EEC Energy Savings Strategy for the Town of Eliot and EEC FY 15 Budget Review

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Eliot Energy Commission

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EEC FY 15 Proposed Budget, Solar Reserve Account & Warrant Article for Energy Reduction Improvements

1. Proposed Budget - $2,500 (no change from FY 13 or FY14)
$2500 normal expenses; Printing, Professional services

FY 13 expenditure history - $2,500
$157.40 closeout of EECBG grant
$497.50 printing energy savers booklets
$783.00 Attar engineering evaluation of garage roof
$1061.10 Town Hall insulation repairs

FY14 expenditures so far $1,100
$450 Fest Day booth expenses and printing Climate Action Plan brochures
$650 solar sign at Transfer Station

2. Proposed Reserve Account - $7,000
$7,000 toward a reserve account for solar system accrued over 6 years allowing purchase July 1, 2019. Town will save between $150,000 (today's elec. rates) and $300,000 (2% annual rate increase) over 40 years and in addition can sell Renewable Energy Credits (now 5 – 6 cents per kwh)

3. Proposed Warrant Article - $28,000
Continue energy reduction improvements identified from professional energy audits. Full project list will cost $99,000 and save the Town $300,000 over 20 years at today's costs. Priorities to be determined by Town

Overview - Energy Savings Strategy to Reduce Energy Costs & CO2

EEC Mission: "Promote Increased Energy Conservation, Efficiency and Local Energy Production Throughout the Town of Eliot". Town Comprehensive Plan includes Energy Policies and Strategies.

EEC Recommendations - Energy Reduction Targets, Actions and Implementation Costs Which Will Help Control Inevitable Large Future Energy Cost Increases for the Town and Residents

If No Reductions Achieved over FY 09 Baseline, Town Energy Costs (Including Schools) Could Increase by $1.0M per year when Crude Oil Reaches $200 /barrel (FY 09 $70, Jan 2014 - $92 WTI, $107 Brent)

Library Trustees Set Best Example; New Library Insulation Reduced Heating Oil 63% from FY 09 to FY 13

Municipal Energy Reduction Efforts Also Successful from FY 09 to FY 13

- **Municipal Electricity Use is Down 14% (including Sewer Pumps Down 31%)**
- **Municipal Heating Oil Use is Down 28%**
- **Phase 1 Garage Solar Produced 99.1% of Predicted Power (July to Dec 13) for Public Works & Part of Police**

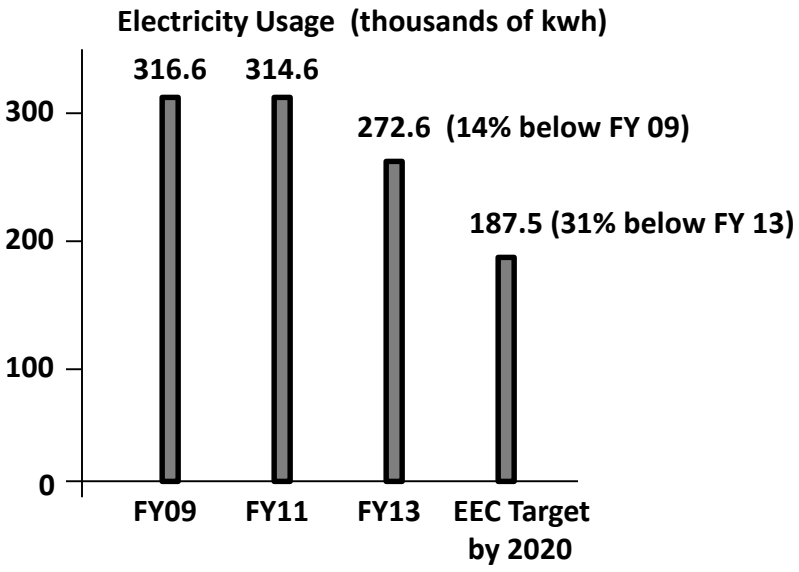
Opportunity to Further Reduce Electricity, Heating Oil and Vehicle Fuel by 2020 including:

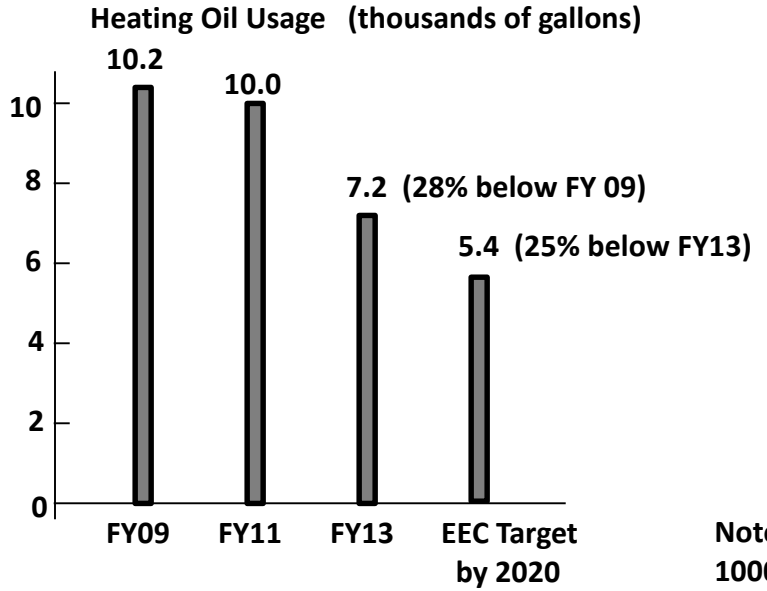
- **Completion of Energy Reduction Projects from Audits (EEC Target - Elec down 31%, Heat Oil down 25%)**
- **More Efficient Town Vehicles (EEC Target down 24%) and Conversion of Street Lights to LEDs (down 90%)**
- **Proposed Phase 2 Landfill Solar Can Generate 100 % of 2020 EEC Target Municipal Electricity Usage**

Recommend Close Cooperation Between Town & Schools Since School Electricity and Heating Oil Use is 8 Times Municipal Use

- **Town Pays Over 50% of School Costs**
- **School Energy Reduction Program Completed Prior to FY 09 Baseline Inventory**
- **Proposed Phase 2 Landfill Solar Can Generate up to 79% of EEC Target 2020 School Electricity Usage**

Municipal Energy Reduction Shows Large Reduction from FY 09 to FY 13 and EEC Targets for 2020





Previous Efforts Have Been Successful

- Electricity Usage down 14%
- Heating Oil Usage down 28%
- Sewer System Infiltration Substantially Reduced
- Major Investments – Town Hall FY10 - $20,000
  Police Station FY11 - $15,000

Heat Index for Buildings Reduced

	FY09	FY11	FY13
Town Hall	10.04	7.00	5.34
Police Sta	9.09	9.50	6.46
Fire Sta	6.33	7.70	5.43
Garage	4.77	5.01	3.95

Examples of Energy Reduction Successes (FY 09 to FY 13)

Town Hall
Electricity Usage down 36%
Heating Oil down 49%

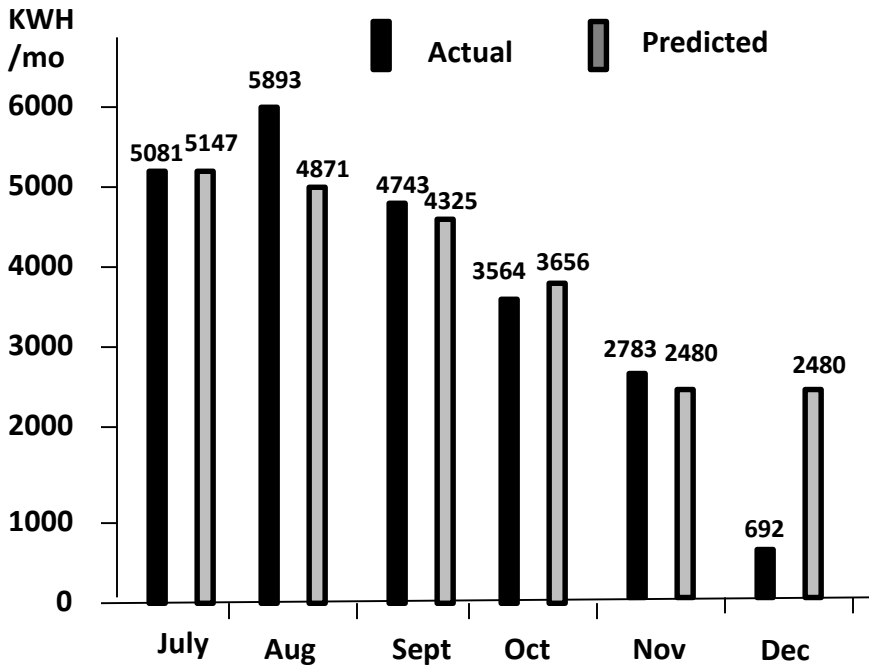
Police Station
Electricity Usage down 16%
Heating Oil down 35%

