Arbogast Energy Auditing

Energy Auditing for Commercial, Government, & Industrial

"Lower Your Building's Costs & Save Thousands of $"

ASHRAE Level II Audit

Town Buildings

Town of Madison New Hampshire

1923 Village Rd

Madison, NH

Member of U.S. Green Building Council

LEED Accredited Professional

Utility History Period Evaluated

8/1/2008 7/31/2010

Building Type

Muncipal Buildings

Energy Audit Date:

10/8/2010

Infrared Thermography Certification

Energy Audit Preformed by:

Elmer Arbogast

Member of

Certifications from AEE

Certified Energy Manager

Certified Energy Auditor

Certified Sustainable Development Professional

Member of ASHRAE

ASHRAE

Advancing HVAC&R to serve humanity and promote a sustainable world

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Executive Summary

Definition of an ASHRAE Level II Audit

- A breakdown of energy use within each building is to be provided. A Level II energy analysis identifies and provides the savings and cost analysis of all practical measures that meet the owner's constraints and economic criteria, along with a discussion of any effect on operation and maintenance procedures. It also provides a listing of potential capital-intensive improvements that require more thorough data collections and analysis, along with an initial judgment of potential costs and savings.

Existing Energy Performance of Your Building

- The Town of Madison buildings are performing very well as far as energy usage is concerned. The contributing factors in this performance is a good energy awareness by the town employees, the town's residences and the town's Selectmen. The two best performing buildings are the library and the Madison garage with an energy usage index(EUI) of 50 and 60. A high performing building is one with an EUI of 58 or less. Two other buildings the fire station and the town hall have EUI of 69 and 79. It should be noted that the Madison garage has under gone insulation improvements that reduced the EUI from 100 to 60. The Hwy garage and transfer station trailer both have EUI over 100. Since the Hwy garage burns waste oil it has a low fuel cost even with it high usage. The historical building has an EUI of less than 1 due to it's very

Potential Energy Performance of Your Building

- All buildings have potential for improving their energy usage. The recommendations which I am making will reduce the electrical usage by 30,080 KWH, Electrical Demand by 14 KW per month, Fuel oil usage by 2,704 gallons and Propane usage by 617 gallons for an estimated investment of $127,839. Please note that during the energy audit the fire station was converted from fuel oil to propane, therefore the town will see an increase in propane usage while seeing a decrease in fuel oil usage. Removing the historical building from evaluation if all recommendations were implemented would reduce the buildings average EUI from 75 to 40.5.

Process and Parameters used to evaluate ECMs

- Each recommendation energy savings were estimated using energy savings calculation and data collected. An estimated installation cost was completed for each recommendation, for all major components and equipment an actual cost was obtained. The labor and remaining material was estimated using RSMeans cost data. Each recommendations were then given a priority with the recommendation with payback of 5 years or less or recommendations with life safety components were given the highest priority.

- The then the savings each building was totalized and evaluated against the buildings energy usage index(EUI) and the buildings benchmarking to ensure the energy savings are achievable.

Next Step

- The Town of Madison should consider PSNH's Municipal Smart Start Program. PSNH's municipal customers have the opportunity to install energy saving measures with no up front costs - through our Smart Start Program. Payment for services and products are made over time with the savings obtained from lower energy costs. In addition to the recommendations listed in this report the town should also have all town owned outside lighting evaluated and included in

- The town has several approaches on how the town can have these recommendations

  - The first is to implement each recommendation separately, this gives the town the most flexibility and evaluation of the recommendations. However this also requires the most work by the town employees and Selectmen. This approach will give the selectmen a way closely evaluate the cost of the recommendation, it would however require the Town to take on project management responsibility.

  - The second is to implement all recommendations at once from a contractor who provide this comprehensive appoach. This approach reduces the town's work load by having one project manager for the project and having to issue only one contract for the project. This approach would allow the town to us the PSNH Municipal Smart Start program. These contractors will also bring other financing options to the table which may reduce the overall cost of the project and financing. This approach the town does loss some of the flexibility on who will do the work and can lead to limitation on town input on design. This option also will allow the town to receive a guaranteed savings contract from an energy retrofit service company (ERSCO). This option will ensure that if the savings are not met then the town will receive a check for the difference. There is fee for this service which in general ranges from 5 to 10% of the contractor price. The estimated price does not include this fee and therefore would be need to be added to evaluate return on investment(ROI)

  - The third approach is the one recommended by Arbogast Energy Auditing, which is to have a construction management company manage the project. The estimates in this report are based on Arbogast Energy Auditing providing this service, however the town should be able to find other companies which provide this service at similar cost. This approach reduces the work load required by the town while having a similar flexibility and input on design. It also gives the town one project manager who is responsible for the project, but will require the town issuing multi contracts. This approach also allows the town to use PSNH's Municipal Smart Start Program. Arbogast Energy Auditing and some other providers of this service can bring other financing options to the table which may reduce the overall cost of the project and financing.

Findings and Implementation Plan Summary Table

Finding ID Number	Building	Finding	Recommendation	Package	Priority	Notes
1	Fire Station	Space is Air Condition with no economizer	Add Economizer	2	3	
2	Fire Station	Outside air level below ASHRAE 62.1	Add Heat Recovery unit	2	3	F-1
3	Fire Station	Several Hole in Hard Ceiling above Suspended	Repair holes in ceiling	1	1	
4	Fire Station	Lighting is older inefficient technology	Lighting/Lighting Control Upgrade	2	1	
5	Fire Station	Vending Machine w/o Vending Mizer	Vending Mizer and Delamping	1	1	
6	Fire Station	Non Programmable Stat	Install Programmable T-Stats	1	1	
7	Fire Station	Door seal show air leak from Thermal Scan	Door Weather Stripping	1	2	
8	Fire Station	Vehicle Garage w/o CO & CO2 monitoring	CO and CO2 Alarm	4	1	
9	Fire Station	No Vehicle exhaust extraction system	Vehicle Exhaust Extraction system	4	1	
10	Transfer Station	Lighting is older inefficient technology	Lighting/Lighting Control Upgrade	2	1	
11	Transfer Station	Controls need to be improved	Controls Upgrade	2	1	
12	Transfer Station	Electric operating when Propane heat is on	Permanently Shut off electric heat	1	1	
13	Transfer Station	Domestic hot water heater on when not occupied	Timer on domestic hot water heater	1	2	
14	Town Hall	Chimney effect in stairwell	Weatherize front Stair well	2	2	
15	Town Hall	Zoning Problem	Install Third zone on First Floor	4	3	
16	Town Hall	Non Programmable Stat	Install Programmable T-Stats	1	1	
17	Town Hall	East wall has excess solar gain	Install Solarize Window Blinds	1	1	
18	Town Hall	Front Corner show leakage	Weatherize Front Corner	2	2	
19	Town Hall	Lighting is older inefficient technology	Lighting/Lighting Control Upgrade	2	1	
20	Town Hall	Space is Air Condition with no economizer	Add Economizer	2	3	
21	Town Hall	No Boiler Reset	Control Upgrade - Boiler	2	2	
22	Town Hall	Outside air level below ASHRAE 62.1	Add Heat Recovery unit	2	3	F-1
23	Town Hall	More Efficient boiler available	Boiler Upgrade	2	3	
24	Town Hall	Door seal show air leak from Thermal Scan	Door Weather Stripping	1	1	
25	Town Hall	Domestic hot water heater on when not occupied	Timer on domestic hot water heater	1	2	
26	Town Hall	2 Refrigerators in Police back room	Remove less efficient refrigerator	3	1	
27	Library	Non Programmable Stat	Install Programmable T-Stats	1	1	
28	Library	No Boiler Reset	Controls Upgrade - Boiler Controller	2	2	
29	Library	Lighting is older inefficient technology	Lighting/Lighting Control Upgrade	2	1	
30	Library	Outside air level below ASHRAE 62.1	Add Heat Recovery unit	2	3	F-1
31	Library	Potential of UV damage to books	Install Solarize Window Blinds	1	1	
32	Library	More Efficient boiler available	Boiler Upgrade	2	3	
33	Library	Building would benefit from Thermal Solar	Thermal Solar	2	3	
34	Library	Door seal show air leak from Thermal Scan	Door Weather Stripping	1	1	
35	Library	Domestic hot water heater on when not occupied	Timer on domestic hot water heater	1	2	
36	Historical Building	Lighting is older inefficient technology	Lighting/Lighting Control Upgrade	2	1	
37	Hwy Garage	Lighting is older inefficient technology	Lighting/Lighting Control Upgrade	2	1	
38	Hwy Garage	Non Programmable Stat	Install Programmable T-Stat	1	1	
39	Hwy Garage	Thermal Scan show sagging Insulation	Weatherization- Insulation Repair	2	2	
40	Hwy Garage	Vehicle Garage w/o CO & CO2 monitoring	CO and CO2 Alarm	2	1	
41	Hwy Garage	Door seal show air leak from Thermal Scan	Door Weather Stripping	1	1	
42	Hwy Garage	Electric Demand High in August	Replace Bean Cooker w/ Propane	1	1	
43	Hwy Garage	No Vehicle exhaust extraction system	Vehicle Exhaust Extraction system	4	1	
44	Madison Garage	Lighting is older inefficient technology	Lighting/Lighting Control Upgrade	2	1	
45	Madison Garage	Non Programmable Stat	Install Programmable T-Stat	1	1	
46	Madison Garage	Wet insulation during winter	Weatherization - Vapor Seal Repair	2	1	
47	Madison Garage	Domestic hot water heater on when not occupied	Timer on domestic hot water heater	1	2	
48	Madison Garage	Thermal Scan Show need to insulate walls	Weatherization - Insulation of Walls	2	3	
49	Madison Garage	Vehicle Garage w/o CO & CO2 monitoring	CO and CO2 Alarm	2	1	
50	Madison Garage	Door seal show air leak from Thermal Scan	Door Weather Stripping	1	1	
51	Madison Garage	Waste Oil available for Heat	Waste Oil Heater	2	3	
52	Madison Garage	No Vehicle exhaust extraction system	Vehicle Exhaust Extraction system	4	1	
53	All Buildings		PV Solar	2	4	
54	All Buildings - except Library		Thermal Solar	2	4	
55	All Buildings		Wind energy	2	4	
56	All Buildings		Combine Heat and Power	2	4	
57	All Buildings		District Heating	2	4	
58	All Buildings		Bio Energy	2	4	
59	All Buildings		Yearly Energy Review	3	1	

General Notes

G-1	Package identification 1 - Lower Cost Operational and Maintenance, 2 - Capital Improvement Measure, 3 - Energy Management Improvement Opportunity,4 - non energy savings measure
G-2	Priority ratings 1 - high priority, 2 - Medium priority, 3 - Low Priority, 4-Information Only

Finding Notes

F-1 Space is occupied below the density level used by ASHRAE and therefore indoor air quality is acceptable

Recommendation, Cost and Savings Summary Tables

Existing Energy Usage

Building Base Line	Building(s)	Existing Electric Usage (KWH/yr)	Average Electrical Demand (KW)	Propane Usage (Gal)	Fuel Oil Usage (Gal)	Existing Utility Cost ($)	Existing EUI (kBtu/Sf)	Existing CUI ($/Sf)	Existing Building CO2 Emissions (Metric Tons)
8/01/2009 to 7/31/2010	Town Hall	29,220	8.98	0	1,024	$6,812.72	79	$2.22	20.21
8/01/2009 to 7/31/2010	Library	13,255	15.75	891	0	$4,592.81	50	$1.83	9.58
8/01/2009 to 7/31/2010	Fire Station	15,984	0.00	0	1,189	$4,835.15	69	$1.53	17.44
8/01/2009 to 7/31/2010	Hwy Garage*	9,790	0.00	0	1,839	$2,919.49	120	$1.22	21.96
8/01/2009 to 7/31/2010	Madison Garage	12,509	5.54	0	1,514	$5,826.91	60	$1.39	19.57
8/01/2009 to 7/31/2010	Transfer Station	2,155	0.00	272	0	$1,049.77	142	$4.65	2.29
8/01/2009 to 7/31/2010	Historical Building	86	0.00	0	0	$146.82	0	$0.04	0.03
8/01/2009 to 7/31/2010	Total All Buildings	82,999	30.28	1,163	5,566	$26,183.67	59.82	$1.84	91.08

* Gallons at the highway garage includes purchased fuel oil and waste oil

Goal Levels Energy Usage

Energy Goals will be set during Energy Planning Stage not included in this report

Building Base Line	Building(s)	Electric Usage (KWH/yr)	Average Electrical Demand (KW)	Propane Usage (Gal)	Fuel Oil Usage (Oil)	Utility Cost ($)	EUI (kBtu/Sf)	CUI ($/Sf)	Building CO2 Emissions (Metric Tons)
Short Term (1 -3 Years)									
Mid Term (3 - 5 Years)									
Long Term (5 to 10 Years)									

Operation and Maintenance Measures

Energy Conversion Project Title	Building(s) where Implemented	Finding Number	Electric Energy Avoided (KWH)	Electric Demand Reduced (KW)	Fuel Oil Usage Avoided (Gallons)	Propane Usage Avoided (Gallons)	Metric Tons of CO2 Reduced	Estimated Installation Cost	Simple Payback
Repair holes in ceiling	Fire Station	3	0.00	0.00	15.55	0.00	0.16	$148.15	3.97
Vending Mizer and Delamping	Fire Station	5	2312.64	0.08	0.00	0.00	0.78	$395.06	2.12
Install Programmable T-Stats	Fire Station	6	0.00	0.00	19.29	0.00	0.20	$88.64	1.92
Install Programmable T-Stats	Town Hall	16	0.00	0.00	48.21	0.00	0.49	$335.19	2.90
Install Programmable T-Stats	Library	27	0.00	0.00	0.00	64.29	0.37	$335.19	2.22
Install Programmable T-Stat	Hwy Garage	38	0.00	0.00	56.25	0.00	0.57	$88.64	0.66
Install Programmable T-Stat	Madison Garage	45	0.00	0.00	54.64	0.00	0.55	$88.64	0.68
Door Weather Stripping	Fire Station	7	0.00	0.00	68.89	0.00	0.70	$1,379.88	8.35
Door Weather Stripping	Town Hall	24	0.00	0.00	42.87	0.00	0.44	$779.26	7.57
Door Weather Stripping	Library	34	0.00	0.00	0.00	32.97	0.19	$779.26	10.06
Door Weather Stripping	Hwy Garage	41	0.00	0.00	29.68	0.00	0.30	$546.54	7.67
Door Weather Stripping	Madison Garage	50	0.00	0.00	59.35	0.00	0.60	$546.54	3.84
Timer on domestic hot water heater	Transfer Station	13	273.75	1.50	0.00	0.00	0.09	$139.38	3.39
Timer on domestic hot water heater	Madison Garage	47	273.75	1.50	0.00	0.00	0.09	$139.38	3.39
Timer on domestic hot water heater	Town Hall	25	730.00	4.00	0.00	0.01	0.25	$165.68	1.51
Timer on domestic hot water heater	Library	35	273.75	1.50	0.00	0.00	0.09	$139.38	3.39
Install Solarize Window Blinds	Town Hall	17	2290.68	0.00	85.81	0.00	1.64	$5,283.00	13.57
Install Solarize Window Blinds	Library	31	648.09	0.00	0.00	37.35	0.43	$2,533.00	18.13
Replace Bean Cooker w/ Propane	Hwy Garage	42	160.00	17.80	0.00	-6.67	0.02	$1,200.00	5.32

Capital Improvement Measures

Energy Conversion Project Title	Building(s) where Implemented	Finding Number	Electric Energy Avoided (KWH)	Electric Demand Reduced (KW)	Fuel Oil Usage Avoided (Gallons)	Propane Usage Avoided (Gallons)	Metric Tons of CO2 Reduced	Estimated Installation Cost	Simple Payback
Add Economizer	Fire Station	1	1912.68	0.00	0.00	0.00	0.64	$3,798.77	24.80
Add Economizer	Town Hall	20	3570.34	0.00	0.00	0.00	1.20	$7,597.53	26.57
Add Heat Recovery unit	Fire Station	2	546.48	0.00	52.49	0.00	0.72	$2,962.96	17.46
Add Heat Recovery unit	Town Hall	22	1214.40	0.00	116.64	0.00	1.59	$5,925.93	15.71
Add Heat Recovery unit	Library	30	607.20	0.00	0.00	71.78	0.62	$2,962.96	13.64
Lighting/Lighting Control Upgrade	Fire Station	4	2057.59	39.84	0.00	0.00	0.69	$4,127.68	6.11
Lighting/Lighting Control Upgrade	Transfer Station	10	124.80	1.20	0.00	0.00	0.04	$91.29	3.60
Lighting/Lighting Control Upgrade	Town Hall	19	292.36	3.72	0.00	0.00	0.10	$96.30	1.35
Lighting/Lighting Control Upgrade	Library	29	991.36	8.59	0.00	0.00	0.33	$760.49	4.01
Lighting/Lighting Control Upgrade	Historical Building	36	70.28	21.08	0.00	0.00	0.02	$420.74	74.76

Lighting/Lighting Control Upgrade	Hwy Garage	37	8454.69	47.46	0.00	0.00	2.84	$3,856.58	3.00
Lighting/Lighting Control Upgrade	Madison Garage	44	2764.35	16.01	0.00	0.00	0.93	$2,990.43	7.01
CO and CO2 Alarm	Fire Station	8	0.00	0.00	0.00	0.00	0.00	$8,839.51	0.00
CO and CO2 Alarm	Hwy Garage	40	0.00	0.00	0.00	0.00	0.00	$8,839.51	0.00
CO and CO2 Alarm	Madison Garage	49	0.00	0.00	0.00	0.00	0.00	$8,839.51	0.00
Vehicle Exhaust Extraction system	Fire Station	9	0.00	0.00	0.00	0.00	0.00	$0.00	0.00
Vehicle Exhaust Extraction system	Hwy Garage	43	0.00	0.00	0.00	0.00	0.00	$0.00	0.00
Vehicle Exhaust Extraction system	Madison Garage	52	0.00	0.00	0.00	0.00	0.00	$0.00	0.00
Controls Upgrade	Transfer Station	11	0.00	0.00	0.00	75.96	0.44	$87.65	0.49
Control Upgrade - Boiler	Town Hall	21	0.00	0.00	67.96	0.00	0.69	$555.56	3.41
Controls Upgrade - Boiler Controller	Library	28	0.00	0.00	0.00	51.50	0.30	$871.60	7.20
Weatherize front Stair well	Town Hall	14	0.00	0.00	69.13	0.00	0.70	$790.20	4.76
Weatherize Front Corner	Town Hall	18	0.00	0.00	3.75	0.00	0.04	$51.31	5.70
Weatherization- Insulation Repair	Hwy Garage	39	0.00	0.00	381.02	0.00	3.87	$3,717.21	4.06
Weatherization - Vapor Seal Repair	Madison Garage	46	0.00	0.00	81.65	0.00	0.83	$1.23	0.01
Weatherization - Insulation of Walls	Madison Garage	48	0.00	0.00	63.50	0.00	0.64	$3,470.62	22.77
Boiler Upgrade	Town Hall	23	0.00	0.00	187.20	0.00	1.90	$10,185.19	22.67
Boiler Upgrade	Library	32	0.00	0.00	0.00	192.91	1.11	$10,185.19	22.47
Waste Oil Heater	Madison Garage	51	0.00	0.00	1200.00	0.00	0.00	$13,864.20	4.81
Install Third zone on First Floor	Town Hall	15	0.00	0.00	0.00	0.00	0.00	$1,773.83	0.00

* Economizer savings are based on the addition of air conditioning to the fire house and not existing condition

Renewable Energy Opportunities

Energy Conversion Project Title	Building(s) where Implemented	Finding Number	Electric Energy Avoided (KWH)	Electric Demand Reduced (KW)	Fuel Oil Usage Avoided (Gallons)	Propane Usage Avoided (Gallons)	Metric Tons of CO2 Reduced	Total Estimated Installation Cost	Simple Payback
Thermal Solar	Library	33	0.00	0.00	0.00	96.92	0.56	$5,061.73	22.22
PV Solar	All Buildings	53	0.00	0.00	0.00	0.00	0.00	$0.00	0.00
Thermal Solar	All Buildings - except Library	54	0.00	0.00	0.00	0.00	0.00	$0.00	0.00
Wind energy	All Buildings	55	0.00	0.00	0.00	0.00	0.00	$0.00	0.00
Combine Heat and Power	All Buildings	56	0.00	0.00	0.00	0.00	0.00	$0.00	0.00
District Heating	All Buildings	57	0.00	0.00	0.00	0.00	0.00	$0.00	0.00
Bio Energy	All Buildings	58	0.00	0.00	0.00	0.00	0.00	$0.00	0.00

Energy Management Improvement Opportunities

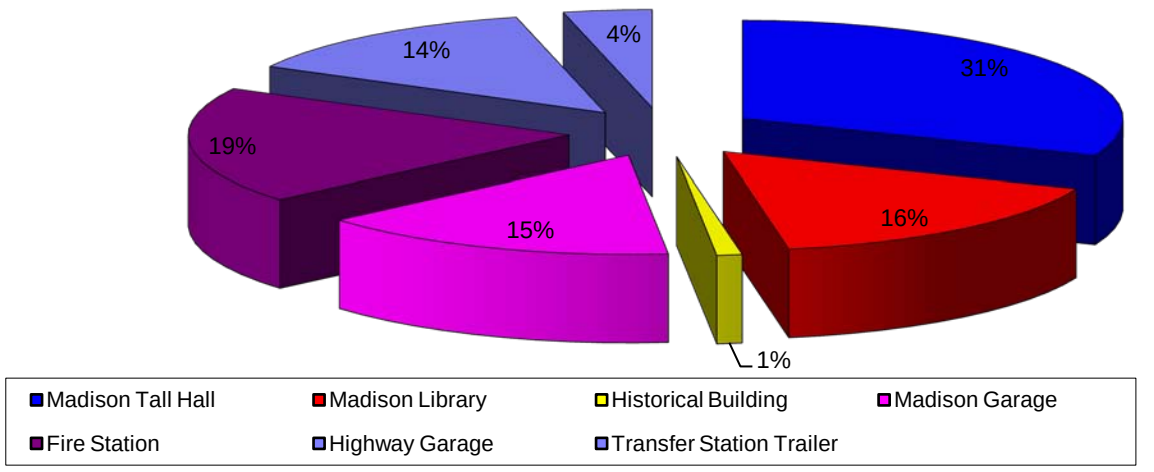
Energy Conversion Project Title	Building(s) where Implemented	Finding Number	Electric Energy Avoided (KWH)	Electric Demand Reduced (KW)	Fuel Oil Usage Avoided (Gallons)	Propane Usage Avoided (Gallons)	Metric Tons of CO2 Reduced	Total Estimated Installation Cost	Simple Payback
Permanently Shut off electric heat	Transfer Station	12	216.00	1.50	0.00	0.00	0.07	$1.23	0.03
Remove less efficient refrigerator	Town Hall	26	294.34	0.17	0.00	0.00	0.10	$1.23	0.05
Yearly Energy Review	All Buildings	59							

Total Project Summary per Building

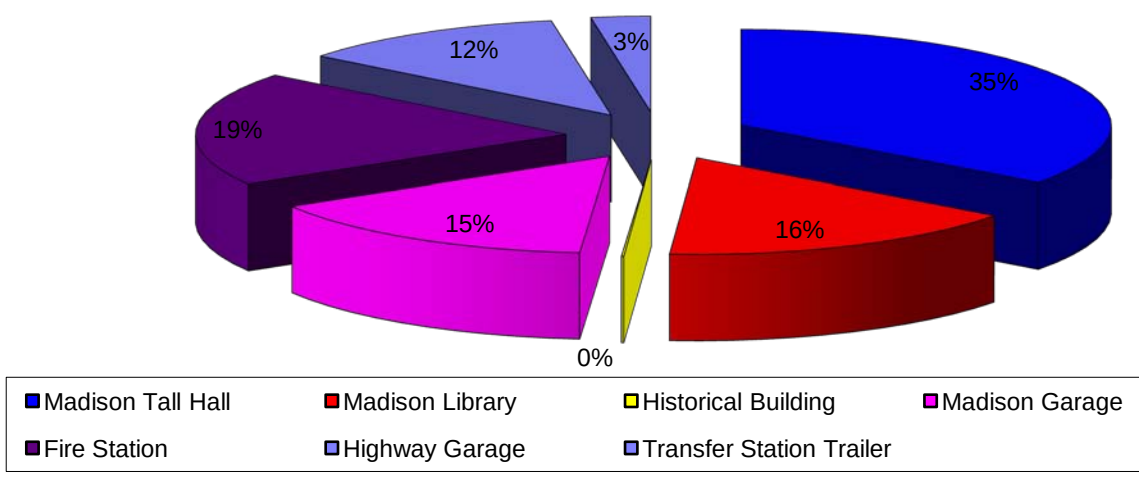
	Total Electric Energy Avoided (KWH)	Total Electric Demand Reduced (KW)	Fuel Oil Usage Avoided (Gallons)	Propane Usage Avoided (Gallons)	Metric Tons of CO2 Reduced	Total Estimated Installation Cost	Simple Payback
Total Reduction:	30080	166	2704	617	29	127839	10.25

Electric Usage, Electric Cost and Total Utility Cost by Building

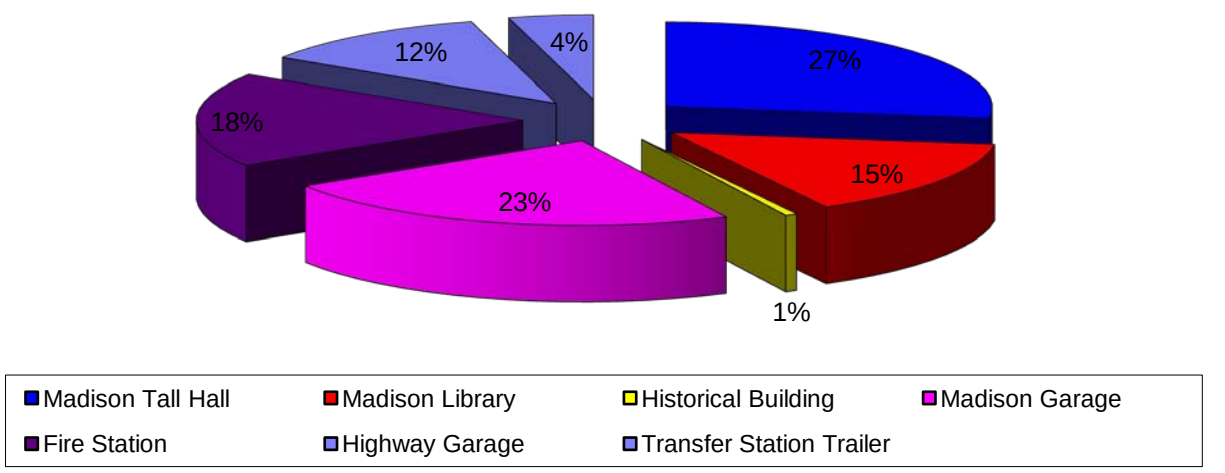
Electric Cost by Building



Electric Usage by Building

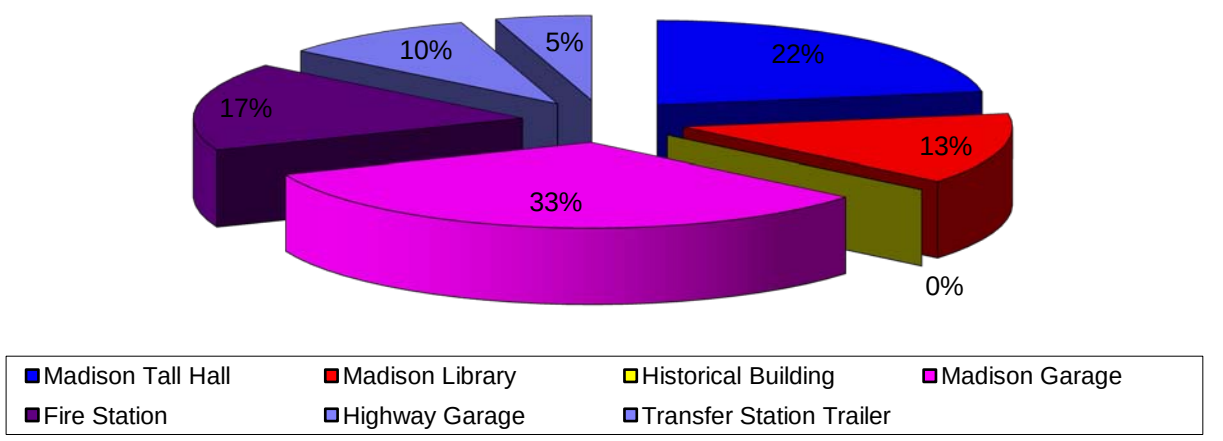


Total Utility Cost by Building

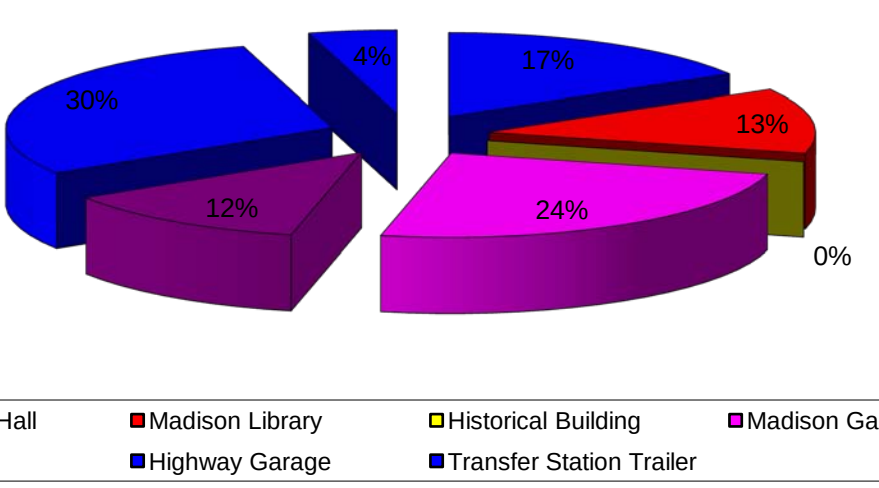


Fuel Usage, Fuel Cost and Total Utility Cost by Building

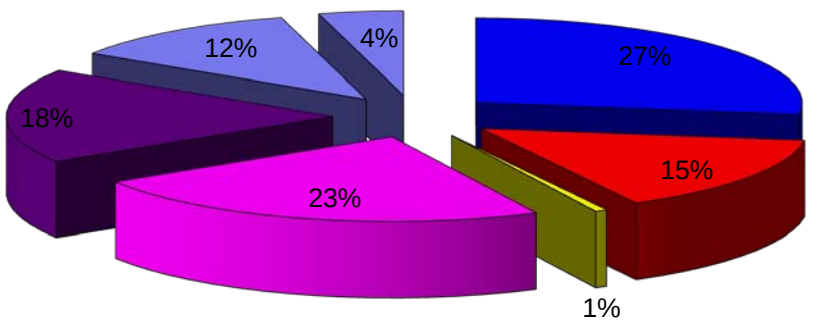
Fuel Cost by Building



Fuel Usage by Building



Total Utility Cost by Building



Observations - Town Hall

Original Design and Current Use

- The Building is a wood frame building that was built in 1904 and was remodeled in 1999. The remodeling in 1999 was to use the basement and first floor of building as a town hall and police station. The remaining of the building is used as storage. The orginal building has a bell tower which is not used and should be sealed off from occuipied space of the building.

