV of 1 or above is considered a good investment and a negative NPV a poor investment.

Payback - based on present value including maintenance, a discount factor, and escalation of energy costs, not simple payback.

WWH Funding —Windham Wood Heat Initiative

The chart below presents more information than the audit analysis. The project costs and 1st year savings used in the cost benefit analysis are found in the last two columns below. This summary is included in the Executive Summary with hopes to prevent (not create) more confusion, while presenting total dollars needed for budgeting purposes.

Buildings	Project Costs	Related Capital Expenses	Known Incentives	Budget Cost	Avoided CI	ESM Analysis Cost	1st Year Savings
Municipal Center	$284,499		$47,452	$237,047		$237,047	$17,787
Library	$288,756	$61,703	$23,065	$327,394	$30,000	$235,691	$12,962
Gibson Aiken	$432,710	$75,725	$75,000	$433,435	$15,000	$357,710	$25,844
Skating Rink	$98,575		n/a	$98,575		$98,575	$7,643
DPW	$233,634		$23,513	$210,121		$210,121	$12,814
General Fund Totals	**$1,338,174**	**$137,428**	**$169,030**	**$1,306,572**	**$45,000**	**$1,139,144**	**$77,050**
Transportation Center Totals	**$172,573**	**$0**	**$21,250**	**$151,323**		**$151,323**	**$10,995**
Pleasant Valley	$115,781		$23,352	$92,429	$15,000	$77,429	$23,385
Retreat Wells	$25,761		$0	$25,761		$25,761	$4,691
Pumping Stations	$40,465	included	$0	$40,465		$40,465	$5,516
Water Plants Totals	**$182,007**	**$0**	**$23,352**	**$158,655**	**$15,000**	**$143,655**	**$33,592**
Totals	**$1,692,754**	**$137,428**	**$213,632**	**$1,616,550**	**$60,000**	**$1,434,122**	**$121,637**

Project costs refer to total ESM related expenses, before incentives.

Related Capital Expenses refers to the cost of the roof replacement at Gibson Aiken and the Library. While insulation cannot be added without replacing the roof, it is considered a capital expense which is recommended for building durability, but will not yield energy savings in itself. Another example would be removing the below grade oil tank at the library, however we do not have a cost estimate for this report. Uniquely, the cost to replace the roof at Retreat Wells Pumping Station is included in the ESM cost and benefit analysis.

Incentives column gives a snapshot of known incentives from WWH and EV, valued at $213,632.

The Budgeted Cost column reflects the actual cost to the Town of Brattleboro to complete all measures.

Avoided Capital Investments is used in the ESM analysis, though doesn't actually exist in the budget. It reflects costs that will need to be covered in the near future, but can be avoided due to the scope of the ESM projects. For example, the boilers in the Library and Pleasant Valley Plant will need to be replaced in the short term for safety and functionality. If the ESM avoids the cost of replacement or repair, convention has it included in the cost benefit analysis of the measures.

Summary of Recommendations for Each Building

Municipal Center

The five recommendations listed below include improvements to the thermal envelope, individual room heating controls, eliminating the issue of mold in the basement, and creating a pellet fired district heating plant to serve the Municipal Center and Brook Memorial Library. EMS #5 targets one office suite for replacing its window air conditioners with a ductless mini split air source heat pump.

A strategic window upgrade - involving either comprehensive air sealing or replacement—was considered but only proved cost effective when the building is heated by the existing two oil fired boilers. Converting to lower cost pellets reduces the financial benefit of doing anything to the windows, yet would not negate the values of improved comfort and functionality.

ESM #	Municipal Center	Cost	1st Year Savings	ROI %	SIR	NPV ($)	NPV Payback	Life Years
1	Replace Valves	$15,675	$4,200	26.8%	4.6	$56,326	3.6	15
2	Ceiling Plane	$36,444	$3,727	10.2%	4.0	$109,131	9.0	30
3	Wood Pellet Heating	$142,355	$7,021	4.9%	1.9	$128,962	12.0	20
4	Foundation Wall	$23,763	$1,739	7.3%	1.7	$16,668	15.8	30
5	Air Source Heat Pump	$18,810	$1,100	5.9%	1.3	$4,982	19.2	25
	Total All Measures	**$237,047**	**$17,787**	**8.0%**	**2.5**	**$360,748**	**10.7**	

