

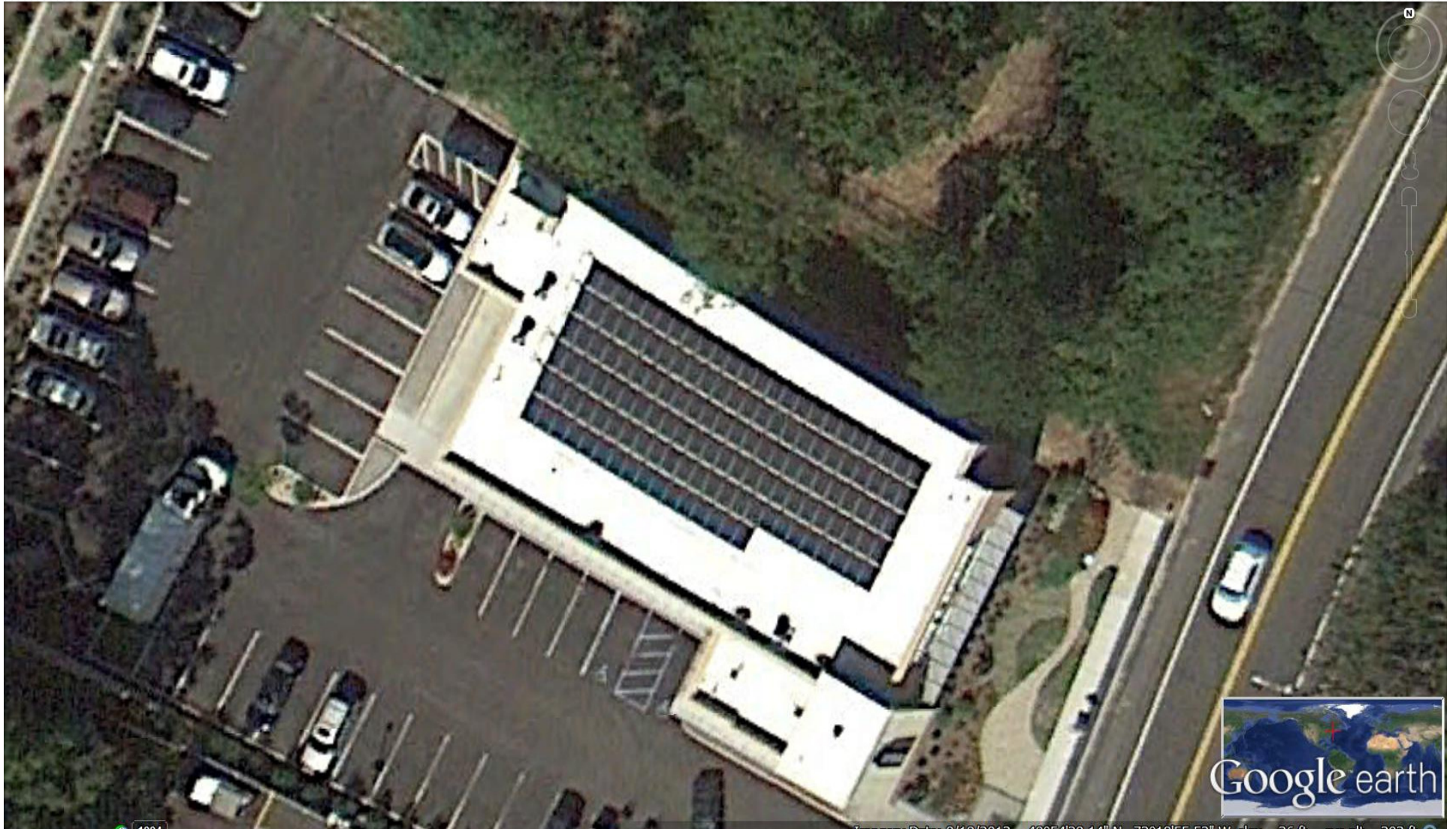
2014 Update: Solar and Geothermal Designs for Commercial Buildings