Retrofits

- The retrofit recommendation include lighting, HVAC improvements, window covering and building envelope improvement and sealing. High priority recommendations all have a payback of less than 5 years or have health safety issues attached. A total of 13 recommendations are being made for this building.

On-Site Renewable Energy

- This building does not have any on-site renewable energy fit which would have less than a 10 year payback. This building has low energy usage due to good efficiency of occupied space and building space being only 50% occupied. If usage of this building increases the addition of on-site renewable should be reviewed with new usage. On-site renewable energy sources for all buildings are addressed later in this report.

Age and Condition of the Mechanical Equipment

- The major HVAC equipment was installed in 1999 and should have a life of 20 years. Equipment replacement should be investigated in 2014 which is 5 years prior to end of expected equipment life. Equipment appears in good working condition and are operating at rated efficiency.

Indoor Air Quality

- Overall the Indoor air quality of this building is very good with C02 and particle counts well below acceptable levels. It should be noted that the current air handling system is not in compliance with ASHRAE 62.1 however the occupancy rate of this building is below the rate used by ASHRAE for this Standard. Therefore it is not recommended that ventilation rate is increased at this time.

Space temperature and Humidity

- The temperature in this space is controlled by manual thermostats and humidity is manually controlled. Programmable thermostats would ensure the building is set back during un-occupied periods. Low humidity is addressed by a manual floor mounted humidifier since this is adequate for this building use, it is recommended that humidity control stays the same. The air handlers are controlled by Honeywell HZ 311 controller and boilers are controlled by Taco relay controller, addition of boiler reset control will produce additional energy savings

R- Value

- Overall the R-Value of this building is in acceptable range. Several areas where repair of sealing and insulation were noted and are listed in the recommendation. The largest heat lost in this building is due to the chimney effect created by the open stairwell to old bell tower. Sealing this stairwell from the occupied space and bell tower will result in reduce energy usage.

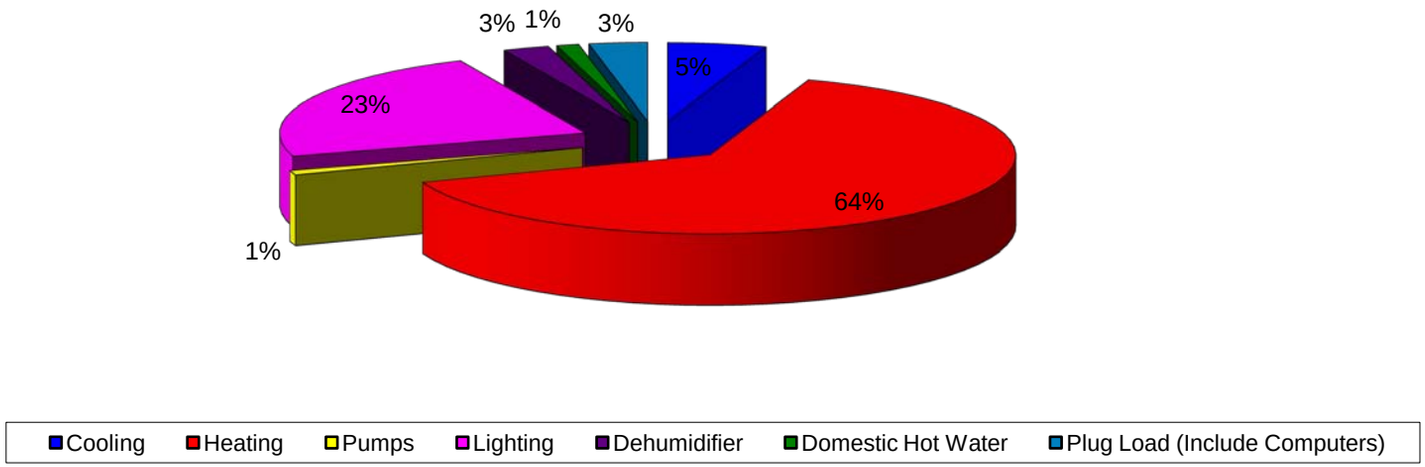
Maintenance

- Maintenance is on call manor, changing over to a preventive maintenance approach would result in future energy usage and extend the life of the equipment resulting in reduced future operation cost.

People's energy awareness

- The occupant energy awareness in this building as throughout most of the town buildings is very good. A yearly review of energy usage is recommended to keep the awareness of energy usage high.

Town Hall
ENERGY USAGE PROFILE



Total Facility Consumption	243 (Millions of BTU/hr)
Cooling	15.5%
Heating	59.0%
Pumps	0.6%
Lighting	11.7%
Fans	2.2%
Domestic Hot Water	2.3%
Plug Load (Include Computers)	8.8%
Total	100%

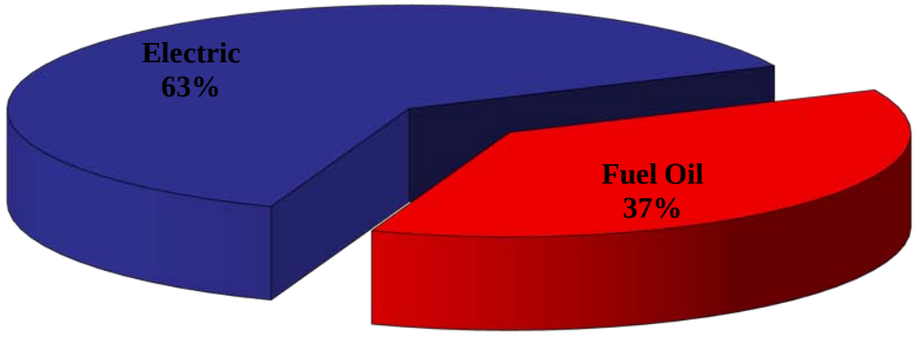
Town of Madison New Hampshire
Town Hall
Utility Analysis Period:

8/01/2009 to 7/31/2010

	Current Year			Previous Year		
	8/1/2009	to	7/31/2010	8/1/2008	to	7/31/2009
	Electric		Fuel Oil	Electric		Fuel Oil
Utility Costs	$4,269		$2,543	$4,549		$2,241
Utility Usage	29,220		1,024	29,870		1,140
$ Cost/Unit (kWh, Therm, Gal)	$0.15		$2.48	$0.15		$1.97
	CDD		HDD	CDD		HDD
	353		7,263	273		7,998
Current Year Vs Previous Year	**Electric**		**Fuel Oil**			
Change in Cost	-6%		13%			
Change in Usage	-2%		-10%			
Change in $ Cost/Unit	-4%		26%			
Change in Degree Day	29%		-9%			

Fuel Oil usage increased in proportional to heating degree days increase, noting no change in heating performance. Electrical usage decrease despite a increase in cooling degree days, noting that nice weather keep people out of the town hall

Utility Cost Comparison Current Year



Energy Benchmarking - Town Hall

The calculation of EUI (Energy Use Intensity) is shown below. EUI, expressed in kBtu/sf, is normalized for floor area, the most dominant influence on energy use in most buildings. Its use usually provides a good approximation of how your building's energy performance compares to others. Site EUI indicates the rate at which energy is used at your building (the point of use). Source EUI indicates the rate at which energy is used at the generation sources serving your building (the point of source) and indicates the societal energy penalty due to your building The lower the EUI, the higher the rating, indicating that the building is more efficient than other buildings. The greater the EUI, the lower the rating, indicating that there is an opportunity for higher potential benefits from operational improvements.

To compare the buildings shown below to each other, and to determine the ranking of the buildings from having the most to the least opportunity for demand-side improvements from a financial perspective, please see the Site EUI ranking below.

The Site EUI below has been applied to a Department of Energy statistical model from the Oak Ridge National Laboratory web site, http://eber.ed.ornl.gov/benchmark. The Department of Energy has estimated energy use and cost reductions for building source EUI ratings (percentiles) in the table below. Please see the DOE Regional Source EUI Comparison graph below to rate your building in relation to the regional distribution of similar type buildings. (Note: The Source EUI includes the inefficiencies of electrical generation and transmission. A reduction in 'electrical' source EUI includes a benefit in terms of reduction of air pollution emissions and green house gases, and is thus an indicator of societal benefit.)

Source EUI Rating for your Building	Energy use and cost reduction potential (%)	Walk-thru energy assessment recommended?
above 60%	below 25%	No
40 to 60%	20 to 35%	Maybe
20 to 40%	35 to 50%	Yes
Below 20%	above 50%	Definitely

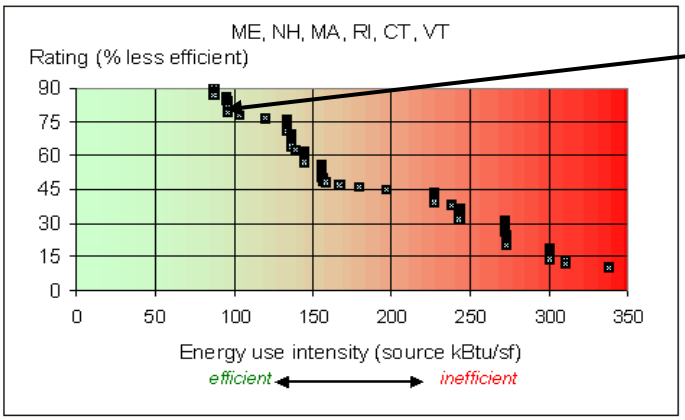
Rating from the most efficient to the least efficient - 2010 consumption

Site EUI Rank	Building	Annual Total Electrical Use (kWh)	Annual Total Non-Electrical Fuel Use (Gals)	Occupied Building Gross Floor Area (sq-ft)	Site EUI Rating	Source EUI: Annual Total Source Energy Use per Sq-Ft (kBtu/sf)	Rating (Regional Source EUI Comparison)
1	Town Hall	29,220	1,024	3,068	**79**	**145**	**0.76**

Building Type

Office Building

Site EUI	Est Regional Rating	Building
79	76%	Town Hall



Source: Oak Ridge National Laboratory web site, http://eber.ed.ornl.gov/benchmark

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 14**

Finding Description: **Weatherize front Stair well**

Building: **Town Hall**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	No
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

The stairwell in the front of the building creates a "chimney effect" since it is not completely sealed from the open bell tower above. The stairwell walls at the third level should be insulated and have a vapor/air barrier installed. The doors to the second and third levels should be weatherized and keep shut when not in use. It is recommended that a sign to keep the door shut be made up and attached to each door.

Estimated Economic Impact Summary

Energy Savings heating = Open Area X Avg. Wind Speed X Diversity Factor X 1.08 X (Interior Temperature – Avg. OA Temperature Heating Season) X Hours/day X Days/Year
Energy Savings Cooling = [(Open Area X Avg. Wind Speed X Diversity Factor)/13.8] X (Avg. OA Enthalpy Cooling Season - Interior Enthalpy) X Hours/Day X Days/Year

Open	Avg. Wind	Diversity	Constant	Interior	Avg OA Temp	Hours per year
5.76	7	0.7	1.08	70	28	6048

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	69.13	Gallons

Implementation Plan

Existing insulation on the walls between the third floor and the stairwell should be removed. Then a layer of 6 mil plastic should be installed to cover all of the wall from the floor side. The plastic should be kept tight to the wall and studs. Then a R-13 insulation should be installed in all the stud cavities in the wall.

Estimated cost for this installation: $790.20

Description	# Units	Labor and Material Cost/Unit	Total	Source
Fiberglass Insulation - roll 13	16	20.98	335.68	
Vapor/Air barrier. - 6 mil plastic	1	93.98	93.98	
Entrance Door Jam Kit	2	72.7	145.4	

Picture of Wall to be insulated in Town Hall

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 15**

Finding Description: **Install Third zone on First Floor**

Building: **Town Hall**

General Finding Impacts

Energy Savings	No
Fuel Savings	No
Electric Savings	No
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

The zoning on the first floor creates comfort issues, and a additional zone to control the administrator office should be installed. Minimal energy saving will be achieved

Estimated Economic Impact Summary

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

The existing Honeywell zone controller should be upgraded to a HZ311, ductwork with a zone damper should be installed from the unit to the adminitrator office ductwork. The ductwork currently serving this office should be cap at the office wall and made to serve the selctmen office, kitchette and bathroom. A new programable Honeywell TH4110D should be installed in that office. The thermostat in the administrator office should be moved to the selectmen office.

Estimated cost for this installation: $1,773.83

Description	# Units		Total	Source
Honeywell HZ311 controller	1	280	280	
Honeywell TH4110D1007	1	71.8	71.8	
Honeywell ZD damper	1	185	185	
Ductwork	1	900	900	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$1,773.83	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 16**

Finding Description: **Install Programmable T-Stats**

Building: **Town Hall**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	Yes
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

A programmable T-Stat should be install to replace the existing 5 non programable thermostats

Estimated Economic Impact Summary

Energy Saving = BTU/hr of Boiler * Reduce Runtime from Programmable T-Stat

Btu/hr	Reduced Run Hours	
150000	36	Based on reducing the runtime of the furnace by 1 hour per week during the heating season

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	48.21	Gallons

Implementation Plan

The Honeywell T4110D1007 will install in place of exiting Honeywell TH5110D non programmable stat. Stat should be program only to heat the building to 55 degrees during unoccupied time and heat up to 68 degrees 1 1/2 hours prior to occupied times.

Estimated cost for this installation: $335.19

Description	# Units		Total	Source
Honeywell TH4110D1007	5	54.3	271.5	
	0	0	0	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total			$335.19	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 17**

Finding Description: **Install Solarize Window Blinds**

Building: **Town Hall**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	Yes
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

The east side of the building gets excessive solar gain during the morning while the west side which is shaded loses heat through the windows. The comfort issuse are amphide because the east side has more office equpment producing heat. Therefore the installation of inflector window treatments would reduce the solar gain on the east side while reflecting back the radiation heat on the west side. In addition it would improve the comfort in the code enforcement office by reflecting back the heat into his office.

Estimated Economic Impact Summary

Energy Savings Cooling = Area X (Existing SHGC – New SHGC) X (Incident Total Irradiance) X Hours/Day X Days/Year

Area	Existing SHGC	New SHGC	Incient Total Irradiance	Hour/day	Days per year
304	0.85	0.45	197.6	10	208

Estimated Annual Electrical Savings	2290.68	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	85.81	Gallons

Implementation Plan

Install Solarize Inflector vertical blind system on seven large window in the office area of the first floor and the four larger windows facing east on the basement floor. These vertical blinds will allow the natural light to enter the space while relecting the radiation heat back the direction that is desired. Note that this recommendation has a high priority because it will also increase comfort as long as saving energy.

Estimated cost for this installation: $5,283.00

Description	# Units		Total	Source
Inflector system Vertical 48X96	7	569	3983	
Inflector system Vertical 42X54	4	325	1300	
Contractor Mark Up			0%	Equivalent of 10% Overhead and 10% Profit
Total			$5,283.00	

Recommend Work to be performed by – Town employee

Owner Action – order blinds

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 18**

Finding Description: **Weatherize Front Corner**

Building: **Town Hall**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	No
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

There is a draft in the front north west corner of the building between the main buildng and the vestibule. It is recmmended that a backer rod be calked into that corner to seal corner.

Estimated Economic Impact Summary

Energy Savings heating = Open Area X Avg. Wind Speed X Diversity Factor X 1.08 X (Interior Temperature – Avg. OA Temperature Heating Season) X Hours/day X Days/Year
Energy Savings Cooling = [(Open Area X Avg. Wind Speed X Diversity Factor)/13.8] X (Avg. OA Enthalpy Cooling Season - Interior Enthalpy) X Hours/Day X Days/Year

Open	Avg. Wind	Diversity	Constant	Interior	Avg OA Temp	Hours per year
0.3125	7	0.7	1.08	70	28	6048

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	3.75	Gallons

Implementation Plan

Caulk a backer rod in the northwest corner between the main building and vestibule area.Caulk Backer should be Caulk Backer Rod, Polyethylene Closed Cell Foam, Color Gray, Height 1/2 In., Width 1/2 In., Length

Estimated cost for this installation: $51.31

Description	# Units	Labor and Material Cost/Unit	Total	Source
Backer Rod	1	20.26	20.26	
Calking	1	21.3	21.3	

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 19**

Finding Description: **Lighting/Lighting Control Upgrade**

Building: **Town Hall**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	No
Electric Savings	Yes
Demand Savings	Yes
Indoor Air Quality	No
Comfort	No
Maintenance and Reliability	Yes

Recommendation:

The town hall lighting was retrofited a few years ago. There are some incandesent spot light that should be upgraded to solid state lighting.

Estimated Economic Impact Summary

Energy Savings = [Watts of Existing Fixture-Watts of New Fixture] x Number of Fixture x Lighting hours per year

Estimated Annual Electrical Savings	292.36	KWH
Estimated Annual Electric Demand Savings	3.72	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

Please see attached detail lighting sheet and sketch for detail of work.

Estimated cost for this installation: $160.49

Description	# Units		Total	Source
9- Watt LED spot light	5	26	130	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$160.49	
Total Post PSNH Rebate			$96.30	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

Lighting Audit Report

Madison New Hampshire - Town Hall

1	Location:	Recommendation:							
	Outdoor	Replace Incandecent Floods with 9 Watt LED	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	75 Watt Floods	3	75	300	67.5	0.225		
	Proposed:	9 watt LED flood	3	9	300	8.1	0.027	59.4	0.198
		Proposed lighting controls:	No work in this area						

2	Location:	Recommendation:							
	Town Clerk	No work in this area	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	3 Blub F32T8/TK735	3	100.8	2080	628.992	0.3024		
	Proposed:	No Work	3	100.8	2080	628.992	0.3024	0	0
		Proposed lighting controls:	No work in this area						

3	Location:	Recommendation:							
	Hallway	No work in this area	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	3 Blub F32T8/TK735	4	100.8	2080	838.656	0.4032		
	Proposed:	No work in this area	4	100.8	2080	838.656	0.4032	0	0
		Proposed lighting controls:	No work in this area						

4	Location:	Recommendation:							
	Rear Vestibule	No Work in this area	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	2- 11 Watt Incandescent	2	11	832	18.304	0.022		
	Proposed:	No work in this area	2	11	832	18.304	0.022	0	0
		Proposed lighting controls:	No work in this area						

5	Location:	Recommendation:							
	Town Administrator	No work in this area	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	3 Blub F32T8/TK735	3	100.8	2080	628.992	0.3024		
	Proposed:	No work in this area	3	100.8	2080	628.992	0.3024	0	0
		Proposed lighting controls:	No work in this area						

6	Location:	Recommendation:							
	Kitchenette	replace 65 Watt incandecent Floods with 9 watt LED	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	2 - 65 watt	2	65	2080	270.4	0.13		
	Proposed:	9 watt LED flood	2	9	2080	37.44	0.018	232.96	0.112
		Proposed lighting controls:	No work in this area						

Lighting Report - Town of Madison Town Hall - Page 2

7	Location:	Recommendation:							
	Bathroom	No work in this area	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	3 Blub F32T8/TK735	1	100.8	2080	209.664	0.1008		
	Proposed:	No work in this area	1	100.8	2080	209.664	0.1008	0	0
		Proposed lighting controls:	No work in this area						

8	Location:	Recommendation:							
	Office	No work in this area	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	3 Blub F32T8/TK735	3	100.8	2080	628.992	0.3024		
	Proposed:	No work in this area	3	100.8	2080	628.992	0.3024	0	0
		Proposed lighting controls:	No work in this area						

9	Location:	Recommendation:							
	Code Enforcement	No work in this area	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	3 Blub F32T8/TK735	2	100.8	2080	419.328	0.2016		
	Proposed:	No work in this area	2	100.8	2080	419.328	0.2016	0	0
		Proposed lighting controls:	None						

10	Location:	Recommendation:							
	Hallway - vestibule	No work in this area	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	11 watt compact flouracent	1	11	2080	22.88	0.011		
	Proposed:	None	1	11	2080	22.88	0.011	0	0
		Proposed lighting controls:							

11	Location:	Recommendation:							
	Police Rear room	No work in this area	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	3 Blub F32T8/TK735	2	100.8	2080	419.328	0.2016		
	Proposed:	No work in this area	2	100.8	2080	419.328	0.2016	0	0
		Proposed lighting controls:	none						

12	Location:	Recommendation:							
	Police Finger Printing	No work in this area	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	2-F32TS SP35 U6	2	67.2	2080	279.552	0.1344		
	Proposed:	No work in this area	2	67.2	2080	279.552	0.1344	0	0
		Proposed lighting controls:	None						

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13	Location:	Recommendation:							
	Police Office	No work in this area	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	2-F32TS SP35 U6	4	67.2	2080	559.104	0.2688		
	Proposed:	No work in this area	4	67.2	2080	559.104	0.2688	0	0
		Proposed lighting controls:	None						

14	Location:	Recommendation:							
	Police Office/recp	No work in this area	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	2-F32TS SP35 U6	4	67.2	2080	559.104	0.2688		
	Proposed:	No work in this area	4	67.2	2080	559.104	0.2688	0	0
		Proposed lighting controls:	None						

15	Location:	Recommendation:							
	Meeting Room	Lights should be removed after installation of LED street light	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	2-F32TS SP35 U6	8	67.2	2080	1118.21	0.5376		
	Proposed:	None	8	67.2	2080	1118.21	0.5376	0	0
		Proposed lighting controls:	None						

16	Location:	Recommendation:							
			# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:		0	0	0	0	0		
	Proposed:		0	0	0	0	0	0	0
		Proposed lighting controls:							

Lighting Cost/Payback Analysis
Madison New Hampshire - Town Hall

KW Rate: 12.82 KWH Rate: 0.08008

Existing System	**Annual**	**Monthly**	**Annual $**	**Montly $**
KWH:	6,669		$534	
KW:	40.944	3.412	$524.90	$43.74
Proposed System	**Annual**	**Monthly**	**Annual $**	**Montly $**
KWH:	6376.644		$511	
KW:	37.224	3.102	$477.21	$39.77
Saved	**Annual**	**Monthly**	**Annual $**	**Montly $**
KWH:	292.36		$23	
KW:	3.72	0.31	$47.69	$3.97

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding #** **20**

Finding Description: **Add Economizer**

Building: **Town Hall**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	No
Electric Savings	Yes
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	No

Recommendation:

Install a mixed air box on back of the two air handlers serving the first floor and the busement along with economizer controls. This installation will reduce the amount of time the air conditioner will run and thus save energy.

Estimated Economic Impact Summary

[[Energy Savings cooling = CFM / 13.8 X (Interior EnthalpyAvg. - OA Enthalpy Cooling Season) X Hours per Day X Days/Year]/ 12000 Btu/ton]*1.1 KWH/ton

CFM	Constant	OA Enthalpy	Interior Enthalpy	Hours per day	Days Per Year	BTU/Ton	KWH/Ton
2800	13.8	15.5	26	4	24	12000	1.1

Estimated Annual Electrical Savings	3570.34	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

Manufacturer does not sell a mixing box for this fan coil, therefore one will need to be built. Mixing air box should be constructed out of 22 ga sheet metal and have three opening equal to the return air opening of the furnace. One opening should be attached to the return of the fan coil, one to the return air duct and the other should be ducted to the outside. A louver with free air opening equal to the return air of the duct shall be installed in the outside wall of the building. Louver shall include screen to eliminate bugs from entering. A damper shall be installed at the connection to the outside air duct and the return air duct. These dampers shall be attached to a actuator which will be controlled by a stand alone air handler controller with economizer capability.

Estimated cost for this installation: $7,597.53

Description	# Units	Labor and Material Cost/Unit	Total	Source
Mixing Box Fabrication	2	480	$960.00	
Damper	4	250	$1,000.00	
Actuator	4	161	$644.00	
Controller and Programming	2	1200	$2,400.00	
Power and Control Wiring	2	275	$550.00	
Louver	2	300	$600.00	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total			$7,597.53	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 21**

Finding Description: **Control Upgrade - Boiler**

Building: **Town Hall**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	No
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

The esixiting TACO relay controller should be upgraded with a TACO add controller which will reset the water temperature

Estimated Economic Impact Summary

See attached calculation sheet

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	67.96	Gallons

Implementation Plan

Install a TACO PC700 controller connected to existing TACO boiler relay controller.

Estimated cost for this installation: $555.56

Description	# Units		Total	Source
Taco PC 700 controller	1	450	450	
	0	0	0	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$555.56	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

Energy Savings Estimate for:
Boiler Temperature Reset
Town Hall
Madison NH

Prepared by Elmer Arbogast

10/8/2010

1.2 Boiler Temperature Reset

Baseline average boiler combustion efficiency is 80%
Baseline average boiler jacket, Heat Exchanger and Piping loss is 10%
The average boiler temperature is the temperature of the hot water produced

A. General Data for Baseline and Proposed Operation

B. Baseline Operation

1	Baseline annual boiler BC	1,024	Gallons	Based on usage provided by Customer
2	Baseline average boiler tempera	205	deg F	Based on Temp of Observed Operation
3	Baseline ave boiler comb efficie	80.0%		Verified
4	Baseline average boiler jacket lo	10.0%		Baxi Jacket Loss
5	Baseline ave boiler overall efficie	70.0%		= BBCE - BBJL
6	Annual facility heating requirem	717	Gallons	= BC x BBOE

C. Proposed Operation

1	Annual facility heating requirem	717	Gallons	= BC x BBOE (same as baseline)
2	Proposed Ave Boiler comb Eff(F	80%		Lochinvar Published Efficiency
3	Proposed average boiler temper	140	deg F	Based Baxi Programming
4	Average reduction in boiler temp	65	deg F	= BT - PT
5	Combustion efficiency improven	1.8%		= (PBCE-BBCE/BBCE) + BTR/36/100
	see http://oee.nrcan.gc.ca/industrial/technical-info/'benchmarking/apma/chapter2.cfm?attr=24			
6	Jacket loss reduction (JLR)	3.2%		= BBJL x (1 - PT/BT)
	Condensing Boiler Jacket Size			Jacket Comparison of New to Existing
7	Reduction(CBJSR)	0.0%		Boilers
8	Proposed ave boiler overall effic	75.0%		= BBCE + CEI - (BBJL - JLR)+(CBJSR*(BBJL-JLR)
9	Proposed boiler Condition (PC)	956	Gallons	= AFHR/PBOE

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 22**

Finding Description: **Add Heat Recovery unit**

Building: **Town Hall**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	Yes
Demand Savings	No
Indoor Air Quality	Yes
Comfort	Yes
Maintenance and Reliability	No

Recommendation:

Install two 500 CFM heat recovery unit to supply air to the training area and office.

Estimated Economic Impact Summary

Energy Savings heating = CFM of Ventilation X 1.08 X (Avg. Unit Discharge Temperature – Avg. OA Temperature Heating Season) X Hours per Day X Days/Year
Energy Savings cooling = CFM of Ventilation / 13.8 X (Avg. OA Enthalpy Cooling Season - Avg. Unit Discharge Enthalpy) X Hours per Day X Days/Year

CFM	Constant	Avg. Discharge Temp	Avg. OA Temp	Hours per day	Days Per Year	BTU/Gallon
1000	1.08	70	28	4	72	140000

CFM	Constant	OA Enthalpy	Interior Enthalpy	Hours per day	Days Per Year	BTU/Ton	KWH/Ton
1000	13.8	34	26	4	30	12000	1.1

Estimated Annual Electrical Savings	1214.40	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	116.64	Gallons

Implementation Plan

A Heat recovery unit equal to a Venmar HRV 600i should be installed in the space above the ceiling next to the fan coil on the first floor and in the boiler room on the lower level. The unit should be ducted into the offices on the first floor and into the meeting area and reception area of the police department on the lower level . Unit should be controlled by a time clock to run only when space is occupied.

Estimated cost for this installation: $5,925.93

Description	# Units	Labor and Material Cost/Unit	Total	Source
Heat Recovery Unit	2	1050	$2,100.00	
Ductwork and Diffuser	2	900	$1,800.00	
Drain Piping	2	175	$350.00	
Power and Control Wiring	2	275	$550.00	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total			$5,925.93	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 23**

Finding Description: **Boiler Upgrade**

Building: **Town Hall**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	No
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

The esixiting TACO relay controller should be upgraded with a TACO add controller which will reset the water temperature

Estimated Economic Impact Summary

See attached calculation sheet

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	187.20	Gallons

Implementation Plan

Install a TACO PC700 controller connected to existing TACO boiler relay controller.

Estimated cost for this installation: $10,185.19

Description	# Units		Total	Source
Budarus	1	8250	8250	
	0	0	0	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$10,185.19	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

Energy Savings Estimate for:
Boiler Upgrade
Town Hall
Madison NH

Prepared by Elmer Arbogast

10/8/2010

1.2 Boiler Temperature Reset

Baseline average boiler combustion efficiency is 80%
Baseline average boiler jacket, Heat Exchanger and Piping loss is 10%
The average boiler temperature is the temperature of the hot water produced

A. General Data for Baseline and Proposed Operation

B. Baseline Operation

1	Baseline annual boiler BC	1,024	Gallons	Based on usage provided by Customer
2	Baseline average boiler temperature (BT)	205	deg F	Based on Temp of Observed Operation
3	Baseline ave boiler comb efficiency (BBCE)	80.0%		Verified
4	Baseline average boiler jacket loss (BBJL)	10.0%		Baxi Jacket Loss
5	Baseline ave boiler overall efficiency (BBOE)	70.0%		= BBCE - BBJL
6	Annual facility heating requirement (AFHR)	717	Gallons	= BC x BBOE

C. Proposed Operation

1	Annual facility heating requirement (AFHR)	717	Gallons	= BC x BBOE (same as baseline)
2	Proposed Ave Boiler comb Eff(PBCE)	88%		Lochinvar Published Efficiency
3	Proposed average boiler temperature (PT)	140	deg F	Based Baxi Programming
4	Average reduction in boiler temperature (BTR)	65	deg F	= BT - PT
5	Combustion efficiency improvement (CEI)	11.8%		= (PBCE-BBCE/BBCE) + BTR/36/100
	see http://oee.nrcan.gc.ca/industrial/technical-info/'benchmarking/apma/chapter2.cfm?attr=24			
6	Jacket loss reduction (JLR)	3.2%		= BBJL x (1 - PT/BT)
	Condensing Boiler Jacket Size			Jacket Comparison of New to Existing
7	Reduction(CBJSR)	10.0%		Boilers
				= BBCE + CEI - (BBJL -
8	Proposed ave boiler overall efficiency (PBOE)	85.7%		JLR)+(CBJSR*(BBJL-JLR)
9	Proposed boiler Condition (PC)	837	Gallons	= AFHR/PBOE

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 24**

Finding Description: **Door Weather Stripping**

Building: **Town Hall**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	No
Demand Savings	No
Indoor Air Quality	Yes
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

Over all the door weather striping is in poor condition at the town hall, weather stripping breaks down over time and with use. Therefore it is recommend that the door weather stripping at this building is set to a high priority at this time. For this type of building and use it is anticipated that the weather-stripping for these doors should be replaced every 8 to 10 years.