Brooks Memorial Library

Integrating the findings of the 2007 CNA and the assessment conducted for this Energy Audit, the following is recommended:

Replace the air handler and air conditioning units; modify the multi zone distribution system, outdoor reset and relatively new control system as needed. The new system also includes Demand Control Ventilation which will address air quality concerns, including mold or mildew, while also reducing air exchange when not needed. Convert to a pellet fired boiler, either on site with its own silo, or through underground hot water pipes connected to a new pellet boiler plant in the Municipal Center (recommended). This will also allow for removal of the underground oil storage tank, which CNA recommended be removed or replaced in 2009. The liability risks associated with underground tanks makes removing this tank a high priority and excellent timing for replacing it with benign above ground pellet storage. Costs for tank removal are not included in this report. Replace all single pane glazing on the Main Level. The analysis in this report indicates a relatively short payback for Main Level glazing replacement, though not for the upper two levels as long as the window quilts are drawn closed at night. Adjusting the outdoor reset for hydronic baseboards contributes to savings. The CNA suggested the roof was replaced in 2001 with an expected 20 year service life. While not in immediate need of replacement, proactively replacing it before it starts leaking will also allow for a substantial insulation upgrade and so has been recommended in this report.

ESM #	Brooks Memorial Library	Cost	1st Year Savings	ROI %	SIR	NPV ($)	NPV Payback	Life Years
1	Replace Air Handler	$161,975	$4,228	3.0%	0.7	-$50,124	45.6	30
2	Glass Upgrade	$16,966	$4,077	24.0%	16.6	$264,992	4.1	50
3	Municipal Pellet System	$43,453	$3,591	8.0%	3.5	$106,570	8.2	20
4	Roof Deck Insulation	$13,297	$1,066	8.0%	2.5	$19,583	14.6	50
	Totals All Measures	**$235,691**	**$12,962**	**5.0%**	**2.5**	**$341,021**	**14.9**	

Gibson-Aiken Community Center

Cost effective envelope improvements are limited to general air sealing, improving the ceiling plane insulation and replacing the gym windows. Upgrading roof insulation requires replacing the roof membrane which is a necessary capital expense. Since about half the windows were replaced in the Fall 2015, after the latest heating season, the building was modeled in its prior condition and their installation has been listed below as a "0" ESM and not included in the total costs or benefits of ESM's 1-6.

Three energy saving measures have been recommended for the kitchen: installing a demand control exhaust system, replacing the dish washer, and replacing several of the cooking pots with very efficient pots. This latter measure will mostly reduce propane usage, which the Town does not pay for directly, however it will also help relieve overheating in the basement and therefore cooling costs as well as improve comfort. The cost and resulting savings of a new dishwasher is not included in the energy model or analysis below.

There are two approaches to energy reductions on the supply side: Either install thermostatic vents on the radiators and other control improvements, or convert from oil to primarily burning wood pellets and replace the distribution to forced hot water, (hydronic). The WWH makes this an opportune time to modernize the heating system with far better thermostatic control than can be available from steam.

ESM #	Gibson-Aiken Community Center	Cost	Yearly Savings	ROI %	SIR	NPV ($)	NPV Payback	Life Yrs
0	2015 Window Replacement	$30,492	$1,870	6.1%	1.9	$26,204	14.6	25
1	Weatherstrip Doors	$487	$424	87.2%	4.6	$1,729	1.1	5
2	Kitchen Improvements	$5,768	$2,268	39.3%	8.9	$45,736	2.5	20
3	Improve Controls	$7,336	$4,306	58.7%	6.4	$39,321	1.7	10
4	Roof Insulation	$21,297	$1,883	8.8%	3.3	$49,884	10.4	30
5	Wood Pellet Heating	$286,958	$15,351	5.3%	1.5	$139,756	14.5	20
6	Replace Gym Windows	$35,864	$1,612	4.0%	1.3	$10,417	28.5	40
	Total All Measures	**$357,710**	**$25,844**	**7.0%**	**1.9**	**$286,843**	**11.9**	

Nelson Withington Skating Facility

The Nelson Withington Skating Facility is very efficiently operated. When we reported annual use to various consultants and suppliers most thought we must be talking about monthly use. The low energy use and low cost of LP gas makes large long term investments difficult to justify on strictly energy savings.

