TOWN OF LINCOLN
Green Energy Technology Committee

LINCOLN TOWN HALL
16 LINCOLN ROAD
LINCOLN, MA 01773
Office No. *781/*259-2603
FAX No *781/*259-1677

April 15, 2010

M E M O R A N D U M

To: The Lincoln School Committee
Michael Brandmeyer, Superintendent
From: John Snell, Chair, Green Energy Technology Committee
RE: Town of Lincoln Green Community Designation Application and Grant Opportunities

The Green Energy Technology Committee is pleased to have received town support for the pursuit of a Green Communities designation by DOER, as shown by the approval of the two green initiative articles on the annual town meeting warrant. This was a major step by the community to meet the five criteria required for a community be designated a Green Community. Acceptance and implementation of these five criteria make the Town eligible to apply for significant grant funds for various energy initiatives that will reduce energy-related operational costs savings for future years. These five criteria are:

1. As-of-right siting of a green energy facility – as voted by town meeting
2. Expedited permitting of such facility
3. Development of a 20% energy reduction plan
4. Commitment toward purchasing fuel efficient municipal vehicles
5. Adoption of the Stretch Energy Code – as voted by town meeting

Attached is a copy of the Energy Baseline and 20% Energy Reduction Plan the Green Technology Committee has prepared to meet Criteria 3. We presented the baseline and plan to the Board of Selectmen and they voted to support this plan on April 12. As the School Committee will see in the document the School is responsible for a significant percentage of the Town's base energy use and a significant percentage of the potential energy savings that we identified. In addition to Board of Selectmen support required to meet Criteria 3 we would like to make sure that the School Committee is comfortable with the proposed energy savings that we've identified as well. It should be noted that while these are target energy ("site" MMBTUs) savings we will inform DOER that we intend to achieve, we understand from MA DOER staff that there is no penalty if we fail to undertake or complete these projects due to causes outside of our control such as lack of funds being appropriated by town meeting, or MSBA mandates regarding school campus conditions.

We look forward to a discussion of the proposed energy savings targets with the School Committee. In addition, as a heads up, we have requested time at a follow up School Committee meeting to review specific grant requests for energy-related school upgrades. The Green Community Grant Funding opportunity that we propose to apply for is only open to designated Green Communities (that meeting the five criteria listed above) and will be due May 28, 2010. We have already started discussions with school staff and Utility-sponsored energy contractors to identify appropriate investments that could be installed in the next two years. The facility assessment about to start up will most likely identify further opportunities for cost effective energy efficiency and renewable energy upgrades.,

We appreciate your consideration of this item. We look forward to having a detailed discussion regarding this issue at your next school committee meeting.

Green Communities Designation

Criteria 3: Energy Baseline and 20% Energy Reduction Plan

Town of Lincoln

Energy Baseline

The Town of Lincoln established a fiscal year 2009 energy use baseline with DOER's MassEnergyInsight tool for the Town's facility and vehicle energy cost and consumption. The Town has participated in the training and has populated the building and utility account information. Lincoln will continue to use Energy Insight (at no charge) to monitor the Town's facility and vehicle energy cost and consumption. The town understands that MA DOER will update NSTAR electricity and National Grid gas account information on a regular basis and that the Town will enter heating oil and vehicle fuel use and cost information and supplier cost information on a regular basis. Appendix A includes a print screen from the energy use report