Estimated Economic Impact Summary

Energy Savings heating = Open Area X Avg. Wind Speed X Diversity Factor X 1.08 X (Interior Temperature – Avg. OA Temperature Heating Season) X Hours/day X Days/Year
Energy Savings Cooling = [(Open Area X Avg. Wind Speed X Diversity Factor)/13.8] X (Avg. OA Enthalpy Cooling Season - Interior Enthalpy) X Hours/Day X Days/Year

Open Area	Avg. Wind Speed	Diversity Factor	Constant	Interior Temp	Avg OA Temp	Hours per year
2.5	7	1	1.08	70	28	6048

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	42.87	Gallons

Implementation Plan

The Entire perimeter of the entrance doors should be sealed to eliminate heat loss, Sealing kits from American garage door supplies is in the appendix of this report.

Estimated cost for this installation: $779.26

Description	# Units		Total	Source
Overhead - Top Seal Cap	0	71	0	
Over Head - Perimeter Seal	0	108	0	
Overhead - Bottom Seal	0	93.5	0	
Overhead Felt	0	65	0	
Entrance Door Jam Kit	6	72.7	436.2	
Entrance Door Bottom Kit	6	32.5	195	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total			$779.26	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

Inspection Report

Report Date 10/11/2010

Company	Arbogast Energy Auditing	**Customer**	Town of Madison NH
Address	317 Austin St #4	**Site Address**	Town Hall
Thermographer	Elmer Arbogast	**Contact Person**	Sue Stacy

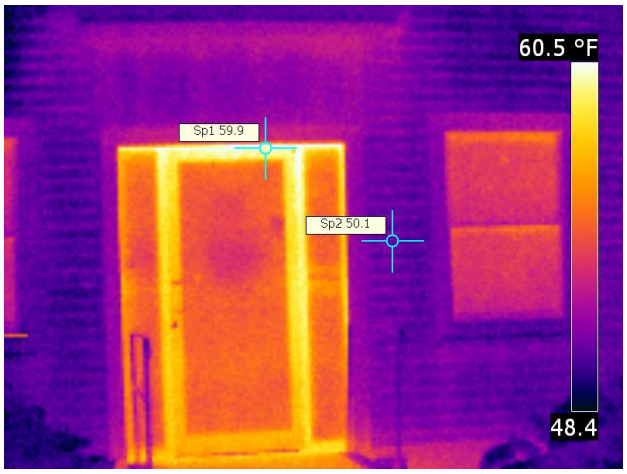

Image and Object Parameters

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Image Date	9/15/2010 10:27:49 AM
Image Name	IR_1845.jpg
Emissivity	0.95
Reflected apparent temperature	0.0 °F
Object Distance	3.2 ft

Text Comments

Description

Doors at town hall are leaking excessive heat.

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 25**

Finding Description: **Timer on domestic hot water heater**

Building: **Town Hall**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	No
Electric Savings	Yes
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

It was observed during the energy audit that the electric hot water heater was on when the space was not occupied. Installing a time clock will shut off the water heater when space is unoccupied but ensure hot water when needed.

Estimated Economic Impact Summary

Energy Saving = KW of Water Heater * Reduce Runtime from time clock

Btu/hr	Reduced Run Hours	
4	182.5	Based on reducing the runtime of the water heater by 1/2 hour per day

Estimated Annual Electrical Savings	730.00	KWH
Estimated Annual Electric Demand Savings	4.00	KW
Estimated Annual Propane Savings	0.01	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

Time Clock should be installed in the power wiring of the water heater and time clock set 1 hour prior to space being occupied and shut off 1/2 prior to space being unoccupied.

Estimated cost for this installation: $165.68

Description	# Units		Total	Source
INTERMATIC Model # EI600WC	1	134.2	134.2	
	0	0	0	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$165.68	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 26**

Finding Description: **Remove less efficient refrigerator**

Building: **Town Hall**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	No
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

In the police department rear room sits a white GE mini refrigerator which at the time of the audit was not being used but was plugged in. This unit uses more electric than larger refrigerator which site upon top of it. Therefore this GE refrigerator should be taken out of service.

Estimated Economic Impact Summary

Unit watt rateing	Hours of operation	Diversity factor of compressor runtime
168	8760	0.2

Estimated Annual Electrical Savings	294.34	KWH
Estimated Annual Electric Demand Savings	0.17	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

Unplug White GE refrigerator

Estimated cost for this installation: $1.23

Description	# Units		Total	Source
Refrigerator removal	1	1	1	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$1.23	

Recommend Work to be performed by – Town Employees

Owner Action – Unplug refrigerator

Observations - Library

Original Design and Current Use

- The Building is a wood frame building that was built in 1994 and an addition was added in 2008. The building was built to be a library and was design for current use. Only issues noted with design of building is windows are not blocking UV light adequately resulting in potential fading of some books.

Retrofits

- The retrofit recommendation include lighting, HVAC improvements, window covering and building envelope improvement and sealing. I am also recommending a comfort improvement recommendation of adding an additional zone to the first floor HVAC system. High priority recommendation all have a payback of less than 5 years or have health safety issues attached. A total of 10 recommendation are being made for this building.

On-Site Renewable Energy

- This building does have a nice south facing roof where Thermal solar could be installed and would have less than a 10 year payback. Other onsite renewable are not recommended due to good efficiency of occupied space. If usage of this building increases the addition of on-site renewable should be reviewed with new usage. On-site renewable energy sources for all buildings are

Age and Condition of the Mechanical Equipment

- The major HVAC equipment was installed in 1994 and should have a life of 20 years. Equipment replacement should be considered in 5 to 10 years as it approach the end of its service life. Equipment appears in good working condition and are operating at rated efficiency.

Indoor Air Quality

- Overall the Indoor air quality of this building is very good with C02 and particle counts well below acceptable levels. It should be noted that since building does not have a central ventilating system is not in compliance with ASHRAE 62.1 however the occupancy rate of this building is below the rate used by ASHRAE for this Standard. Therefore it is recommended that heat recovery ventilation system be considered but at a low priority compared to other retrofits.

Space temperature and Humidity

- The temperature in this space is controlled by manual thermostats and humidity is manually controlled. Programmable thermostat would ensure the building is set back during un-occupied periods. High humidity is addressed by a manual floor mounted humidifier since this is adequate for this building use it is recommended that humidity control stays the same. Boiler has no centralized logic controller, the addition of boiler controller with reset control will produce additional energy

R- Value

- Overall the R-Value of this building is in acceptable range. Several areas where repair of sealing were noted and are listed in the recommendations.

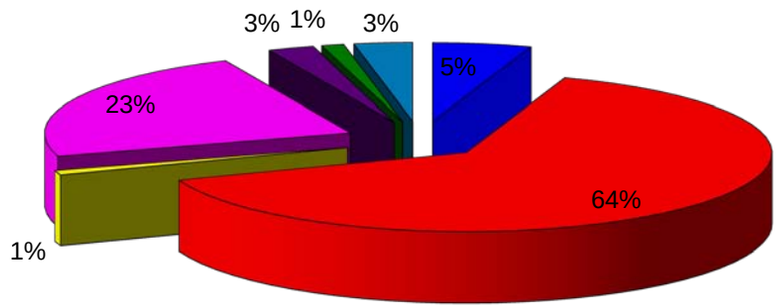
Maintenance

- Maintenance is on call manor, changing over to a preventive maintenance approach would result in future energy usage and extend the life of the equipment resulting in reduced future operation cost.

People's energy awareness

- The occupant energy awareness in this building as throughout most of the town buildings is very good. A yearly review of energy usage is recommended to keep the awareness of energy usage high.

Library
ENERGY USAGE PROFILE



Cooling | Heating | Pumps | Lighting | Dehumidifier | Domestic Hot Water | Plug Load (Include Computers)

Total Facility Consumption	126 (Millions of BTU/hr)
Cooling	5.2%
Heating	64.2%
Pumps	0.9%
Lighting	23.1%
Dehumidifier	2.4%
Domestic Hot Water	1.2%
Plug Load (Include Computers)	3.1%
Total	100%

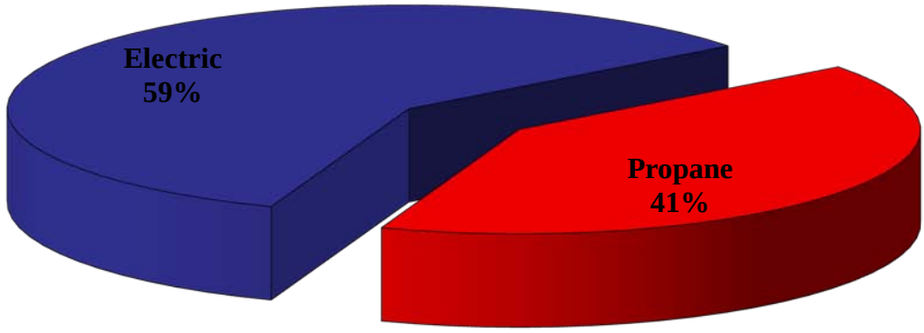
Town of Madison New Hampshire
Library
Utility Analysis Period:

8/01/2009 to 7/31/2010

	Current Year			Previous Year		
	8/1/2009	to	7/31/2010	8/1/2008	to	7/31/2009
	Electric		Propane	Electric		Propane
Utility Costs	$2,205		$1,527	$2,166		$2,427
Utility Usage	13,255		776	13,045		891
$ Cost/Unit (kWh, Therm, Gal)	$0.17		$1.97	$0.17		$2.72
	CDD		HDD	CDD		HDD
	353		7,263	273		7,998
Current Year Vs Previous Year	**Electric**		**Propane**			
Change in Cost	2%		-37%			
Change in Usage	2%		-13%			
Change in $ Cost/Unit	0%		-28%			
Change in Degree Day	29%		-9%			

Propane usage decrease greatly in poportional to heating degree days increase, This was due to deliver not actual usage changes. Electrical usage had a slight increase with a large increase in cooling degree days, this can be partially contributed to this past summer was warmer but dryer than preivious summer

Utility Cost Comparison Current Year



Energy Benchmarking - Library

The calculation of EUI (Energy Use Intensity) is shown below. EUI, expressed in kBtu/sf, is normalized for floor area, the most dominant influence on energy use in most buildings. Its use usually provides a good approximation of how your building's energy performance compares to others. Site EUI indicates the rate at which energy is used at your building (the point of use). Source EUI indicates the rate at which energy is used at the generation sources serving your building (the point of source) and indicates the societal energy penalty due to your building The lower the EUI, the higher the rating, indicating that the building is more efficient than other buildings. The greater the EUI, the lower the rating, indicating that there is an opportunity for higher potential benefits from operational improvements.

To compare the buildings shown below to each other, and to determine the ranking of the buildings from having the most to the least opportunity for demand-side improvements from a financial perspective, please see the Site EUI ranking below.

The Site EUI below has been applied to a Department of Energy statistical model from the Oak Ridge National Laboratory web site, http://eber.ed.ornl.gov/benchmark. The Department of Energy has estimated energy use and cost reductions for building source EUI ratings (percentiles) in the table below. Please see the DOE Regional Source EUI Comparison graph below to rate your building in relation to the regional distribution of similar type buildings. (Note: The Source EUI includes the inefficiencies of electrical generation and transmission. A reduction in 'electrical' source EUI includes a benefit in terms of reduction of air pollution emissions and green house gases, and is thus an indicator of societal benefit.)

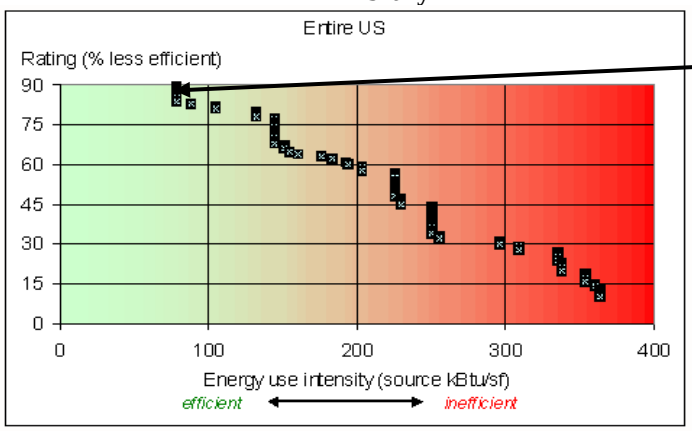
Source EUI Rating for your Building	Energy use and cost reduction potential (%)	Walk-thru energy assessment recommended?
above 60%	below 25%	No
40 to 60%	20 to 35%	Maybe
20 to 40%	35 to 50%	Yes
Below 20%	above 50%	Definitely

Rating from the most efficient to the least efficient - 2010 consumption

Site EUI Rank	Building	Annual Total Electrical Use (kWh)	Annual Total Non-Electrical Fuel Use (Gals)	Occupied Building Gross Floor Area (sq-ft)	Site EUI Rating	Source EUI: Annual Total Source Energy Use per Sq-Ft (kBtu/sf)	Rating (Regional Source EUI Comparison)
1	Library	13,255	891	2,509	**50**	**87**	**0.90**

Building Type

Library



Site EUI	Est Regional Rating	Building
50	90%	Library

Source: Oak Ridge National Laboratory web site, http://eber.ed.ornl.gov/benchmark

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 27**

Finding Description: **Install Programmable T-Stats**

Building: **Library**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	Yes
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

A programmable T-Stat should be installed to replace the 5 existing non programable thermostats.

Estimated Economic Impact Summary

Energy Saving = BTU/hr of Boiler * Reduce Runtime from Programmable T-Stat

Btu/hr	Reduced Run Hours	
130000	36	Based on reducing the runtime of the furnace by 1 hour per week during the heating season

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	64.29	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

The Honeywell T4110D1007 will install in place of exiting Honeywell T87 non programmable stats. Stat should be program only to heat the building to 55 degrees during unoccupied time and heat up to 68 degrees 1 1/2 hour prior to schedule occupied times.

Estimated cost for this installation: $335.19

Description	# Units		Total	Source
Honeywell TH4110D1007	5	54.3	271.5	
	0	0	0	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total			$335.19	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 28**

Finding Description: **Controls Upgrade - Boiler Controller**

Building: **Library**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	No
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

The esixiting relays controlling the boiler should be ugraded to a TACO relay controller with a TACO add controller which will reset the water temperature

Estimated Economic Impact Summary

See attached calculation sheet

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	51.50	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

Install a TACO PC700 controller connected to existing TACO boiler relay controller.

Estimated cost for this installation: $871.60

Description	# Units		Total	Source
Taco PC 700 controller	1	450	450	
Taco relay controller	1	256	256	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$871.60	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

Energy Savings Estimate for:
Boiler Temperature Reset
Library
Madison NH

Prepared by Elmer Arbogast

10/8/2010

1.2 Boiler Temperature Reset

Baseline average boiler combustion efficiency is 80%
Baseline average boiler jacket, Heat Exchanger and Piping loss is 10%
The average boiler temperature is the temperature of the hot water produced

A. General Data for Baseline and Proposed Operation

B. Baseline Operation

1	Baseline annual boiler BC	776	Gallons	Based on usage provided by Customer
2	Baseline average boiler tempera	205	deg F	Based on Temp of Observed Operation
3	Baseline ave boiler comb efficie	80.0%		Verified
4	Baseline average boiler jacket lo	10.0%		Baxi Jacket Loss
5	Baseline ave boiler overall efficie	70.0%		= BBCE - BBJL
6	Annual facility heating requirem	543	Gallons	= BC x BBOE

C. Proposed Operation

1	Annual facility heating requirem	543	Gallons	= BC x BBOE (same as baseline)
2	Proposed Ave Boiler comb Eff(F	80%		Lochinvar Published Efficiency
3	Proposed average boiler temper	140	deg F	Based Baxi Programming
4	Average reduction in boiler temp	65	deg F	= BT - PT
5	Combustion efficiency improven	1.8%		= (PBCE-BBCE/BBCE) + BTR/36/100
	see http://oee.nrcan.gc.ca/industrial/technical-info/'benchmarking/apma/chapter2.cfm?attr=24			
6	Jacket loss reduction (JLR)	3.2%		= BBJL x (1 - PT/BT)
	Condensing Boiler Jacket Size			Jacket Comparison of New to Existing
7	Reduction(CBJSR)	0.0%		Boilers
8	Proposed ave boiler overall effic	75.0%		= BBCE + CEI - (BBJL - JLR)+(CBJSR*(BBJL-JLR)
9	Proposed boiler Condition (PC)	724	Gallons	= AFHR/PBOE

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 29**

Finding Description: **Lighting/Lighting Control Upgrade**

Building: **Library**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	No
Electric Savings	Yes
Demand Savings	Yes
Indoor Air Quality	No
Comfort	No
Maintenance and Reliability	Yes

Recommendation:

The Library lighting was retrofited a few years ago. There are some outdoor ights that should be upgraded to solid state lighting.

Estimated Economic Impact Summary

Energy Savings = [Watts of Existing Fixture-Watts of New Fixture] x Number of Fixture x Lighting hours per year

Estimated Annual Electrical Savings	991.36	KWH
Estimated Annual Electric Demand Savings	8.59	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

Please see attached detail lighting sheet and sketch for detail of work.

Estimated cost for this installation: $760.49

Description	# Units		Total	Source
9- Watt LED spot light	6	26	156	
Solid State Wall Pack	1	460	460	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$760.49	
Total Post PSNH Rebate			$456.30	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

Lighting Audit Report

Madison New Hampshire - Library

1	Location:	Recommendation:							
	Outdoor	Replace 400 watt Quartz with solid state lighting	**# of Fixtures**	**Average Watts**	**Usage (hrs ann.)**	**KWH (Used)**	**KW (Used)**	**KWH (Saved)**	**KW (Saved)**
	Existing:	400 watt quartz	1	400	2000	800	0.4		
	Proposed:	9 watt LED flood	1	50	2000	100	0.05	700	0.35
		Proposed lighting controls:							
2	Location:	Recommendation:							
	Basement	No work in this area	**# of Fixtures**	**Average Watts**	**Usage (hrs ann.)**	**KWH (Used)**	**KW (Used)**	**KWH (Saved)**	**KW (Saved)**
	Existing:	2 Blub F32T8/TK735	30	100.8	728	2201.472	3.024		
	Proposed:	No Work	30	100.8	728	2201.472	3.024	0	0
		Proposed lighting controls:	No work in this area						
3	Location:	Recommendation:							
	Upper level	No work in this area	**# of Fixtures**	**Average Watts**	**Usage (hrs ann.)**	**KWH (Used)**	**KW (Used)**	**KWH (Saved)**	**KW (Saved)**
	Existing:	2 Blub F32T8/TK735	44	100.8	728	3228.8256	4.4352		
	Proposed:	No work in this area	44	100.8	728	3228.8256	4.4352	0	0
		Proposed lighting controls:	No work in this area						
4	Location:	Recommendation:							
	Outdoor floods	Replace Incandecent flood with 9 watt solid state floods	**# of Fixtures**	**Average Watts**	**Usage (hrs ann.)**	**KWH (Used)**	**KW (Used)**	**KWH (Saved)**	**KW (Saved)**
	Existing:	75 Watt	4	75	300	90	0.3		
	Proposed:	No work in this area	4	9	300	10.8	0.036	79.2	0.264
		Proposed lighting controls:	No work in this area						
5	Location:	Recommendation:							
	Upper rest room	Replace Incandecent flood with 9 watt solid state floods	**# of Fixtures**	**Average Watts**	**Usage (hrs ann.)**	**KWH (Used)**	**KW (Used)**	**KWH (Saved)**	**KW (Saved)**
	Existing:	60 watt	1	60	2080	124.8	0.06		
	Proposed:	9 watt LED	1	9	2080	18.72	0.009	106.08	0.051
		Proposed lighting controls:	No work in this area						
6	Location:	Recommendation:							
	Lower level restroom	Replace Incandecentwith 9 watt solid state	**# of Fixtures**	**Average Watts**	**Usage (hrs ann.)**	**KWH (Used)**	**KW (Used)**	**KWH (Saved)**	**KW (Saved)**
	Existing:	60 watt	1	60	2080	124.8	0.06		
	Proposed:	9 watt LED	1	9	2080	18.72	0.009	106.08	0.051
		Proposed lighting controls:	No work in this area						

Lighting Cost/Payback Analysis

Madison New Hampshire - Library

KW Rate: 12.82 KWH Rate: 0.08008

Existing System	**Annual**	**Monthly**	**Annual $**	**Montly $**
KWH:	6,570		$526	
KW:	99.3504	8.2792	$1,273.67	$106.14
Proposed System	**Annual**	**Monthly**	**Annual $**	**Montly $**
KWH:	5578.5376		$447	
KW:	90.7584	7.5632	$1,163.52	$96.96
Saved	**Annual**	**Monthly**	**Annual $**	**Montly $**
KWH:	991.36		$79	
KW:	8.592	0.716	$110.15	$9.18

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 30**

Finding Description: **Add Heat Recovery unit**

Building: **Library**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	Yes
Demand Savings	No
Indoor Air Quality	Yes
Comfort	Yes
Maintenance and Reliability	No

Recommendation:

Install one 500 CFM heat recovery unit to supply air to the training area and office.

Estimated Economic Impact Summary

Energy Savings heating = CFM of Ventilation X 1.08 X (Avg. Unit Discharge Temperature – Avg. OA Temperature Heating Season) X Hours per Day X Days/Year
Energy Savings cooling = CFM of Ventilation / 13.8 X (Avg. OA Enthalpy Cooling Season - Avg. Unit Discharge Enthalpy) X Hours per Day X Days/Year

CFM	Constant	Avg. Discharge Temp	Avg. OA Temp	Hours per day	Days Per Year	BTU/Gallon
500	1.08	70	28	4	72	91000

CFM	Constant	OA Enthalpy	Interior Enthalpy	Hours per day	Days Per Year	BTU/Ton	KWH/Ton
500	13.8	34	26	4	30	12000	1.1

Estimated Annual Electrical Savings	607.20	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	71.78	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

A Heat recovery unit equal to a Venmar HRV 600i should be installed in rear room on the lower level. The unit should be ducted the first floor and into the meeting area on the lower level . Unit should be controlled by a time clock to run only when space is occupied.

Estimated cost for this installation: $2,962.96

Description	# Units	Labor and Material Cost/Unit	Total	Source
Heat Recovery Unit	1	1050	$1,050.00	
Ductwork and Diffuser	1	900	$900.00	
Drain Piping	1	175	$175.00	
Power and Control Wiring	1	275	$275.00	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total			$2,962.96	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 31**

Finding Description: **Install Solarize Window Blinds**

Building: **Library**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	Yes
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

This building has a lot of solar gain and therefore would benefit from solarize window blinds. Although energy saving is important in this application the elimnation of UV light which has the potential to damage books is the reason this finding has a high priority.

Estimated Economic Impact Summary

Energy Savings Cooling = Area X (Existing SHGC – New SHGC) X (Incident Total Irradiance) X Hours/Day X Days/Year

Area	Existing SHGC	New SHGC	Incient Total Irradiance	Hour/day	Days per year
161.7	0.85	0.45	105.105	10	208

Estimated Annual Electrical Savings	648.09	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	37.35	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

Install Solarize Inflector vertical blind system on seven large window in the office area of the first floor and the four larger windows facing east on the basement floor. These vertical blinds will allow the natural light to enter the space while relecting the radiation heat back the direction that is desired. Note that this recommendation has a high priority because it will also increase comfort as long as saving energy.

Estimated cost for this installation: $2,533.00

Description	# Units		Total	Source
Inflector system Roller shade 30x36	9	125	1125	
Inflector system Roller shade 24x36	5	100	500	
Inflector system Roller shade 24x27	4	77	308	
Inflector system Roller shade 24x54	4	150	600	
Contractor Mark Up			0%	Equivalent of 10% Overhead and 10% Profit
Total			$2,533.00	

Recommend Work to be performed by – Town employee

Owner Action – order blinds

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 32**

Finding Description: **Boiler Upgrade**

Building: **Library**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	No
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

The esixiting TACO relay controller should be upgraded with a TACO add controller which will reset the water temperature

Estimated Economic Impact Summary

See attached calculation sheet

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	192.91	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

Install a TACO PC700 controller connected to existing TACO boiler relay controller.

Estimated cost for this installation: $10,185.19

Description	# Units		Total	Source
Lochinvar	1	8250	8250	
	0	0	0	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$10,185.19	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

Energy Savings Estimate for:
Boiler Upgrade
Town Hall
Madison NH

Prepared by Elmer Arbogast

10/8/2010

1.2 Boiler Temperature Reset

Baseline average boiler combustion efficiency is 80%
Baseline average boiler jacket, Heat Exchanger and Piping loss is 10%
The average boiler temperature is the temperature of the hot water produced

A. General Data for Baseline and Proposed Operation

B. Baseline Operation

1	Baseline annual boiler BC	776	Gallons	Based on usage provided by Customer
2	Baseline average boiler temperature (BT)	205	deg F	Based on Temp of Observed Operation
3	Baseline ave boiler comb efficiency (BBCE)	80.0%		Verified
4	Baseline average boiler jacket loss (BBJL)	10.0%		Baxi Jacket Loss
5	Baseline ave boiler overall efficiency (BBOE)	70.0%		= BBCE - BBJL
6	Annual facility heating requirement (AFHR)	543	Gallons	= BC x BBOE

C. Proposed Operation

1	Annual facility heating requirement (AFHR)	543	Gallons	= BC x BBOE (same as baseline)
2	Proposed Ave Boiler comb Eff(PBCE)	94%		Lochinvar Published Efficiency
3	Proposed average boiler temperature (PT)	140	deg F	Based Baxi Programming
4	Average reduction in boiler temperature (BTR)	65	deg F	= BT - PT
5	Combustion efficiency improvement (CEI)	19.3%		= (PBCE-BBCE/BBCE) + BTR/36/100
	see http://oee.nrcan.gc.ca/industrial/technical-info/'benchmarking/apma/chapter2.cfm?attr=24			
6	Jacket loss reduction (JLR)	3.2%		= BBJL x (1 - PT/BT)
	Condensing Boiler Jacket Size			Jacket Comparison of New to Existing
7	Reduction(CBJSR)	10.0%		Boilers
				= BBCE + CEI - (BBJL -
8	Proposed ave boiler overall efficiency (PBOE)	93.2%		JLR)+(CBJSR*(BBJL-JLR)
9	Proposed boiler Condition (PC)	583	Gallons	= AFHR/PBOE

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding #** **33**

Finding Description: **Thermal Solar**

Building: **Library**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	No
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

The library has a south facing roof that has the opertunity to install a solar hot water heater to help heat the space.

Estimated Economic Impact Summary

Energy Savings heating =Btu of Heating per day* Diversity Factor * Units * Weeks Per Year * Days Per week

Btu/day	Diversity Factor	# of Units	Weeks per year	Days per week
28000.00	1	1	36	7

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	96.92	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

Install a themal solar collector model SunMaxx-30 Evacuated Tube or equalt on the south facing roof of the library. The installation shall include all pumps and piping ncessary to complete a working system including a storage tank, controls and conncection to existing system.

Estimated cost for this installation: $5,061.73

Description	# Units	Labor and Material Cost/Unit	Total	Source
Sun-Maxx 30	1	2250	2250	
Tank and controls	1	1850	1850	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total			$5,061.73	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 34**

Finding Description: **Door Weather Stripping**

Building: **Library**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	No
Demand Savings	No
Indoor Air Quality	Yes
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

Over all the door weather striping is in fair condition at the town hall, weather stripping breaks down over time and with use. Therefore it is recommend that the door weather stripping at this building is set to a medium priority at this time. For this type of building and use it is anticipated that the weather-stripping for these doors should be replaced every 10 to 12 years.

Estimated Economic Impact Summary

Energy Savings heating = Open Area X Avg. Wind Speed X Diversity Factor X 1.08 X (Interior Temperature – Avg. OA Temperature Heating Season) X Hours/day X Days/Year
Energy Savings Cooling = [(Open Area X Avg. Wind Speed X Diversity Factor)/13.8] X (Avg. OA Enthalpy Cooling Season - Interior Enthalpy) X Hours/Day X Days/Year

Open Area	Avg. Wind Speed	Diversity Factor	Constant	Interior Temp	Avg OA Temp	Hours per year
1.25	7	1	1.08	70	28	6048

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	32.97	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

The Entire perimeter of the entrance doors should be sealed to eliminate heat loss, Sealing kits from American garage door supplies is in the appendix of this report.