In addition to improvements to the envelope and controls described below and in the report, we also recommend some system upgrades for ice rink operations, including ice production and cleaning. We reviewed estimates from IB Storey's study of three years ago and obtained estimates from Cimco for similar renovations. Major investments of $600,000 to $1,200,000 for conversions to ammonia or CO_2 refrigerant are not currently cost effective based on energy savings. The projected savings for these measures will be further reduced if our recommendations are implemented as the total annual energy cost will be down to $40,000.

The current refrigerant (R22) will not be manufactured for refrigeration after the next four years and the substitutes are not sustainable. Though CO_2 is the preferred refrigerant in terms of efficiency and safety it adds another $100,000 to $200,000 to the upgrade cost.

Fifteen years ago, in a move toward ammonia capability, American Refrigeration replaced the failed Trane chiller with a flooded plate and frame exchanger. We recommend continuation of the move toward ammonia with replacement of the condensers with evaporative condensers and other equipment as needed. When the conversion takes place it should cost less than $400,000.

ESM #	Skating Rink	Cost	Yearly Savings	ROI %	SIR	NPV ($)	NPV Payback	Life in Yrs
1	Night Setback	$30	$257	856.3%	91.4	$2,711	0.1	10
2	Air Sealing	$2,179	$290	13.3%	4.8	$8,309	7.2	30
3	Insulate lockers	$47,832	$3,121	6.5%	3.3	$112,226	14.0	40
4	Insulate Pipes and Ducts	$1,378	$110	8.0%	2.9	$2,611	11.6	30
5	Programmable Ice Controls	$1,908	$249	13.1%	2.4	$2,595	8.0	20
6	Control Lights	$5,173	$602	11.6%	2.1	$5,698	9.0	20
7	H20 Vortex Water Treatment	$28,000	$2,595	9.0%	1.9	$26,347	10.5	20
8	Insulate Warming Area Walls	$12,076	$420	3.0%	1.8	$9,442	28.8	40
	Totals All Measures	$98,576	$7,644	8.0%	2.6	$158,931	12.3	

Public Works Garage

The measures below include installing programmable thermostats with slightly reduced nighttime and weekend setbacks; installing two pellet boilers as primary heating equipment; insulating the exterior of all uninsulated CMU walls; removing the foil faced fiberglass batts in the ceiling joist bays; and weatherstripping all exterior windows and doors—including the overhead doors. These measures are described in greater detail on pages 128-132. Following envelope improvements, the last three bays would be heated entirely by waste oil in the existing burner.

A lighting upgrade was completed in the last few years which reduced the costs of lighting. There is at least one garage bay, however, where the new light fixtures and lamps do not provide adequate task lighting. The solution has been to add high cost lamp lights to meet the need. We recommend that the Town hire a lighting engineer or technician to redesign lighting for individual bays as needed—using high efficiency, long lasting LED's.

ESM #	Public Works Garage	Cost	Yearly Savings	ROI %	SIR	NPV ($)	NPV Payback	Life in Yrs
1	Programmable Thermostats	$2,466	$1,200	50.0%	23.1	$54,522	2.0	10
2	Wood Pellet Conversion	$70,538	$3,795	8.0%	2.8	$129,658	12.4	20
3	Ceiling Upgrade	$7,167	$400	6.0%	1.9	$6,956	19.7	40
4	Insulate Walls	$126,273	$6,944	5.0%	1.6	$75,769	22.0	40
5	Weatherstripping	$3,677	$475	13.0%	1.2	$717	8.3	10
	Total all measures	**$210,121**	**$12,814**	**6.0%**	**2.9**	**$394,460**	**13.8**	

Transportation Center

ESMs for the Transportation Center include the substantial envelope upgrade of insulating the brick walls. Increasing insulation on the ceiling, with the special goal of eliminating thermal bridging, was explored but the cost could not be justified. If, however, there's a turnover in occupancy, spraying an addition 3-4" of insulation across the entire ceiling plane, including concrete beams, is strongly recommended. It was the added cost of covering everything in the retail spaces that thwarted the cost benefit analysis. Air sealing the wall/ceiling connection will have to suffice at this time. Installing window quilts is recommended for the glazing.

Thanks to funding support from WHH, converting to wood pellet boiler has a favorable return, even at today's low oil prices. This is in part due to the cost of the electric pump which circulates oil to and from the outdoor tank 24/7/365. Though the oil boiler still has some service life left, replacement is not entirely premature.

