Cape Elizabeth Alternative Energy Committee
Minutes: August 25, 2009

Present: Wyman Briggs, Alan Lishness, Bill Slack, Ernie McVane, Dave Whitten
Absent: Ted Hawkes, Sarah Lennon, Kathy Ray
Guests: Fortunat Meller (Revision Energy)

1. **Revision Energy Solar Thermal Proposal**
   Fortunat Mueller with Revision Energy presented a preliminary solar hot water proposal to the committee for the high school. The proposal was based on using solar energy for heating domestic hot water or he pool. The proposal estimated the system cost at $370,000 and would save around 11,000 gal/yr and reduce greenhouse gas emissions by 189,000 lbs/yr.

   As an alternate Revision subsequently revised their preliminary proposal for hot water domestic heating only with the following estimated economics. The revised proposal estimated the system cost at $85,000 and would save around 1,700 gal/yr and reduce greenhouse gas emissions by 38,500 lbs/yr.

   According to Revision, the next step would be to perform a more detailed engineering and cost analysis. Revision has subsequently submitted a proposal for this additional study for a fee of $1,200. Committee to take under consideration.

2. **Energy Conservation Measures List**

   Team continued to prioritize the energy conservations measures list towards finalizing recommendations to Town council (see attached).

Priority Ranking	Building	Scope	CM3 Est Cost	CM3 Est Savings	CM3 Est Effic Maine	CM3 Est Simple Payback
1	MS / Pond Cove	Control Upgrades & Recommissioning	$263,055	$18,166	$8,172	14.03
3		Insulation 1930'3 Bldg	$6,188	$355		17.43
1	HS	Control Upgrades & Recommissioning	$142,420	$15,454	$3,902	8.96
		Boiler Replacement & Biomass Boiler	$1,033,500	$88,733		11.65
1		Natural Gas Boiler/Oil				
3		Biomass Boiler				
3		Pool Unit replacement	$184,600	$3,948		46.76
1		Insulation	$55,372	$8,666		6.39
1	Public Works	Control Upgrades & Recommissioning	$8,080	$1,125		7.18
2		Pump Redundancy	$2,340			
3		Boiler Controllers	$5,950	$1,132		5.26
3		Insulation	$5,247	$614		8.55
1	Community Center	Control Upgrades & Recommissioning	$2,340			
1	Police Station	Insulation	$818	$85		9.62
1		Economizer Repair	$1,624			
3		Boiler Controllers	$4,950	$1,444		3.43
3	Transfer Station	Install Split System	$6,845	$778		8.80
1	Town Hall	Control Upgrades & Recommissioning	$16,994	$1,900		8.94
1		Boiler Controller	$3,990	$571		6.99
1		Insulation	$3,525	$415		8.49
1		Dom Hot Water Replacement	$5,810	$629		9.24
1	Library	Boiler Replacement	$15,360	$2,993		5.13
2		Boiler Controllers	$5,340	$900		5.93
1		DHW Replacement	$6,810	$708		9.62
3		Control Upgrades & Recommissioning	$4,560	$550		8.29
1	Light All Buildings		$733,074	$113,719	$18,710	6.28
		Bonds / Permits/ Contingency	$145,000			
		Engineering				
	Totals		**$2,663,792**	**$262,885**	**$30,784**	**10.02**
		660 kW Wind Turbine				
3		Measurement				
1		Implementation				
		Solar Thermal for Pool				
1		Check Calcs				
2		Further Study				

3. **Next Meeting**
   Bill to send out notice for next meeting to be scheduled in September

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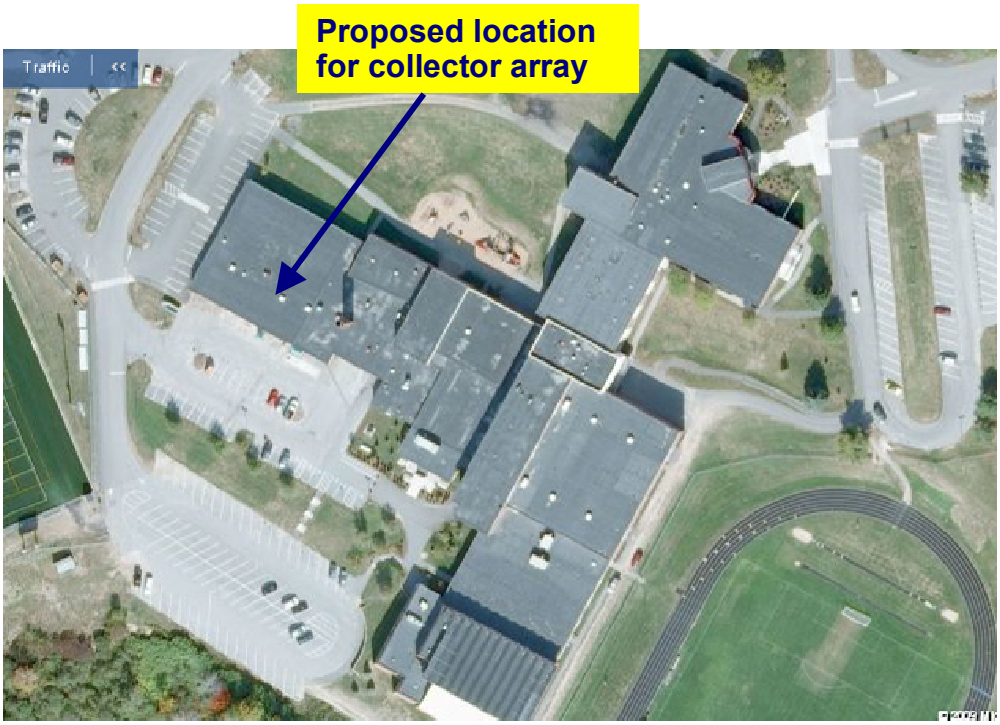
Preliminary Solar Hot Water Proposal
Cape Elizabeth High School