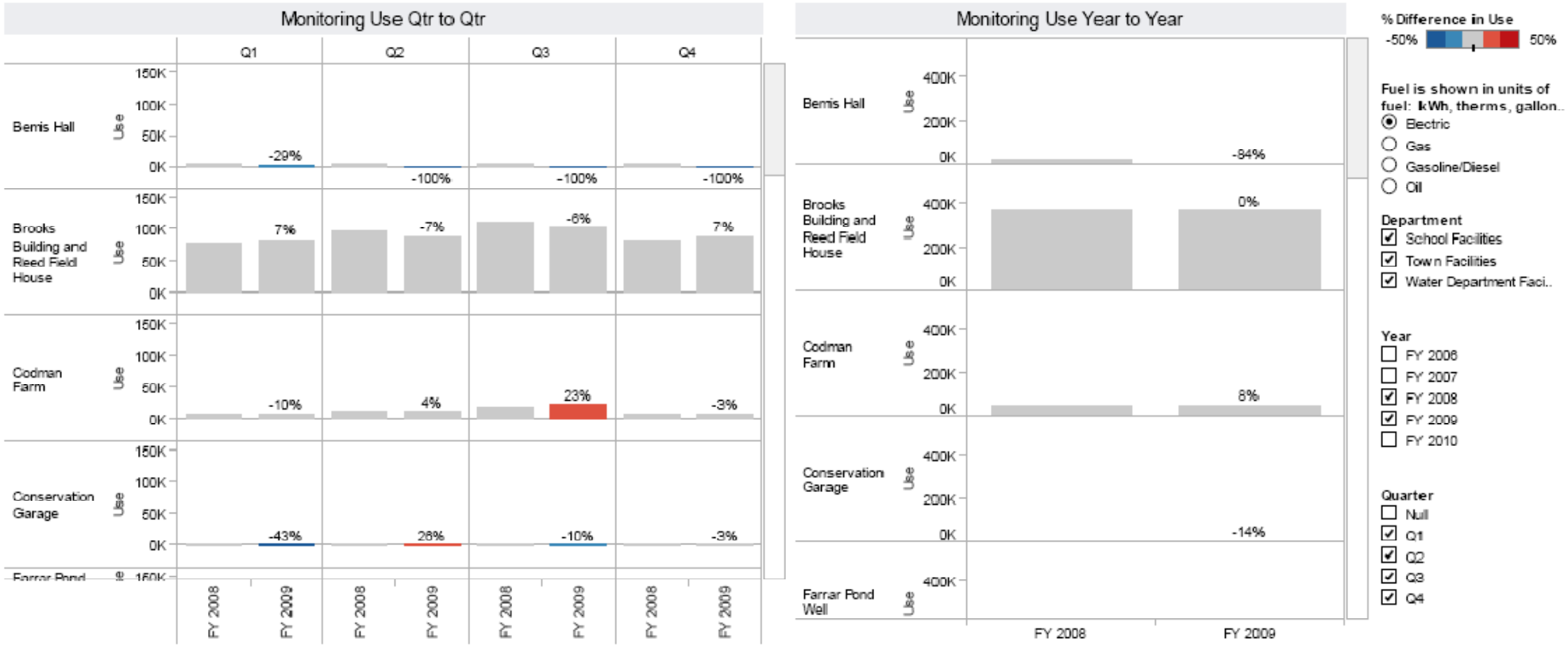
20% Energy Reduction Plan

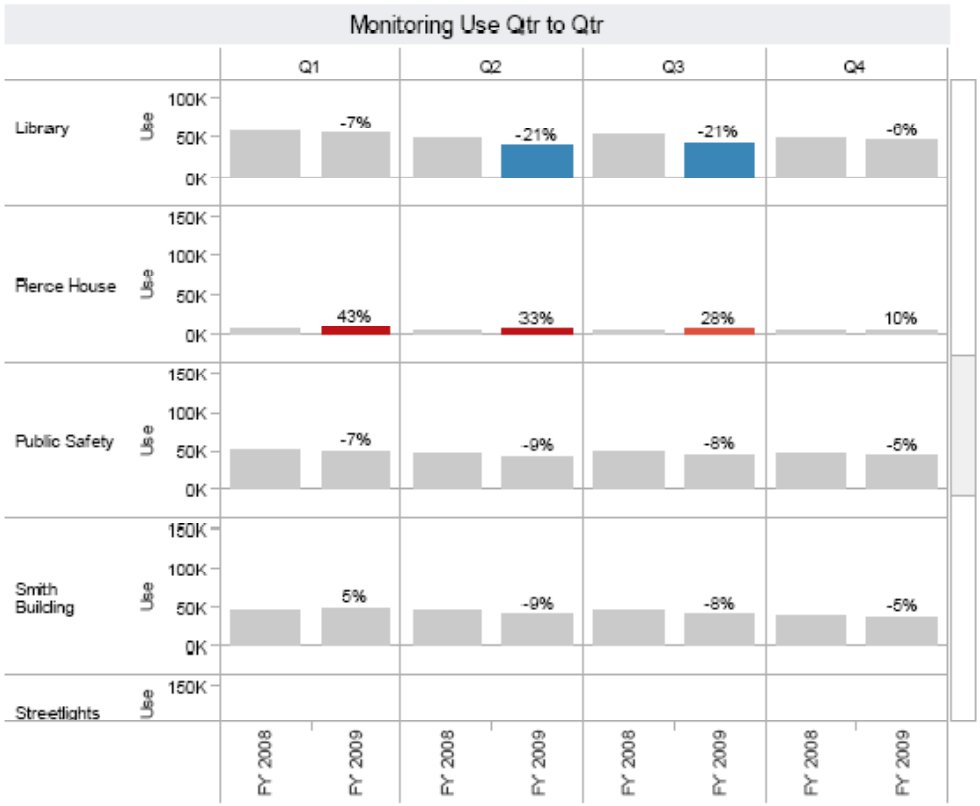
Lincoln's Green Technology Committee has reviewed opportunities for the Town to reduce its municipally-owned facilities and vehicles by 20% from a fiscal year 2009 base year (Appendix B). NSTAR, National Grid, and MA DOER staff and subcontractors have assisted the Committee in this effort. The Committee identified energy efficiency and renewable energy (site MMBTU) reduction targets for each account that range from 0% to 50% (Appendix C). The combined energy savings equal about 22% by 2015, five years after the energy initiative begins in fiscal year 2011 (Appendix D).

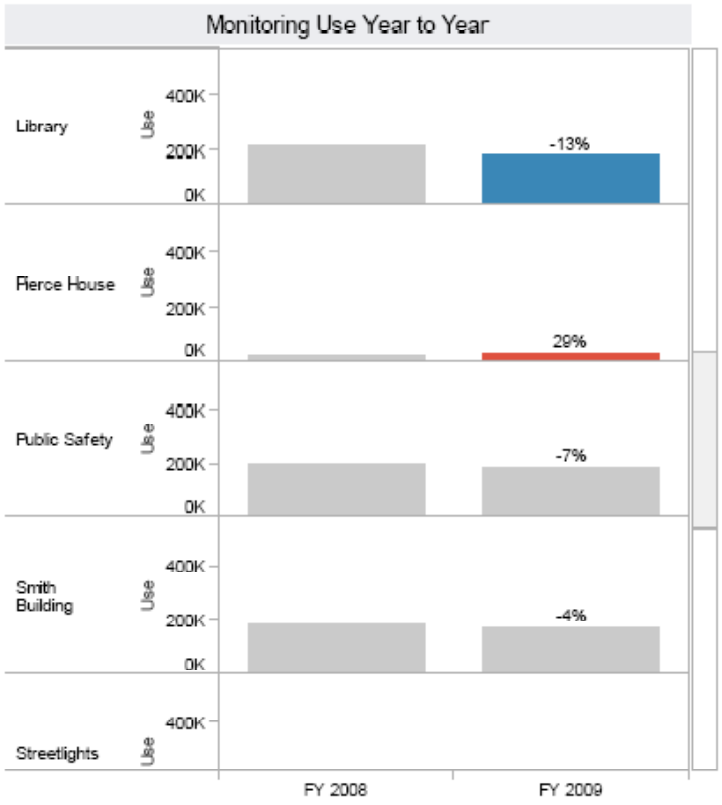
The four strategies the Green Technology Committee recommends to achieve the 20% reduction target in five years include:

1. Deep energy savings in Town Hall and the Brooks/ Smith School facilities that are integrated in the major rehab projects currently under investigation
2. Moderately aggressive energy savings in facilities identified by NSTAR electric and National Grid gas subcontractors that qualify for system benefit charge incentive funding
3. Improved facility scheduling and control through proposed web-enabled energy management system upgrades
4. Improved vehicle fleet energy efficiency with higher mile per gallon replacement vehicles as they become available

Appendix A


Monitoring Use Qtr to Qtr
Q1
Q2
Q3
Q4
Bemis Hall
Brooks Building and Reed Field House
Codman Farm
Conservation Garage
Farrar Pond
Use
150K
100K
50K
0K
-29%
-100%
-100%
-100%
7%
-7%
-6%
7%
-10%
4%
23%
-3%
-43%
28%
-10%
-3%
FY 2008
FY 2009
Monitoring Use Year to Year
400K
200K
-84%
0%
8%
-14%
% Difference in Use
-50%
50%
Fuel is shown in units of fuel: kWh, therms, gallon..
Electric
Gas
Gasoline/Diesel
Oil
Department
School Facilities
Town Facilities
Water Department Faci..
Year
FY 2006
FY 2007
FY 2008
FY 2009
FY 2010
Quarter
Null
Q1
Q2
Q3
Q4





% Difference in Use

-50% 50%

Fuel is shown in units of fuel: kWh, therms, gallon..