Estimated cost for this installation: $779.26

Description	# Units		Total	Source
Overhead - Top Seal Cap	0	71	0	
Over Head - Perimeter Seal	0	108	0	
Overhead - Bottom Seal	0	93.5	0	
Overhead Felt	0	65	0	
Entrance Door Jam Kit	6	72.7	436.2	
Entrance Door Bottom Kit	6	32.5	195	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total			$779.26	

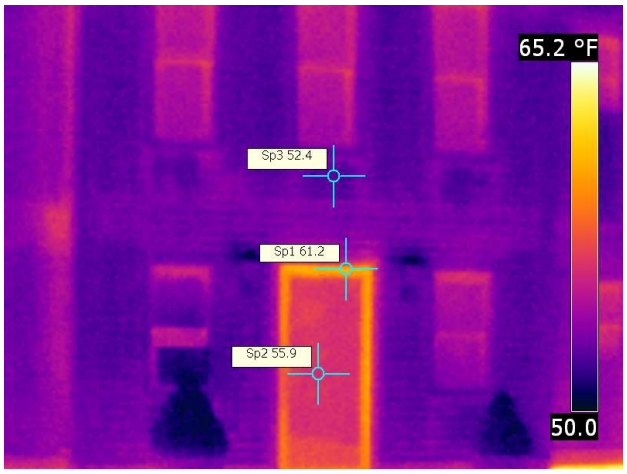
Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

Inspection Report

Report Date 10/11/2010

Company	Arbogast Energy Auditing	**Customer**	Town of Madison NH
Address	317 Austin St #4	**Site Address**	Library
Thermographer	Elmer Arbogast	**Contact Person**	Sue Stacy



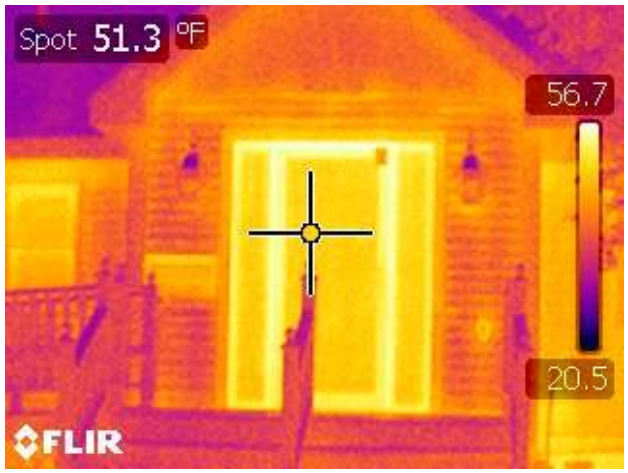


Image and Object Parameters

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Image Date	9/15/2010 10:44:46 AM
Image Name	IR_1897.jpg
Emissivity	0.95
Reflected apparent temperature	0.0 °F
Object Distance	3.2 ft

Text Comments

Description

Library doos are showing excessive heat loss

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 35**

Finding Description: **Timer on domestic hot water heater**

Building: **Library**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	No
Electric Savings	Yes
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

It was observed during the energy audit that the electric hot water heater was on when the space was not occupied. Installing a time clock will shut off the water heater when space is unoccupied but ensure hot water when needed.

Estimated Economic Impact Summary

Energy Saving = KW of Water Heater * Reduce Runtime from time clock

Btu/hr	Reduced Run Hours	
1.5	182.5	Based on reducing the runtime of the water heater by 1/2 hour per day

Estimated Annual Electrical Savings	273.75	KWH
Estimated Annual Electric Demand Savings	1.50	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

Time Clock should be installed in the power wiring of the water heater and time clock set 1 hour prior to space being occupied and shut off 1/2 prior to space being unoccupied.

Estimated cost for this installation: $139.38

Description	# Units		Total	Source
INTERMATIC Model # EI500WC	1	112.9	112.9	
	0	0	0	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$139.38	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

Observations - Fire Station

Original Design and Current Use

- The Building is a metal frame building was built in 1984 and is good condition. The building was built to be a fire station and the use of the building has not changed. At the time of the Audit the HVAC system was being updated to a more efficient propane fired system. Since this is not a full time fire station fuel usage is low per square footage compared to similar buildings used as full time

Retrofits

- The retrofit recommendation include lighting, HVAC improvements, vending machine control and building envelope improvement and sealing. I am also recommending a CO and CO2 monitoring system be installed as a safety issues, it should be noted that this retrofit has the potential to increase energy cost. High priority recommendations all have a payback of less than 5 years or have health safety issues attached. A total of 9 recommendation are being made for this building which have the potential to reduce the building.

On-Site Renewable Energy

- This building does not have any on-site renewable energy fit which would have less than a 10 year payback. This is due mainly due to the low energy usage due to it part time status. If usage of this building increases the addition of on-site renewable should be reviewed with new usage. On-site renewable energy sources for all buildings are addressed later in this report.

Age and Condition of the Mechanical Equipment

- The major HVAC equipment is being replace in 2010 and should have a life of 20 years. Since the equipment is new it is currently in good condition. At the time of the Audit the old oil fired unit was not removed, it should be removed and flue properly sealed.

Indoor Air Quality

- Overall the Indoor air quality of this building is good. A couple of issues was noted during the Energy Audit. First the outside air connection for the new furnace serving the office and training room area was not connect and therefore compliance with ASHRAE 62.1 could not be confirmed. Second a major of the building is a garage area with out an exhaust extraction system and/or a CO or CO2 monitoring system. It is recommended that a exhaust extraction system and CO and CO2 monitoring system be installed.

Space temperature and Humidity

- The temperature in this space is controlled by manual thermostats and humidity is not controlled. Due to light usage a programmable thermostat with a timed override would ensure building is set back during un-occupied periods. Since humidity is not a concern with in this space due to climate and use it is recommended that humidity control stays the same.

R- Value

- Overall the R-Value of this building is in acceptable range. Several areas where repair of sealing and insulation were noted and are listed in the recommendation.

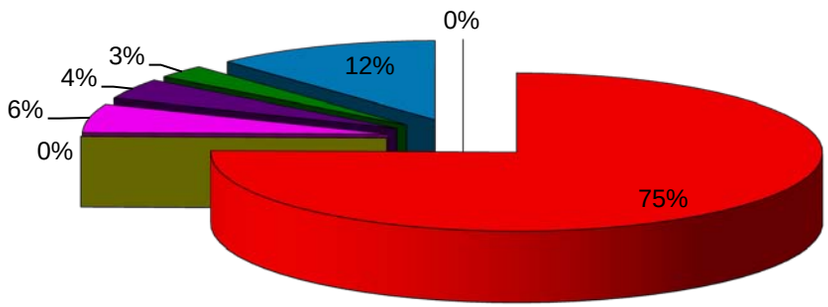
Maintenance

- Maintenance is on call manor, changing over to a preventive maintenance approach would result in future energy usage and extend the life of the equipment resulting in reduced future operation cost.

People's energy awareness

- The occupant energy awareness in this building as throughout most of the town buildings is very good. A yearly review of energy usage is recommended to keep the awareness of energy usage high.

Fire Station
ENERGY USAGE PROFILE



Total Facility Consumption	221 (Millions of BTU/hr)
Cooling	0.0%
Heating	75.3%
Pumps	0.0%
Lighting	5.9%
Fans	4.2%
Domestic Hot Water	2.7%
Plug Load (Include Computers)	11.9%
Total	100.0%

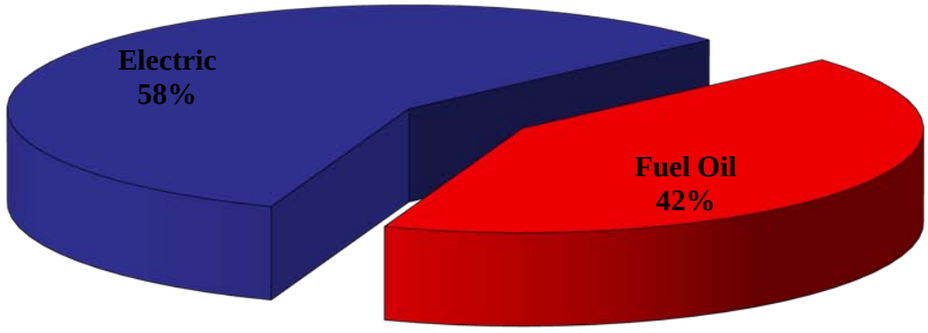
Town of Madison New Hampshire
Fire Station
Utility Analysis Period:

8/01/2009 to 7/31/2010

	Current Year			Previous Year		
	8/1/2009	to	7/31/2010	8/1/2008	to	7/31/2009
	Electric		Fuel Oil	Electric		Fuel Oil
Utility Costs	$2,621		$1,905	$2,286		$2,550
Utility Usage	15,984		775	13,086		1,189
$ Cost/Unit (kWh, Therm, Gal)	$0.16		$2.46	$0.17		$2.15
	CDD		HDD	CDD		HDD
	353		7,263	273		7,998
Current Year Vs Previous Year	**Electric**		**Fuel Oil**			
Change in Cost	15%		-25%			
Change in Usage	22%		-35%			
Change in $ Cost/Unit	-6%		15%			
Change in Degree Day	29%		-9%			

Fuel usage decreased greater than decrease in heating degree days. This most likely resulted in tank being left at a lower level due to planned retrofit. Electrical had a dramatic increase which most likely was a result of increase usage.

Utility Cost Comparison Current Year



Energy Benchmarking - Fire Station

The calculation of EUI (Energy Use Intensity) is shown below. EUI, expressed in kBtu/sf, is normalized for floor area, the most dominant influence on energy use in most buildings. Its use usually provides a good approximation of how your building's energy performance compares to others. Site EUI indicates the rate at which energy is used at your building (the point of use). Source EUI indicates the rate at which energy is used at the generation sources serving your building (the point of source) and indicates the societal energy penalty due to your building The lower the EUI, the higher the rating, indicating that the building is more efficient than other buildings. The greater the EUI, the lower the rating, indicating that there is an opportunity for higher potential benefits from operational improvements.

To compare the buildings shown below to each other, and to determine the ranking of the buildings from having the most to the least opportunity for demand-side improvements from a financial perspective, please see the Site EUI ranking below.

The Site EUI below has been applied to a Department of Energy statistical model from the Oak Ridge National Laboratory web site, http://eber.ed.ornl.gov/benchmark. The Department of Energy has estimated energy use and cost reductions for building source EUI ratings (percentiles) in the table below. Please see the DOE Regional Source EUI Comparison graph below to rate your building in relation to the regional distribution of similar type buildings. (Note: The Source EUI includes the inefficiencies of electrical generation and transmission. A reduction in 'electrical' source EUI includes a benefit in terms of reduction of air pollution emissions and green house gases, and is thus an indicator of societal benefit.)

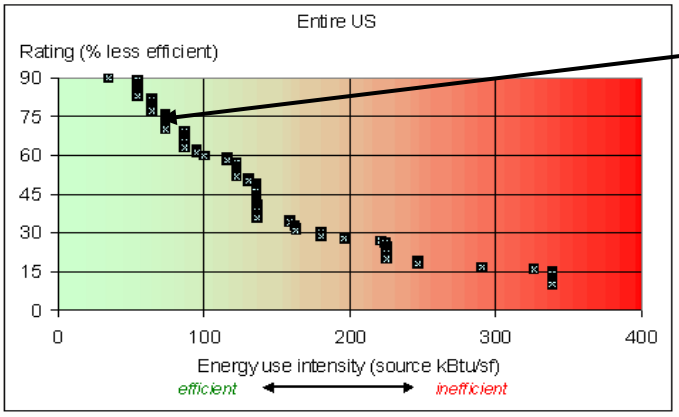
Source EUI Rating for your Building	Energy use and cost reduction potential (%)	Walk-thru energy assessment recommended?
above 60%	below 25%	No
40 to 60%	20 to 35%	Maybe
20 to 40%	35 to 50%	Yes
Below 20%	above 50%	Definitely

Rating from the most efficient to the least efficient - 2010 consumption

Site EUI Rank	Building	Annual Total Electrical Use (kWh)	Annual Total Non-Electrical Fuel Use (Gals)	Occupied Building Gross Floor Area (sq-ft)	Site EUI Rating	Source EUI: Annual Total Source Energy Use per Sq-Ft (kBtu/sf)	Rating (Regional Source EUI Comparison)
1	Fire Station	15,984	1,189	3,168	**70**	**105**	**0.74**

Building Type

Fire/Police Station



Site EUI	Est Regional Rating	Building
70	74%	Fire Station

Source: Oak Ridge National Laboratory web site, http://eber.ed.ornl.gov/benchmark

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding #** **1**

Finding Description: **Add Economizer**

Building: **Fire Station**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	No
Electric Savings	Yes
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	No

Recommendation:

Install a mixed air box on back of new furnace along with economizer controls. It should be noted that this will not save energy over existing condition since space is not air conditioned. However it will reduce the amount of time which an added air conditioner will run and thus save future energy.

Estimated Economic Impact Summary

[[Energy Savings cooling = CFM / 13.8 X (Interior EnthalpyAvg. - OA Enthalpy Cooling Season) X Hours per Day X Days/Year]/ 12000 Btu/ton]*1.1 KWH/ton

CFM	Constant	OA Enthalpy	Interior Enthalpy	Hours per day	Days Per Year	BTU/Ton	KWH/Ton
1200	13.8	15.5	26	4	30	12000	1.1

Estimated Annual Electrical Savings	1912.68	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

Lennox does not sell a mixing box for this G61 Furnace, therefore one will need to be built. Mixing air box should be constructed out of 22 ga sheet metal and have three opening equal to the return air opening of the furnace. One opening should be attached to the return of the furnace, one to the return air duct and the other should be ducted to the outside. A louver with free air opening equal to the return air of the duct shall be installed in the outside wall of the building. Louver shall include screen to eliminate bugs from entering. A damper shall be installed at the connection to the outside air duct and the return air duct. These dampers shall be attached to a actuator which will be controlled by a stand alone air handler controller with economizer capability.

Estimated cost for this installation: $3,798.77

Description	# Units	Labor and Material Cost/Unit	Total	Source
Mixing Box Fabrication	1	480	$480.00	
Damper	2	250	$500.00	
Actuator	2	161	$322.00	
Controller and Programming	1	1200	$1,200.00	
Power and Control Wiring	1	275	$275.00	
Louver	1	300	$300.00	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total			$3,798.77	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 2**

Finding Description: **Add Heat Recovery unit**

Building: **Fire Station**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	Yes
Demand Savings	No
Indoor Air Quality	Yes
Comfort	Yes
Maintenance and Reliability	No

Recommendation:

Install a 450 CFM heat recovery unit to supply air to the training area and office.

Estimated Economic Impact Summary

Energy Savings heating = CFM of Ventilation X 1.08 X (Avg. Unit Discharge Temperature – Avg. OA Temperature Heating Season) X Hours per Day X Days/Year

Energy Savings cooling = CFM of Ventilation / 13.8 X (Avg. OA Enthalpy Cooling Season - Avg. Unit Discharge Enthalpy) X Hours per Day X Days/Year

CFM	Constant	Avg. Discharge Temp	Avg. OA Temp	Hours per day	Days Per Year	BTU/Gallon
450	1.08	70	28	4	72	140000

CFM	Constant	OA Enthalpy	Interior Enthalpy	Hours per day	Days Per Year	BTU/Ton	KWH/Ton
450	13.8	34	26	4	30	12000	1.1

Estimated Annual Electrical Savings	546.48	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	52.49	Gallons

Implementation Plan

A Heat recovery unit equal to a Venmar HRV 600i should be installed in the space above the training area. The unit should be hung from upper ceiling support. The unit should be ducted to the training area and the office and balance for 410 CFM into the training area and 40 CFM into the office. Unit should be turned on if the light switch in the office or the training are is turned on.

Estimated cost for this installation: $2,962.96

Description	# Units	Labor and Material Cost/Unit	Total	Source
Heat Recovery Unit	1	1050	$1,050.00	
Ductwork and Diffuser	1	900	$900.00	
Drain Piping	1	175	$175.00	
Power and Control Wiring	1	275	$275.00	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total			$2,962.96	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 3**

Finding Description: **Repair holes in ceiling**

Building: **Fire Station**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	Yes
Demand Savings	No
Indoor Air Quality	Yes
Comfort	Yes
Maintenance and Reliability	No

Recommendation:

Repair solid ceiling above the drop ceiling in the training area of the Fire Station. Openings in the hard ceiling allows heated air to raise in to attic space. Please see pictures of opening in this report.

Estimated Economic Impact Summary

Energy Savings heating = Open Area X Air transfer rate X Diversity Factor X 1.08 X (Interior Temperature – Avg. OA Temperature Heating Season) X Hours/day X Days/Year

Open area	Air Transfer Rate	Diversity Factor	Constant	Interior Temp	Avg. OA Temp	Hours per year	Day per year
32	10	1	1.08	70	28	4	30

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	15.55	Gallons

Implementation Plan

Since the damaged area is above a drop ceiling placing back the insulation and installing plastic and taping to hard ceiling is the most cost effective method of solving this problem. This could be complete by town employees.

Estimated cost for this installation: $148.15

Description	# Units	Labor and Material Cost/Unit	Total	Source
Plastic	2	60	$120.00	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total			$148.15	

Recommend Work to be performed by – Town employees

Owner Action – Install with own work force

Picture of Damage to Hard Ceiling in Fire Station

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 4**

Finding Description: **Lighting/Lighting Control Upgrade**

Building: **Fire Station**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	No
Electric Savings	Yes
Demand Savings	Yes
Indoor Air Quality	No
Comfort	No
Maintenance and Reliability	Yes

Recommendation:

Lights in the fire station are T-12 fluorescents and incandescent bulbs and should be replaced with high efficient Fluorescents and LED Bulbs

Estimated Economic Impact Summary

Energy Savings = [Watts of Existing Fixture-Watts of New Fixture] x Number of Fixture x Lighting hours per year

Estimated Annual Electrical Savings	2057.59	KWH
Estimated Annual Electric Demand Savings	39.84	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

It is my recommendation that the Town of Madison installs solid state lighting in the high bay garage area and high efficiency T-8 lamps in the office, training, kitchen and restrooms. This installation will allow the town to take advantage of the low installation cost of the T-8 while receiving the most benefits from the solid state lighting. These benefits include long life of 60,000 plus hours, smaller fixtures with more flexibility on location. This will allow the lights to be installed in a manor which will allow installation of the vehicle exhaust extraction system. It is also recommended that the outside lighting be replaced with solid state lighting. It is also recommend that occupancy sensors be installed. Please see attached detail lighting sheet and sketch.

Estimated cost for this installation: $6,879.47

Description	# Units		Total	Source
LUMAPRO Model #: 2ZE23	7	61.62	431.34	
LUMAPRO Model # 2UWU3	1	65.35	65.35	
DuroSiteTM LED High Bay Fixture Options and Accessories Occupancy Sensor Version With Oval Light Pattern	4	975	3900	
Street Light	1	1175.68	1175.68	
13 Watt Compact Fluorescent	2	6	12	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$6,879.47	
Total Post PSNH Rebate			$4,127.68	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

Lighting Audit Report

Madison New Hampshire - Fire Station

1	Location:	Recommendation:							
	Training Center - Switch 1	No work in this area	**# of Fixtures**	**Average Watts**	**Usage (hrs ann.)**	**KWH (Used)**	**KW (Used)**	**KWH (Saved)**	**KW (Saved)**
	Existing:	3 Blub F32T8/TK735	6	100.8	832	503.194	0.6048		
	Proposed:	No Work	6	100.8	832	503.194	0.6048	0	0
		Proposed lighting controls:	No work in this area						
2	Location:	Recommendation:							
	Training Center Switch 2	No work in this area	**# of Fixtures**	**Average Watts**	**Usage (hrs ann.)**	**KWH (Used)**	**KW (Used)**	**KWH (Saved)**	**KW (Saved)**
	Existing:	3 Blub F32T8/TK735	2	100.8	832	167.731	0.2016		
	Proposed:	No Work	2	100.8	832	167.731	0.2016	0	0
		Proposed lighting controls:	No work in this area						
3	Location:	Recommendation:							
	Kitchen	Remove existing channel strip light and replace with two 22 Watt Circular fluorescent	**# of Fixtures**	**Average Watts**	**Usage (hrs ann.)**	**KWH (Used)**	**KW (Used)**	**KWH (Saved)**	**KW (Saved)**
	Existing:	2 F96T12/	1	126	832	104.832	0.126		
	Proposed:	LUMAPRO Model #: 2ZE23 - 22 Watt bulb	2	22	832	36.608	0.044	68.224	0.082
		Proposed lighting controls:	No work in this area						
4	Location:	Recommendation:							
	Women's Restroom	Remove incandescent fixture and replace with 22 Watt Circular fluorescent	**# of Fixtures**	**Average Watts**	**Usage (hrs ann.)**	**KWH (Used)**	**KW (Used)**	**KWH (Saved)**	**KW (Saved)**
	Existing:	1 - 75 Watt Incandescent	1	75	832	62.4	0.075		
	Proposed:	LUMAPRO Model #: 2ZE23 - 22 Watt bulb	1	22	832	18.304	0.022	44.096	0.053
		Proposed lighting controls:	No work in this area						
5	Location:	Recommendation:							
	Men's Rest Room	Remove incandescent fixture and replace with 22 Watt Circular fluorescent	**# of Fixtures**	**Average Watts**	**Usage (hrs ann.)**	**KWH (Used)**	**KW (Used)**	**KWH (Saved)**	**KW (Saved)**
	Existing:	2-100 watt bulb	1	200	832	166.4	0.2		
	Proposed:	LUMAPRO Model #: 2ZE23 - 22 Watt bulb	1	22	832	18.304	0.022	148.096	0.178
		Proposed lighting controls:	No work in this area						
6	Location:	Recommendation:							
	Shower	Remove incandescent fixture and replace with 22 Watt Circular fluorescent	**# of Fixtures**	**Average Watts**	**Usage (hrs ann.)**	**KWH (Used)**	**KW (Used)**	**KWH (Saved)**	**KW (Saved)**
	Existing:	1 - 100 Watt	1	100	832	83.2	0.1		
	Proposed:	LUMAPRO Model #: 2ZE23 - 22 Watt bulb	1	22	832	18.304	0.022	64.896	0.078
		Proposed lighting controls:	No work in this area						

Lighting Report - Town of Madison Fire Station - Page 2

7	Location:	Recommendation:							
	Equipment Closet	Replace existing Incandescent bulb with 13 watt compact fluorescent	**# of Fixtures**	**Average Watts**	**Usage (hrs ann.)**	**KWH (Used)**	**KW (Used)**	**KWH (Saved)**	**KW (Saved)**
	Existing:	1- 100 watt	1	100	832	83.2	0.1		
	Proposed:	1- 13 Watt	1	13	832	10.816	0.013	72.384	0.087
		Proposed lighting controls:	No work in this area						
8	Location:	Recommendation:							
	Office	Remove existing channel strip light and replace with two 22 Watt Circular fluorescent	**# of Fixtures**	**Average Watts**	**Usage (hrs ann.)**	**KWH (Used)**	**KW (Used)**	**KWH (Saved)**	**KW (Saved)**
	Existing:	2 F96T12/	1	126	832	104.832	0.126		
	Proposed:	LUMAPRO Model #: 2ZE23 - 22 Watt	2	22	832	36.608	0.044	68.224	0.082
		Proposed lighting controls:	No work in this area						
9	Location:	Recommendation:							
	Shop area Switch 1	Remove existing channel strip light fixture and replace with LED high bay fixture	**# of Fixtures**	**Average Watts**	**Usage (hrs ann.)**	**KWH (Used)**	**KW (Used)**	**KWH (Saved)**	**KW (Saved)**
	Existing:	2 F96T12/	5	122.4	832	509.184	0.612		
	Proposed:	DuroSiteTM LED High Bay Fixture Options and Accessories Occupancy Sensor Version With Oval Light Pattern Part # HB6C4T	2	150	624	187.2	0.3	321.984	0.312
		Proposed lighting controls:	Fixture mounted occupancy sensor						
10	Location:	Recommendation:							
	Shop area switch 2	Remove existing channel strip light fixture	**# of Fixtures**	**Average Watts**	**Usage (hrs ann.)**	**KWH (Used)**	**KW (Used)**	**KWH (Saved)**	**KW (Saved)**
	Existing:	2 F96T12/	5	122.4	832	509.184	0.612		
	Proposed:	None	0	150	624	0	0	509.184	0.612
		Proposed lighting controls:							
11	Location:	Recommendation:							
	Shop area switch 3	Remove existing channel strip light fixture and replace with LED high bay fixture	**# of Fixtures**	**Average Watts**	**Usage (hrs ann.)**	**KWH (Used)**	**KW (Used)**	**KWH (Saved)**	**KW (Saved)**
	Existing:	2 F96T12/	5	122.4	832	509.184	0.612		
	Proposed:	DuroSiteTM LED High Bay Fixture Options and Accessories Occupancy Sensor Version With Oval Light Pattern Part # HB6C4T	2	150	624	187.2	0.3	321.984	0.312
		Proposed lighting controls:	Fixture mounted occupancy sensor						
12	Location:	Recommendation:							
	Upper Storage Area - Rear	Remove exisitng T-12 fixture and replace with T-8 strip fixture	**# of Fixtures**	**Average Watts**	**Usage (hrs ann.)**	**KWH (Used)**	**KW (Used)**	**KWH (Saved)**	**KW (Saved)**
	Existing:	3 Fd40T12/	1	126	832	104.832	0.126		
	Proposed:	LUMAPRO Model # 2UWU3	1	58.8	832	48.9216	0.0588	55.9104	0.0672
		Proposed lighting controls:	None						

Lighting Report - Town of Madison Fire Station - Page 3

13	Location:	Recommendation:	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Back Storage Area - Front	Replace existing Incandescent bulb with 13 watt compact fluorescent							
	Existing:	1-60 watt	1	60	832	49.92	0.06		
	Proposed:	1- 13 Watt	1	13	832	10.816	0.013	39.104	0.047
		Proposed lighting controls:	None						
14	Location:	Recommendation:	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Outdoor	Remove existing Mercury Vapor fixture and replace with LED fixture							
	Existing:	250 Watt Mercury Vapor	1	250	2000	500	0.25		
	Proposed:	LITHONIA Model # ALX1 7000L SR3 MVOLT SPA DDBXD	1	110	2000	220	0.11	280	0.14
		Proposed lighting controls:	Photothelic eye						
15	Location:	Recommendation:	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Outdoor	Lights should be removed after installation of LED street light							
	Existing:	500 Watts Quartz	2	500	50	50	1		
	Proposed:	None	0	0	0	0	0	50	1
		Proposed lighting controls:	None						
16	Location:	Recommendation:	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Outdoor	Lights should be removed after installation of LED street light							
	Existing:	Incandescent - Floods	3	90	50	13.5	0.27		
	Proposed:	None	0	0	0	0	0	13.5	0.27
		Proposed lighting controls:							

Lighting Cost/Payback Analysis
Madison New Hampshire - Fire Station

KW Rate: 12.82 KWH Rate: 0.08008

Existing System	**Annual**	**Monthly**	**Annual $**	**Montly $**
KWH:	3,522		$282	
KW:	60.9048	5.0754	$780.80	$65.07
Proposed System	**Annual**	**Monthly**	**Annual $**	**Montly $**
KWH:	1464.0064		$117	
KW:	21.0624	1.7552	$270.02	$22.50
Saved	**Annual**	**Monthly**	**Annual $**	**Montly $**
KWH:	2057.5864		$165	
KW:	39.8424	3.3202	$510.78	$42.56

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 5**

Finding Description: **Vending Mizer and Delamping**

Building: **Fire Station**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	No
Electric Savings	Yes
Demand Savings	Yes
Indoor Air Quality	No
Comfort	No
Maintenance and Reliability	Yes

Recommendation:

Vending machine in kitchen area should have a vending mizer installed and display lights removed

Estimated Economic Impact Summary

Energy Savings = [Watts of Existing Fixture-Watts of New Fixture] x Number of Fixture x Lighting hours per year

Energy Savings = KW of equipment X Reduced Hours of Operation

Watts of Lamps to be removed	Hours Per Year	KW of Vending Machine	Reduce Hours of Operation
84	8760	1.2	1314

Estimated Annual Electrical Savings	2312.64	KWH
Estimated Annual Electric Demand Savings	0.08	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

The lamps in vending machines are designed only to draw people to the machine to buy produce, where this machine is located it has little effect. Therefore these bulbs should be removed. A Vending mizer allows the machine to run at a slightly higher temperature and shuts down certain features when no one is present. When someone activate the occupancy sensor the machine returns to full operation and normal set temperature. The vending mizer has no effect on product or operation of machine.

Estimated cost for this installation: $395.06

Description	# Units		Total	Source
Vending Mizer	1	285	285	
Lamp removal	1	35	35	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$395.06	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 6**

Finding Description: **Install Programmable T-Stats**

Building: **Fire Station**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	Yes
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

A programmable T-Stat should be install for the furnace which serves the Office and training area. The Thermostat for the high bay area should be set at 60 degrees.

Estimated Economic Impact Summary

Energy Saving = BTU/hr of Furnace * Reduce Runtime from Programmable T-Stat

Btu/hr	Reduced Run Hours	
60000	36	Based on reducing the runtime of the furnace by 1 hour per week during the heating season

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	19.29	Gallons

Implementation Plan

The Honeywell T4110D1007 will install in place of exiting Honeywell TH5110D non programmable stat. Stat should be program only to heat the building to 48 degrees during unoccupied time and heat up to 68 degrees 1 hour prior to schedule events in the fire house.

Estimated cost for this installation: $88.64

Description	# Units		Total	Source
Honeywell TH4110D1007	1	71.8	71.8	
	0	0	0	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$88.64	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 7**

Finding Description: **Door Weather Stripping**

Building: **Fire Station**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	No
Demand Savings	No
Indoor Air Quality	Yes
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

Over all the door weather striping is in OK condition at the fire house, however weather stripping breaks down over time and with use. Therefore it is recommend that the door weather stripping at this building is set to a medium priority at this time. For this type of building and use it is anticipated that the weather-stripping for these doors should be replaced every 10 to 12 years.

Estimated Economic Impact Summary

Energy Savings heating = Open Area X Avg. Wind Speed X Diversity Factor X 1.08 X (Interior Temperature – Avg. OA Temperature Heating Season) X Hours/day X Days/Year
Energy Savings Cooling = [(Open Area X Avg. Wind Speed X Diversity Factor)/13.8] X (Avg. OA Enthalpy Cooling Season - Interior Enthalpy) X Hours/Day X Days/Year

Open Area	Avg. Wind Speed	Diversity Factor	Constant	Interior Temp	Avg OA Temp	Hours per year
3.75	7	0.75	1.08	60	28	6048

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	68.89	Gallons

Implementation Plan

The Entire perimeter of the overhead door and entrance doors should be sealed to eliminate heat loss, Sealing kits from American garage door supplies is in the appendix of this report. The overhead doors are showing heat loss through the joints where the panel come together. Installing Wool Felt with Backing Type Adhesive, Thickness 1/16 In, Width 2 In, F1 Grade, Density 1 Lbs/Sq Yd between each door panel will reduce heat loss with affecting operation of door.