The existing controls are essentially not functioning. Replacement is strongly recommended.

ESM #	Transportation Center	Cost	Yearly Savings	ROI %	SIR	NPV ($)	NPV Payback	Life Yrs
1	Air Sealing	$2,514	$472	18.8%	3.2	$5,490	5.1	15
2	Wood Pellet Heating	$66,619	$4,544	6.8%	2.6	$106,915	9.9	20
3	Replace Controls	$15,257	$1,436	9.4%	1.2	$2,984	12.2	15
4	Window Quilts	$23,513	$2,490	10.6%	1.8	$17,989	10.4	20
5	Insulate Masonry Walls	$43,420	$2,053	4.7%	1.4	$17,175	29.2	50
	Totals All Measures	$151,323	$10,995	7.0%	2.8	$279,575	11.7	

Water Treatment Plant

Envelope improvements recommended to reduce demand include air sealing doors and the ceiling to reduce infiltration and exfiltration and installing window quilts for nighttime use. Upgrading the insulation above the ceiling is desired but not recommended at this time. In this building, with three large water tanks, heat loss to the cold water in winter is approximately the same as the heat loss to the outside through the walls, so insulating the tanks is also recommended. Note that John Highter indicated that even with anticipated equipment upgrades, the tanks have could continue to serve the facility for 20 years or more.

Lowering indoor air temperature, particularly at night, is generally an excellent way to save energy and operational costs. Reducing temperatures only two degrees at night was modeled due to concerns around risk to operations from colder temperatures.

Replace the existing oil boiler and piping system with a pellet boiler and back up high efficiency propane with cost sharing from the Windham Wood Initiative. Working with EV to hire an electrical engineer for analyzing water pump efficiency is recommended.

ESM #	Water Treatment Plant	Cost	Yearly Savings	ROI %	SIR	NPV ($)	Simple Payback
1	Air Sealing	$2,306	$3,056	132.5%	22.4	$49,288	0.7
2	Reduce Temperatures	$1,411	$1,560	110.6%	18.7	$24,924	0.9
3	Insulate Filter Tanks	$13,001	$2,525	19.4%	4.5	$46,055	4.9
4	Wood Pellet Conversion	$55,908	$7,631	13.6%	4.0	$169,481	6.3
5	Install Window Quilts	$4,803	$406	8.4%	1.4	$2,009	13.4
	Totals All Measures	$77,429	$15,178	20.0%	5.1	$315,830	4.7

Retreat Wells

Envelope improvements include air sealing, most especially the ceiling over the lab and pump room area, insulating the foundation and re-insulating the ceiling.

Improving controls and lowering thermostat settings will yield the most return when implemented.

The gas boiler is quite old and seasonal, total system, efficiency is estimated between 60% and 66%, therefore it was assumed that replacing the boiler, and hot water heater, would prove cost effective. And yet, as

long as it is functioning safely and reliably, the energy model suggests that replacement is not warranted from a strictly energy saving perspective at this time. It could be warranted from a reliability standpoint.

Converting to wood pellets with WWH's incentive funding was analyzed and the results are presented, but proves to be an unviable expense. Lighting is primarily 4' T8 32 watt lamps and considered the most efficient upgrade until only recently. As with all the buildings, converting to LED's is now proving a cost effective upgrade considering reduced energy use in addition to longevity. Electric usage is the most dominant load and is due primarily to pumping water and outside the scope of this audit.

ESM #	Retreat Wells	Cost	1st Year Savings	ROI %	SIR	NPV ($)	NPV Payback	Life Years
1	Improve Controls	$2,633	$1,377	50.8%	7.4	$19,416	1.9	15
2	Air Sealing	$806	$383	47.5%	6.8	$5,505	0.9	15
3	Insulate Foundation	$4,600	$1,233	26.8%	5.1	$23,342	3.6	20
4	Re-Insulate Ceiling	$17,722	$1,698	9.6%	2.5	$43,460	9.8	30
	Totals All Measures	**$25,761**	**$4,691**	**7.0%**	**3.6**	**$91,723**	**12.4**	

Water Supply Pumping Stations

Eight water supply pumping stations were included in this audit contract. One of the eight is in the process of being decommissioned at the time of this writing so an assessment was not completed. Three others were assessed, however no cost effective energy saving measures were found to be practical. Those buildings are described on pages 148-152. The remaining four buildings were found to have cost saving measures with favorable SIR's. The summary below presents all seven existing buildings in terms of their EUI, estimated annual heating costs, ESM costs and savings and resulting reduced EUI. It should be noted that the energy required for pumping water greatly exceeds energy used for heating in most cases. Working with Efficiency Vermont to hire an electrical engineer for a comprehensive electric audit is recommended. Savings from increasing pump efficiency could be substantial, though would also likely reduce internal gains—which would impact the predicted savings below.