- (•) Electric
- ( ) Gas
- ( ) Gasoline/Diesel
- ( ) Oil

Department

- [x] School Facilities
- [x] Town Facilities
- [x] Water Department Faci..

Year

- [ ] FY 2006
- [ ] FY 2007
- [x] FY 2008
- [x] FY 2009
- [ ] FY 2010

Quarter

- [ ] Null
- [x] Q1
- [x] Q2
- [x] Q3
- [x] Q4

Appendix B

Town of Lincoln Energy Use
Fiscal Year 2009

Building	Department	Fuel	Account	Electricity (kWh)	Gas (Therms)	Oil (Gallons)	Fuel (Gallons)	FY 2009 MMBTU	Facility Percent	Department Percent
Brooks Building	School	Electric	25853051008	366,480				1,250.80	4%	
Brooks Building	School	Gas	4961419180		61,974			6,197.40	21%	
Smith Building	School	Electric	25853161005	171,840				586.49	2%	
Smith Building	School	Gas	4961418610		35,249			3,524.90	12%	
Hartwell Parking Lot Lights	School	Electric	25853041009	1,486				5.07	0%	
Hartwell Building and Pods	School	Electric	28233750018	472,200				1,611.62	5%	
Hartwell Building	School	Gas	4961419030		13,229			1,322.90	4%	
Hartwell Pod A	School	Gas	4961420230		4,457			445.70	1%	
Hartwell Pod B	School	Gas	4961420260		3,185			318.50	1%	
Hartwell Pod C	School	Gas	4961420650		2,815			281.50	1%	**52%**
Bemis Hall	Town	Electric	26945850019	16,691				56.97	0%	
Bemis Hall	Town	Electric	27147940012	1,555				5.31	0%	
Bemis Hall	Town	Oil	LINCBEMI			4,772		668.08	2%	
Codman Farm	Town	Electric	25851591005	47,987				163.78	1%	
Codman Farm	Town	Electric	25851591005	18				0.06	0%	
Codman Farm	Town	Gas	4961410360		4,932			493.20	2%	
Conservation Garage	Town	Electric	27918570014	130				0.44	0%	
Conservation Garage	Town	Gas	4961419210		4,455			445.50	1%	
Library	Town	Electric	25848721004	179,440				612.43	2%	
Library	Town	Oil	LINCLIBR			5,082		711.48	2%	
Pierce House	Town	Electric	25853171004	24,047				82.07	0%	
Pierce House	Town	Gas	4961417230		6,510			651.00	2%	
Public Safety	Town	Electric	25851861002	181,280				618.71	2%	
Public Safety	Town	Gas	4961419960		11,294			1,129.40	4%	
Streetlights	Town	Electric	24409551009	15,768				53.82	0%	
Streetlights	Town	Electric	25398931003	5,004				17.08	0%	
Streetlights	Town	Electric	26773441006	3,864				13.19	0%	
Streetlights	Town	Electric	27355050017	1,240				4.23	0%	
TBD6	Town	Electric	25849341000	7,699				26.28	0%	
Tennis Court Lights	Town	Electric	25853031000	2,671				9.12	0%	
Town Hall	Town	Electric	25852971008	67,040				228.81	1%	
Town Hall	Town	Electric	25852971008	22,281				76.05	0%	
Town Hall	Town	Oil	LINCTOWN			6,892		964.88	3%	
Transfer Station	Town	Electric	25847781009	18,869				64.40	0%	24%
Vehicles - Gasoline	Vehicles	Gas/ Diesel	1250345				16,870	2,361.80	8%	
Vehicles - Diesel	Vehicles	Gas/ Diesel	4402813				17,947	2,512.58	8%	16%
Farrar Pond Well	Water	Electric	25850721009	3,680				12.56	0%	
Filtration Plant	Water	Electric	27302860013	405,760				1,384.86	5%	
Flints Pond Pump Station	Water	Electric	25848831001	178,160				608.06	2%	
Flints Pond Pump Station	Water	Gas	4961411890		1,660			166.00	1%	
Telemetry	Water	Electric	23608911006	3,520				12.01	0%	
Tower Road Well	Water	Electric	25851561008	28,752				98.13	0%	
Tower Road Well	Water	Gas	4961619210		765			76.50	0%	8%
Total				2,227,462	150,525	16,746	34,817	29,873.65	100%	100%

