

**ASHBURNHAM ENERGY COMMITTEE**  
**WEDNESDAY, MARCH 23, 2016 – 8:00 a.m.**

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MINUTES

Present: Mark Carlisle, (chairman), Ed Vitone, Kelly Brown, from DOER, Douglas Briggs, and Sylvia Turcotte. Kyle Johnson and Mike Rivers absent.

Mark Carlisle opened the meeting at 9:30 a.m. ***Ed Vitone motioned to approve the agenda and was seconded by Mark Carlisle. Motion carried.***

Meet with Kelly Brown from DOER to discuss funding options

Chairman Mark Carlisle gave some history on what has occurred with the Library Project.

At this time Ed Vitone went over his detailed report/presentation which was very informative (attached). Kelly Brown noted that this was impressive and that when the final report is sent in this presentation should be sent along with it.

Kelly Brown had a few comments on the heating system. She also noted that there are programs in the works for heating system projects, such as pellet systems. She stated that funding might be possible through USDA for heating systems. Doug Briggs sent a request to his contact at USDA regarding a grant and the response was that Ashburnham was too high in income but that a loan would be possible.

Ms. Brown also stated that the work could be done in phases. She noted that there's a website with Mass Save for Upstream Incentives.

Mark Carlisle inquired if she was reasonably assured that we would qualify for the competitive grant and she responded that the data is great, which is a good start. She added that doing Phase 1 is good and that once this is done, you could see a change in the savings. She added that the competitive grant could be as much as \$250,000.

Ed Vitone noted that with the remaining \$80,000 in grant monies, he is going to ask the Trustees to vote on the remaining \$20,000 needed to complete Phase 1 from the Whittemore Trust. He noted that he would check on this at their next meeting.

Mark Carlisle asked about the chances that district pellet projects would be covered by grants through the DOER. Ms. Brown stated that there should be an announcement in the next six weeks or so. She stated that they would cover a feasibility study as well as the project itself.

There followed a discussion on available funds.

Mark Carlisle stated that if there were no grants available then their fall back would be to put in an additional boiler.

Ms. Brown stated that since 2012 they have awarded over \$9m in competitive grants. She stated that the grants could include lighting, weatherizing, vehicles, etc. She suggested that they go on the “Commbuys” site to see what qualifies.

#### New Business

Doug Briggs noted that there were two invoices to approve for payment and one quote for the Public Safety Building. Ed Vitone stated that they should hold off on the PSB lighting as the Library project should have priority with the funds remaining from the grant. The invoices for JH Renovations, one for \$3,000 and the other for \$1,121 were approved for payment.

Mark Carlisle stated that he would send an email to Rob Rizzo to see what the status is on funding and would mention that Kelly Brown said they would be coming out soon with an announcement and how to apply.

Mark Carlisle stated that they would wait to set the next meeting.