Saves $9,367 per year

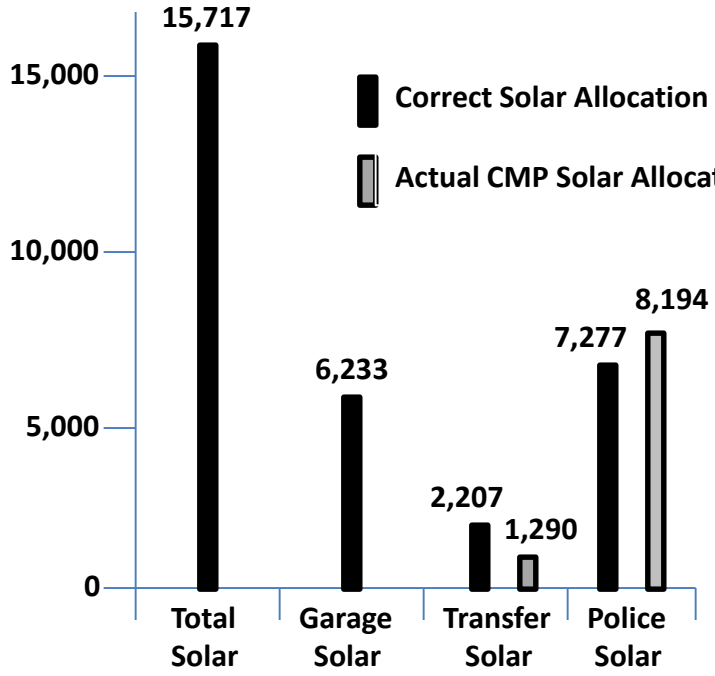
Note: One Kilowatt Hour (kwh) runs a 1000 watt space heater for one hour

Phase 1 Garage Solar Operated as Predicted July – December 2013

Actual vs Predicted Performance
Shows 99.1% Correlation



July – Sept Shows Shift of 917 kwh of Solar Power from Transfer Station to Police Station Due To Initial CMP Billing Error (clerk assumed Eliot System operated like most other Net Metering installations)



Total Solar Generated July 2 – Dec 28 = 22,756 KWH

Total Predicted July – Dec = 22,959 KWH

Value of Electricity Generated @ CMP Rate = $2,981

Town Pays ReVision (2) cents per kwh less than CMP Rate

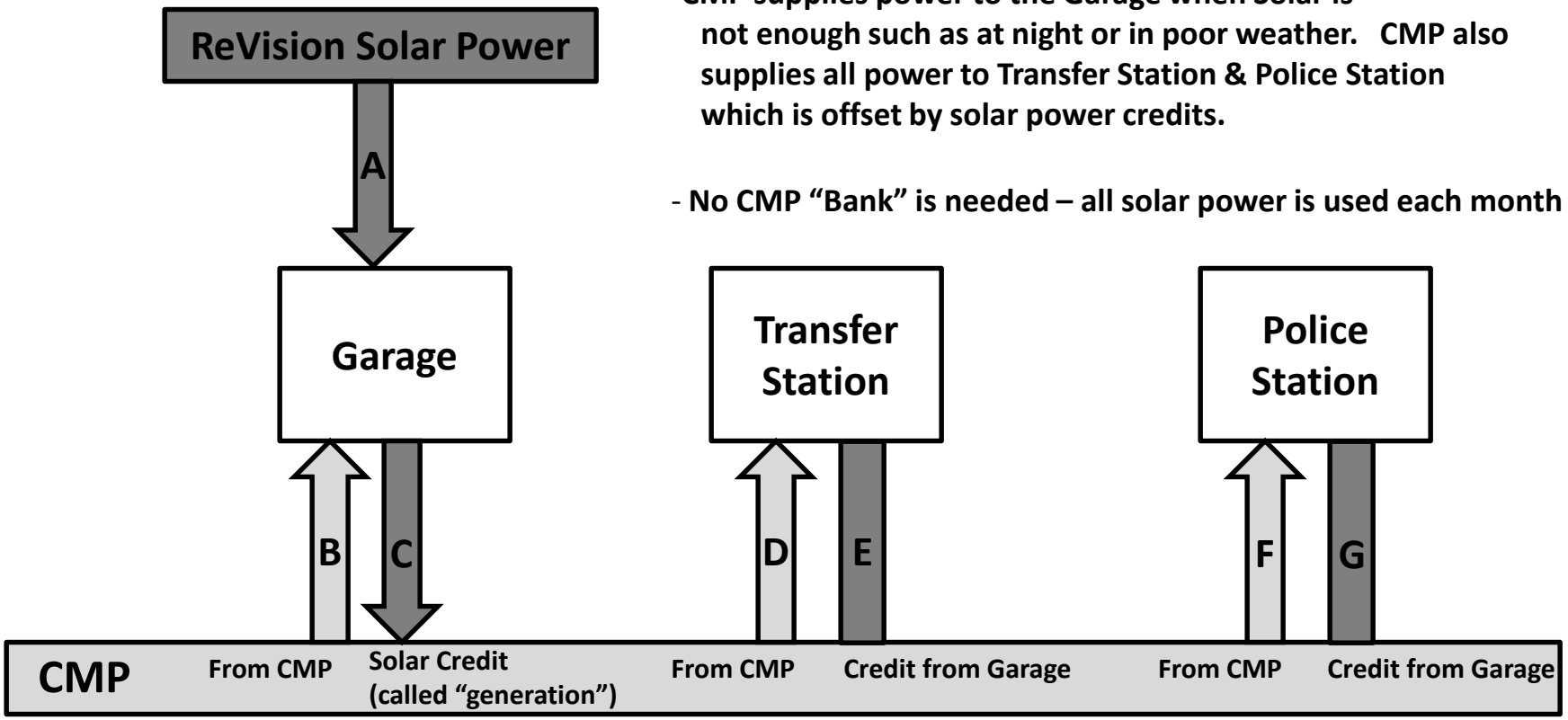
Phase 1 Garage Solar Power Operation & How Credits Work