Appendix C

Town of Lincoln Energy Use

Target Energy Savings

Building	Department	Fuel	Account	Electric kWh Savings	Gas Therm Savings	Oil Gallon Savings	Gasoline/ Diesel Savings	Target MMBTU Savings	Facility Percent	Department Percent
Brooks Building	School	Electric	25853051008	20%				250.16	1%	
Brooks Building	School	Gas	4961419180		40%			2,478.96	8%	
Smith Building	School	Electric	25853161005	20%				117.30	0%	
Smith Building	School	Gas	4961418610		40%			1,409.96	5%	
Hartwell Parking Lot Lights	School	Electric	25853041009					-	0%	
Hartwell Building and Pods	School	Electric	28233750018	20%				322.32	1%	
Hartwell Building	School	Gas	4961419030		20%			264.58	1%	
Hartwell Pod A	School	Gas	4961420230		50%			222.85	1%	
Hartwell Pod B	School	Gas	4961420260		20%			63.70	0%	
Hartwell Pod C	School	Gas	4961420650		20%			56.30	0%	17%
Bemis Hall	Town	Electric	26945850019	30%				17.09	0%	
Bemis Hall	Town	Electric	27147940012					-		
Bemis Hall	Town	Oil	LINCBEMI			10%		66.81	0%	
Codman Farm	Town	Electric	25851591005	20%				32.76	0%	
Codman Farm	Town	Electric	25851591005	20%				0.01	0%	
Codman Farm	Town	Gas	4961410360		10%			49.32	0%	
Conservation Garage	Town	Electric	27918570014	10%				0.04	0%	
Conservation Garage	Town	Gas	4961419210		10%			44.55	0%	
Library	Town	Electric	25848721004	20%				122.49	0%	
Library	Town	Oil	LINCLIBR			25%		177.87	1%	
Pierce House	Town	Electric	25853171004	20%				16.41	0%	
Pierce House	Town	Gas	4961417230		20%			130.20	0%	
Public Safety	Town	Electric	25851861002	10%				61.87	0%	
Public Safety	Town	Gas	4961419960		5%			56.47	0%	
Streetlights	Town	Electric	24409551009					-		
Streetlights	Town	Electric	25398931003					-		
Streetlights	Town	Electric	26773441006					-		
Streetlights	Town	Electric	27355050017					-		
TBD6	Town	Electric	25849341000					-		
Tennis Court Lights	Town	Electric	25853031000					-		
Town Hall	Town	Electric	25852971008	20%				45.76	0%	
Town Hall	Town	Electric	25852971008	20%				15.21	0%	
Town Hall	Town	Oil	LINCTOWN			40%		385.95	1%	
Transfer Station	Town	Electric	25847781009	5%				3.22	0%	4%
Vehicles - Gasoline	Vehicles	Gas/ Diesel	1250345				5%	118.09	0%	
Vehicles - Diesel	Vehicles	Gas/ Diesel	4402813				5%	125.63	0%	1%
Farrar Pond Well	Water	Electric	25850721009					-		
Filtration Plant	Water	Electric	27302860013					-		
Flints Pond Pump Station	Water	Electric	25848831001					-		
Flints Pond Pump Station	Water	Gas	4961411890					-		
Telemetry	Water	Electric	23608911006					-		
Tower Road Well	Water	Electric	25851561008	10%				9.81	0%	
Tower Road Well	Water	Gas	4961619210					-		0%
Total				**3%**	**16%**	**2%**	**0%**	6,665.70	**22%**	**22%**

Appendix D

Town of Lincoln Energy Use

Target MMBTU 2010 - 2015

Building	Department	Fuel	Account	FY 2010 Target MMBTU/ YR	FY 2011 Target MMBTU/ YR	FY 2012 Target MMBTU/ YR	FY 2013 Target MMBTU/ YR	FY 2014 Target MMBTU/ YR	FY 2015 Target MMBTU/ YR
Brooks Building	School	Electric	25853051008	1,250.80	1,250.80	1,250.80	1,250.80	1,250.80	1,000.64
Brooks Building	School	Gas	4961419180	6,197.40	6,197.40	6,197.40	6,197.40	6,197.40	3,718.44
Smith Building	School	Electric	25853161005	586.49	586.49	586.49	586.49	586.49	469.19
Smith Building	School	Gas	4961418610	3,524.90	3,524.90	3,524.90	3,524.90	3,524.90	2,114.94
Hartwell Parking Lot Lights	School	Electric	25853041009	5.07	5.07	5.07	5.07	5.07	5.07
Hartwell Building and Pods	School	Electric	28233750018	1,611.62	1,289.29	1,289.29	1,289.29	1,289.29	1,289.29
Hartwell Building	School	Gas	4961419030	1,322.90	1,058.32	1,058.32	1,058.32	1,058.32	1,058.32
Hartwell Pod A	School	Gas	4961420230	445.70	222.85	222.85	222.85	222.85	222.85
Hartwell Pod B	School	Gas	4961420260	318.50	254.80	254.80	254.80	254.80	254.80
Hartwell Pod C	School	Gas	4961420650	281.50	225.20	225.20	225.20	225.20	225.20
Bemis Hall	Town	Electric	26945850019	56.97	39.88	39.88	39.88	39.88	39.88
Bemis Hall	Town	Electric	27147940012	5.31	5.31	5.31	5.31	5.31	5.31
Bemis Hall	Town	Oil	LINCBEMI	668.08	601.27	601.27	601.27	601.27	601.27
Codman Farm	Town	Electric	25851591005	163.78	163.78	163.78	163.78	163.78	163.78
Codman Farm	Town	Electric	25851591005	0.06	0.06	0.06	0.06	0.06	0.06
Codman Farm	Town	Gas	4961410360	493.20	493.20	493.20	493.20	493.20	493.20
Conservation Garage	Town	Electric	27918570014	0.44	0.44	0.44	0.44	0.44	0.44
Conservation Garage	Town	Gas	4961419210	445.50	445.50	445.50	445.50	445.50	445.50
Library	Town	Electric	25848721004	612.43	489.94	489.94	489.94	489.94	489.94
Library	Town	Oil	LINCLIBR	711.48	533.61	533.61	533.61	533.61	533.61
Pierce House	Town	Electric	25853171004	82.07	82.07	82.07	65.66	65.66	65.66
Pierce House	Town	Gas	4961417230	651.00	651.00	651.00	520.80	520.80	520.80
Public Safety	Town	Electric	25851861002	618.71	618.71	618.71	618.71	556.84	556.84
Public Safety	Town	Gas	4961419960	1,129.40	1,129.40	1,129.40	1,129.40	1,072.93	1,072.93
Streetlights	Town	Electric	24409551009	53.82	53.82	53.82	53.82	53.82	53.82
Streetlights	Town	Electric	25398931003	17.08	17.08	17.08	17.08	17.08	17.08
Streetlights	Town	Electric	26773441006	13.19	13.19	13.19	13.19	13.19	13.19
Streetlights	Town	Electric	27355050017	4.23	4.23	4.23	4.23	4.23	4.23
TBD6	Town	Electric	25849341000	26.28	26.28	26.28	26.28	26.28	26.28
Tennis Court Lights	Town	Electric	25853031000	9.12	9.12	9.12	9.12	9.12	9.12
Town Hall	Town	Electric	25852971008	228.81	228.81	228.81	228.81	228.81	183.05
Town Hall	Town	Electric	25852971008	76.05	76.05	76.05	76.05	76.05	60.84
Town Hall	Town	Oil	LINCTOWN	964.88	964.88	964.88	964.88	964.88	578.93
Transfer Station	Town	Electric	25847781009	64.40	64.40	61.18	61.18	61.18	61.18
Vehicles - Gasoline	Vehicles	Gas/ Diesel	1250345	2,361.80	2,361.80	2,361.80	2,361.80	2,361.80	2,243.71
Vehicles - Diesel	Vehicles	Gas/ Diesel	4402813	2,512.58	2,512.58	2,512.58	2,512.58	2,512.58	2,386.95
Farrar Pond Well	Water	Electric	25850721009	12.56	12.56	12.56	12.56	12.56	12.56
Filtration Plant	Water	Electric	27302860013	1,384.86	1,384.86	1,384.86	1,384.86	1,384.86	1,384.86
Flints Pond Pump Station	Water	Electric	25848831001	608.06	608.06	608.06	608.06	608.06	608.06
Flints Pond Pump Station	Water	Gas	4961411890	166.00	166.00	166.00	166.00	166.00	166.00
Telemetry	Water	Electric	23608911006	12.01	12.01	12.01	12.01	12.01	12.01
Tower Road Well	Water	Electric	25851561008	98.13	88.32	88.32	88.32	88.32	88.32
Tower Road Well	Water	Gas	4961619210	76.50	76.50	76.50	76.50	76.50	76.50
Total				**29,873.65**	**28,549.83**	**28,546.61**	**28,399.99**	**28,281.65**	**23,334.63**
Percent Savings				**0%**	**4%**	**4%**	**5%**	**5%**	**22%**