Estimated cost for this installation: $1,379.88

Description	# Units		Total	Source
Overhead - Top Seal Cap	3	71	213	
Over Head - Perimeter Seal	3	108	324	
Overhead - Bottom Seal	3	93.5	280.5	
Overhead Felt	3	65	195	
Entrance Door Jam Kit	1	72.7	72.7	
Entrance Door Bottom Kit	1	32.5	32.5	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total			$1,379.88	

Recommend Work to be performed by – Qualified Contractor

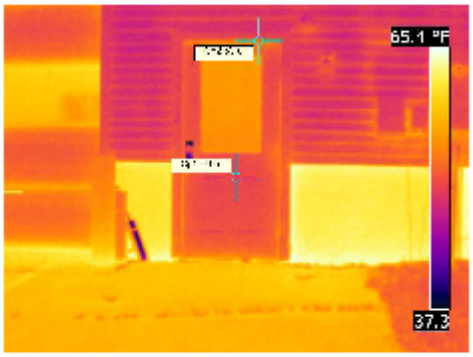
Owner Action – Solicited Bids from Contractor

AEA

Inspection Report

Report Date	10/8/2010

Company	Arbogast Energy Auditing	**Customer**	Town of Madison NH
Address	317 Austin St #4	**Site Address**	Fire Station
Thermographer	Elmer Arbogast	**Contact Person**	Sue Stacy



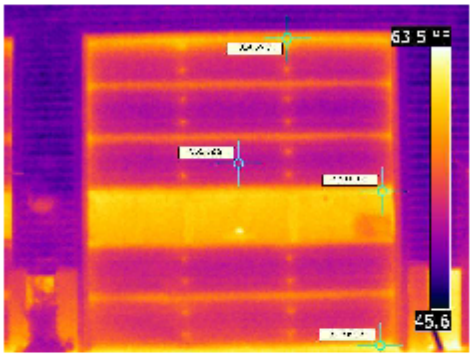


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Image Name	IR_1861.jpg
Emissivity	0.95
Reflected apparent temperature	0.0 °F
Object Distance	3.2 ft

Text Comments

Description

Door is showing signs of leakage and door seals should be replace in the next 5 years.

Door is showing signs of leakage and door seals should be replace in the next 5 years.

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 8**

Finding Description: **CO and CO2 Alarm**

Building: **Fire Station**

General Finding Impacts

Energy Savings	No
Fuel Savings	No
Electric Savings	No
Demand Savings	No
Indoor Air Quality	Yes
Comfort	No
Maintenance and Reliability	Yes

Recommendation:

The fire station has vehicle which run inside the building dangerous level of Carbon Monoxide and Carbon Dioxide could build up in this space and cause harm. It is recommended that a monitor capable of detecting and reporting CO and CO2 be installed in the space and trip an audible alarm. Note that this unit can be tied into future vehicle exhaust extraction system.

Estimated Economic Impact Summary

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

It is recommended that a Honeywell Multi-point sample draw gas monitor model VASQN82 CO CO2 8XTL3 be installed in the fire station. Unit should be located outside of office area with draw points 3 feet above the floor in the shop area.

Estimated cost for this installation: $8,839.51

Description	# Units		Total	Source
Gas Monitor	1	7160	7160	Kele quoted price
Unit set up	1	220	220	AEA quoted price
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$8,839.51	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 9**

Finding Description: **Vehicle Exhaust Extraction system**

Building: **Fire Station**

General Finding Impacts

Energy Savings	No
Fuel Savings	No
Electric Savings	No
Demand Savings	No
Indoor Air Quality	Yes
Comfort	No
Maintenance and Reliability	Yes

Recommendation:

The fire station has vehicle which run inside the building dangerous level of Carbon Monoxide and Carbon Dioxide and other gas could build up in this space and cause harm. It is recommend that a quilfied design professional design an system to extract these gases directly from the exhaust pipe of the trucks. This system should also include a gas monitoring system as outline in previous recommendation.

Estimated Economic Impact Summary

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

This system should be design by quilfied design professional and therefore no implementation plan is given at this time

Estimated cost for this installation: $0.00 This recommendation cost was not estimated

Description	# Units		Total	Source
Contractor Mark Up			0%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$0.00	

Recommend Work to be performed by – Qualified Contractor after design by quilfied professional

Owner Action – Solicited Bids from quilfied design professional

Observations - HWY Garage

Original Design and Current Use

- The Building is a metal frame building was built in 1985 and is good condition. The building was built to be a hwy and the use of the building has not changed.

Retrofits

- The retrofit recommendation include lighting, HVAC improvements, l and building envelope improvement and sealing. I am also recommending a CO and CO2 monitoring system be installed as a safety issues, it should be noted that this retrofit has the potential to increase energy cost. Hight priority recommendations all have a payback of less than 5 years or have health safety issues attached. A total of 7 recommendation are being made for this building.

On-Site Renewable Energy

- This building does not have any on-site renewable energy fit which would have less than a 10 year payback. This building has low purchased energy usage due use of waste oil heat If usage of this building changes the addition of on-site renewable should be reviewed with new usage. On-site renewable energy sources for all buildings are addressed later in this report.

Age and Condition of the Mechanical Equipment

- Most of the heat for this building is supplied from a waste oil heater which is in its service life and is currently in good condition. The original oil fired heater should remain as backup only as it has reached it life expenancy and is in fair to poor condition.

Indoor Air Quality

- Overall the Indoor air quality of this building is good. A couple of issues was noted during the Energy Audit. A major of the building is a garage area with out an exhaust extraction system and/or a CO or CO2 monitoring system. It is recommended that a exhaust extraction system and CO and CO2 monitoring system be installed.

Space temperature and Humidity

- The temperature in this space is controlled by manual thermostats and humidity is not controlled. Due to usage a programmable thermostat with a timed override would ensure building is set back during un-occupied periods. Since humidity is not a concern with in this space due to climate and use it is recommended that humidity control stays the same.

R- Value

- Overall the R-Value of this building is in acceptable range. Major areas of insulation in need of repair were noted and are listed in the recommendation.

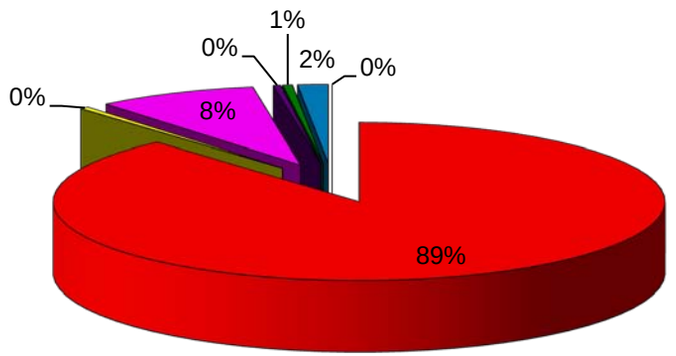
Maintenance

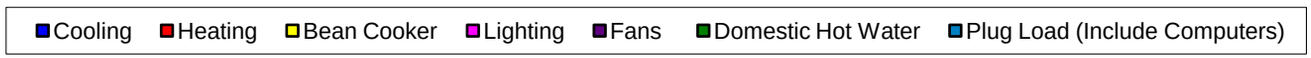
- Maintenance is on call manor, changing over to a preventive maintenance approach would result in future energy usage and extend the life of the equipment resulting in reduced future operation cost.

People's energy awareness

- The occupant energy awareness in this building as throughout most of the town buildings is very good. A yearly review of energy usage is recommended to keep the awareness of energy usage high.

Hwy Garage
ENERGY USAGE PROFILE





Total Facility Consumption	291 (Millions of BTU/hr)
Cooling	0.0%
Heating	88.5%
Bean Cooker	0.5%
Lighting	8.5%
Fans	0.4%
Domestic Hot Water	0.5%
Plug Load (Include Computers)	1.6%
Total	100.0%

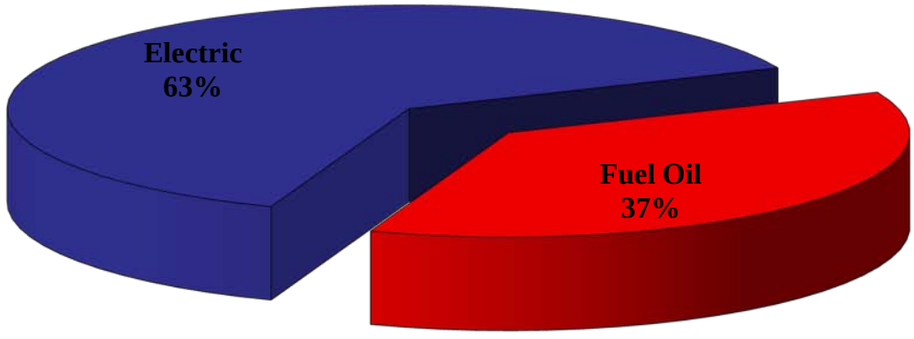
Town of Madison New Hampshire
Highway Garage
Utility Analysis Period:

8/01/2009 to 7/31/2010

	Current Year			Previous Year		
	8/1/2009	to	7/31/2010	8/1/2008	to	7/31/2009
	Electric		Fuel Oil	Electric		Fuel Oil
Utility Costs	$1,839		$1,080	$2,463		$1,024
Utility Usage	9,790		1,839	11,890		1,900
$ Cost/Unit (kWh, Therm, Gal)	$0.19		$0.59	$0.21		$0.54
	CDD		HDD	CDD		HDD
	353		7,263	273		7,998
Current Year Vs Previous Year	**Electric**		**Fuel Oil**			
Change in Cost	-25%		5%			
Change in Usage	-18%		-3%			
Change in $ Cost/Unit	-9%		9%			
Change in Degree Day	29%		-9%			

Fuel oil usage decresed in line with heating degree day. Fuel oil usage includes purchased fuel usage and waste oil usage, Fuel cost is for purchased oil only. Electrical had a dramatic decrease which most likely was a result of decreased usage.

Utility Cost Comparison Current Year



Energy Benchmarking - Highway Garage

The calculation of EUI (Energy Use Intensity) is shown below. EUI, expressed in kBtu/sf, is normalized for floor area, the most dominant influence on energy use in most buildings. Its use usually provides a good approximation of how your building's energy performance compares to others. Site EUI indicates the rate at which energy is used at your building (the point of use). Source EUI indicates the rate at which energy is used at the generation sources serving your building (the point of source) and indicates the societal energy penalty due to your building The lower the EUI, the higher the rating, indicating that the building is more efficient than other buildings. The greater the EUI, the lower the rating, indicating that there is an opportunity for higher potential benefits from operational improvements.

To compare the buildings shown below to each other, and to determine the ranking of the buildings from having the most to the least opportunity for demand-side improvements from a financial perspective, please see the Site EUI ranking below.

The Site EUI below has been applied to a Department of Energy statistical model from the Oak Ridge National Laboratory web site, http://eber.ed.ornl.gov/benchmark. The Department of Energy has estimated energy use and cost reductions for building source EUI ratings (percentiles) in the table below. Please see the DOE Regional Source EUI Comparison graph below to rate your building in relation to the regional distribution of similar type buildings. (Note: The Source EUI includes the inefficiencies of electrical generation and transmission. A reduction in 'electrical' source EUI includes a benefit in terms of reduction of air pollution emissions and green house gases, and is thus an indicator of societal benefit.)

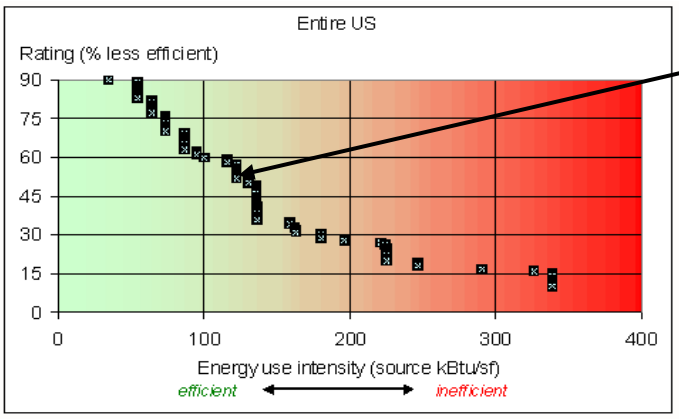
Source EUI Rating for your Building	Energy use and cost reduction potential (%)	Walk-thru energy assessment recommended?
above 60%	below 25%	No
40 to 60%	20 to 35%	Maybe
20 to 40%	35 to 50%	Yes
Below 20%	above 50%	Definitely

Rating from the most efficient to the least efficient - 2010 consumption

Site EUI Rank	Building	Annual Total Electrical Use (kWh)	Annual Total Non-Electrical Fuel Use (Gals)	Occupied Building Gross Floor Area (sq-ft)	Site EUI Rating	Source EUI: Annual Total Source Energy Use per Sq-Ft (kBtu/sf)	Rating (Regional Source EUI Comparison)
1	Highway Garage	9,790	1,839	2,400	**121**	**149**	**0.50**

Building Type

Fire/Police Station



Site EUI	Est Regional Rating	Building
121	50%	Highway Garage

Source: Oak Ridge National Laboratory web site, http://eber.ed.ornl.gov/benchmark

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 37**

Finding Description: **Lighting/Lighting Control Upgrade**

Building: **Hwy Garage**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	No
Electric Savings	Yes
Demand Savings	Yes
Indoor Air Quality	No
Comfort	No
Maintenance and Reliability	Yes

Recommendation:

The Higway Garage is lite with T-12 flourencts and has old HID lights which are not used. It is my recommendation that these HID lights be replaced with soild state lighting and the Flourcents be removed in the shop area and replaced with high efficency flourcents in the office area.

Energy Savings = [Watts of Existing Fixture-Watts of New Fixture] x Number of Fixture x Lighting hours per year

Estimated Annual Electrical Savings	8454.69	KWH
Estimated Annual Electric Demand Savings	47.46	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

Please see attached detail lighting sheet and sketch for detail of work.

Estimated cost for this installation: $28.00

Description	# Units		Total	Source
LUMAPRO Model # 2UWU3	2	65.35	130.7	
DuroSiteTM LED High Bay Fixture	4	975	3900	
Street Light	1	1175.68	1175.68	
3 Watt LED	1	28	28	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$6,427.63	
Total Post PSNH Rebate			$3,856.58	

Recommend Work to be performed by – Qualified Contractor

Lighting Audit Report

Madison New Hampshire - Hwy Garage

1	Location:	Recommendation:							
	Out side	Replace Mercury Vapor with Solid State	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	250 Watt Mercury Vapor	1	250	2000	500	0.25		
	Proposed:	3 Watt LED	1	110	2000	220	0.11	280	0.14
		Proposed lighting controls:							

2	Location:	Recommendation:							
	Shop Area	Replace Flourecents with solid state lighting, locate new lights inplace of HID lights	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	2-F96-T22	14	157.5	2080	4586.4	2.205		
	Proposed:	DuroSiteTM LED High Bay Fixture Options and Accessories Occupancy Sensor Version With Oval Light Pattern Part # HB6C4T	4	150	2080	1248	0.6	3338.4	1.605
		Proposed lighting controls:	No work in this area						

3	Location:	Recommendation:							
	Bathroom	Replace Incandecent with LED	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	75 watt	1	75	2080	156	0.075		
	Proposed:	3 Watt LED	1	3	2080	6.24	0.003	149.76	0.072
		Proposed lighting controls:	No work in this area						

4	Location:	Recommendation:							
	Office	Replace T-12 Flourcents withT-8	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	2 - f40 T12	2	84	2080	349.44	0.168		
	Proposed:	2 - F32 T8	2	58.8	2080	244.608	0.1176	104.832	0.0504
		Proposed lighting controls:	No work in this area						

5	Location:	Recommendation:							
	Storage Area above Office	Replace Incandecent with LED	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	2-F96-T22	14	157.5	2080	4586.4	2.205		
	Proposed:	2 - F32 T8	2	58.8	40	4.704	0.1176	4581.7	2.0874
		Proposed lighting controls:	No work in this area						

6	Location:	Recommendation:							
	Lower level restroom	0	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	0	0	0	0	0	0		
	Proposed:	0	0	0	0	0	0	0	0
		Proposed lighting controls:	No work in this area						

Lighting Cost/Payback Analysis

Madison New Hampshire - Hwy Garage

			KW Rate:	12.82	KWH Rate:	0.08008
Existing System		**Annual**		**Monthly**	**Annual $**	**Montly $**
	KWH:	10,178			$815	
	KW:	58.836		4.903	$754.28	$62.86
Proposed System		**Annual**		**Monthly**	**Annual $**	**Montly $**
	KWH:	1723.552			$138	
	KW:	11.3784		0.9482	$145.87	$12.16
Saved		**Annual**		**Monthly**	**Annual $**	**Montly $**
	KWH:	8454.688			$677	
	KW:	47.4576		3.9548	$608.41	$50.70

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 38**

Finding Description: **Install Programmable T-Stat**

Building: **Hwy Garage**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	Yes
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

A programmable T-Stat should be installed to replace the existing non programable thermostat.

Estimated Economic Impact Summary

Energy Saving = BTU/hr of Boiler * Reduce Runtime from Programmable T-Stat

Btu/hr	Reduced Run Hours	
350000	18	Based on reducing the runtime of the furnace by 1/2 hour per week during the heating season

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	56.25	Gallons

Implementation Plan

The Honeywell T4110D1007 will install in place of exiting Honeywell T87 non programmable stat. Stat should be program only to heat the building to 55 degrees during unoccupied time and heat up to 68 degrees 1 hour prior to schedule occupied times.

Estimated cost for this installation: $88.64

Description	# Units		Total	Source
Honeywell TH4110D1007	1	71.8	71.8	
	0	0	0	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total			$88.64	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 39**

Finding Description: **Weatherization- Insulation Repair**

Building: **Hwy Garage**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	No
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

The insulation in the walls of the Hwy Garage have dropped severly and needs to be replaced.

Estimated Economic Impact Summary

Building Envelope R-Value improvement – including Windows
Energy Savings heating = Area X (Existing U-Value – New U-Value) X (Interior Temperature – Avg. OA Temperature Heating Season) X Hours/day X Days/Year
Energy Savings Cooling = Area X (Existing U-Value – New U-Value) X (Avg. OA Temperature Cooling Season - Interior Temperature) X Hours/Day X Days/Year

Area	Existing U-value	New U-value	Interior Temp	Avg OA Temp	Hours per year
840	0.75	0.55	70	28	6048

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	381.02	Gallons

Implementation Plan

Remove the insterior wall panels to expose the damaged insulation, and remove the insulation. The removal of the panels should be done in such a manor that they can be reused. Then install R-13 fiberglass roll insullation and a 6 mil plastic vapor/air barrier. Reinstall wall panels

Estimated cost for this installation: $1,680.00

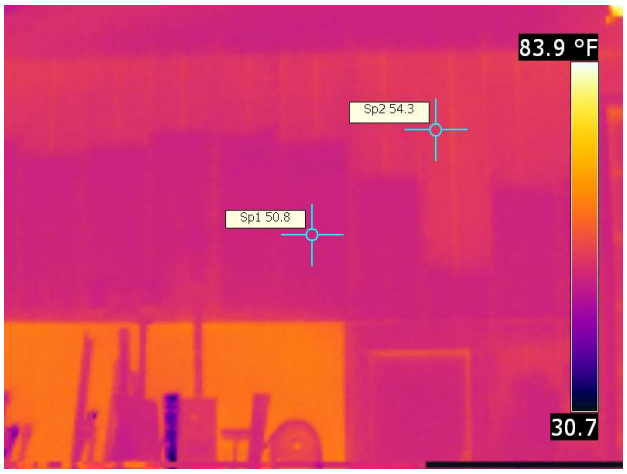
Estimated cost for this installation: $3,717.21

Description	# Units	Material	Total	Source

Inspection Report

Report Date	10/11/2010

Company	Arbogast Energy Auditing	**Customer**	Town of Madison NH
Address	317 Austin St #4	**Site Address**	Hwy Garage
Thermographer	Elmer Arbogast	**Contact Person**	Sue Stacy



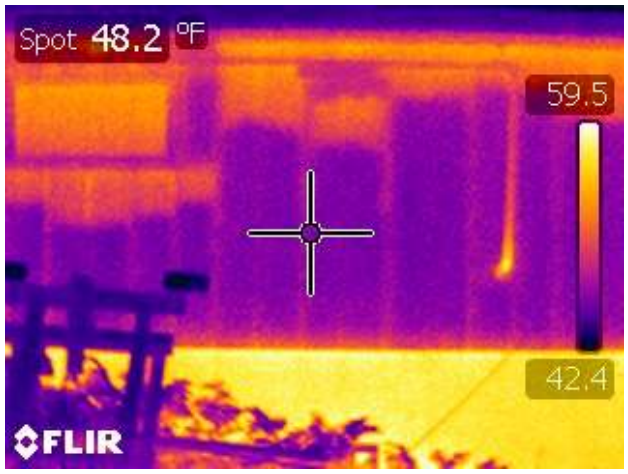


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Image Name	IR_1875.jpg
Emissivity	0.95
Reflected apparent temperature	0.0 °F
Object Distance	3.2 ft

Text Comments

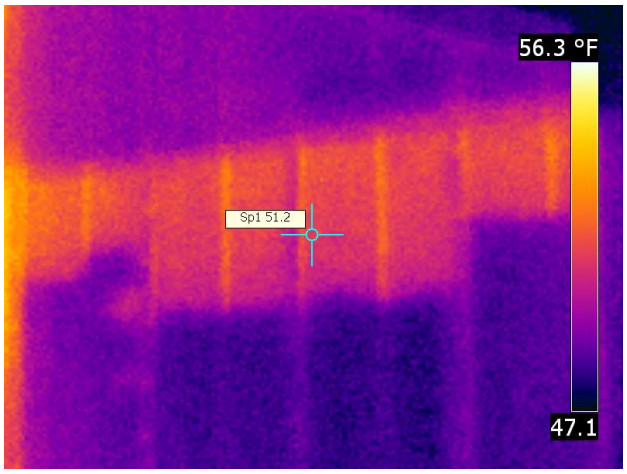
Description

Hwy Garage is showing insulation damage in all walls.

Inspection Report

Report Date 10/11/2010

Company	Arbogast Energy Auditing	**Customer**	Town of Madison NH
Address	317 Austin St #4	**Site Address**	Hwy Garage
Thermographer	Elmer Arbogast	**Contact Person**	Sue Stacy



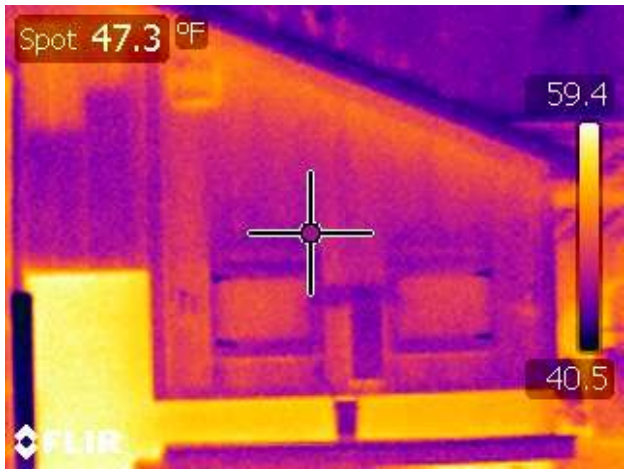


Image and Object Parameters

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Image Name	IR_1891.jpg
Emissivity	0.95
Reflected apparent temperature	77.0 °F
Object Distance	3.2 ft

Text Comments

Description

Inspection Report

Report Date 10/11/2010

Company	Arbogast Energy Auditing	**Customer**	Town of Madison NH
Address	317 Austin St #4	**Site Address**	Hwy Garage
Thermographer	Elmer Arbogast	**Contact Person**	Sue Stacy

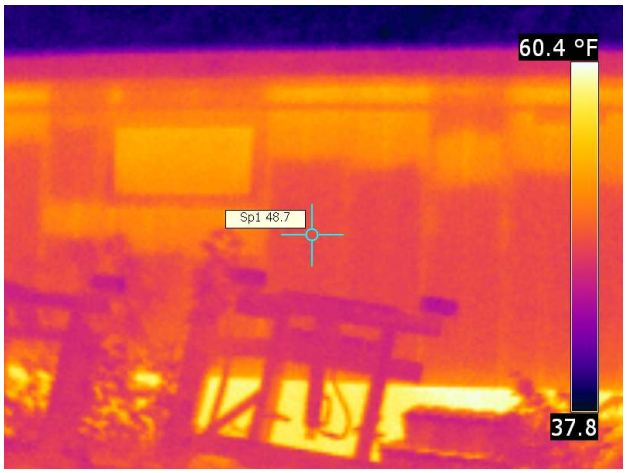

Image and Object Parameters

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Image Name	IR_1885.jpg
Emissivity	0.95
Reflected apparent temperature	77.0 °F
Object Distance	3.2 ft

Text Comments

Description

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 40**

Finding Description: **CO and CO2 Alarm**

Building: **Hwy Garage**

General Finding Impacts

Energy Savings	No
Fuel Savings	No
Electric Savings	No
Demand Savings	No
Indoor Air Quality	Yes
Comfort	No
Maintenance and Reliability	Yes

Recommendation:

The Hwy Garage has vehicle which run inside the building dangerous level of Carbon Monoxide and Carbon Dioxide could build up in this space and cause harm. It is recommended that a monitor capable of detecting and reporting CO and CO2 be installed in the space and trip an audible alarm. Note that this unit can be tied into future vehicle exhaust extraction system.

Estimated Economic Impact Summary

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

It is recommended that a Honeywell Multi-point sample draw gas monitor model VASQN82 CO CO2 8XTL3 be installed in the Garage. Unit should be located outside of office area with draw points 3 feet above the floor in the shop area.

Estimated cost for this installation: $8,839.51

Description	# Units		Total	Source
Gas Monitor	1	7160	7160	Kele quoted price
Unit set up	1	220	220	AEA quoted price
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$8,839.51	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 41**

Finding Description: **Door Weather Stripping**

Building: **Hwy Garage**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	No
Demand Savings	No
Indoor Air Quality	Yes
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

Over all the door weather striping is in poor condition at the town hall, weather stripping breaks down over time and with use. Therefore it is recommend that the door weather stripping at this building is set to a medium priority at this time. For this type of building and use it is anticipated that the weather-stripping for these doors should be replaced every 10 to 12 years.

Estimated Economic Impact Summary

Energy Savings heating = Open Area X Avg. Wind Speed X Diversity Factor X 1.08 X (Interior Temperature – Avg. OA Temperature Heating Season) X Hours/day X Days/Year
Energy Savings Cooling = [(Open Area X Avg. Wind Speed X Diversity Factor)/13.8] X (Avg. OA Enthalpy Cooling Season - Interior Enthalpy) X Hours/Day X Days/Year

Open Area	Avg. Wind Speed	Diversity Factor	Constant	Interior Temp	Avg OA Temp	Hours per year
1.13	7	1	1.08	70	28	6048

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	29.68	Gallons

Implementation Plan

The Entire perimeter of the entrance doors should be sealed to eliminate heat loss, Sealing kits from American garage door supplies is in the appendix of this report.

Estimated cost for this installation: $546.54

Description	# Units		Total	Source
Overhead - Top Seal Cap	1	71	71	
Over Head - Perimeter Seal	1	108	108	
Overhead - Bottom Seal	1	93.5	93.5	
Overhead Felt	1	65	65	
Entrance Door Jam Kit	1	72.7	72.7	
Entrance Door Bottom Kit	1	32.5	32.5	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total			$546.54	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

Inspection Report

Report Date	10/11/2010

Company	Arbogast Energy Auditing	**Customer**	Town of Madison NH
Address	317 Austin St #4	**Site Address**	Hwy Garage
Thermographer	Elmer Arbogast	**Contact Person**	Sue Stacy

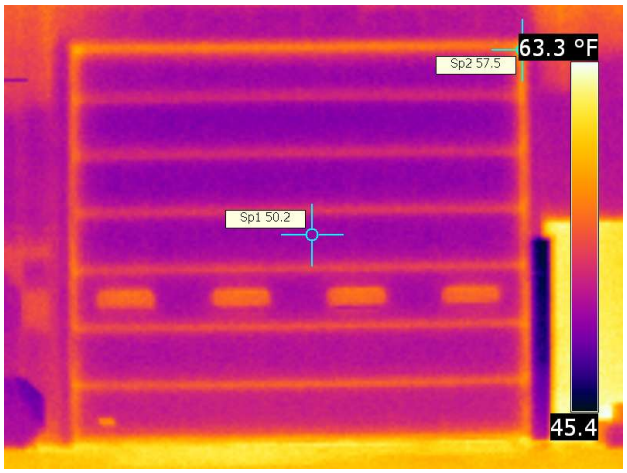

Image and Object Parameters

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Image Name	IR_1879.jpg
Emissivity	0.95
Reflected apparent temperature	0.0 °F
Object Distance	3.2 ft

Text Comments

Description

Hwy garage door is showing heat loss.

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 42**

Finding Description: **Replace Bean Cooker w/ Propane**

Building: **Hwy Garage**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	No
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

The town of Madison uses an electric cooker to cook beans each August. This casuses the demand at the Hwy Garage to rasie by 17.8 KW at a rate of $12.83 per KW. This results in a demand charge of $228.38 and the electric used could be replaced with 6.67 gallons of propane at a charge of $15.67

Estimated Economic Impact Summary

Unit watt rateing	Hours of operation	Diversity factor of compressor runtime
168	8760	0.2

Estimated Annual Electrical Savings	160.00	KWH
Estimated Annual Electric Demand Savings	17.80	KW
Estimated Annual Propane Savings	-6.67	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

A specfic cooker was not choosen to replace electric cooker, however an allowance of $1,200.00 was estimated to purchase a new propane fired cooker.

Estimated cost for this installation: $1,200.00

Description	# Units		Total	Source
Allowance for New Cooker	1	1200	1200	
Contractor Mark Up			0%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$1,200.00	

Recommend Work to be performed by – Town Employees

Owner Action – Unplug refrigerator

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 43**

Finding Description: **Vehicle Exhaust Extraction system**

Building: **Hwy Garage**

General Finding Impacts

Energy Savings	No
Fuel Savings	No
Electric Savings	No
Demand Savings	No
Indoor Air Quality	Yes
Comfort	No
Maintenance and Reliability	Yes

Recommendation:

The Hwy Garage has vehicle which run inside the building dangerous level of Carbon Monoxide and Carbon Dioxide and other gas could build up in this space and cause harm. It is recommend that a quilfied design professional design an system to extract these gases directly from the exhaust pipe of the trucks. This system should also include a gas monitoring system as outline in previous recommendation.

Estimated Economic Impact Summary

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

This system should be design by quilfied design professional and therefore no implementation plan is given at this time

Estimated cost for this installation: $0.00 This recommendation cost was not estimated

Description	# Units		Total	Source
Contractor Mark Up			0%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$0.00	

Recommend Work to be performed by – Qualified Contractor after design by quilfied professional

Owner Action – Solicited Bids from quilfied design professional

Observations - Madison Garage

Original Design and Current Use

- The Building is a metal frame building was built in 1968 and is good condition. The building was built to be a garage and the use of the building has not changed. Part of this building is used for Madison TV and fits well as an energy user withing this building.