***At 11:05 a.m., Ed Vitone made the motion to adjourn the meeting and was seconded by Mark Carlisle.***

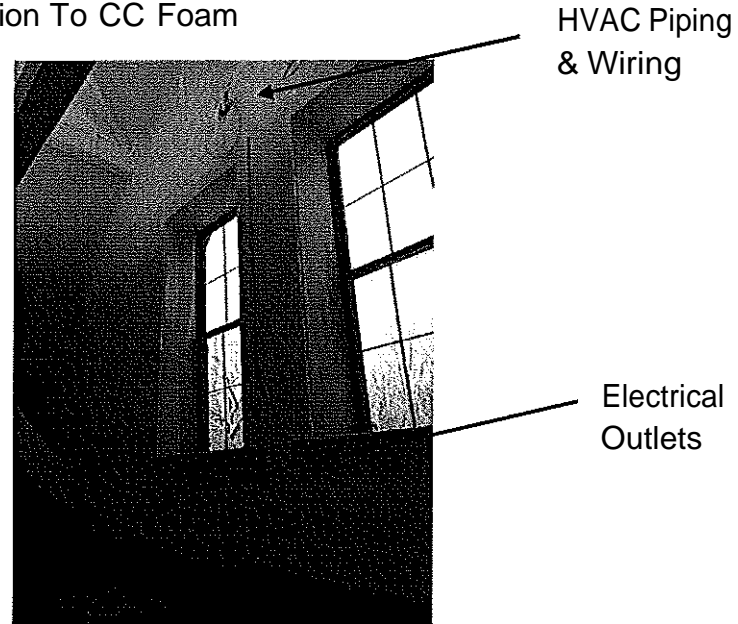
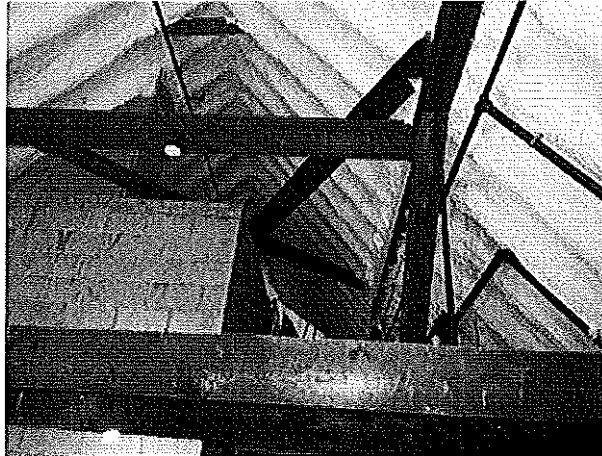
Respectfully submitted  
Sylvia Turcotte  
Executive Assistant

Ashburnham Green Energy Committee Meeting  
With Kelly Brown-Mass DER

March 23, 2016

## Library Insulation

- Report Submitted January 25 - Change Attic Insulation To CC Foam
- Lowest Cost Bidder Selected - FoamRun
- Work Completed On Feb 22, 2016



- Early Results Encouraging

	From	To	HOD	Oil (Gal)	K (HOD/Gal)	Comment
Pre-Foam	11/20/14	5/19/15	6030	5141	1.17	Baseline
Post Foam	02/23/16	03/22/16	779.5	508	1.61	PRELIMINARY
					Prelim Improvement	37%

- Simple Payback (Preliminary) 12.3 Years
  - 7,112 Avg HDD (Last 3 Complete Heating Seasons)

HOD (Sept thru May)	
'12 to '13	6,537
'13 to '14	7,425
'14 to '15	7,375
3 year Avg	7,112

	K-Factor	Annual Oil Usage
Pre Foam	1.17	6079
Post Foam	1.6	4445
	Savings (gallons)	1634
	Savings(\$)*	\$4,901
		*at \$3/gallon

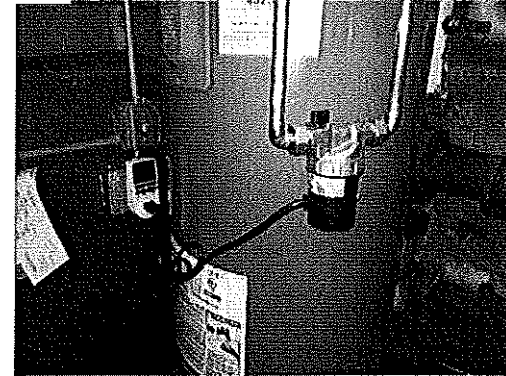
Foam Cost	\$51,944
Wall & Ppg	\$8,559
Total Cost	\$60,503

Simple Payback 12.3

## Library Domestic Hot Water

- Report Submitted February 5 - Add Circulator/Check Valve/Timer And Low Flow Aerators
- Work Awarded To Ashburnham Plumbing
- Work Partially Completed
  - Add Jumper between 1st & 2nd Floor & Install Aerators (On Order)
- Estimated Simple Payback – 1.9Yrs.