ENERGY EFFICIENCY OPPORTUNITY

BENCHMARKING REPORT

Prepared for the Town of Lincoln, MA

Lincoln Public School K - 8

Ballfield Road – Lincoln, MA 01773

Prepared by

EMA - Energy Management Associates, Inc.

www.EMA-Boston.com

Site Visit

March 5th 2010

Extract

INTRODUCTION

The Town of Lincoln is a participant in the NSTAR-NGRID ENERGY STAR Benchmarking Initiative, a program designed to help customers assess the energy performance of their buildings and identify opportunities for improvement. They chose to participate with the K-8 School located at Ballfield Road Lincoln, MA.

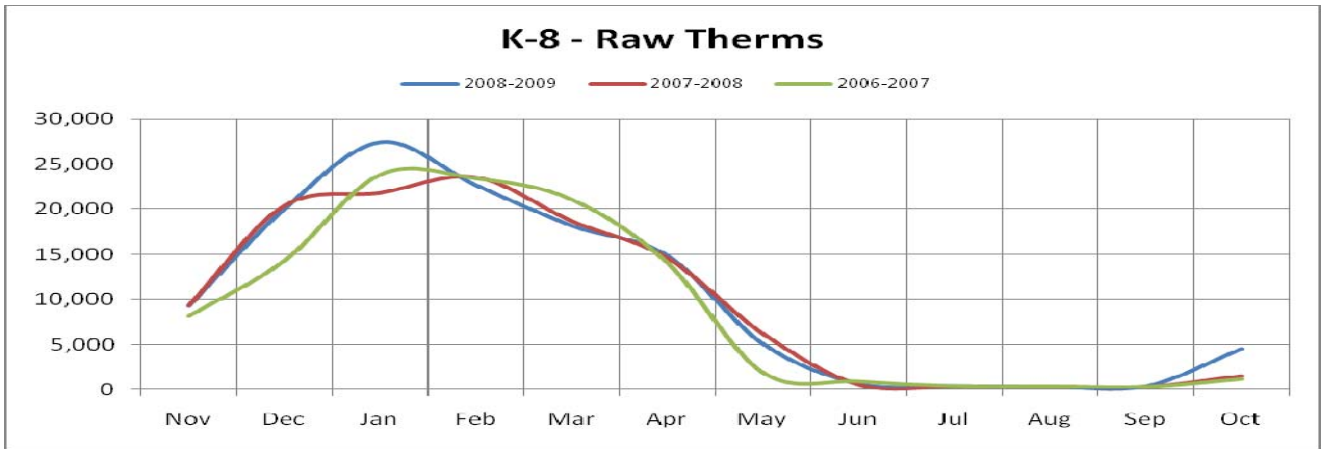
Energy Performance Rating:
42

The performance of this building was assessed using the Portfolio Manager benchmarking tool from ENERGY STAR. For the twelve months ending November 30, 2009, the building received an energy performance rating of 42. The rating represents the percentile ranking of this building compared to others of its type in the United States. Buildings that receive a rating of **75** or greater are eligible for an ENERGY STAR label. A Statement of Energy Performance, generated by Portfolio Manager, is included as the last page of this report. To identify opportunities to improve energy performance, Scott Greenbaum, P.E., CEM, of Energy Management Associates, Inc (EMA) on March 5th conducted an Energy Efficiency Opportunity Assessment. We would like to recognize Michael Haines and Patrick MacMillan who provided invaluable assistance and a walkthrough and detailed discussions regarding the operations of the equipment and controls. We thank them for their time, interest and invaluable assistance during the audit process.