-Garage Uses Solar Power first, then CMP Power

-Extra Solar Power is a CMP credit used to offset power supplied by CMP to the 3 buildings

-CMP supplies power to the Garage when Solar is not enough such as at night or in poor weather. CMP also supplies all power to Transfer Station & Police Station which is offset by solar power credits.

- No CMP "Bank" is needed – all solar power is used each month



Total Garage Power Usage = A + B – C

How Solar Credit is Used C = B + E + G

Suggested Future Energy Reductions – Recommended Investment & Savings (savings calculated at 2013 energy costs)

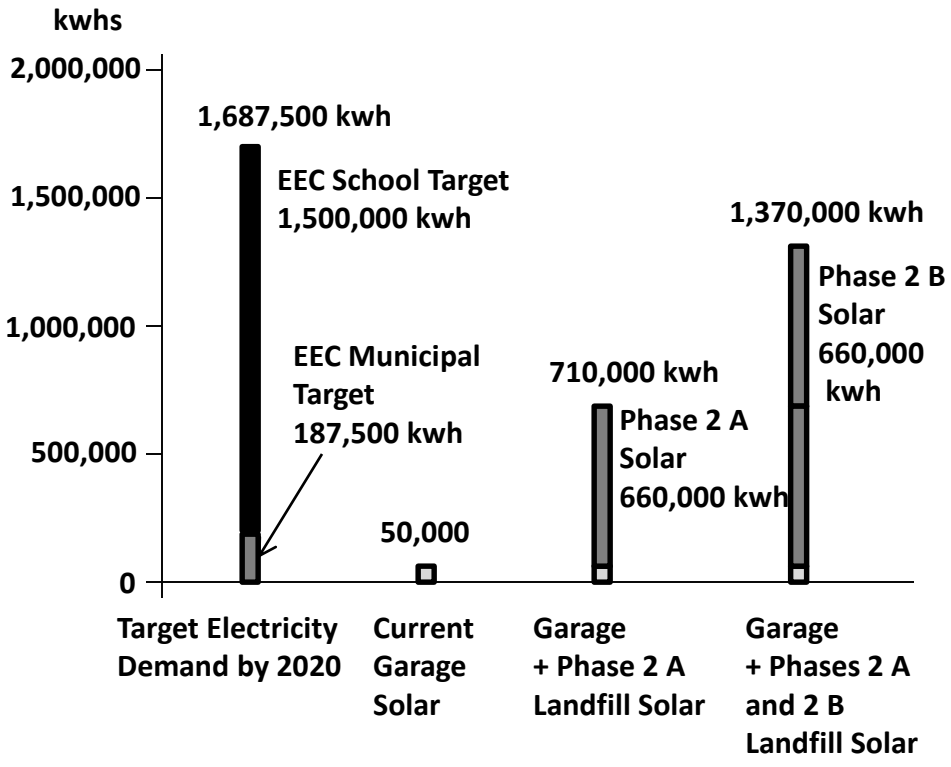
Energy Reduction	Recommended Investment	Savings
Complete energy reduction improvements identified from professional energy audits Priorities determined by Town	$99,000 spread over 4 years (FY 15 to FY 18) $28,000 recommended for FY 15	$300,000 over 20 years
Reserve to purchase Phase 1 Garage Solar on July 1, 2019	$43,000 spread over 6 years $7,000 recommended for FY 15	$150,000 over 40 years
Increase current $48,000 annual vehicle reserve for Police and Public Works (ref FY 12 Budget) to allow purchase of more cost efficient vehicles (CNG or Hybrid)	Reserve increased by $17,000 per year for total of $65,000	$450,000 over 20 years
Reserve to purchase proposed Phase 2 Landfill Solar in FY 23	$120,000 (+) toward Eliot portion of phase 2 A landfill solar $40,000 (+) spread over 6 years (FY 18 to FY 23)	2 A $600,000 for Municipal & $2,300,000 for Schools over 40 years 2 B $2,900,000 for Schools over 40 yrs
Convert Street Lights to LED	$50,000 spread over 4 years (FY 18 to FY 21)	$100,000 over 20 years
Infiltration & sewer pump motors	NA	$14,350 over 20 years
Complete LED lighting conversion	$25,000 spread over FY22 & FY23	