	Estimated Savings		
	kW-Hr	\$0.14/kW-Hr	
Circulator	1335	\$187	By committee
Aerator	1092	\$153	From Audit
Total	2,427	\$340	
Cost		\$650	



## Public Safety Building Lighting

Location	Estimated KWH Savings		
	kWH	.at \$0.14/kWH	
Parking Lot	12,019	\$1,683	LED Replacement Heads
Building Interior	34,963	\$4,895	T8 4ft LED Tubes & CFL LED Replacement Bulbs
<u>Apparatus Bays</u>	13,699	\$1,918	CFL LED Replacement Bulbs
Total	60,681	\$8,495	
cost		\$16,556	Includes \$2,000 by Town



## Library HVAC

- Audit Report Recommended 3 Alternatives
  1. New Boiler/Distribution System/Controls
  2. Wood Pellet Boiler
  3. Heat Pump
- Committee Evaluated Each Option
  - Options 1& 2 Require A Hydronic Distribution System & Current Chilled Water System
  - Option 3 Completely Replaces Current HVAC System
- Current Hydronic System Found in Very Poor Condition
  - Boiler at end of useful life – Fuel oil stored in old 3,000 gallon underground tank
  - The fresh air management system in all 8 unit ventilators inoperable:
    - The dampers no longer move /Some dampers are partially open / All motors burned out
    - The gaskets on all dampers have disintegrated - leak outside air 24/7
  - The heat control valves on 14 of 32 heating elements frozen "ON" & no longer regulated by thermostats
  - Appears that four (4) heaters in the seldom used entrances have been intentionally turned off
  - Five baseboard heaters are somewhat covered by book shelves
  - 10-year old Sanyo Unit not longer operable - Ran continuously for 10 years
  - The baseboard heater in the community room cold (control valve frozen "OFF"?)
  - The exhaust blowers manually controlled via a potentiometer. Proper settings unknown - Two no longer operable.
  - Seven-day Paragon clock to set back temperature at night not used - No pins & no knowledge on use
  - Chill water system is mothballed for the winter - no components tested
    - Condition of chiller "Fair" by auditor

Distribution System & Control Replacement Required  
Replacement Parts No Longer Available

# Library HVAC Distribution & Control

ROM Cost Estimate Prepared

Elements Common To Boiler & Wood Pellet Options

Additional Costs Elements Required for Each Option

		Total Quantity	New Quantity	Material Cost	Labor Removal	Labor Install	Disposal Cost	Comments
<b>Convectors</b>	<b>Outside Air</b>	8	8	\$27,678	\$1,647	\$4,118	\$2,768	Removal: 2 people for 1hour Install: 2 people for 2.5 hrs
<b>Convectors</b>	No Outside Air	5	5	\$8,590	\$1,030	\$1,544	\$859	Removal: 2 people for 1hour Install: 2 people for 1.5 hrs
<b>Baseboard</b>	<b>Sections</b>	11	0	\$0				
<b>Convectors</b>	Static	4	0	\$0				
Attic Blower		1	0	\$0				
Heat Pump	<b>'Pres Room</b>	1	1	\$11,000	<b>complete</b>	<b>incl</b>		Budgetary Quote
<b>Balance Vlvs</b>			42	\$5,040		\$4,324		1person for 1hour (includes balancing)
<b>Isolation vlvs</b>			82	\$1,230		\$2,111		1person for 0.25 hour
Control Vlvs			15	\$1,200		\$772		<b>1person for 0.5 hour</b>
<b>Thermostats</b>	<b>- 17 zones excl Pres Room</b>		17	\$1,020		\$438		1person for 0.25 hour
Control System	Includes hardware and wiring			\$9,000		<b>incl</b>		<b>50% more than system for heat pump wireless &amp; Integrated</b>
Remove Undergorund Oil Tank					\$5,000			
				\$64,758	\$7,677	\$13,308	\$3,627	
					Subtotal	\$89,369		
					High Side Uncertainty	<b>25%</b>		
					<b>Budgetary Estimate</b>	<b>\$111,711</b>		