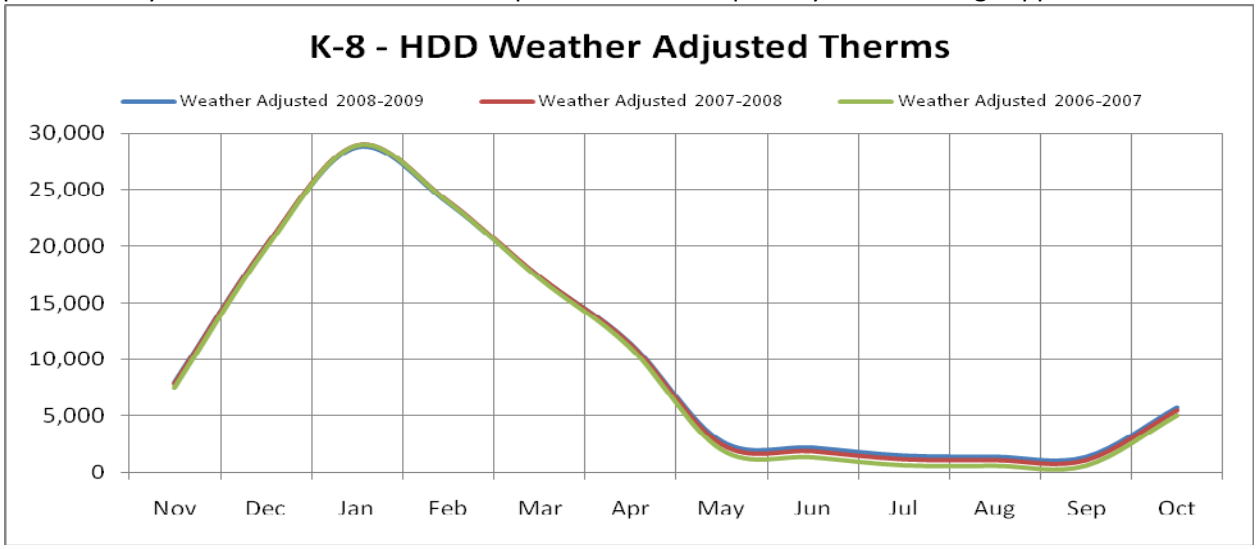
FACILITY DESCRIPTION

Energy Use

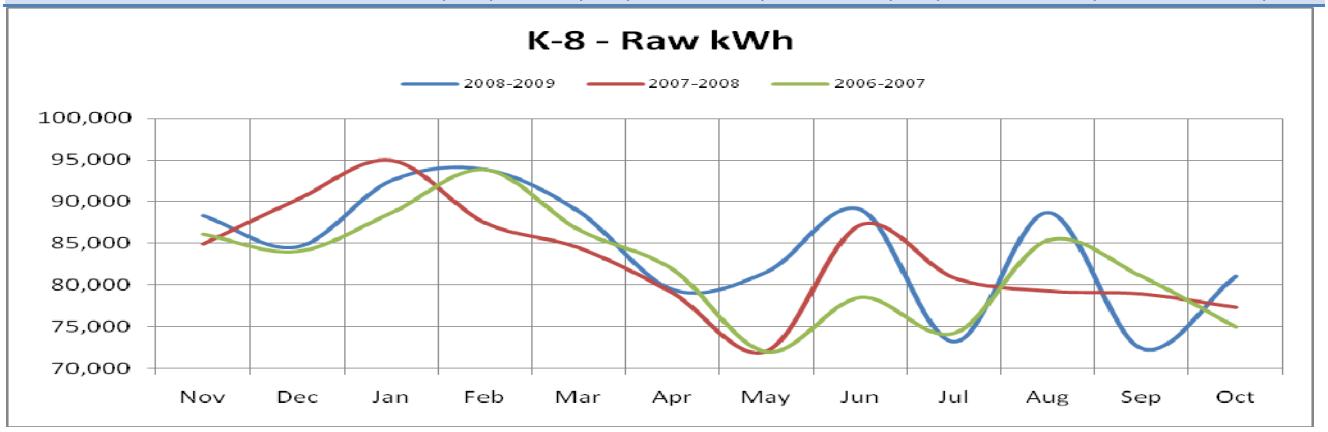
Days in Period		Weather Adjusted Therms 2008-2009	Weather Adjusted Therms 2007-2008	Unadjusted Therms 2008-2009	Unadjusted Therms 2007-2008
27	Nov	8,015	7,811	9,319	9,337
34	Dec	20,020	19,963	20,052	20,379
33	Jan	28,808	28,943	27,399	21,802
29	Feb	23,888	23,977	22,666	23,519
28	Mar	17,348	17,318	18,190	18,663
29	Apr	11,483	11,321	14,876	14,580
30	May	2,800	2,449	5,099	6,186
33	Jun	2,233	1,830	720	569
32	Jul	1,540	1,136	466	355
30	Aug	1,444	1,065	362	357
29	Sep	1,422	1,057	423	351
32	Oct	5,767	5,449	4,546	1,525
366	**Total**	**124,769**	**122,320**	**124,118**	**117,623**



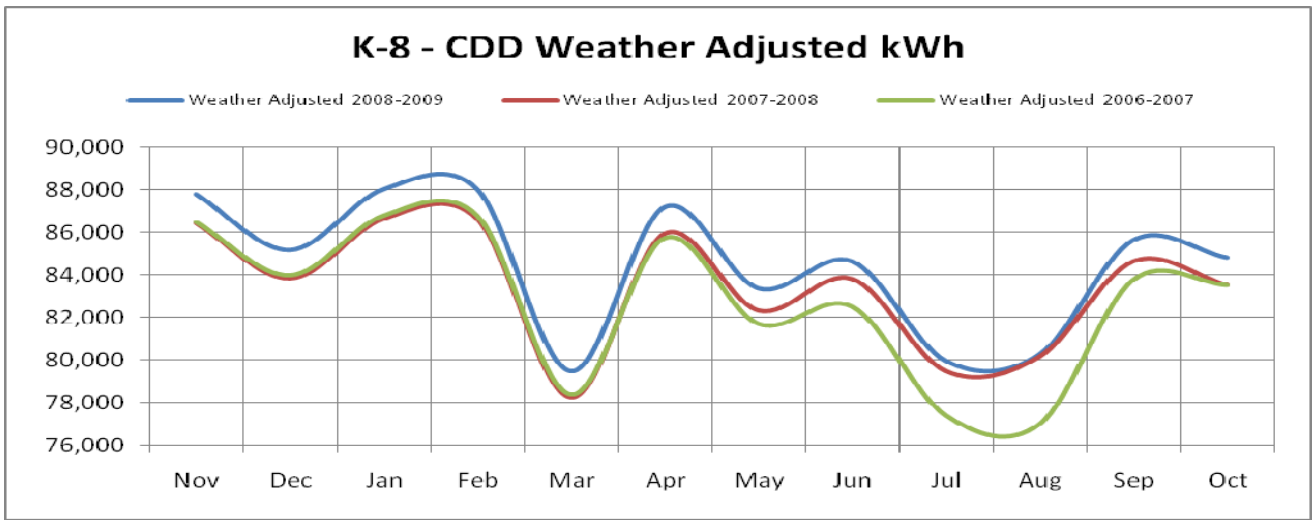
Degree day statistical anlysis shows the r-squared is 96% to 98% which indicates there is a high predictability between the outdoor air temperature and the quantity of heat being supplied to the building.