Funding Profile for Suggested Investment to Further Reduce Energy Use
(thousands of dollars)

	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23
Energy projects identified	28	28	28	15					
Reserve to purchase Garage Solar	7	7	7	7	7	8			
Reserve Public Works Trucks	40	40	40	40	40	40	40	40	40
Reserve Police Vehicles	25	25	25	25	25	25	25	25	25
Reserve to purchase Landfill solar				40	40	40	40	40	40
Street Light Conversion to LED				10	13	13	14		
Building Light Conversion to LED								13	12
Totals	100	100	100	137	125	126	119	118	117

The EEC also suggests that the Town consider placing responsibility for all town building infrastructure under a single person working in cooperation with department heads.

Phase 2 Solar Options Based on Target Demand in 2020
Potential to Power 100% of Municipal and 79% of Schools
(savings calculated at 2013 energy costs)



EEC 2020 Target Demand

Municipal – 187,500 kwh (FY 13 is 272,600 kwh)

Schools – 1,500,000 kwh (FY 12 is 2,180,803 kwh)

Current Phase 1 Garage Solar PPA

50,000 kwh powers Public Works and part of Police

Cost to purchase - $43,000 July 1, 2019

Saves Town - $150,000 over 40 years

Phase 2 is based on same type of PPA and purchase as phase 1 Garage Solar.

Proposed Phase 2 A Landfill Solar (ref EEC 2020 targets)

660,000 kwh increases Municipal solar power to 100% and powers 31% of Schools

Estimated cost to purchase after 6 years:

Town - $120,000; Schools - $460,000

Saves Town - $600,000 over 40 years

Saves Schools - $2,300,000 over 40 years

Proposed Phase 2 B Landfill Solar

660,000 kwh increases solar power for Schools to 79%

Estimated cost to purchase: Schools - $580,000

Saves Schools - $2,900,000 over 40 years

Proposed Large Phase 2 A & 2 B Solar Installations on Capped Landfill

Example 5,000 panel solar installation on capped landfill in Methuen MA coordinated by new Kittery Town Manager

Phase 2 installation would be on capped landfill site next to the Transfer Station using current technology

ReVision has indicated that 660,000 kwh installations are the largest that can qualify as a small generator so phase 2 is proposed in two steps of 660,000 kwh each.

This approach allows up to 18 other meters to be credited

Phases 2 A and 2 B each use 2,200 (300) watt panels

ReVision estimates install cost of approx $3.00 per watt $3.50 per watt is used for these calculations

Each phase 2 step would cost $2,300,000 and would be funded by an installer / investor under a PPA with a favorable purchase option after 6 years

ReVision does not make enough profit to benefit from the 30% federal tax credit for these large systems
Investors would need to be found that can benefit

At this point our phase 1 Garage system has operated for 6 months and has required no maintenance