Retrofits

- The retrofit recommendation include lighting, HVAC improvements, l and building envelope improvement and sealing. I am also recommending a CO and CO2 monitoring system be installed as a safety issues, it should be noted that this retrofit has the potential to increase energy cost. High priority recommendations all have a payback of less than 5 years or have health safety issues attached. A total of 10 recommendation are being made for this building.

On-Site Renewable Energy

- This building does not have any on-site renewable energy fit which would have less than a 10 year payback. This building has a potential to lower its purchased energy usage by using waste oil to heat If usage of this building changes the addition of on-site renewable should be reviewed with new usage. On-site renewable energy sources for all buildings are addressed later in this report.

Age and Condition of the Mechanical Equipment

- Most of the heat for this building is supplied from a waste oil heater which is in its service life and is currently in good condition. The original oil fired heater should remain as backup only as it has reached it life expenancy and is in fair to poor condition.

Indoor Air Quality

- Overall the Indoor air quality of this building is good. A couple of issues was noted during the Energy Audit. A major of the building is a garage area with out an exhaust extraction system and/or a CO or CO2 monitoring system. It is recommended that a exhaust extraction system and CO and CO2 monitoring system be installed.

Space temperature and Humidity

- The temperature in this space is controlled by manual thermostats and humidity is not controlled. Due to usage a programmable thermostat with a timed override would ensure building is set back during un-occupied periods. Since humidity is not a concern with in this space due to climate and use it is recommended that humidity control stays the same.

R- Value

- Overall the R-Value of this building is in acceptable range. Areas of insulation in need of repair were noted and are listed in the recommendation.

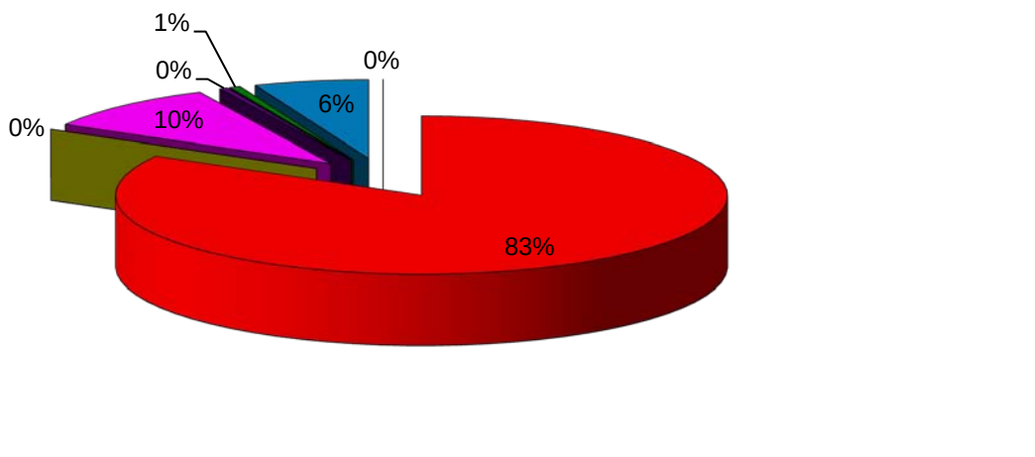
Maintenance

- Maintenance is on call manor, changing over to a preventive maintenance approach would result in future energy usage and extend the life of the equipment resulting in reduced future operation cost.

People's energy awareness

- The occupant energy awareness in this building as throughout most of the town buildings is very good. A yearly review of energy usage is recommended to keep the awareness of energy usage high.

Madison Garage
ENERGY USAGE PROFILE



Total Facility Consumption	255 (Millions of BTU/hr)
Cooling	0.0%
Heating	83.2%
Pumps	0.0%
Lighting	9.7%
Fans	0.4%
Domestic Hot Water	0.6%
Plug Load (Include Computers)	6.1%
Total	100.0%

Town of Madison New Hampshire
Madison Garage
Utility Analysis Period:

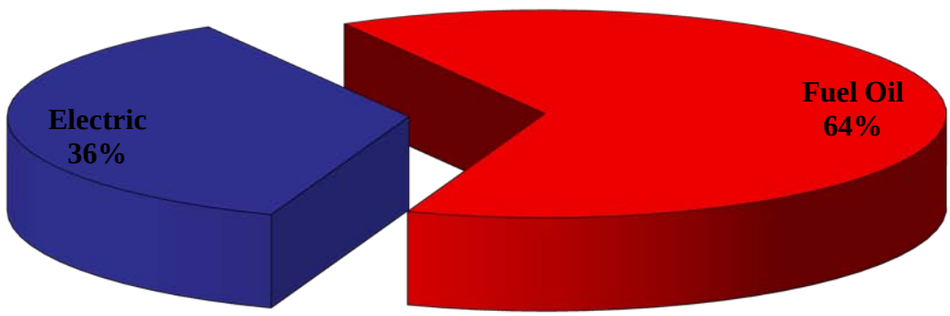
8/01/2009 to 7/31/2010

	Current Year			Previous Year		
	8/1/2009	to	7/31/2010	8/1/2008	to	7/31/2009
	Electric		Fuel Oil	Electric		Fuel Oil
Utility Costs	$2,104		$3,723	$2,133		$5,611
Utility Usage	12,509		1,514	13,334		2,133
$ Cost/Unit (kWh, Therm, Gal)	$0.17		$2.46	$0.16		$2.63
	CDD		HDD	CDD		HDD
	353		7,263	273		7,998

Current Year Vs Previous Year	Electric		Fuel Oil
Change in Cost	-1%		-34%
Change in Usage	-6%		-29%
Change in $ Cost/Unit	5%		-7%
Change in Degree Day	29%		-9%

Fuel usage decreased dremactically due to insulation of roof. Electrical decreased slightly, since this is a mostly un air conditioned building this decrease is based on a slight decrease in light and plug load.

Utility Cost Comparison Current Year



Energy Benchmarking - Madison Garage

The calculation of EUI (Energy Use Intensity) is shown below. EUI, expressed in kBtu/sf, is normalized for floor area, the most dominant influence on energy use in most buildings. Its use usually provides a good approximation of how your building's energy performance compares to others. Site EUI indicates the rate at which energy is used at your building (the point of use). Source EUI indicates the rate at which energy is used at the generation sources serving your building (the point of source) and indicates the societal energy penalty due to your building The lower the EUI, the higher the rating, indicating that the building is more efficient than other buildings. The greater the EUI, the lower the rating, indicating that there is an opportunity for higher potential benefits from operational improvements.

To compare the buildings shown below to each other, and to determine the ranking of the buildings from having the most to the least opportunity for demand-side improvements from a financial perspective, please see the Site EUI ranking below.

The Site EUI below has been applied to a Department of Energy statistical model from the Oak Ridge National Laboratory web site, http://eber.ed.ornl.gov/benchmark. The Department of Energy has estimated energy use and cost reductions for building source EUI ratings (percentiles) in the table below. Please see the DOE Regional Source EUI Comparison graph below to rate your building in relation to the regional distribution of similar type buildings. (Note: The Source EUI includes the inefficiencies of electrical generation and transmission. A reduction in 'electrical' source EUI includes a benefit in terms of reduction of air pollution emissions and green house gases, and is thus an indicator of societal benefit.)

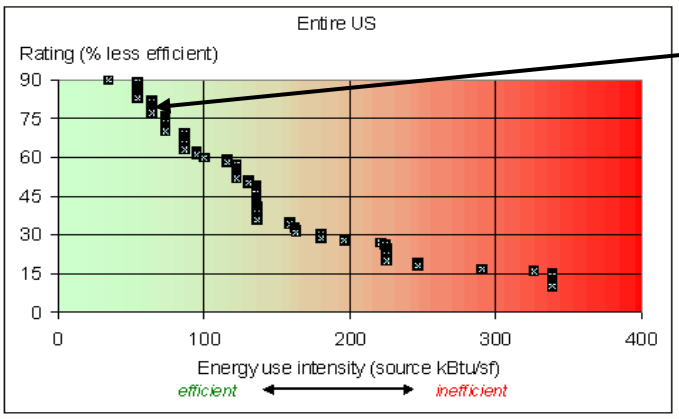
Source EUI Rating for your Building	Energy use and cost reduction potential (%)	Walk-thru energy assessment recommended?
above 60%	below 25%	No
40 to 60%	20 to 35%	Maybe
20 to 40%	35 to 50%	Yes
Below 20%	above 50%	Definitely

Rating from the most efficient to the least efficient - 2010 consumption

Site EUI Rank	Building	Annual Total Electrical Use (kWh)	Annual Total Non-Electrical Fuel Use (Gals)	Occupied Building Gross Floor Area (sq-ft)	Site EUI Rating	Source EUI: Annual Total Source Energy Use per Sq-Ft (kBtu/sf)	Rating (Regional Source EUI Comparison)
1	Madison Garage	12,509	1,514	4,200	**61**	**81**	**0.80**

Building Type

Fire/Police Station



Site EUI	Est Regional Rating	Building
61	80%	Madison Garage

Source: Oak Ridge National Laboratory web site, http://eber.ed.ornl.gov/benchmark

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 44**

Finding Description: **Lighting/Lighting Control Upgrade**

Building: **Madison Garage**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	No
Electric Savings	Yes
Demand Savings	Yes
Indoor Air Quality	No
Comfort	No
Maintenance and Reliability	Yes

Recommendation:

The Higway Garage is lite with T-12 flourencts and has old HID lights which are not used. It is my recommendation that these HID lights be replaced with soild state lighting and the Flourcents be removed in the shop area and replaced with high efficency flourcents in the office area.

Energy Savings = [Watts of Existing Fixture-Watts of New Fixture] x Number of Fixture x Lighting hours per year

Estimated Annual Electrical Savings	2764.35	KWH
Estimated Annual Electric Demand Savings	16.01	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

Please see attached detail lighting sheet and sketch for detail of work.

Estimated cost for this installation: $2,990.43

Description	# Units		Total	Source
LUMAPRO Model # 2UWU3	4	65.35	261.4	
22" HID - LED Retrofit	4	650	2600	
Street Light	1	1175.68	1175.68	
3 Watt LED	1	28	28	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$4,984.05	
Total Post PSNH Rebate			$2,990.43	

Recommend Work to be performed by – Qualified Contractor

Lighting Audit Report

Madison New Hampshire - Madison Garage

1	Location:	Recommendation:							
	Out side	Replace Mercury Vapor with Solid State	**# of Fixtures**	**Average Watts**	**Usage (hrs ann.)**	**KWH (Used)**	**KW (Used)**	**KWH (Saved)**	**KW (Saved)**
	Existing:	250 Watt Mercury Vapor	1	250	2000	500	0.25		
	Proposed:	LED Street light	1	110	2000	220	0.11	280	0.14
		Proposed lighting controls:							
2	Location:	Recommendation:							
	Shop Area	Replace Flourecents with solid state lighting, locate new lights inplace of HID lights	**# of Fixtures**	**Average Watts**	**Usage (hrs ann.)**	**KWH (Used)**	**KW (Used)**	**KWH (Saved)**	**KW (Saved)**
	Existing:	400 Watt HID	4	400	2080	3328	1.6		
	Proposed:	HID - LED retrofit kit	4	150	2080	1248	0.6	2080	1
		Proposed lighting controls:	No work in this area						
3	Location:	Recommendation:							
	Bathroom	Replace Incandecent with LED	**# of Fixtures**	**Average Watts**	**Usage (hrs ann.)**	**KWH (Used)**	**KW (Used)**	**KWH (Saved)**	**KW (Saved)**
	Existing:	75 watt	1	75	2080	156	0.075		
	Proposed:	3 Watt LED	1	3	2080	6.24	0.003	149.76	0.072
		Proposed lighting controls:	No work in this area						
4	Location:	Recommendation:							
	Madison TV	Replace T-12 Flourcents withT-8	**# of Fixtures**	**Average Watts**	**Usage (hrs ann.)**	**KWH (Used)**	**KW (Used)**	**KWH (Saved)**	**KW (Saved)**
	Existing:	2 - f40 T12	2	84	2080	349.44	0.168		
	Proposed:	2 - F32 T8	2	58.8	2080	244.608	0.1176	104.832	0.0504
		Proposed lighting controls:	No work in this area						
5	Location:	Recommendation:							
	Storage	Replace Incandecent with LED	**# of Fixtures**	**Average Watts**	**Usage (hrs ann.)**	**KWH (Used)**	**KW (Used)**	**KWH (Saved)**	**KW (Saved)**
	Existing:	75 watt	1	75	2080	156	0.075		
	Proposed:	3 Watt LED	1	3	2080	6.24	0.003	149.76	0.072
		Proposed lighting controls:	No work in this area						
6	Location:	Recommendation:							
	Lower level restroom	0	**# of Fixtures**	**Average Watts**	**Usage (hrs ann.)**	**KWH (Used)**	**KW (Used)**	**KWH (Saved)**	**KW (Saved)**
	Existing:	0	0	0	0	0	0		
	Proposed:	0	0	0	0	0	0	0	0
		Proposed lighting controls:	No work in this area						

Lighting Cost/Payback Analysis

Madison New Hampshire - Madison Garage

			KW Rate:	12.82	KWH Rate:	0.08008
Existing System		**Annual**		**Monthly**	**Annual $**	**Montly $**
	KWH:	4,489			$360	
	KW:	26.016		2.168	$333.53	$27.79
Proposed System		**Annual**		**Monthly**	**Annual $**	**Montly $**
	KWH:	1725.088			$138	
	KW:	10.0032		0.8336	$128.24	$10.69
Saved		**Annual**		**Monthly**	**Annual $**	**Montly $**
	KWH:	2764.352			$221	
	KW:	16.0128		1.3344	$205.28	$17.11

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 45**

Finding Description: **Install Programmable T-Stat**

Building: **Madison Garage**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	Yes
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

A programmable T-Stat should be installed to replace the existing non programable thermostat.

Estimated Economic Impact Summary

Energy Saving = BTU/hr of Boiler * Reduce Runtime from Programmable T-Stat

Btu/hr	Reduced Run Hours	
340000	18	Based on reducing the runtime of the furnace by 1/2 hour per week during the heating season

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	54.64	Gallons

Implementation Plan

The Honeywell T4110D1007 will install in place of exiting Honeywell T87 non programmable stat. Stat should be program only to heat the building to 55 degrees during unoccupied time and heat up to 68 degrees 1 hour prior to schedule occupied times.

Estimated cost for this installation: $88.64

Description	# Units		Total	Source
Honeywell TH4110D1007	1	71.8	71.8	
	0	0	0	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total			$88.64	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 46**

Finding Description: **Weatherization - Vapor Seal Repair**

Building: **Madison Garage**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	No
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

Insulation was installed in the ceiling of the HWY garage and a vapor barrier was install however it showed signs that it leaked and allowed condensation to form on the steel of the building. This should be repair by the existing contractor and therefore no cost in included in this audit.

Estimated Economic Impact Summary

Building Envelope R-Value improvement – including Windows
Energy Savings heating = Area X (Existing U-Value – New U-Value) X (Interior Temperature – Avg. OA Temperature Heating Season) X Hours/day X Days/Year
Energy Savings Cooling = Area X (Existing U-Value – New U-Value) X (Avg. OA Temperature Cooling Season - Interior Temperature) X Hours/Day X Days/Year

Area	Existing U-value	New U-value	Interior Temp	Avg OA Temp	Hours per year
720	0.6	0.55	70	28	6048

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	81.65	Gallons

Implementation Plan

Instruct insulation contractor to repair vapor barrier

Estimated cost for this installation: $1.23

Description	# Units	Material	Total	Source

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 47**

Finding Description: **Timer on domestic hot water heater**

Building: **Madison Garage**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	No
Electric Savings	Yes
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

It was observed during the energy audit that the electric hot water heater was on when the space was not occupied. Installing a time clock will shut off the water heater when space is unoccupied but ensure hot water when needed.

Estimated Economic Impact Summary

Energy Saving = KW of Water Heater * Reduce Runtime from time clock

Btu/hr	Reduced Run Hours	
1.5	182.5	Based on reducing the runtime of the water heater by 1/2 hour per day

Estimated Annual Electrical Savings	273.75	KWH
Estimated Annual Electric Demand Savings	1.50	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

Time Clock should be installed in the power wiring of the water heater and time clock set 1 hour prior to space being occupied and shut off 1/2 prior to space being unoccupied.

Estimated cost for this installation: $139.38

Description	# Units		Total	Source
INTERMATIC Model # EI500WC	1	112.9	112.9	
	0	0	0	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$139.38	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 48**

Finding Description: **Weatherization - Insulation of Walls**

Building: **Madison Garage**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	No
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

The wall beam of the madison garage should be insulated.

Estimated Economic Impact Summary

Building Envelope R-Value improvement – including Windows
Energy Savings heating = Area X (Existing U-Value – New U-Value) X (Interior Temperature – Avg. OA Temperature Heating Season) X Hours/day X Days/Year
Energy Savings Cooling = Area X (Existing U-Value – New U-Value) X (Avg. OA Temperature Cooling Season - Interior Temperature) X Hours/Day X Days/Year

Area	Existing U-value	New U-value	Interior Temp	Avg OA Temp	Hours per year
140	0.75	0.55	70	28	6048

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	63.50	Gallons

Implementation Plan

Install 2" x 8' x 4' Insulated Sheathing on the interior of the wall of the garage. The insulation should be installed in such a manor that thewall's metal support structure is covered.

Estimated cost for this installation: $3,470.62

Description	# Units	Material	Total	Source

Inspection Report

Report Date	10/11/2010

Company	Arbogast Energy Auditing	**Customer**	Town of Madison NH
Address	317 Austin St #4	**Site Address**	Madison Garage
Thermographer	Elmer Arbogast	**Contact Person**	Sue Stacy

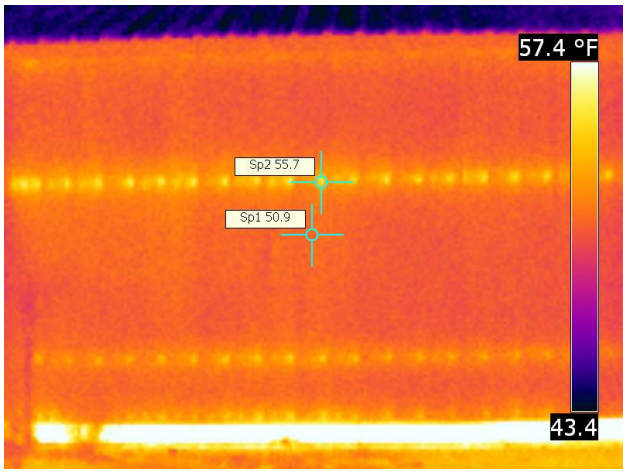


Image and Object Parameters

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Image Date	9/15/2010 10:53:28 AM
Image Name	IR_1931.jpg
Emissivity	0.95
Reflected apparent temperature	0.0 °F
Object Distance	3.2 ft

Text Comments

Description

Wall beams are losing excessive heat through siding connection points.

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 49**

Finding Description: **CO and CO2 Alarm**

Building: **Madison Garage**

General Finding Impacts

Energy Savings	No
Fuel Savings	No
Electric Savings	No
Demand Savings	No
Indoor Air Quality	Yes
Comfort	No
Maintenance and Reliability	Yes

Recommendation:

The Madison Garage has vehicle which run inside the building dangerous level of Carbon Monoxide and Carbon Dioxide could build up in this space and cause harm. It is recommended that a monitor capable of detecting and reporting CO and CO2 be installed in the space and trip an audible alarm. Note that this unit can be tied into future vehicle exhaust extraction system.

Estimated Economic Impact Summary

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

It is recommended that a Honeywell Multi-point sample draw gas monitor model VASQN82 CO CO2 8XTL3 be installed in the Garage. Unit should be located outside of office area with draw points 3 feet above the floor in the shop area.

Estimated cost for this installation: $8,839.51

Description	# Units		Total	Source
Gas Monitor	1	7160	7160	Kele quoted price
Unit set up	1	220	220	AEA quoted price
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$8,839.51	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 50**

Finding Description: **Door Weather Stripping**

Building: **Madison Garage**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	No
Demand Savings	No
Indoor Air Quality	Yes
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

Over all the door weather striping is in poor condition at the town hall, weather stripping breaks down over time and with use. Therefore it is recommend that the door weather stripping at this building is set to a high priority at this time. For this type of building and use it is anticipated that the weather-stripping for these doors should be replaced every 8 to 10 years.

Estimated Economic Impact Summary

Energy Savings heating = Open Area X Avg. Wind Speed X Diversity Factor X 1.08 X (Interior Temperature – Avg. OA Temperature Heating Season) X Hours/day X Days/Year
Energy Savings Cooling = [(Open Area X Avg. Wind Speed X Diversity Factor)/13.8] X (Avg. OA Enthalpy Cooling Season - Interior Enthalpy) X Hours/Day X Days/Year

Open Area	Avg. Wind Speed	Diversity Factor	Constant	Interior Temp	Avg OA Temp	Hours per year
2.25	7	1	1.08	70	28	6048

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	59.35	Gallons

Implementation Plan

The Entire perimeter of the entrance doors should be sealed to eliminate heat loss, Sealing kits from American garage door supplies is in the appendix of this report.

Estimated cost for this installation: $546.54

Description	# Units		Total	Source
Overhead - Top Seal Cap	1	71	71	
Over Head - Perimeter Seal	1	108	108	
Overhead - Bottom Seal	1	93.5	93.5	
Overhead Felt	1	65	65	
Entrance Door Jam Kit	1	72.7	72.7	
Entrance Door Bottom Kit	1	32.5	32.5	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total			$546.54	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

Inspection Report

Report Date 10/11/2010

Company	Arbogast Energy Auditing	**Customer**	Town of Madison NH
Address	317 Austin St #4	**Site Address**	Madison Garage
Thermographer	Elmer Arbogast	**Contact Person**	Sue Stacy

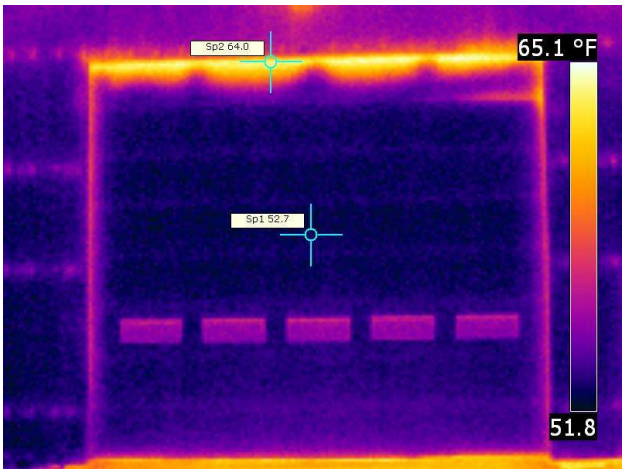


Image and Object Parameters

Text Comments

Description

Madison Garage door is leaking excessive heat out the top seal.

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 51**

Finding Description: **Waste Oil Heater**

Building: **Madison Garage**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	No
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

The town of Madison already burns waste oil to heat the Hwy garage, if the Hwy garage effiecency is improved than the waste oil could be burned at the Madison Garage. This would reduce the need to purchase #2 fuel oil.

Estimated Economic Impact Summary

Unit will replace 1300 gallons of purchased fuel.

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	1200.00	Gallons

Implementation Plan

Clean Burn CB2500 used-oil(waste oil) furnace with 250 gallon tank, tank stands,tank drain, pump mount, draw assembly, gauge, copper line, sheething, and pump wiring should be installed in the north east corner of the garage utilizing exisitng exhaust hole.

Estimated cost for this installation: $13,864.20

Description	# Units		Total	Source
Clean Burn CB 2500	1	7495	7495	
Exhaust Venting	1	1800	1800	
Power and Control wiring	1	375	375	
Oil Piping	1	1560	1560	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$13,864.20	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 52**

Finding Description: **Vehicle Exhaust Extraction system**

Building: **Madison Garage**

General Finding Impacts

Energy Savings	No
Fuel Savings	No
Electric Savings	No
Demand Savings	No
Indoor Air Quality	Yes
Comfort	No
Maintenance and Reliability	Yes

Recommendation:

The MadisonGarage has vehicle which run inside the building dangerous level of Carbon Monoxide and Carbon Dioxide and other gas could build up in this space and cause harm. It is recommend that a quilfied design professional design an system to extract these gases directly from the exhaust pipe of the trucks. This system should also include a gas monitoring system as outline in previous recommendation.

Estimated Economic Impact Summary

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

This system should be design by quilfied design professional and therefore no implementation plan is given at this time

Estimated cost for this installation: $0.00 This recommendation cost was not estimated

Description	# Units		Total	Source
Contractor Mark Up			0%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$0.00	

Recommend Work to be performed by – Qualified Contractor after design by quilfied professional

Owner Action – Solicited Bids from quilfied design professional

Observations - Historical Building

Original Design and Current Use

- The Building is a wood frame building was built in 1898 and is used as a museum.

Retrofits

- The retrofit recommendation include lighting improvemen. High priority recommendations all have a payback of less than 5 years or have health safety issues attached. A total of 1 recommendation are being made for this building which have the potential to reduce the building.

On-Site Renewable Energy

- This building does not have any on-site renewable energy fit which would have less than a 10 years. If usage of this building increases the addition of on-site renewable should be reviewed with new usage. On-site renewable energy sources for all buildings are addressed later in this report.

Age and Condition of the Mechanical Equipment

- N/A

Indoor Air Quality

- N/A

Space temperature and Humidity

- N/A

R- Value

- R-Value of this building was not measure since it is not a conditioned space.

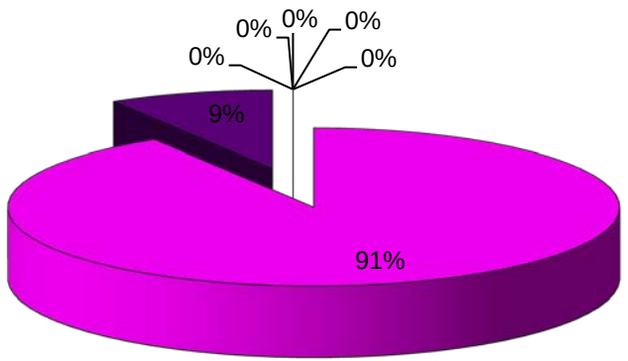
Maintenance

- N/A

People's energy awareness

- The occupant energy awareness in this building as throughout most of the town buildings is very good. A yearly review of energy usage is recommended to keep the awareness of energy usage high.

Historical Building
ENERGY USAGE PROFILE



Cooling | Heating | Pumps | Lighting | Fans | Domestic Hot Water | Plug Load (Include Computers)

Total Facility Consumption	293 (Thousand of BTU/hr)
Cooling	0.0%
Heating	0.0%
Pumps	0.0%
Lighting	91.3%
Fans	8.7%
Domestic Hot Water	0.0%
Plug Load (Include Computers)	0.0%
Total	100.0%

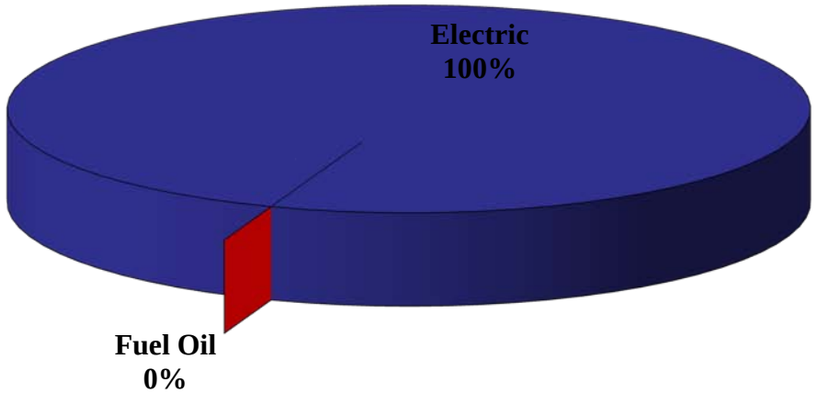
Town of Madison New Hampshire
Historical Building
Utility Analysis Period:

8/01/2009 to 7/31/2010

	Current Year			Previous Year		
	8/1/2009	to	7/31/2010	8/1/2008	to	7/31/2009
	Electric		Fuel Oil	Electric		Fuel Oil
Utility Costs	$147		$0	$155		$0
Utility Usage	86		0	140		0
$ Cost/Unit (kWh, Therm, Gal)	$1.71		$0.00	$1.11		$0.00
	CDD		HDD	CDD		HDD
	353		7,263	273		7,998
Current Year Vs Previous Year	**Electric**		**Fuel Oil**			
Change in Cost	-5%					
Change in Usage	-39%					
Change in $ Cost/Unit	54%					
Change in Degree Day	29%		-9%			

Electrical decreased greatly, since this is a lighting and ceiling fan load only it has to be assume this decrease is a result of decrease in usage

Utility Cost Comparison Current Year



Energy Benchmarking - Historical Building

The calculation of EUI (Energy Use Intensity) is shown below. EUI, expressed in kBtu/sf, is normalized for floor area, the most dominant influence on energy use in most buildings. Its use usually provides a good approximation of how your building's energy performance compares to others. Site EUI indicates the rate at which energy is used at your building (the point of use). Source EUI indicates the rate at which energy is used at the generation sources serving your building (the point of source) and indicates the societal energy penalty due to your building The lower the EUI, the higher the rating, indicating that the building is more efficient than other buildings. The greater the EUI, the lower the rating, indicating that there is an opportunity for higher potential benefits from operational improvements.

To compare the buildings shown below to each other, and to determine the ranking of the buildings from having the most to the least opportunity for demand-side improvements from a financial perspective, please see the Site EUI ranking below.

The Site EUI below has been applied to a Department of Energy statistical model from the Oak Ridge National Laboratory web site, http://eber.ed.ornl.gov/benchmark. The Department of Energy has estimated energy use and cost reductions for building source EUI ratings (percentiles) in the table below. Please see the DOE Regional Source EUI Comparison graph below to rate your building in relation to the regional distribution of similar type buildings. (Note: The Source EUI includes the inefficiencies of electrical generation and transmission. A reduction in 'electrical' source EUI includes a benefit in terms of reduction of air pollution emissions and green house gases, and is thus an indicator of societal benefit.)