## Library HVAC: Oil Fired

### Scope

- New Oil Boiler/Burner/Circulator
- Install Twin 325 Gallon Indoor Oil Tanks
- Demo Staff Kitchen and Build Indoor Oil Tank Storage Room – Relocate & Rebuild Staff Kitchen

Boiler		\$24,700	incl	incl	From Audit Report (Budgetary bids straddle estimate)
Oil Tanks	two 375 Gal inside tanks	\$900		\$824	Tank pricing on-line - 2 people for 4 hours
Tank storage	Demo room/cabinets and sink	\$17,542	incl	incl	2x Preservation Wall + plumbing
		\$43,142	\$0	\$824	
				\$43,966	
				<u>High Side Uncertainty</u>	10%
				Budgetary Estimate	\$48,362
				Distribution & Controls	\$111,711
				<u>Total ROM Cost</u>	<u>\$160,074</u>

### Heat Loss

- New Heat Loss Model Completed for Library
- Losses at 70F I/S & 6F O/S:

	Heat Loss i (BTU/Hr)		CFM	Heat Loss (BTULHr)
Structure	84,703	Infiltration Flow	671	45,396
Air ducts	15,471	Make-up air flow	1,118	42,250
<u>Total</u>	<u>100,174</u>		<u>1,789</u>	<u>87,646</u>



**Library HVAC: Oil Fired Boiler (continued)**

Oil Consumption Estimated Using Local Weather Data

	AvgHDD	Avg Temp	Delta T	Bldg Loss BTU/Hr	Make-up & Infil lbm/hr	BTU/Hr	Total BTU/Hr	Gal Oil/Hr	Gallons
Aug	59	63	2	2,982	3260	1282	4,264		
Sep	180	59	6	9,404	3286	4075	13,479	0.11	80
Oct	467	50	15	23,560	3344	10389	33,949	0.28	207
Nov	798	38	27	41,616	3421	18776	60,392	0.50	357
Dec	1003	33	32	50,621	3461	23106	73,727	0.60	450
Jan	1292	23	42	65,209	3528	30338	95,547	0.78	583
Feb	1194	22	43	66,745	3535	31116	97,862	0.80	540
Mar	1094	30	35	55,254	3482	25373	80,627	0.66	492
Apr	625	44	21	32,591	3382	14536	47,128	0.39	278
May	219	56	9	14,104	3305	6147	20,250	0.17	124
Jun	138	60	5	7,183	3277	3104	10,286		
Jul	41	64	1	2,087	3256	896	2,983		

Total	3111	gallons
Current Usage	6079	gallons
Foam Savings	1634	gallons
Adjusted Current Usage	4445	gallons
Forecasted Annual Usage	3111	gallons
Savings	1335	gallons
Savings*	\$4,004	
	"at \$3/gallon	

Simple Payback: 40 Years (\$160,000/\$4,000)

## Library HVAC: Propane Fired

Propane Considered to Eliminate Need for Demo/Construction of Indoor Oil Tanks  
 Propane & Oil Comparison

	Oil	Propane	Propane/Oil
HV	138500	92500	1.50
Combust Eff	88%	95%	1.08
Cost*	\$2.19	\$2.73	1.25

\*from State Website (Current heating season average)

### Propane Cost Estimated from Oil

Current Usage	6079	gallons - Oil
Foam Savings	1634	gallons - Oil
<u>Adjusted Current Usage</u>	4445	gallons - Oil
Baseline Oil cost	\$13,336	\$3.00 per gallon
<u>Forecasted Annual Oil Usage</u>	3111	gallons - Oil
<b>Forecast Propane cost</b>	<b>\$16,135</b>	Propane .....