CDD/d	Days in Period		Weather Adjusted 2008-2009	Weather Adjusted 2007-2008	Weather Adjusted 2006-2007	Unadjusted 2008-2009	Unadjusted 2007-2008	Unadjusted 2006-2007
0.56	31	Nov	87,789	86,461	86,472	88,361	84,895	86,066
0.00	30	Dec	85,186	83,863	83,971	84,595	90,213	83,989
0.00	31	Jan	88,025	86,658	86,770	92,550	94,914	88,611
0.00	31	Feb	88,025	86,658	86,770	93,906	87,438	93,802
0.00	28	Mar	79,507	78,272	78,373	88,869	84,432	86,601
2.00	31	Apr	87,189	85,959	85,713	79,481	79,033	81,844
4.45	30	May	83,386	82,357	81,695	81,586	72,039	71,944
8.08	31	Jun	84,649	83,833	82,499	89,107	87,164	78,482
12.87	30	Jul	79,983	79,509	77,390	73,235	80,842	74,173
18.52	31	Aug	80,288	80,184	76,984	88,716	79,262	85,334
5.71	31	Sep	85,639	84,662	83,752	72,413	78,910	80,983
0.90	30	Oct	84,822	83,558	83,511	81,095	77,311	74,932
	365		1,014,488	1,001,972	993,901	1,013,914	996,453	986,761



Degree day statistical analysis shows that the r-square is well below 50% indicating that electric usage is not used in a predictable manner relative to air-conditioning usage which is understandable and to be expected.



ENERGY EFFICIENCY OPPORTUNITIES

EEM #		Q	Cost	Est'd Savings kWh	Est'd Savings Therms Equivalent	Est'd Svgs per Yr	Simple Pay Back
	Low Cost / No Cost Energy Efficiency Opportunities						
1	Control Energy use of PC-Monitors & PC-Hard Drives	500	$0	25,000	0	$3,125	
2	Employee Energy Education Program	1	$0	20,223	1,238	$4,884	
3	Vending Mizor Beverage Controls	1	$180	800	0	$132	
4	Re-commission existing EMS,POD Thermostats, and Boiler Controls	1	$20,000	78,056	9,955	$25,323	0.8
	Energy Efficiency Opportunities Requiring Capital Outlay						
5	EMS system with Demand Ventilation and Heating System Control	1	$250,000	97,517	34,187	$58,823	4.3
6	Variable Speed Drive AHU # 1 Library (20 HP @ 208 Volt)	1	$7,159	9,591	0	$1,199	6.0
7	Lighting Occupancy Sensors Gyms	4	$9,600	9,600	0	$1,584	6.1
8	Lighting Occupancy Sensors Classroom	60	$15,000	30,000	0	$4,950	3.0
9	Condensing Heating Boiler Such as AERCO Benchmark 3.0 for Brooks Boiler Room	1	$90,000	0	4,800	$6,000	15.0
	Totals		**$371,939**	**192,731**	**40,224**	**$80,697**	**4.61**
	Total % Savings			**19%**	**32%**		

Solar PV: we found 50,000 sq. ft. of flat roof in support of 80 kW of future photo-voltaic arrays that could displace 84,000 kWh (8%)

RECOMMENDATIONS

Low Cost/No Cost Energy Efficiency Opportunities

(1) Control Energy Use of PC Monitors and Hard Drives

Computer energy use can be controlled through a combination of automatic power management features and manual shut down by users. Organizations can use a standardized setting so that all monitors go into sleep mode after 10 minutes of inactivity. Power management can also be enabled for computer hard drives, but may require some investigation and testing before full implementation. Savings calculations in this report are based on 50 kWh saved per PC**.** There are no costs to implement the power management, other than in-house efforts. Insist on 80% or greater energy efficient power supplies and visit www.80plus.org. Additional information is available on the ENERGY STAR website at www.energystar.gov/powermanagement. Some firms have found that some software is disabled by antivirus programs; it has been reported that Night Watchman® does not have this issue: http://www.1e.com/softwareproducts/nightwatchman/index.aspx

► ***Action Steps:*** *Work with in-house IT staff to adjust power management settings.*

(2) Employee Energy Education Program

An employee energy education program can raise awareness among employees about how energy is used in the building, and provide recommendations on how employees can help save energy. Energy-saving tips can include shutting off lights when leaving a room, use revolving doors whenever possible, and bring a sweater t o work. Periodically verify lighting schedules. Savings estimates for energy education programs are difficult to quantify and vary widely. Savings were estimated at 1% of current consumption kWh consumption and 2% of current gas consumption. Costs will vary based on the level of sophistication of the program.

► ***Action Steps:*** *An energy education program can be developed by internal employees or with help from external organizations. The ENERGY STAR web site has resources that can help with energy education efforts.*

(3) Install Controls for Vending Machines and/or Beverage Coolers

Refrigerated beverage coolers typically consume energy 24 hours per day, in the form of lights and refrigeration. Energy savings can be achieved by installing an occupancy-based controller that will turn the lights off and reduce the compressor runtime when the area is unoccupied. The cost for each beverage machine is $180. NSTAR offers rebates of $75 for each beverage vending machine. To qualify for the rebate, a vending machine sensor must be installed on a unit located indoors and scheduled to remain in NSTAR's territory for a minimum of three years. A single unit can be used to control a bank of vending machines for additional savings at no additional cost. The most popular controllers are the Energy Miser series from USA Technologies. We have assumed 500 kWh savings per beverage machine.
(www.usatech.com/energy_management).
http://www.nstar.com/docs3/misc/Vending%20Brochure.pdf?unique=20070526111315

► ***Action Steps*****:** *Purchase Vending Misers directly or work with an installing contractor. The NSTAR Program Manager for this facility can provide assistance with obtaining financial incentives.*

(4) Re-commission existing EMS, POD Thermostats, and Boiler Control

The existing EMS system, POD thermostats, and boiler room controls are not living up to its potential due to failed devices, e.g. sensors, actuators, and outdated scheduling, hard to update holiday scheduling, and failed controllers. The town can consider bringing in the EMS contractor and Retro-commissioning Professional to identify failed in service devices and determine if it is economically viable to repair or replace these devices. Coordinate with the school/recreation and private staff to update the scheduling. Program the holiday schedule for the remainder of the year (must be updated each year). Reset the POD thermostats for effective night setback control. Review the operation of the stand-alone heating controls for maximum operating efficiency. After Re-commissioning the school will still have an outdate system, with poor communication interface, requiring annual scheduling for holidays. The energy savings of this option will not be sustainable unless the scheduling is kept up-to-date and frequent repair and re-commissioning to identify failed in service devices. EMA does not recommend proceeding with this EEO.