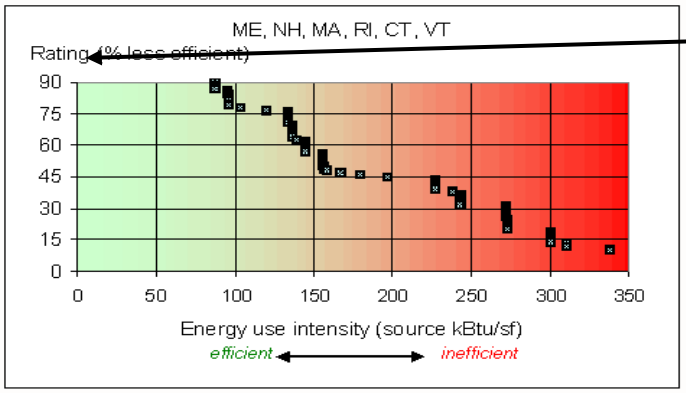
Source EUI Rating for your Building	Energy use and cost reduction potential (%)	Walk-thru energy assessment recommended?
above 60%	below 25%	No
40 to 60%	20 to 35%	Maybe
20 to 40%	35 to 50%	Yes
Below 20%	above 50%	Definitely

Rating from the most efficient to the least efficient - 2010 consumption

Site EUI Rank	Building	Annual Total Electrical Use (kWh)	Annual Total Non-Electrical Fuel Use (Gals)	Occupied Building Gross Floor Area (sq-ft)	Site EUI Rating	Source EUI: Annual Total Source Energy Use per Sq-Ft (kBtu/sf)	Rating (Regional Source EUI Comparison)
1	Historical Building	86	-	3,959	**0**	**0**	**0.98**

Building Type

Office



Site EUI	Est Regional Rating	Building
0	98%	Historical Building

Source: Oak Ridge National Laboratory web site, http://eber.ed.ornl.gov/benchmark

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 36**

Finding Description: **Lighting/Lighting Control Upgrade**

Building: **Historical Building**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	No
Electric Savings	Yes
Demand Savings	Yes
Indoor Air Quality	No
Comfort	No
Maintenance and Reliability	Yes

Recommendation:

The Historical building consist mainly of incandesent bulbs and should be upgraded to solid state

Energy Savings = [Watts of Existing Fixture-Watts of New Fixture] x Number of Fixture x Lighting hours per year

Estimated Annual Electrical Savings	70.28	KWH
Estimated Annual Electric Demand Savings	21.08	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

Please see attached detail lighting sheet and sketch for detail of work.

Estimated cost for this installation: $701.23

Description	# Units		Total	Source
18 Watt LED	7	58	406	
3- watt LED	9	18	162	
	0	58		
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$701.23	
Total Post PSNH Rebate			$420.74	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

Lighting Audit Report

Madison New Hampshire - Historical Building

1	Location:	Recommendation:							
	Front office	Replace Incandecent with LED	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	60 watt	1	60	40	2.4	0.06		
	Proposed:	3 Watt LED	1	3	40	0.12	0.003	2.28	0.057
		Proposed lighting controls:							

2	Location:	Recommendation:							
	Basement	Replace Incandecent with LED	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	100 watt	4	100	40	16	0.4		
	Proposed:	3 Watt LED	4	3	40	0.48	0.012	15.52	0.388
		Proposed lighting controls:	No work in this area						

3	Location:	Recommendation:							
	Main Hall	Replace Incandecent with LED	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	150 watt	7	150	40	42	1.05		
	Proposed:	18 Watt LED	7	18	40	5.04	0.126	36.96	0.924
		Proposed lighting controls:	No work in this area						

4	Location:	Recommendation:							
	Kitchen	Replace Incandecent with LED	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	100 watt	2	100	40	8	0.2		
	Proposed:	3 Watt LED	2	3	40	0.24	0.006	7.76	0.194
		Proposed lighting controls:	No work in this area						

5	Location:	Recommendation:							
	Lecture Hall	Replace Incandecent with LED	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	100 watt	2	100	40	8	0.2		
	Proposed:	3 Watt LED	2	3	40	0.24	0.006	7.76	0.194
		Proposed lighting controls:	No work in this area						

6	Location:	Recommendation:							
	Lower level restroom	0	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Existing:	0	0	0	0	0	0		
	Proposed:	0	0	0	0	0	0	0	0
		Proposed lighting controls:	No work in this area						

Lighting Cost/Payback Analysis

Madison New Hampshire - Historical Building

KW Rate: 0 KWH Rate: 0.08008

Existing System	**Annual**	**Monthly**	**Annual $**	**Montly $**
KWH:	76		$6	
KW:	22.92	1.91	$0.00	$0.00
Proposed System	**Annual**	**Monthly**	**Annual $**	**Montly $**
KWH:	6.12		$0	
KW:	1.836	0.153	$0.00	$0.00
Saved	**Annual**	**Monthly**	**Annual $**	**Montly $**
KWH:	70.28		$6	
KW:	21.084	1.757	$0.00	$0.00

Observations - Transfer Station Trailer

Original Design and Current Use

- The Building is a trailer was built in 1980 and is fair condition.

Retrofits

- The retrofit recommendation include lighting and HVAC improvements. High priority recommendations all have a payback of less than 5 years or have health safety issues attached. A total of 4 recommendation are being made for this building which have the potential to reduce the building.

On-Site Renewable Energy

- The layout of the land at the transfer station creates winds such that a wind mill could be installed however the payback was greater than a 15 year payback. Therefore at this time onsite renewable are not recommended for this site. As wind technology improves this site should be re-evaluated for the application of wind power. On-site renewable energy sources for all buildings are addressed later in this report.

Age and Condition of the Mechanical Equipment

- The electric heater in the trailer is in very poor condition and should not be used. The propane heaters are over 30 years old and have exceed the life expectancy of this type of equipment. However due to the type of use of this space they are not recommended to be replaced.

Indoor Air Quality

- Overall the Indoor air quality of this building is good.

Space temperature and Humidity

- The temperature in this space is controlled by manual thermostats and humidity is not controlled. Due to use of this space it is recommended that a occupancy sensor be installed to operate heater in office area. Since humidity is not a concern with in this space due to climate and use it is recommended that humidity control stays the same.

R- Value

- Overall the R-Value of this building is below acceptable range, however due to the type of use of this trailer building envelope improvements are not recommended.

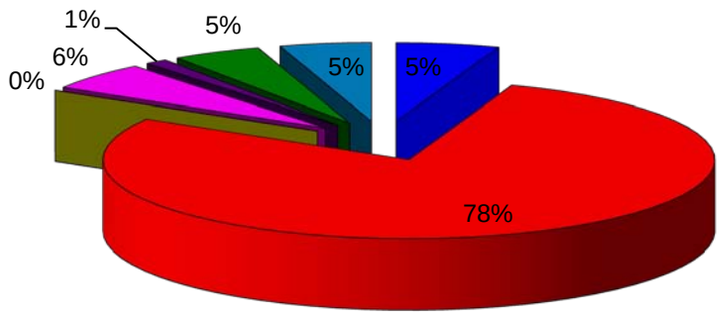
Maintenance

- Maintenance is on call manor, changing over to a preventive maintenance approach would result in future energy usage and extend the life of the equipment resulting in reduced future operation cost.

People's energy awareness

- The occupant energy awareness in this building as throughout most of the town buildings is very good. A yearly review of energy usage is recommended to keep the awareness of energy usage high.

Transfer Station Trailer
ENERGY USAGE PROFILE



Cooling | Heating | Pumps | Lighting | Fans | Domestic Hot Water | Plug Load (Include Computers)

Total Facility Consumption	32 (Millions of BTU/hr)
Cooling	5.4%
Heating	77.1%
Pumps	0.0%
Lighting	5.6%
Fans	1.1%
Domestic Hot Water	4.6%
Plug Load (Include Computers)	4.8%
Total	98.7%

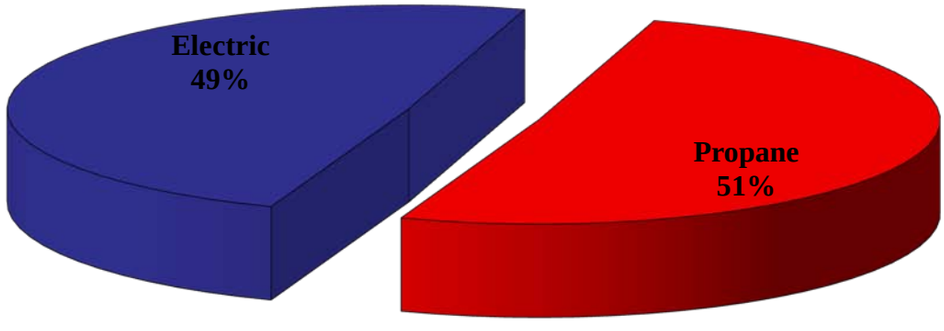
Town of Madison New Hampshire
Transfer Station Trailer
Utility Analysis Period:

8/01/2009 to 7/31/2010

	Current Year			Previous Year		
	8/1/2009	to	7/31/2010	8/1/2008	to	7/31/2009
	Electric		Propane	Electric		Propane
Utility Costs	$516		$534	$391		$975
Utility Usage	2,155		272	1,642		358
$ Cost/Unit (kWh, Therm, Gal)	$0.24		$1.97	$0.24		$2.72
	CDD		HDD	CDD		HDD
	353		7,263	273		7,998
Current Year Vs Previous Year	**Electric**		**Propane**			
Change in Cost	32%		-45%			
Change in Usage	31%		-24%			
Change in $ Cost/Unit	1%		-28%			
Change in Degree Day	29%		-9%			

Propane usage drop dramitically and Electrical had a dramatic increase.

Utility Cost Comparison Current Year



Energy Benchmarking - Transfer Station Trailer

The calculation of EUI (Energy Use Intensity) is shown below. EUI, expressed in kBtu/sf, is normalized for floor area, the most dominant influence on energy use in most buildings. Its use usually provides a good approximation of how your building's energy performance compares to others. Site EUI indicates the rate at which energy is used at your building (the point of use). Source EUI indicates the rate at which energy is used at the generation sources serving your building (the point of source) and indicates the societal energy penalty due to your building The lower the EUI, the higher the rating, indicating that the building is more efficient than other buildings. The greater the EUI, the lower the rating, indicating that there is an opportunity for higher potential benefits from operational improvements.

To compare the buildings shown below to each other, and to determine the ranking of the buildings from having the most to the least opportunity for demand-side improvements from a financial perspective, please see the Site EUI ranking below.

The Site EUI below has been applied to a Department of Energy statistical model from the Oak Ridge National Laboratory web site, http://eber.ed.ornl.gov/benchmark. The Department of Energy has estimated energy use and cost reductions for building source EUI ratings (percentiles) in the table below. Please see the DOE Regional Source EUI Comparison graph below to rate your building in relation to the regional distribution of similar type buildings. (Note: The Source EUI includes the inefficiencies of electrical generation and transmission. A reduction in 'electrical' source EUI includes a benefit in terms of reduction of air pollution emissions and green house gases, and is thus an indicator of societal benefit.)

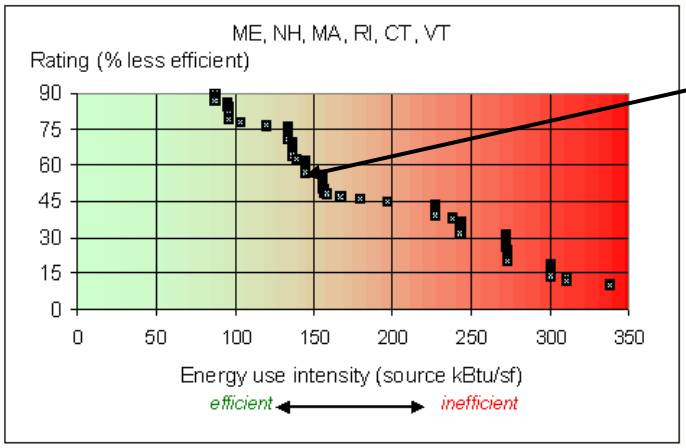
Source EUI Rating for your Building	Energy use and cost reduction potential (%)	Walk-thru energy assessment recommended?
above 60%	below 25%	No
40 to 60%	20 to 35%	Maybe
20 to 40%	35 to 50%	Yes
Below 20%	above 50%	Definitely

Rating from the most efficient to the least efficient - 2010 consumption

Site EUI Rank	Building	Annual Total Electrical Use (kWh)	Annual Total Non-Electrical Fuel Use (Gals)	Occupied Building Gross Floor Area (sq-ft)	Site EUI Rating	Source EUI: Annual Total Source Energy Use per Sq-Ft (kBtu/sf)	Rating (Regional Source EUI Comparison)
1	Transfer Station Trailer	2,155	272	226	**142**	**208**	**0.50**

Building Type

Office



Site EUI	Est Regional Rating	Building
142	50%	Transfer Station Trailer

Source: Oak Ridge National Laboratory web site, http://eber.ed.ornl.gov/benchmark

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 10**

Finding Description: **Lighting/Lighting Control Upgrade**

Building: **Transfer Station**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	No
Electric Savings	Yes
Demand Savings	Yes
Indoor Air Quality	No
Comfort	No
Maintenance and Reliability	Yes

Recommendation:

Lights in the fire station are T-12 fluorescents and incandescent bulbs and should be replaced with high efficient Fluorescents

Estimated Economic Impact Summary

Energy Savings = [Watts of Existing Fixture-Watts of New Fixture] x Number of Fixture x Lighting hours per year

Estimated Annual Electrical Savings	124.80	KWH
Estimated Annual Electric Demand Savings	1.20	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

The town of madison should replace the overhead light in the office area and the lamp in the storage area with circular flourescents. Please see attached detail lighting sheet and sketch.

Estimated cost for this installation: $152.15

Description	# Units		Total	Source
LUMAPRO Model #: 2ZE23	2	61.62	123.24	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$152.15	
Total Post PSNH Rebate			$91.29	

Lighting Audit Report

Madison New Hampshire - Transfer Station

1	Location:	Recommendation:	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Kitchen	Remove existing channel strip light and replace with two 22 Watt Circular fluorescent							
	Existing:	2 f40T12	1	84	1248	104.832	0.084		
	Proposed:	LUMAPRO Model #: 2ZE23 - 22 Watt bulb	1	22	1248	27.456	0.022	77.376	0.062
		Proposed lighting controls:	No work in this area						

2	Location:	Recommendation:	# of Fixtures	Average Watts	Usage (hrs ann.)	KWH (Used)	KW (Used)	KWH (Saved)	KW (Saved)
	Women's Restroom	Remove incandescent fixture and replace with 22 Watt Circular fluorescent							
	Existing:	1 - 60 Watt Incandescent	1	60	1248	74.88	0.06		
	Proposed:	LUMAPRO Model #: 2ZE23 - 22 Watt bulb	1	22	1248	27.456	0.022	47.424	0.038
		Proposed lighting controls:	No work in this area						

Lighting Cost/Payback Analysis

Madison New Hampshire - Transfer Station

KW Rate: 12.82 KWH Rate: 0.08008

Existing System	**Annual**	**Monthly**	**Annual $**	**Montly $**
KWH:	180		$14	
KW:	1.728	0.144	$22.15	$1.85
Proposed System	**Annual**	**Monthly**	**Annual $**	**Montly $**
KWH:	54.912		$4	
KW:	0.528	0.044	$6.77	$0.56
Saved	**Annual**	**Monthly**	**Annual $**	**Montly $**
KWH:	124.8		$10	
KW:	1.2	0.1	$15.38	$1.28

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 11**

Finding Description: **Controls Upgrade**

Building: **Transfer Station**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	No
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

A occupancy sensor should be install in series with the T-Stat for the furnace which serves the Office area. This thermostat then should be set at 70 degrees. The Thermostat for the storage area should be set at 55 degrees.

Estimated Economic Impact Summary

Energy Saving = BTU/hr of Furnace * Reduce Runtime from Programmable T-Stat

Btu/hr	Reduced Run Hours	
48000	144	Based on reducing the runtime of the furnace by 4 hour per week during the heating season

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	75.96	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

A occupancy sensor should be installed in series with the thermostat in the heater serving the front office area. This will only allow the heater to come on when the office is occupied, thus creating energy savings. Since the trailer will be protected from frezzing from the unit in the storage area this unit can remain off when the trailer is unoccupied.

Estimated cost for this installation: $87.65

Description	# Units		Total	Source
LEVITON PR150-1LW	1	71	71	
	0	0	0	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$87.65	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 12**

Finding Description: **Permanently Shut off electric heat**

Building: **Transfer Station**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	No
Electric Savings	Yes
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

It was observed during the energy audit that the electric heat was coming on. The space has an propane fired unit which should be used.

Estimated Economic Impact Summary

Energy Saving = KW of Furnace * Reduce Runtime from Programmable T-Stat

Btu/hr	Reduced Run Hours	
1.5	144	Based on reducing the runtime of the furnace by 4 hour per week during the heating season

Estimated Annual Electrical Savings	216.00	KWH
Estimated Annual Electric Demand Savings	1.50	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

Electric breakers were shut off during the energy audit and the town employees which used this trailer should be instructed to leave these breakers shut off.

Estimated cost for this installation: $1.23

Description	# Units		Total	Source
	1	1	1	
	0	0	0	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$1.23	

Recommend Work to be performed by – Town Employee

Owner Action – Instruct town employees to level electric heat breakers off

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 13**

Finding Description: **Timer on domestic hot water heater**

Building: **Transfer Station**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	No
Electric Savings	Yes
Demand Savings	No
Indoor Air Quality	No
Comfort	Yes
Maintenance and Reliability	Yes

Recommendation:

It was observed during the energy audit that the electric hot water heater was on when the space was not occupied. Installing a time clock will shut off the water heater when space is unoccupied but ensure hot water when needed.

Estimated Economic Impact Summary

Energy Saving = KW of Water Heater * Reduce Runtime from Time Clock

Btu/hr	Reduced Run Hours	
1.5	182.5	Based on reducing the runtime of the water heater by 1/2 hour per day

Estimated Annual Electrical Savings	273.75	KWH
Estimated Annual Electric Demand Savings	1.50	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

Time Clock should be installed in the power wiring of the water heater and time clock set 1 hour prior to space being occupied and shut off 1/2 prior to space being unoccupied.

Estimated cost for this installation: $139.38

Description	# Units		Total	Source
INTERMATIC Model # EI500WC	1	112.9	112.9	
	0	0	0	
Contractor Mark Up			23%	Equivalent of 10% Overhead and 10% Profit
Total Prior to PSNH Rebate			$139.38	

Recommend Work to be performed by – Qualified Contractor

Owner Action – Solicited Bids from Contractor

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding #** **53**

Finding Description: **PV Solar**

Building: **All Buildings**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	No
Electric Savings	Yes
Demand Savings	No
Indoor Air Quality	No
Comfort	No
Maintenance and Reliability	No

Recommendation:

When evaluating PV solar application for the Town of Madison building I did not find a fit. The best candidate would be the library however the payback period would be excessive. The main reason the Town of Madison buildings do not have a good fit with PV solar is the lack of south facing roofs that do not have shading.

Estimated Economic Impact Summary

PV solar is an on-site renewable energy which would reduce the town's purchased electrical energy.

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

As PV solar technology improves and the price of the panels decrease the Town should have buildings reevaluated for the application of PV Solar

Estimated cost for this installation: $0.00

Description	# Units	Labor and Material Cost/Unit	Total	Source

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 54**

Finding Description: **Thermal Solar**

Building: **All Buildings - except Library**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	Yes
Electric Savings	No
Demand Savings	No
Indoor Air Quality	No
Comfort	No
Maintenance and Reliability	No

Recommendation:

When evaluating Thermal solar application for the Town of Madison building I found one building with a potential fit. The best candidate would be the library and a evaluation of this application is in this report. The main reason the Town of Madison buildings do not have a good fit with PV solar is the lack of south facing roofs that do not have shading.

Estimated Economic Impact Summary

Thermal solar is an on-site renewable energy which would reduce the town's purchased fuel.

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

As Thermal solar technology improves and the price of the panels decrease the Town should have buildings reevaluated for the application of Thermal Solar

Estimated cost for this installation: $0.00

Description	# Units	Labor and Material Cost/Unit	Total	Source

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding #** **55**

Finding Description: **Wind energy**

Building: **All Buildings**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	No
Electric Savings	Yes
Demand Savings	No
Indoor Air Quality	No
Comfort	No
Maintenance and Reliability	No

Recommendation:

When evaluating Wind Energy application for the Town of Madison building I did not find a fit. The best candidate would be the transfer station trailer. The main reason the Town of Madison buildings do not a fit with wind energy is the lack of maintained wind. There is however the potential for wind energy with in the Town of Madison on the Ridge east of route 113 between Madison and Route 16

Estimated Economic Impact Summary

Wind power is an on-site renewable energy which would reduce the town's purchased electric.

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

As wind power technology improves and the price of the panels decrease the Town should have buildings reevaluated for the application of wind power.

Estimated cost for this installation: $0.00

Description	# Units	Labor and Material Cost/Unit	Total	Source

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 56**

Finding Description: **Combine Heat and Power**

Building: **All Buildings**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	No
Electric Savings	Yes
Demand Savings	Yes
Indoor Air Quality	No
Comfort	No
Maintenance and Reliability	No

Recommendation:

When evaluating combined heat and power application for the Town of Madison building I did not find a fit. The best potential fit for the town's building would be micro CHP, however the town does not have a year round heating requirment or the disired electrical use profile for this type of CHP. The town of madison does not have a central heating plant and therefore is not a fit for the steam based CHP.

Estimated Economic Impact Summary

Combined Heat and Power (CHP) is an on-site electrical production which would reduce the town's purchased electric while using the waste heat from this process to heat their buildings.

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

With current use of the town building CHP does not have an application for the Town of Madison. If the town was going to build a cental district heat plant then CHP should be part of that project. District heating is addressed later in this report.

Estimated cost for this installation: $0.00

Description	# Units	Labor and Material Cost/Unit	Total	Source

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 57**

Finding Description: **District Heating**

Building: **All Buildings**

General Finding Impacts

Energy Savings	No
Fuel Savings	No
Electric Savings	No
Demand Savings	No
Indoor Air Quality	No
Comfort	No
Maintenance and Reliability	Yes

Recommendation:

When evaluating district heat application for the Town of Madison building I did not find a fit. I would not recommend that the Town build a district heating plant, however if an outside source was planning to build a large heating plant to burn waste wood and was willing to sell the town heat then I would recommend the town investigate this option. The contract should be written such that guarantees the town a lower BTU cost than oil or propane.

Estimated Economic Impact Summary

District heating is a heat production and delivery method which allow small communities to take advantage of large scale heat production. This includes burning of waste wood products, combine heat and power and other central heating plant saving methods.

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

No action at this time unless approached by outside source which wants to install a district heating source.

Estimated cost for this installation: $0.00

Description	# Units	Labor and Material Cost/Unit	Total	Source

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 58**

Finding Description: **Bio Energy**

Building: **All Buildings**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	No
Electric Savings	Yes
Demand Savings	No
Indoor Air Quality	No
Comfort	No
Maintenance and Reliability	No

Recommendation:

When evaluating Bio Energy application for the Town of Madison building I did not find a fit. The best fit for bio energy for the Town's building would be wood pellets. However do to the low usage of fuel by the town's building, I could not justify an application at any of the buildings.

Estimated Economic Impact Summary

Bio Energy is the use of Bio product such as wood that is renewable to heat building versus using fossil fuels which have a limited supply.

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

No action at this time.

Estimated cost for this installation: $0.00

Description	# Units	Labor and Material Cost/Unit	Total	Source

FINDINGS, RECOMMENDATIONS & IMPLEMENTATION

DETAILED FINDINGS **Finding # 59**

Finding Description: **Yearly Energy Review**

Building: **All Buildings**

General Finding Impacts

Energy Savings	Yes
Fuel Savings	No
Electric Savings	Yes
Demand Savings	No
Indoor Air Quality	No
Comfort	No
Maintenance and Reliability	No

Recommendation:

Energy usage tends to drift higher as people lose focus on saving energy. In addition technology is consistently advancing and recommendation that did not make sense today may make sense in a few years. In addition continually review energy usage will create behavior changes that will reduce energy usage.

Estimated Economic Impact Summary

Energy Awareness creates energy saving by having people stay focus on energy savings and latest technology. .

Estimated Annual Electrical Savings	0.00	KWH
Estimated Annual Electric Demand Savings	0.00	KW
Estimated Annual Propane Savings	0.00	Gallons
Estimated Annual Fuel Oil Savings	0.00	Gallons

Implementation Plan

Have a qualified consultant review energy usage and energy star portfolio manager yearly. Cost will be $550.00 for 2011 an anticipate an increase of 5% per year there after.

Estimated cost for this installation: $0.00

Description	# Units	Labor and Material Cost/Unit	Total	Source
Contractor Mark Up			0%	Equivalent of 10% Overhead and 10% Profit
Total			$0.00	

Recommend Work to be performed by – Qualified Consultant

Owner Action – Hire Qualified consultant

6 Brown Street
Kennebunk, ME 04043

Solarize Inflector
WINDOW SYSTEMS

207-985-4438
800-370-0163
fax: 207-985-3146

INFLECTOR WINDOW PROPOSAL

NAME: Madison Town Hall & Library DATE: 9/22/2010
ADDRESS:
CITY,ST,ZIP: Madison, New Hampshire
PHONE:

Customer has selected the following Inflector system(s), style(s) and quanity(s) to be custom manufactured and installed at the address listed above to the exact measurements and specification listed below.

ITEM	QTY	TYPE	HARDWARE	OVERALL SIZE WIDTH	OVERALL SIZE LENGTH	OPTION	PRICE EA	TOTAL
	7	Town Hall Vertical		48	96		$569.00	$3,983.00
	4	Town Hall Vertical		42	54		$325.00	$1,300.00
	9	Library Roller Shades		30	36		$125.00	$1,125.00
	5	Library Roller Shades		24	36		$100.00	$500.00
	4	Library Roller Shades		24	27		$77.00	$308.00
	4	Library Roller Shades		24	54		$150.00	$600.00

Sub Total $7,771.00

Tax N/A

TOTAL PRICE $7,771.00

DEPOSIT $3,885.50

This proposal includes installation

BALANCE DUE $3,885.50

Inflector products will be manufacturing as per the above specifications in a professional manner. Customer understands that these are custom made to fit only these windows at the address stated above and is responsible for full payment of the above cost when the products are delivered and accepted. A 50% deposit is required to manufacturer said system(s). This quote is valid for 30 days after the above date unless stated in writing. Delivery of the product(s) is expected within 20 working days after the receipt of this contract.

SOLARIZE REPRESENTATIVE AUTHORIZED SIGNATURE *Lisa Getchell*

I HAVE REVIEWED THE ABOVE CONTRACT AND FOUND IT TO BE SATISFACTORY. I AUTHORIZE THE MANUFACTURE OF THE PRODUCT(S). I HAVE ENCLOSED A NON-REFUNDABLE 50% DEPOSIT AND AGREE TO PAY THE REMAINDER WHEN PRODUCT(S) ARE DELIVERED AND ACCEPTED.

SIGNATURE OF OWNER_____ **DATE:**_____

Dirigo Waste Oil LLC
92 College Ave
Waterville, ME 04901
Phone # **207 873 0881**
Fax # 207 877 9701
dirigowasteoil@roadrunner.com

ESTIMATE

Date	Estimate #
9/22/2010	20102

Bill To	Ship To
Arbogast Energy Auditing 317 Austin St # 4 Westbrook, ME 04092	Town of Madison

Rep	Terms
TA	Due On Delivery/Pick Up

Description	Qty	Total
Clean Burn CB2500 used-oil(waste oil) furnace with 250 gallon tank, tank stands, tank drain, pump mount, draw assembly, gauge, copper line, sheething, and pump wiring FOR LIMITED TIME INCLUDES FREE BASIC CHIMNEY PACK - CLASS A PACKAGE 8"		7,495.00T

Subtotal	**$7,495.00**
Sales Tax (5.0%)	$374.75
Total	$7,869.75

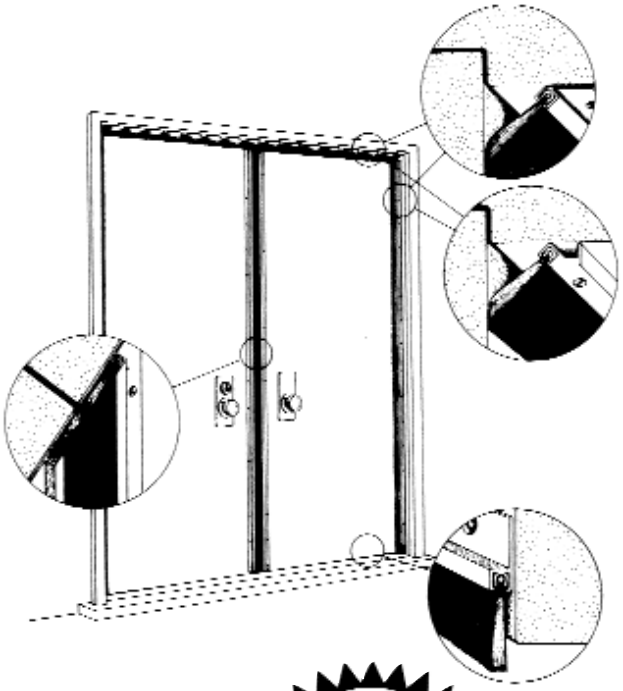
WE ACCEPT CASH, CHECKS, VISA, MASTERCARD, & DISCOVER.
ATTRACTIVE FINANCING OFFERS AS WELL.