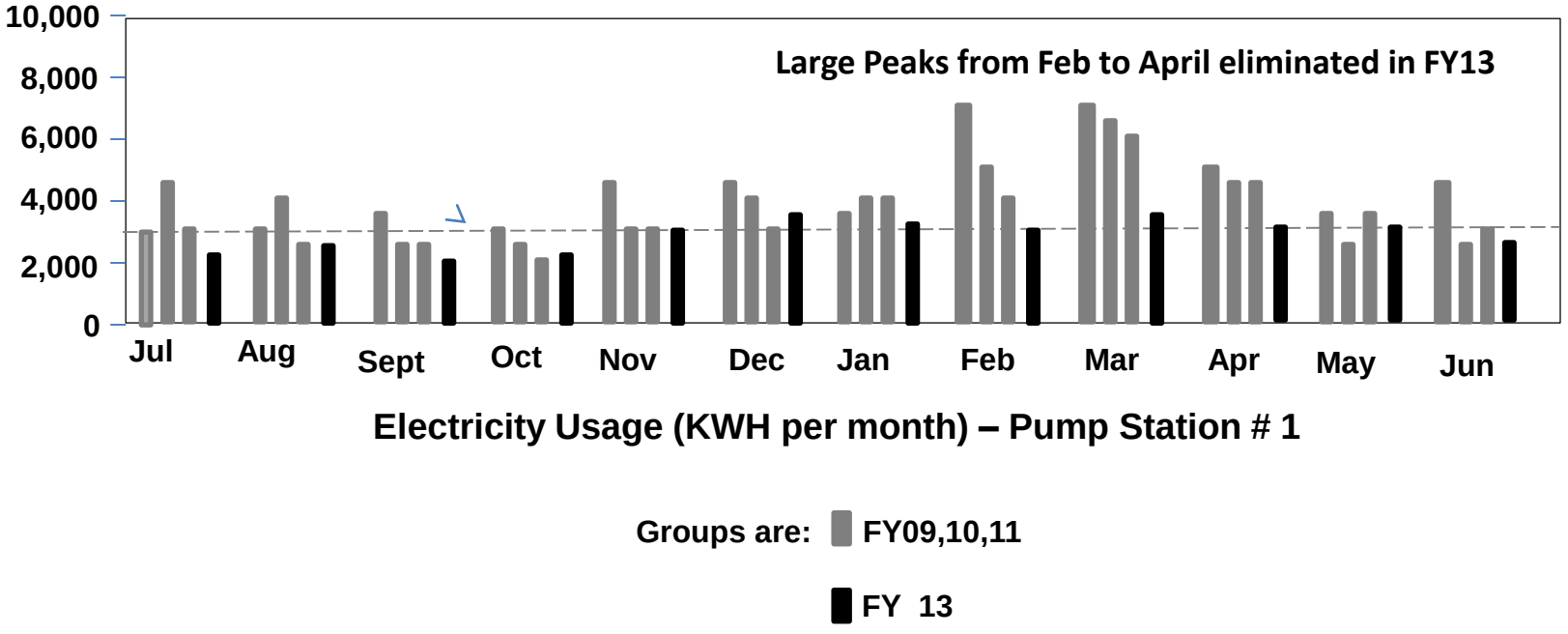
Backup Charts

Municipal Electricity Usage Shows 14 % Reduction from FY 09 to FY 13
(Data shown in Kilowatt Hours)

	FY09 Baseline	FY 11	FY 13	Change 09-13	FY 20 EEC Goal	Comments Re FY 20 EEC Target
Town Hall	36,788	28,334	23,533	36% down	11,176	Lighting Improvements
Fire Station	19,444	31,450	31,318	61% up	15,227	Comm Serv to School + Lighting Improve
Police Sta	64,480	59,280	53,840	16% down	36,733	Lighting + Gen Htr on only in heat season
Garage	14,033	20,446*	24,112*	72% up*	22,353	Lighting, insulation and HW improve
Transfer	19,850	20,041	20,441	3% up	18,000	
Sewer Pumps	101,676	101,372	69,684	31% down	64,208	New high efficiency pumps
Street Lights	40,296	41,556	42,623	6% up	4,156	Change to LED lighting
Traffic Lights	5,125	5,420	5,632	10% up	5,632	
C. S. + Parks	14,875	6,740	1,401	91% down	10,000	Community Service moves to School
Municipal	316,567	314,639	272.584	14% down	187,485	FY 20 Target 31% down from FY 13

•Increase in Electricity Usage at Garage from increased welding to repair equipment and modify truck to haul trash dumpsters

Reduction in Sewer Pump Station 1 Electricity from FY09-FY11 to FY 13 Shows Infiltration Problem Nearly Resolved