**Propane Expected to Cost More Than Oil  
 with Current Distribution System!!**

## Library Heating: Wood

Committed Considered District Heating Using Wood Pellets

Town Hall

Current Library

Former Library (Currently Piano Museum)

Use Town Hall's New Boiler With Larger Capacity Nozzles As Back-up To Pellet Boiler

Cost Of Wood Pellet District System \$315,000 (Budgetary Bid)

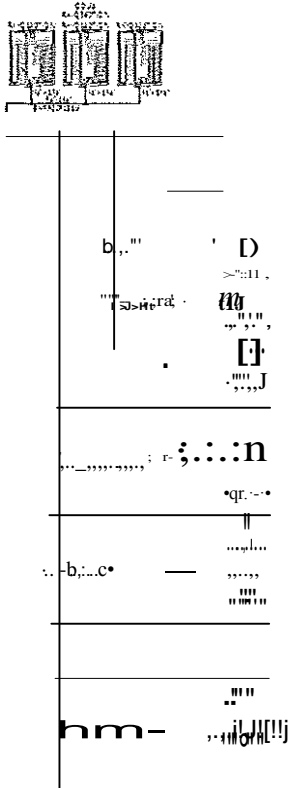
Requires Additional \$112,00 For Library Distribution & Control Upgrade

Project No Longer Feasible  
With Library Distribution Upgrade

**Library HVAC: Heat Pump**

Committee Secured System Design & Budgetary Pricing From Daikin  
 Good Experience at Local Private Secondary School

Electric Cost Assessment



	Annual Usage (3-Yr avg)					
	Electric - Other than HVAC	Electric for Heat	A/C Only	Total Kw-hr	Evaluation Rate	Annual Cost
Current	31,965	1,679	6,157	39,800	\$0.14	\$5,572
Heat Pump*	31,965	21,060		53,025	\$0.14	\$7,423
					Savings	(\$1,851)

Oil Usage

Library Heating Forecast -No Heat Pump

Oil Usage	6079 Gallons/year average (approximate)
Reduction	-1634 Foam Insulation
Future usage	4445 Estimated
Oil Cost	\$3 Estimated \$/Gal
Oil Cost/year	\$13,336 Estimated at future oil price

Simple Payback: 19.6 Years plus 3,000,000 Pounds of Carbon\*

\*22.55 lbs carbon/gallon oil & 30 year equipment life-AML carbon neutral

Budgetary Cost	\$220,000	Electric Increase	(\$1,851)
Oil Tank Removal	\$5,000	Oil Savings	\$13,336
Total Cost	\$225,000	Net Savings	\$11,484

# Library HVAC: Heat Pump (continued)

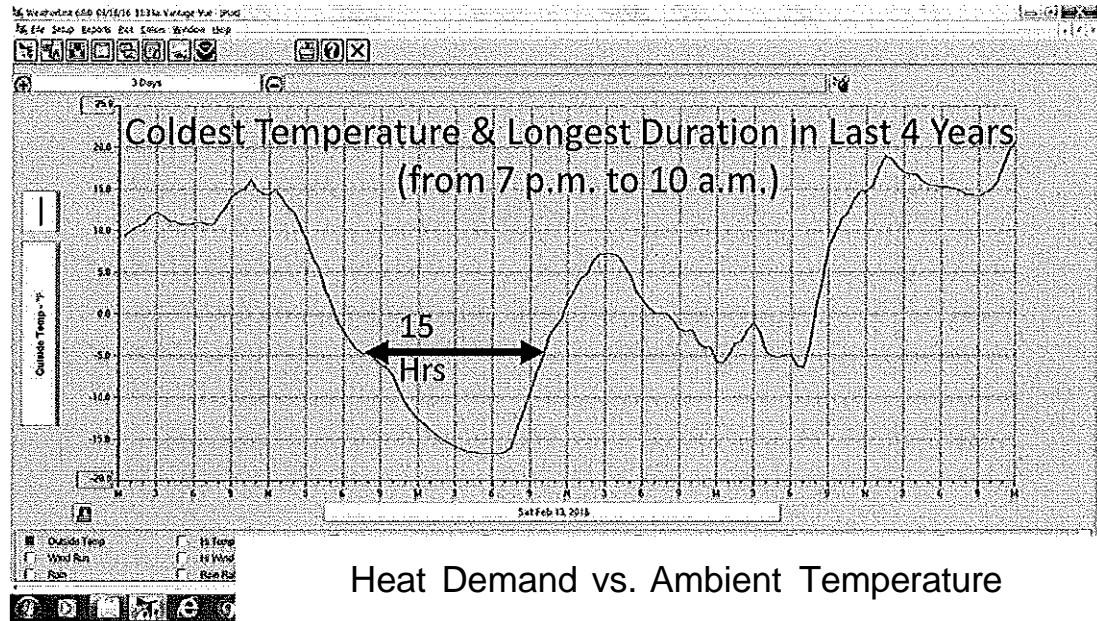
Is Back-up Needed?