- ***Action Steps*****:** *Contact NSTAR and National Grid to determine if incentive financing will be supplied to support this project. Schedule the different control device contractors for a service call including Barbara Colman, Tekmar, and Books boiler controller. Hire a commissioning agent to spearhead re-commissioning team; team to include various staff and custodian as members*

Energy Efficiency Opportunities Requiring Capital Outlay

(5) EMS system with Demand Ventilation and Heating System Control

The existing EMS system is functionally obsolete. It is not web compatible. Scheduling is time consuming. All the Unit Ventilators except the Library/Link UVs are pneumatically controlled and not addressable by the EMS system. Since pneumatic night setback is by building (Brooks or Smith) if a classroom is used in the building all the classrooms must be activated as occupied. The Hartwell Building and PODS operate on electro/mechanical controls with no central monitoring or control.

EMA recommends overlaying a WEB compatible EMS system over the existing Barbara Colman 8000 system utilizing as much of the existing communication loop, sensors, actuators, etc. that can be salvaged. Convert all UVs from pneumatic control to modern unitary control with CO2 based demand-controlled ventilation. This will include replacing the damper actuator, heating valve, thermostat, etc. Install discharge air sensor for trouble shooting. The UVs should be grouped based on the current after school and summer space usage so that only the spaces being used can be programmed for occupied operation after normal school hours. The three gym H&V units should be outfitted with demand ventilation control based on return air sensor. The library unit should be outfitted with CO2 demand-controlled ventilation (DCV) controls by using a combination thermostat/CO_2 sensor.

The three boilers rooms control should be converted to DDC. Outdoor reset control shall be implemented taking into consideration the buildings are poorly insulated. The circulating pumps should be shut down when the occupied outdoor air temperature is above 55 ^{o}F (adjustable). During unoccupied periods the circulating pumps should be shut down when the outdoor air temperature is above 35 ^{o}F unless a sample quantity of spaces drop below night setback set point. The pumps should operate below 35 ^{o}F for freeze protection of the distribution lines.

EMA recommends that relays be installed on each Hartwell window A/C unit power supply so that the EMS system can control them. The primary reason for this relay is to provide night setback control of the air conditioning. The Hartwell building may have to have a separate supervisory controller due to its distance from the other building on the complex. The PODs may require WIFI thermostats or some sort of web communication for monitoring and control.

- Work with an NSTAR preferred provider to develop a design build turnkey proposal for the project. The preferred provider will develop the incentive application that will be submitted to NSTAR and National Grid. Work with NSTAR Electric and National Grid Gas to determine incentive dollars.

(6) Variable Speed Drive AHU # 1 Library (20 HP @ 208 Volt)

The existing Library AHU # 1 is a Variable Air Volume (VAV) unit. Air volume is controlled by variable inlet vanes (VIVs). EMA recommends removing or fixing in place the VIVs and installing a Variable Speed drive (VSD) with a premium energy efficient motor that is inverter duty-rated. The existing static pressure sensor shall control the drive speed and therefore its delivery volume. This improvement should be coordinated with the EMS upgrade to insure proper operation. This EEM will improve the aerodynamic flow field, saving significant energy.

- ***Action Steps**: Work with an NSTAR preferred provider to develop a design build turnkey proposal for the project. This project may qualify for incentive financing from NSTAR under a custom application with the EMS system.*

(7) Lighting Occupancy Sensors Gyms

Occupancy in the gyms vary greatly during the day and after school. The existing instant start T-5 fluorescent lighting system is manually switched. During EMA's survey the lighting systems in the gyms where on when the gyms where un-occupied. We recommend retrofitting the lighting fixtures with occupancy sensor to control the lighting systems and reduce energy consumption.

- ***Action Steps**: Work with an NSTAR preferred provider to develop a design build turnkey proposal for the project. The preferred provider will develop the incentive application that will be submitted to NSTAR. Work with NSTAR Electric to determine incentive dollars.*

(8) Lighting Occupancy Sensors Classrooms

Install dual technology dual output occupancy sensors in each classroom. The sensors will shut down the lighting when the room is un-occupied during the normal day and turn the lighting on for custodial services. The dual output sensor can send a signal to the EMS system so that the UV can be put in stand-by operation during occupied periods when the classroom is vacated. This will reduce both lighting energy consumption and HVAC energy consumption.

- ***Action Steps**: Work with an NSTAR preferred provider to develop a design build turnkey proposal for the project. The preferred provider will develop the incentive application that will be submitted to NSTAR. Work with NSTAR Electric to determine incentive dollars.*

(9) Condensing Heating Boiler Such as AERCO Benchmark 3.0 for Brooks Boiler Room

The back-up boiler in the Brooks boiler room is original. It has exceeded its useful service life. EMA recommends installing a condensing heating boiler such as an AERCO Benchmark 3.0 (3,000,000 BTU/Hr) heating boiler in the boiler rooms. This new high efficiency boiler can become the base loaded boiler with a seasonal operating efficiency 10% better than the new cast iron boiler. Since the proposed boiler is a condensing boiler it can feed heating hot water to the heating loop at the outdoor air reset temperature (below 140 ^{o}F during warmer winter weather) without thermal shock return water issues of a cast iron boilers. The proposed boiler has the capacity of heating the school most of the winter resulting in significant reduction in natural gas consumption.

- ***Action Steps**: Work with National Grid for prescriptive incentives on condensing boilers.*

Additional Important Energy Savings Notes & Discussion Items:

1. The building shells are very poorly insulated and leaky. The shell should be improved as it is retrofitted. When roofs are replaced R-30 or better rigid roof insulation should be installed prior to reinstalling the EPDM roof. White roofing is not recommended unless the space is air conditioned. The wall insulation packages should be improved and leaks eliminated.

2. The town should look at deep energy retrofits of the shells and windows of the PODS.

3. Single glazed windows are a priority for replacement.

4. Reprogram gym and auditorium units so fan operates only when CO2 or space temperature requires operation.