Municipal Heating Oil Usage Shows 28 % Reduction from FY 09 to FY 13

	FY 09		FY 11		FY 13				
	Gallons	Heat Ind	Gallons	Heat Ind	Gallons	Heat Ind	Change 09-13	FY 20 EEC Target	Comments re FY 20 Target
Town Hall	2,273	10.04	1,531	7.00	1,167	5.34	49% down	835	
Fire Station	3,119	6.33	3,562	7.70	2,377	5.43	24% down	1,652	
Police	1,589	9.09	1,605	9.50	1,032	6.46	35% down	845	
Garage	2,273	4.77	2,305	5.01	1,721	3.95	24% down	1,427	
Transfer	980		993		854		13% down	640	
Muni Totals	10,234		9,996		7,151		28% down	5,399	25% down
Heating Deg Days	6,958		6,712		6,349				

Heat Index is btu/sq ft of heated area/heating degree day

Municipal Vehicle Fuel Usage - gallons

	FY 09	FY 10	FY 11	FY 12	FY 13	FY 20 EEC Goal	Comments
Fire Dept Total				**2,221**	**2,894**	**2,894**	
- gasoline				**1,636**	**2,222**		
- diesel				**585**	**672**		
Police Dept				**7,596**	**7,930**	**3,965**	**EEC goal based on new vehicles with 50% more efficient technology** **Suggest Reserve 25K per yr**
Public Works	**9,129**	**6,814**	**10,161**	**11,106**	**14,635**	**12,440**	**EEC Goal based on new trucks with 20% more efficient technology** **Some increase in fuel use due to trash haul to eco Maine** **Snow Plowing is large variable** **Suggest Vehicle Reserve 40K per yr**

School Energy Usage Details

Electricity	FY 09	FY 11	FY 12
Total Schools Elec (kwh)	2,295,203	2,315,171	2,148,803

Heating Oil	FY 11		FY 12		FY 13	
	Gallons	Heat Index	Gallons	Heat Index	Gallons	Heat Index
Eliot Elem	18,308	7.16	13,258	6.21	11,423	4.72
Central	14,374	6.01	10,557	5.29		
Great Works	18,377	7.51	15,131	7.41		
Middle	19,304	4.94	17,109	5.24	19,712	5.33
High School*		3.83				
Admin	1,401		1,331		1,268	
Total Schools Heat Oil	71,764		57,386			
Heating Degree Days	6,712		5,606		6,349	

School Vehicles	53,978

*High School heats with natural gas

Energy Savings Initiatives for Municipal Buildings
Projects Identified from Professional Energy Audits

	Annual Savings	Cost of Work	Payback	Remarks
Town Hall	**$**	**$**	**Years**	
Lighting	1,118	5,890	5.3	
Bldg Envelope	630	3,910	6.2	
HVAC & HW	2,251	12,720	5.7	
Fire Station				
Lighting	673	8,025	11.9	Second Priority for Chief
Bldg Envelope	2,479	25,151	10.1	Top Priority for Chief
HVAC & HW	1,326	8,700	6.6	
Police Station				
Lighting	1,901	7,900	4.2	
Bldg Envelope	1,282	6,973	5.4	
Generator Heater	816	1,560	1.9	Shut Heater off in summer
Public Works				
Lighting	838	5,000	6.0	
Bldg Envelope	1,033	8,950	8.7	
HVAC & HW	800	2,400	3.0	
Totals				
Lighting	4,530	26,815		
Bldg Envelope	5,424	44,984		
HVAC & HW	5,193	25,380		
Generator Heater	816	1,560		

Timetable for Suggested Energy Savings Actions

Suggested Actions Within 3 Years

1. **Completion of energy reduction projects already identified during 2011/2012 by professional energy audits for the Town Hall, Fire Station, Police Station and Public Works.**

2. **Solar PV PPA purchase reserve for proposed Public Works system**
   Estimate - Reserve $7,000 per year for 6 years starting FY15 ($8,000 in FY20)

3. **Identify options and a timeline for replacing Public Works trucks with more fuel efficient trucks**
   Estimate – Reserve $40,000 per year starting FY15

4. **Identify options and a timeline for replacing Police Dept vehicles with more fuel efficient vehicles**
   Estimate – Reserve $25,000 per year starting FY15

5. **Study the feasibility of a very large solar PV alternate energy facility at the capped landfill to power all town buildings, the sewer system and street lights plus a large portion of MSAD35. Similar PPA as proposed system Estimate – Reserve $40,000 per year for 6 years starting FY16 for Town only. Preliminary Phase 2 System Design Can Power Some of MSAD35 at Higher Cost.**

6. **Examine the possibility of cooperating with other towns and schools for lower cost bulk fuel**

Suggested Actions Within 5 Years

7. **Begin the replacement of Public Works trucks and Police vehicles with more fuel efficient ones**