The energy modelling methodology used for these buildings was simpler than for the other buildings in this study. It is described in the first analysis of the Retreat Wells Pumping Station.

Pump Stations	Heat EUI	Annual Heat Costs	ESM Costs	First Yr Savings	SIR	New Heat EUI	Future Heat Costs
Retreat Wells	52.8	$1,448	$15,428	$1,047	2.2	14.7	$401
Ames Brook	67.7	$2,680	$10,402	$1,698	5.0	42.9	$982
Mountain Home	125.4	$3,365	$14,275	$2,513	4.4	38.8	$852
Common Wealth	47.1	$1,119	$360	$254	10.6	36.4	$865
Pleasant Valley	84.5	$591	n/a	n/a	n/a	n/a	$591
Signal Hill	263	$622	n/a	n/a	n/a	n/a	$622
Sherwood Holler	302	$639	n/a	n/a	n/a	n/a	$639
Totals		**$10,464**	**$40,465**	**$5,512**	**3.8**		**$4,952**

Introduction

1. Report Goals

The primary goal of a building energy audit is to describe energy saving measures (ESM) with enough supportive data to offer confidence in the predicted results. This report presents specific recommendations for a variety of ESMs that result in dollar savings from reduced energy consumption and maintenance costs, as well as improved comfort, building durability, indoor air quality, and a reduction of carbon emissions. Mechanical audits used in this report were partially funded by the Windham Wood Heat Initiative (WHH), a program of the Vermont Clean Energy Development Fund and Efficiency Vermont (EV).

An additional goal is to present these findings along with a general description of each building. The building is described in terms of its historic energy usage, function and floor plan, thermal envelope, heating and cooling systems, and other unique concerns or issues. Photos, diagrams, charts, and text are used to help decision makers foster an understanding of how the buildings work, as well as offer a visual guide for decision makers a way to talk about the building's energy usage in a meaningful way.

2. Audit Scope and Partners

The analysis and recommendations in this report has been a collaborative team effort.

The initial contract for eight municipal building audits was awarded to Margaret Dillon of S.E.E.D.S., with a primary focus to explore cost effective improvements to building envelopes in order to reduce demand of heating energy. This focus was specified as relatively recent audits and mechanical upgrades had been completed by Honeywell and lighting audit and upgrades completed by EV.

Early discussions suggested the value of broadening the initial scope to include mechanical audits in order to evaluate existing controls and the feasibility of converting to wood pellets in one or more of the buildings in this study. With substantial funding from the Windham Wood Heat Initiative and following a preliminary feasibility study, Chris Hebb of Dynamic Integrations, LLC, was contracted to conduct mechanical audits for six of the eight buildings. As the project progresses, Chris had a lead role in the energy modeling and financial analysis of energy saving measures, while Margaret conducted the envelope and building assessments, project coordination, and writing this report.

Efficiency Vermont (EV), the State energy efficiency utility, is a consulting member of WWH. EV offers a range of efficiency programs that complement the core services offered by the WWH program. Among EV-T's current programs, the Pay for Performance Program provides public and commercial buildings with technical and performance-based financial assistance to complete upgrades to their building management systems (BMS) with the intent of better managing energy use. In addition, some insulation upgrades may be supported by EV's Building Performance program. The WWH program will coordinate with EV to maximize these opportunities. If you have specific questions about how Efficiency Vermont may be able to provide technical or financial support in addition to WWH's program, you may contact the local EV Energy Consultant, Gary Swindler, at gswindler@veic.org or by phone (802) 540-7758.

Doug Waitt of Design Day Mechanicals was tasked with designing a new cooling and ventilation system for the Library.

In addition to the engineering expertise above, this audit could not have been prepared without the coopera-