System Guaranteed to (4F)

Few Occurrences < (4F)

7 in 4 Years

	Min Temp 2012-2015YTD	
	Min Temp	11< (4F)
Oct	22	0
Nov	10	0
Dec	0	0
Jan	-10	3
Feb	-17	4
Mar	-1	0
Apr	22	0



Back-up Likely Not Required

Coldest Temp When Library Closed

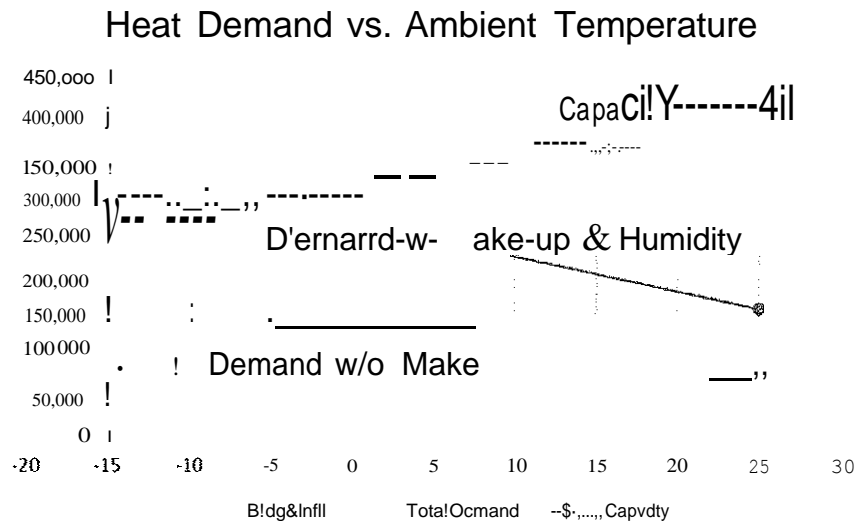
No Make-up Air

Fault Tolerant System: Three 1/3'd Size Compressors

At 2/3 Capacity If One Fails

Evaluating Need for Electric Heaters in Heat Pump Ducts

Ongoing Discussions with Supplier



## Situation/Needs

- Library Boiler Leaks Plugged in FY16
  - Hoping to Complete Current Heating Season
  - Complete Failure in FY17 Highly Probable
- Heat Pump Cost \$225,000
  - Can Be Phased But Extremely Risky Given State Of Boiler
  - is<sup>1</sup> Phase s100,000
  - \$79,000 of Grant Funds Uncommitted
  - Insufficient for Phase 1Heat Pump
- Lighting Energy Savings Opportunities Waiting Award

Town Hall	\$5,000
Library	\$16,840
PSB (Outside)	\$7,200
	\$29,040 .

- Comprehensive Analysis of All Options
- Choices Appear Clear
- Issue: Availability/Timing of Additional Funds
- Suggestions/Guidance Welcomed