8. **Replace street lights with LED technology. Estimate conversion cost $40,000 - $60,000 with annual savings of $6,000 at today's electricity rates. Funding starting FY18**

Timetable for Suggested Energy Savings Actions & Funding Profile for Capital Expenditures for the Next Ten Years

Suggested Actions Within 10 Years

9. **Complete installation of a large solar PV alternate energy facility on the capped landfill**

10. **Complete replacement of all lighting in buildings with LED technology. Estimate $25,000 starting FY22**

11. **Complete conversion of all Public Works trucks and Police vehicles to energy efficient technology**

Funding Profile for Suggested Capital Energy Improvements - in thousands of dollars

	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23
Energy projects identified	28	28	28	15					
Reserve to purchase Garage Solar	7	7	7	7	7	8			
Reserve Public Works Trucks	40	40	40	40	40	40	40	40	40
Reserve Police Vehicles	25	25	25	25	25	25	25	25	25
Reserve to purchase Landfill solar				40	40	40	40	40	40
Street Light Conversion to LED				10	13	13	14		
Building Light Conversion to LED								13	12
Totals	100	100	100	137	125	126	119	118	117

The EEC also suggests that the Town consider placing responsibility for all town infrastructure under a single person working in cooperation with department heads.

Garage Solar Analysis for FY 15 – Garage, Transfer & Police

Analysis uses the following:

1. Projected solar generation by ReVision Energy (actual will vary due to weather conditions and blockage by trees)
Note from startup July 2nd through Dec 28th projection was 22,959 KWH and actual was 22,756.
2. FY 13 actual usage for Garage, Transfer and Police
3. For any month where there is less than 100 KWH supplied by CMP, there is a minimum charge

Analysis shows:

- Projected generation covers the Garage every month
- Projected generation also covers Transfer every month except only part from Nov. through Feb. This is due to higher usage in winter months and less generation.
- Projected generation also covers part of Police except none from Nov. through Feb.

		Garage	Transfer			Police	
	Projected Solar Total	100% Solar	Total	CMP	Solar	Total	CMP	Solar
July	5147	2052	827		827	5840	3572	2268
Aug	4871	2154	800		800	6560	4643	1917
Sept	4325	2006	780		780	4880	3341	1539
Oct	3656	2033	1111		1111	4920	4408	512
Nov	2480	2177	2246	1943	303	4720	4720	
Dec	2480	2233	2373	2126	247	4520	4520	
Jan	3144	2291	3228	2375	853	5000	5000	
Feb	3774	2138	2487	851	1636	3600	3600	
Mar	4753	2107	2392		2392	4160	3906	254
Apr	4674	1690	1991		1991	4320	3327	993
May	5068	1692	1455		1455	5480	3559	1921
June	4832	1539	751		751	5080	2538	2542

Eliot Comprehensive Plan Energy Policies and Strategies

Policies	Strategy	Responsibility
1. Reduce municipal dependence on fossil Fuels	1. Explore the feasibility of installing solar hot water, solar electricity (pv) systems and geo thermal in municipal buildings	Energy Commission
	2. Encourage increased municipal energy conservation and improved usage of energy resources	Energy Commission and Public Works
	3. Establish a procedure and continue to monitor use within municipal government	Energy Commission and Administrative Assistant
	4. Establish municipal target percentages for conservation and renewable energy	Board of Selectmen
2. Promote sustainable municipal building Practices	1. Follow current best practices for building construction to promote energy efficiency and Environmental sustainability while taking into account economic feasibility	Code Enforcement Officer
	2. Utilize locally supplied materials and resources when economically feasible for municipal projects	Public Works
	3. Adopt municipal building codes that promote energy efficiency	Code Enforcement Officer

Eliot Comprehensive Plan Energy Policies and Strategies - cont

Policies	Strategy	Responsibility
3. Consider sustainability as a primary factor in all municipal capital expenditures, including office equipment	1. Consider life-cycle cost when purchasing capital equipment	All Town Departments
	2. Explore the possibilities of working with neighboring communities in developing purchasing cooperatives	Board of Selectmen
	3. Explore purchasing new equipment that utilizes more efficient engines and fuel	Board of Selectmen and Administrative Assistant
	4. Use energy star compliant office equipment	Board of Selectmen
	5. Explore the feasibility of a natural gas distribution center in the town	Board of Selectmen
4. Encourage community participation in energy conservation and policies	1. Promote locally grown food products	Conservation Commission
	2. Post energy information on the town website and at the town hall. Include updates of energy audits and net money saved, as well as state grant programs available	Webmaster/Energy Commission