Project Summary

Client:	Cape Elizabeth		**Load:**	DHW and indoor pool heat
Rough System Cost:	$370,000		**System output:**	720,000,000 BTU per year
Oil savings:	> 11,000 G/yr		**CO2 reduction:**	189,000 lbs of CO2 per year

System Overview

Based on an evaluation of the solar opportunity and the domestic hot water and low temperature pool heating demand at the Cape Elizabeth High School, ReVision Energy proposes a closed loop antifreeze solar water heating system, utilizing 64 flat plate solar hot water collectors, a 1,000 gallon solar storage tank and a custom built solar pump station. The system uses variable speed AC pumps, which are controlled by the schools existing PLC for optimum efficiency. On an average sunny summer day, the system will produce over 2 Million BTUs of clean solar energy for heating domestic hot water or the pool. Backup for the hot

water system will be provided by the existing indirect fired hot water heater from the oil boiler. The oil boiler also provides backup heat to the pool as needed. Concurrent with the solar installation, ReVision energy has proposed some basic boiler repiping which will not only allow for the simple integration of the solar system into the existing heating plant, but will also open opportunities for further efficiency improvements through boiler staging, boiler temperature reset control and other more sophisticated boiler control options. For the sake of this preliminary proposal, it has been assumed that this boiler repiping is done by others concurrent with the proposed solar installation.

Major Components

- (64) Solene Chromagen SLCR-40 Flat Plate Solar hot water collectors (www.solene-usa.com)
- (1) 1,000 Gallon hot water storage tanks
- 40% Dow frost HD inhibited, break down resistant antifreeze (http://www.solarthermal.com/downloads/System%20Maint.pdf)
- Custom built solar pump station
- Flat Plate heat exchanger for integration solar heat into pool loop.

At left are 12 Solene Chromagen flat plate solar hot water collectors mounted on a flat roof in Portland.

The proposed array will be mounted in a similar way on the flat roof above the boiler room, with 8 groups of 8 collectors each making up the 64 collector array.