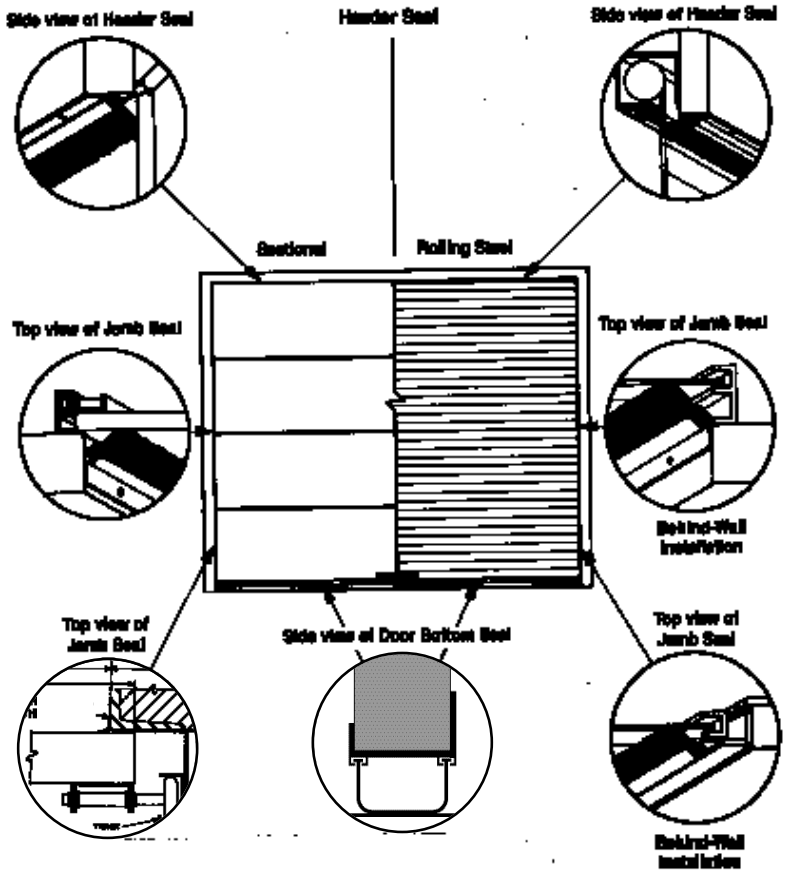
Sign & Fax To Accept

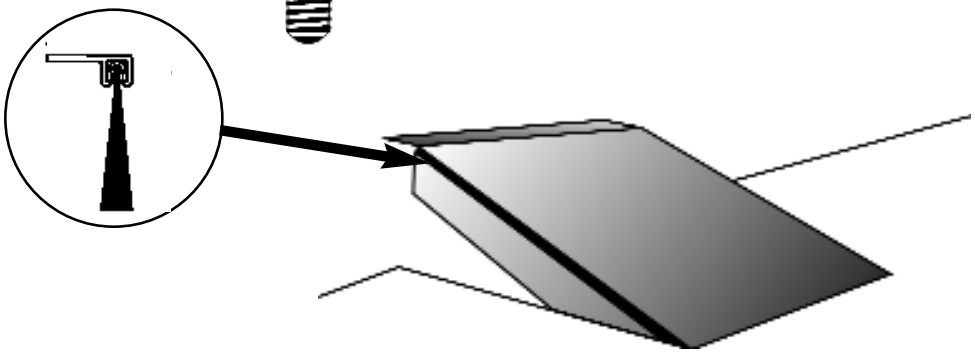
21 TWENTY-ONE YEARS Of Great Service

SECTION 3

Weatherstripping







American™
garage door supply inc.

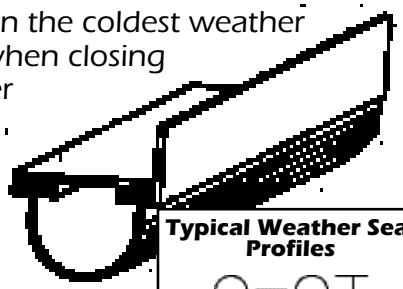
We can help you select the best system.

1-800-233-1487 Fax: (218) 751-6551

WEATHERSTRIPPING - BOTTOM SEALS

Aluminum Retainer With Bulb Seal

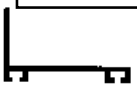
- Black Vinyl Seal
- Won't tear or deform
- Remains pliable in the coldest weather
- Cushions door when closing
- Aluminum holder comes slotted allowing for adjustment and perfect fit.



Typical Weather Seal Profiles

Choose From 2 Popular Retainers

G Type



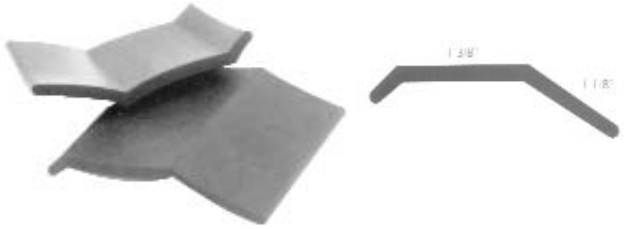
L Type

Part#	Description	Price
WRG10	Bulb Seal Retainer, T & G Type 10'2"	$12.50 ea.
WRG12	Bulb Seal Retainer, T & G Type 12'2"	$15.00 ea.
WRG14	Bulb Seal Retainer, T & G Series 14'2".	$17.50 ea.
WRL-10	Bulb Seal Retainer, L-Type, 119-1/2"	$28.50 ea
WRL-12	Bulb Seal Retainer, L-Type, 145 -1/2"	$31.50 ea
WRR-400-V	4" Vinyl Bottom Bulb Seal, T	$2.25 ft.

Bottom Bulb Seal Also Available In Bulk Rolls

Need bottom replacement seal for your National Brand door?
Call our professionals and let us help you.

Bottom Rubber Seal For Wood Doors



Part#	Description	Price/ft	Price/Roll
WS138	1-3/8" Door Thickness, Soft Sponge	$1.70	$130.00
WD138	1-3/8" Door Thickness, Dense Rubber	$2.00	$150.00
WD134	1-3/4" Door Thickness, Dense Rubber	$2.20	$160.00

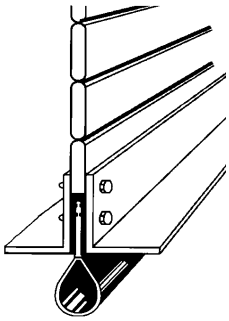
Bulk Rolls 100' Lengths

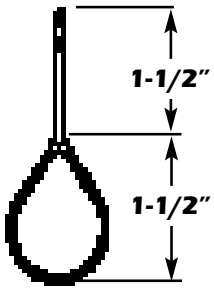
Rolling Steel Bottom Seal

- Dual Durometer Rigid & Flexible
- Standard Colors Black & Grey.

RB-21

$1.85/ft

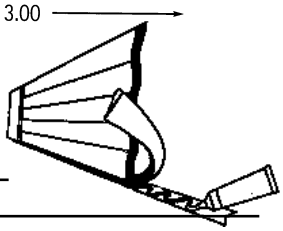




Garage Door Threshold

- Solid black vinyl garage door threshold • Seals out the elements
- Prevents driving rains and snow from backing into the garage
- Helps keep out dirt & leaves
- Keeps door bottom from contact with concrete to prevent rust on metal doors and water damage on wood doors
- Easy to install

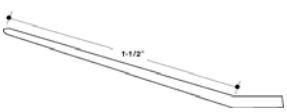
One tube comes with every 20 feet of threshold. Installation works best when temperatures are above 50° F.

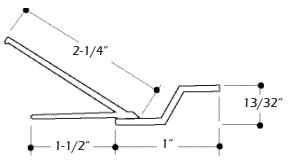


Part#	Description	Price/ Ft.	100 ft. roll
TV35BLN	Threshold	$5.85	$526.50

Part#	Description	Price/Tube
TV35	Adhesive only	$13.00

Top Seal - Sectional

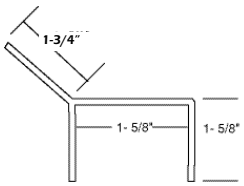




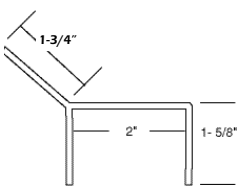
- Rigid and Flexible PVC
- Lengths Cut To Order
- Standard Cut Lengths; 8'2", 9'2", 10'2", 12'2", 14'2", 16'2"
- Standard Color: Black
- Can Be Used On Both Shiplap and T & G Steel Door

Part#	Description	Price/ft
TS-14	Dual Contact Top Seal	$1.45/ft.
TS-15	Single Contact Top Seal	$1.35/ft.

Top Seal Caps - Sectional Doors



1- 5/8" Top Seal Cap
TC-158
$2.75/Ft

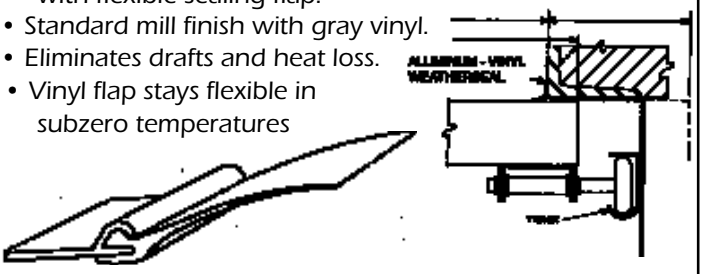


2" Top Seal Cap
TC-200
$3.00/Ft

American Garage Door Supply Inc.
1-800-233-1487 Fax: (218) 751-6551

Aluminum/Vinyl Perimeter Seal

- Heavy duty aluminum extrusion with flexible sealing flap.
- Standard mill finish with gray vinyl.
- Eliminates drafts and heat loss.
- Vinyl flap stays flexible in subzero temperatures



AV21

Standard Sizes 7', 8', 10', 12', 14', 16'

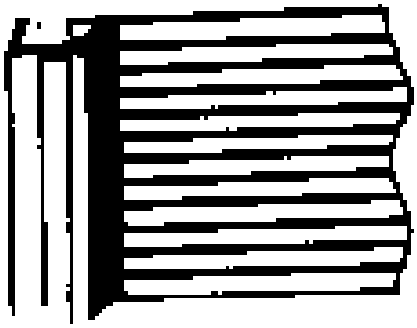
14', 16' Lengths Extrusion Folded in Half with Single Length Blade.
8', 10', 12'- Single Lengths

Part#	Description	Price ea.
AV21-10	1" Aluminum, 2" Vinyl, 10'1"	$17.50
AV21-12	1" Aluminum, 2" Vinyl, 12'1"	$21.00
AV21-14	1" Aluminum, 2" Vinyl, 14'1"	$24.50
AV21-16	1" Aluminum, 2" Vinyl, 16'1"	$28.00

Note: UPS up to 84" only

Rolling Steel Clip-on Brush Seals

For use on commercial rolling steel doors. The WGS combines a 3/4" plastic guide with efficient brush seal.
Fits 3/16" guides use alone or with epoxy for additional hold.



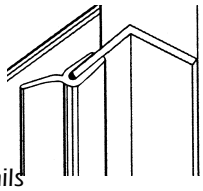
Clips on to guides up to 1/4"

Part#	Description	Price/ft.
WGS10	With 1" Nylon Brush	$4.55
WGS150	With 1 1/2" Nylon Brush	$5.55
WGS520	With 2" Nylon Brush	$6.20
WGS530	With 3" Nylon Brush	$7.15

Note: UPS up to 84" only

Clip On Vinyl Guide Seal

For Rolling Steel Doors



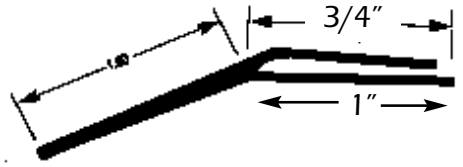
- Use as vinyl perimeter seal on rolling steel or curtain doors
- Use as bottom seal on curtain doors with double or single angle bottom rails
- Fits 3/16" or 1/4" thick steel angle guides
- Standard grey color
- Standard cut lengths; 8'6", 10'6", 12'6", 14'6", 16'6".

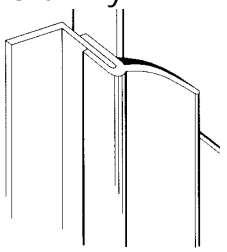
Part#	Description	Price/Box
GS-20-8.5*	**Clip On Vinyl Seal, 8'6"**	**$220.00**
GS-20-10.5	Clip On Vinyl Seal, 10'6"	$275.00
GS-20-12.5	Clip On Vinyl Seal, 12'6"	$330.00
GS-20-14.5	Clip On Vinyl Seal, 14'6"	$385.00
GS-20-16.5	Clip On Vinyl Seal, 16'6"	$440.00

Available in Unit Quantities of 25 Lengths only
***GS-20-8.5 available as (per ea.) at $10.00 each.**

Reverse Angle Clip-on Vinyl Seal

For use on commercial sectional doors. Dual duometer construction provides a hard vinyl holding section and a flexible flap.

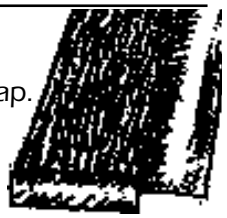




Part#	Description	Price/ft
WRJ-G	Clip-On Vinyl Seal- Gray	$1.65/ft
WRJ-B	Clip-On Vinyl Seal- Brown	$1.65/ft
WRJ-W	Clip-On Vinyl Seal- White	$1.65/ft

Any lengths UPSable

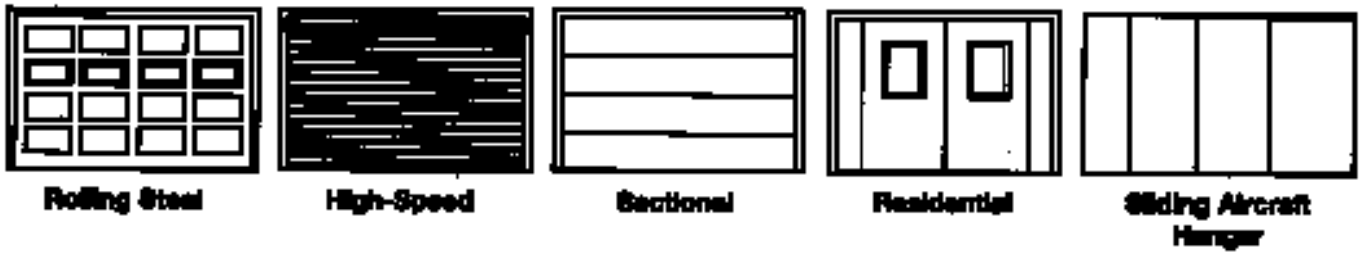
Climate Seals



2" Extruded PVC stop w/ 1" Vinyl Flap.
Will Not Rot, Low Maintenance
Available in white or brown
7', 8', 9', 10', 12', 14', or 16' Lengths
Can be UPS'd in 7' and 8' lengths
Larger sizes and other colors also available

Part#	Description	Price ea.
CS100W-8	Climate Seal, White, 8'	$14.00
CS100W-10	Climate Seal, White, 10'	$17.50
CS100W-12	Climate Seal, White, 12'	$21.00
CS100W-14	Climate Seal, White, 14'	$24.50
CS100W-16	Climate Seal, White, 16'	$28.00
CS100B-8	Climate Seal, Brown, 8'	$14.00
CS100B-10	Climate Seal, Brown, 10'	$17.50
CS100B-12	Climate Seal, Brown, 12'	$21.00
CS100B-14	Climate Seal, Brown, 14'	$24.50
CS100B-16	Climate Seal, Brown, 16'	$28.00

WEATHERSTRIPPING - BRUSH SEALS

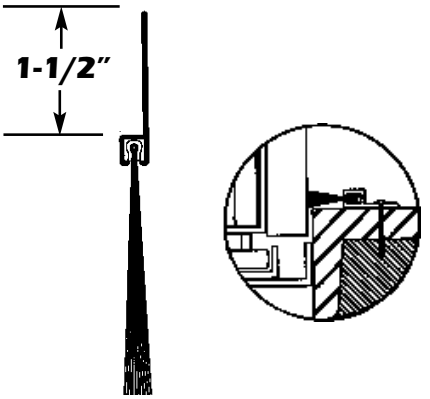


Keeps Out:	• **Drafts**	• **Rain**	• **Snow**	• **Wind**	• **Sand**	• **Debris**
	• **Light**	• **Noise**	• **Insects**	• **Rodents**	• **Birds**	• **Bats**

To minimize air dirt infiltration around rolling steel, sectional and sliding doors, install the best weatherseals available. Our brush weatherseals' unique property of conforming to irregular surfaces provides the most effective seal. Thousands of filaments form a solid wall for a complete weather tight seal without impairing door movement.

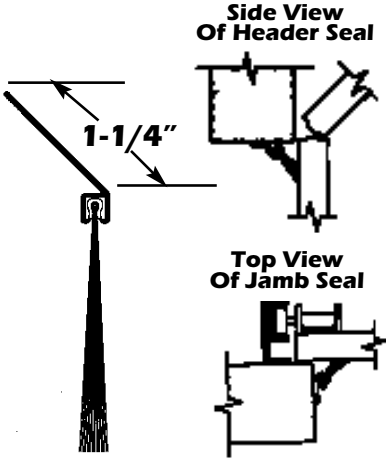
Standard Commercial Brush Seal

1-1/2" Straight



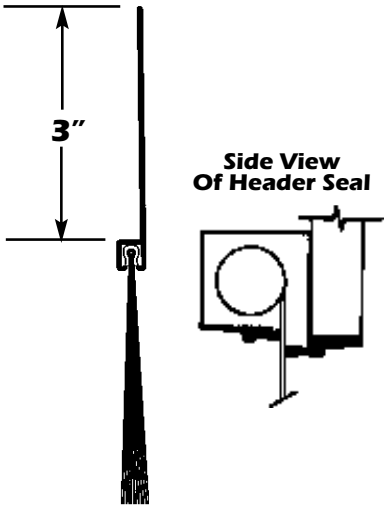
Part #	Brush Type	Length	Price/ft
BPS151	Polypropylene	1"	$3.90
BPS155	Polypropylene	1.5"	$4.55
BPS152	Polypropylene	2"	$4.90
BPS153	Polypropylene	3"	$5.55

1-1/4" x 45°



Part #	Brush Type	Length	Price/ft
BP4121	Polypropylene	1"	$3.60
BP4125	Polypropylene	1.5"	$4.25
BP4122	Polypropylene	2"	$4.55
BP4123	Polypropylene	3"	$5.20

3" Straight



Part #	Brush Type	Length	Price/ft
BPS31	Polypropylene	1"	$5.20
BPS35	Polypropylene	1.5"	$5.85
BPS32	Polypropylene	2"	$6.20
BPS33	Polypropylene	3"	$6.50

Heavy Duty Commercial Brush Seal

These nylon seals are designed for the largest gap on large sectional, industrial rolling steel and aircraft hangar doors.

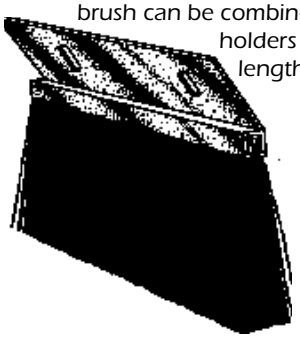
	Part #	Brush Type	Length	Price/ft
1-3/8" Straight	GS34	Nylon	1-3/4"	$12.35
	GS25	Nylon	2-1/2"	$13.35
	GS30	Nylon	3"	$14.65
	GS40	Nylon	4"	$15.95
	GS50	Nylon	5"	$18.20
1-1/2" 45° Angle	GA34	Nylon	1-3/4"	$12.35
	GA25	Nylon	2-1/2"	$13.35
	GA30	Nylon	3"	$14.65
	GA40	Nylon	4"	$15.95
	GA45	Nylon	5"	$18.20
5-1/2" Straight	GLS34	Nylon	1-3/4"	$14.30
	GLS25	Nylon	2-1/2"	$15.30
	GLS30	Nylon	3"	$16.90
	GLS40	Nylon	4"	$17.90
	GLS50	Nylon	5"	$20.50

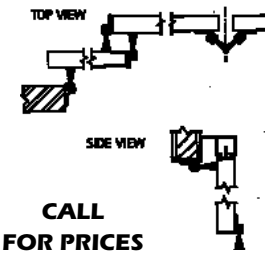
Nylon Construction

The heaviest seals available anywhere. Our heavy duty brushes seal out the elements around large industrial rolling steel doors, sectional doors, and other large doors including aircraft hangar doors. available in brush lengths up to 7". UL Rating for smoke seals on all brushes up to 4" in length

Aircraft Hangar Brush

Crimped polypropylene brush was developed for special use in sealing aircraft doors. This lower priced brush seals the largest gaps usually associated with hangar doors while providing the advantages of nylon brush weather seal. The brush can be combined with angled or straight holders and is available in brush trim lengths of 2", 3" and 4"

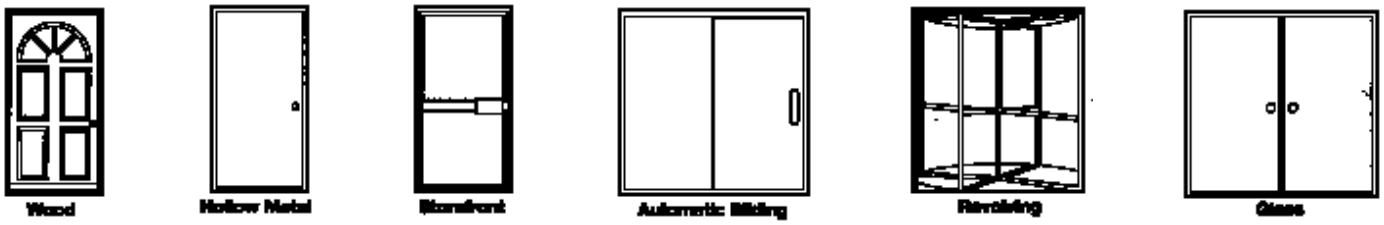




CALL FOR PRICES

American Garage Door Supply Inc.
1-800-233-1487 Fax: (218) 751-6551

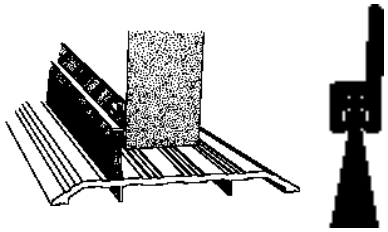
WEATHERSTRIPPING - ENTRANCE DOOR SEALS



Keeps Out: • **Drafts** • **Wind** • **Light** • **Rain** • **Insects** • **Snow** • **Noise** • **Sleet** • **Dust** • **Fumes** • **Sand** • **Rodents**

The importance of sealing openings in a building applies to entrance doors just as it does to overhead doors. Any gap around a door causes energy loss due to air infiltration. Dirt and debris are just as much of a problem. Brush designed Door Bottom Seals and Door Jamb Seals provide the most effective means of solving these problems. Mounted using special finished holders, brush weatherseals provide an attractive and effective solution to gaps for any door.

Door Bottom Seal Kits



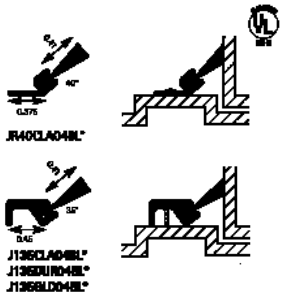
Kit Product Code	Brush Length	Door Bottom Width	Price ea.
A180CLA04BL3	0.41″	3′	$10.40
A180CLA04BL3.5	0.41″	3.5	12.00
A180CLA04BL4	0.41″	4′	13.65
B210CLA05BL3	0.53″	3′	11.40
B210CLA05BL3.5	0.53″	3.5′	13.00
B210CLA05BL4	0.53″	4′	14.65
C380CLA06BL3	0.59″	3′	12.35
C380CLA06BL3.5	0.59″	3.5′	13.65
C380CLA06BL4	0.59″	4′	15.60
D480CLA09BL3	0.94″	3′	14.95
D480CLA09BL3.5	0.94″	3.5′	17.55
D480CLA09BL4	0.94″	4′	19.85

Other lengths and finishes available

Aluminum door sweeps in both clear and adonized finish with black brush are the perfect compliment to corresponding door jamb seals. The Aluminum holders are pre-slotted for ease of installation and sweeps are prepackaged for fasteners for 3′, 3.5′ and 4′ doors.

Jamb Seal Kits

Kit Product Code	Door Size	Holder Length	Brush Size	Price ea.
JR40CLA04BL17	3′ x 7′	.375	.41	$34.80
JR40CLA04BL18	4′ x 7′	.375	.41	36.40
JR40CLA04BL20	6′ x 7′	.375	.41	40.65
J135CLA04BL17	3′ x 7′	.450	.41	55.25
J135CLA04BL18	4′ x 7′	.450	.41	59.80
J135CLA04BL20	6′ x 7′	.450	.41	62.40

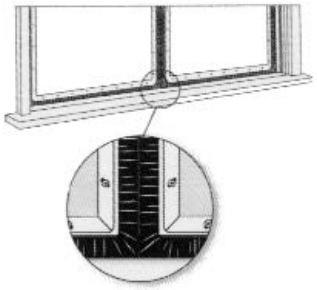


Kit Product Code	Door Size	Holder Length	Brush Size	Price ea.
J140CLA04BL17	3′ x 7′	.750	.41	56.00
J140CLA04BL48	4′ x 7′	.750	.41	58.50
J140CLA04BL20	6′ x 7′	.750	.41	66.50
VX75BLK				1.95/Ft.

JR40 and J140 kits come with screw slots for after-installation adjustments. J135 kits have countersunk screw holes for a neat flush finish. Fasteners and installation instructions are provided with all kits.

All jamb seals have clear anodoized finish.
Other finishes are available.

Jamb seal kits apply to the header and jamb only.



AstraSweep™ corner seals seal the hole between the astragal seal and the door sweep. AstraSweep Kits include two corner seals, two door sweeps and two astragal seals- all the materials neccessary to seal theinside (gaps up to 1 inch) and bottoms of a double door. Holders are preslotted for easy installation.

AstraSweep™ Jamb Seal Kits

Kit Product Code	Door Size W x H	Finish Color	Price ea.
C380CLA06BL67	6′ x 7′	Clear Andodized	97.50
C380DUR06BL67	6′ x 7′	Duradonic	122.00
C380CLA06BL68	6′ x 8′	Clear Andodized	104.00
C380DUR06BL68	6′ x 8′	Duradonic	131.00
C380CLA06BL77	7′ x 7′	Clear Andodized	100.00
C380DUR06BL77	7′ x 7′	Duradonic	126.00
C380CLA06BL78	7′ x 8′	Clear Andodized	108.00
C380DUR06BL78	7′ x 8′	Duradonic	135.00
C380CLA06BL87	8′ x 7′	Clear Andodized	104.00
C380DUR06BL87	8′ x 7′	Duradonic	131.00
C380CLA06BL88	8′ x 8′	Clear Andodized	112.00
C380DUR06BL88	8′ x 8′	Duradonic	140.00

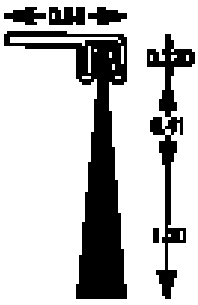
Corner Seal Kits (3″ Legs)

Kit Product Code	Finish Color	Price ea.
C38090CLA06BL	Clear Andodized	38.00
C38090DUR06BL	Duradonic	52.00

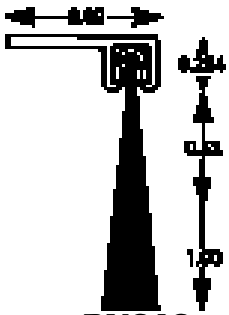
WEATHERSTRIPPING - DOCK LEVELER SEALS

Brush Seals

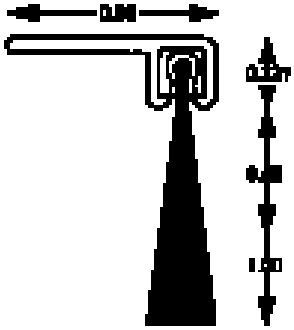
Loading Dock areas present a great opportunity to seal around the many openings of a building. Not only do doors provide areas for air infiltration but the dock levelers themselves can act as wind tunnels robbing a building of heat resources. Our 90° retainer & seal forms the perfect fit for dock leveler seals and other specialty applications. Order your choice of retainer size, brush length and seal width.



BN955



BN969



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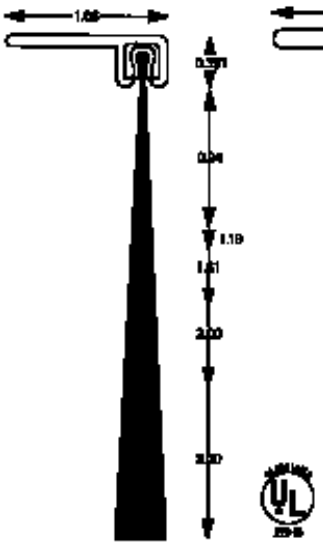
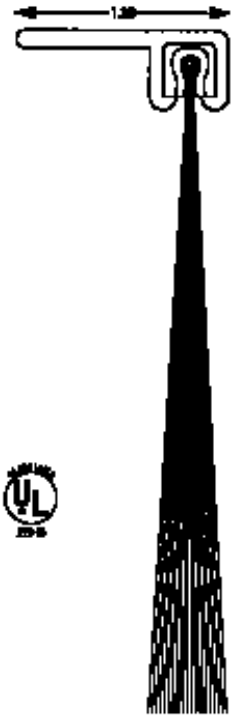


BN916



BN913

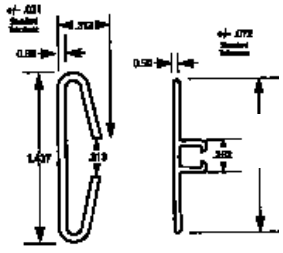
Part Number	Holder Length	Brush Length	Brush Type	Price Ft.
BN9554	0.55″	.41″	Nylon	$3.25
BN9551	0.55″	1.00″	Nylon	$3.90
BN9695	0.69″	.53″	Nylon	$3.60
BN9691	0.69″	1.00″	Nylon	$3.90
BN9965	0.96″	.59″	Nylon	$3.90
BN9961	0.96″	1.00″	Nylon	$4.25
BN9169	1.06″	.94″	Nylon	$4.90
BN9161	1.06″	1.19″	Nylon	$5.20
BN9166	1.06″	1.61″	Nylon	$5.55
BN9162	1.06″	2.00″	Nylon	$6.20
BN9163	1.06″	3.00″	Nylon	$7.15
BN9131	1.38″	1.75″	Nylon	$12.35
BN9132	1.38″	2.53″	Nylon	$13.65
BN9133	1.38″	3.00″	Nylon	$14.65
BN9134	1.38″	4.00″	Nylon	$15.95

Rope Seal

For use in sealing the back portion of a dock leveler. Constructed of neoprene molded in a rope, Our Rope seal is placed near the hinge of a dock leveler and is held in place with hooks. The seal is formed as the leveler lowers compressing against the rope. Order by specifiing the length in feet.

RS10NEOPR. 3.90/ft

Welded Dock Leveler Brush Seal



WH15 **XTBT90**

Part #	Description	Price
WDL71	**Welded Dock Leveler Kit** for 8′ leveler includes: (2- WH15) (2- XTB90) (2- BN100)	**$149.50 ea.**
WDL73	**Welded Dock Leveler Kit** same as above with 1-1/2″ Brush	**$162.50 ea.**
WH15	*Weldable Holder (8′)	$32.50/ea.
XTBT90	* T-Retainer(8′)	$15.60/ea.
BN100	1″ Nylon Brush only	$2.30/ft.
BN112	1-1/2″ Nylon Brush only	$3.25/ft.
BT90	1-1/2″ Flexible PVC Blade Seal Grey, Brown or White	$.65/ft.
B90	90° Bracket for Mechanical (Screw On)	$1.65/ft.

American Garage Door Supply Inc.
1-800-233-1487 Fax: (218) 751-6551