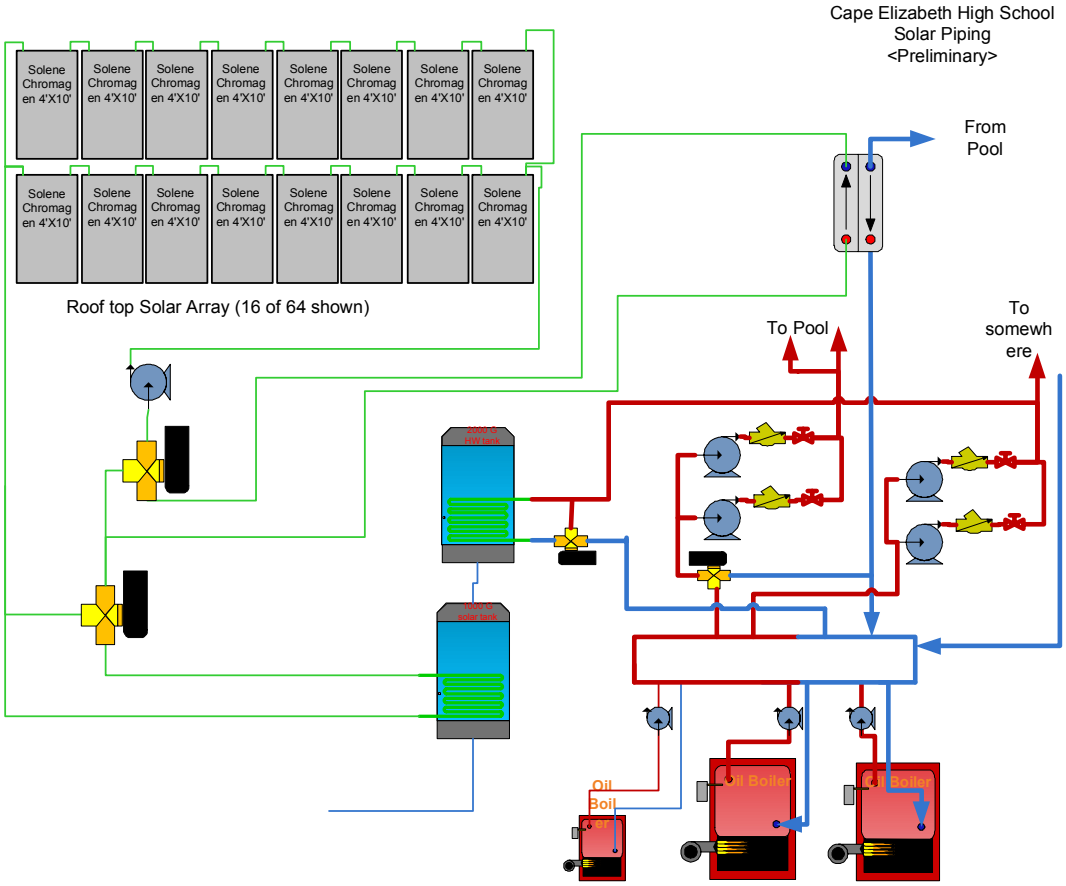
System Operation

Whenever the sun is shining, the solar systems preliminary circulating pump will begin to circulate. The pump circulates the antifreeze solution from the roof top collectors through the primary solar loop which goes down into the boiler room. In the boiler room, the solar fluid will be sent either to the domestic hot water preheat tank or the pool loop reheat exchanger by a pair of three way diverter valves. The heat energy from the sun is thus transferred either to the water in the tank or to the boiler's pool heating loop via the antifreeze solution circulating in a closed loop. The pirmary solar pump will be a variable speed pump to maintain the ideal pump speed to optimize the collection of solar energy under all sun light conditions.

Whenever there is a call for hot water, cold water will flow into the solar storage tank from the cold water lines; pick up heat from the tank, and then flow into the existing oil fired indirect hot water heater. If the thermal storage tank has been warmed sufficiently from the sun, the water heater will not need to come on at all. If the solar preheated water is not quite at the hot water setpoint, the hot water heater will add supplemental heat as needed to meet the required setpoint. In addition, since this portion of the building has a hot water recirculation line which can itself be a substantial load, Revision energy will replumb the recirc return line so it also passes through the solar tank anytime the solar tank is sufficiently warm to justify it.

Whenever the domestic hot water load has been met, the solar system will begin to supply heat to a heat exchanger on the return side of the building's low temperature heating loop (which includes the pool). This control method optimizes the solar contribution at all times, using it for domestic hot water heating when that load is available and putting the excess heat into the pool whenever possible.

Schematic Diagram of System



Construction Specifications

The collector array will be mounted on the large flat roof above the boiler room. The collectors will be elevated off the roof surface and will face south at approximately 45 degrees.
Individual panels measure approximately 4 x 10 and the array will consist of 64 panels in 8 rows of 8 panels each. Total array area will be about 2600 square feet. Solar plumbing will run down from the roof and directly into the boiler room below.
To accommodate the solar array a structural engineering analysis will need to be performed on this flat roof to ensure that it has adequate strength to support the dead load from the array (~3-5 psf) and also any possible wind and snow loads resulting the from the installation.

Above is a portion of a 24 flat plate solar hot water system recently installed by Revision Energy on the Country Inn in Camden. This system does domestic hot water, pool and hot tub heating for the Inn. The collectors used at the Country Inn are similar to those proposed for Cape Elizabeth, though obviously the Cape system will be somewhat larger and mounted on a flat roof instead of the pitched roof shown.

System Economics:

System economics depend on a variety of variables including funding source, system performance, tax status of the entity etc. Though an economic analysis of this project is beyond the scope of this preliminary study, ReVision energy would be happy to assist in whatever analysis is required.

Scope of Work

The estimated price for this job includes the following:

- All materials necessary to mount, and plumb the solar hot water system.
- All necessary disconnects and materials for a code compliant installation.
- All labor required for installation.
- One year service guarantee

Not included in the cost of this job is:

- Roof load structural engineering (if required)
- Boiler Re-piping and controls

Thank you for the opportunity to compete for your business. If this preliminary pricing and performance information is attractive and you are interested in moving forward with this project, we will be delighted to work with you to line up the applicable incentives and finalize system design and firm pricing.

We look forward to working together to reduce fossil fuel costs and CO2 emissions.

Thank you for the opportunity to submit this proposal. For background and company information, including past project references, please see www.revisionenergy.com. For questions or comments, please contact:

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