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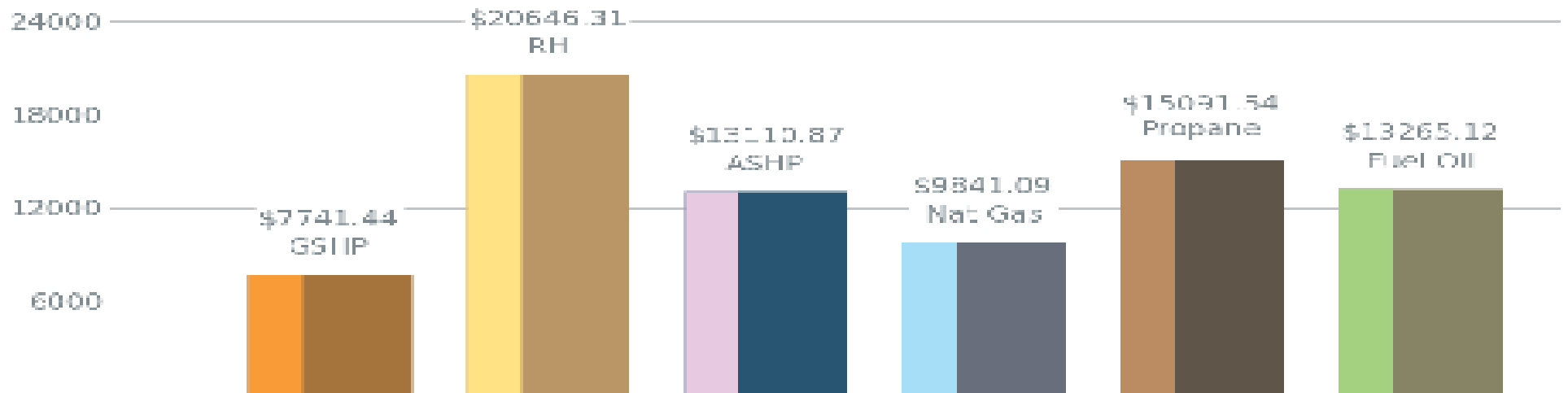
Case Study 1 – near zero energy store



Case Study 1 – Bottle Bargains

- Typically insulated building with open loop geothermal HVAC with staged, super high-efficiency heat pumps
- 42.5KW solar electricity system on new white flat roof
- Annual solar output exceeds geothermal load calculation, so there will be no PSEGLI usage associated with HVAC
- Existing (sister) store exists, with conventional systems for purposes of comparison

Case Study 1 – Geothermal Load Calculation



System Type	Heating	Cooling	Total	vs. GSHP
Ground Source Heat Pump (GSHP)	\$4,885.99	\$2,855.45	\$7,741.44	—
RH	\$17,476.85	\$3,169.46	\$20,646.31	\$12,904
ASHP	\$9,941.41	\$3,169.46	\$13,110.87	\$5,369.
Nat Gas	\$6,671.63	\$3,169.46	\$9,841.09	\$2,099.
Propane	\$11,922.08	\$3,169.46	\$15,091.54	\$7,350.
Fuel Oil	\$10,095.66	\$3,169.46	\$13,265.12	\$5,523.

Case Study 1 – Doing the crunch

- Geothermal load calc projects annual HVAC consumption of \$7,741 in power, which translates to 48,312KWh
- PV system projected output is 48,782KWh/Year
- Annual PV Output > HVAC consumption, so store is heated and cooled without buying power
- Client will have to pay for PSEGLI meter and demand charges, plus partial usage (for lights/computers/phones/displays)



Case Study 1 – Optimization

- Spray foam could have been used under roof (to improve R-Value) – nixed due to aesthetic concerns
- Solar system could have been slightly bigger – there was more available roof space. This would have helped offset consumption of lights, etc. Limited by client's budget.
- Tower on South side of building could have been eliminated or moved to North, creating more usable roof space. However, tower is part of client look & feel and needs to be on South (street side) of building

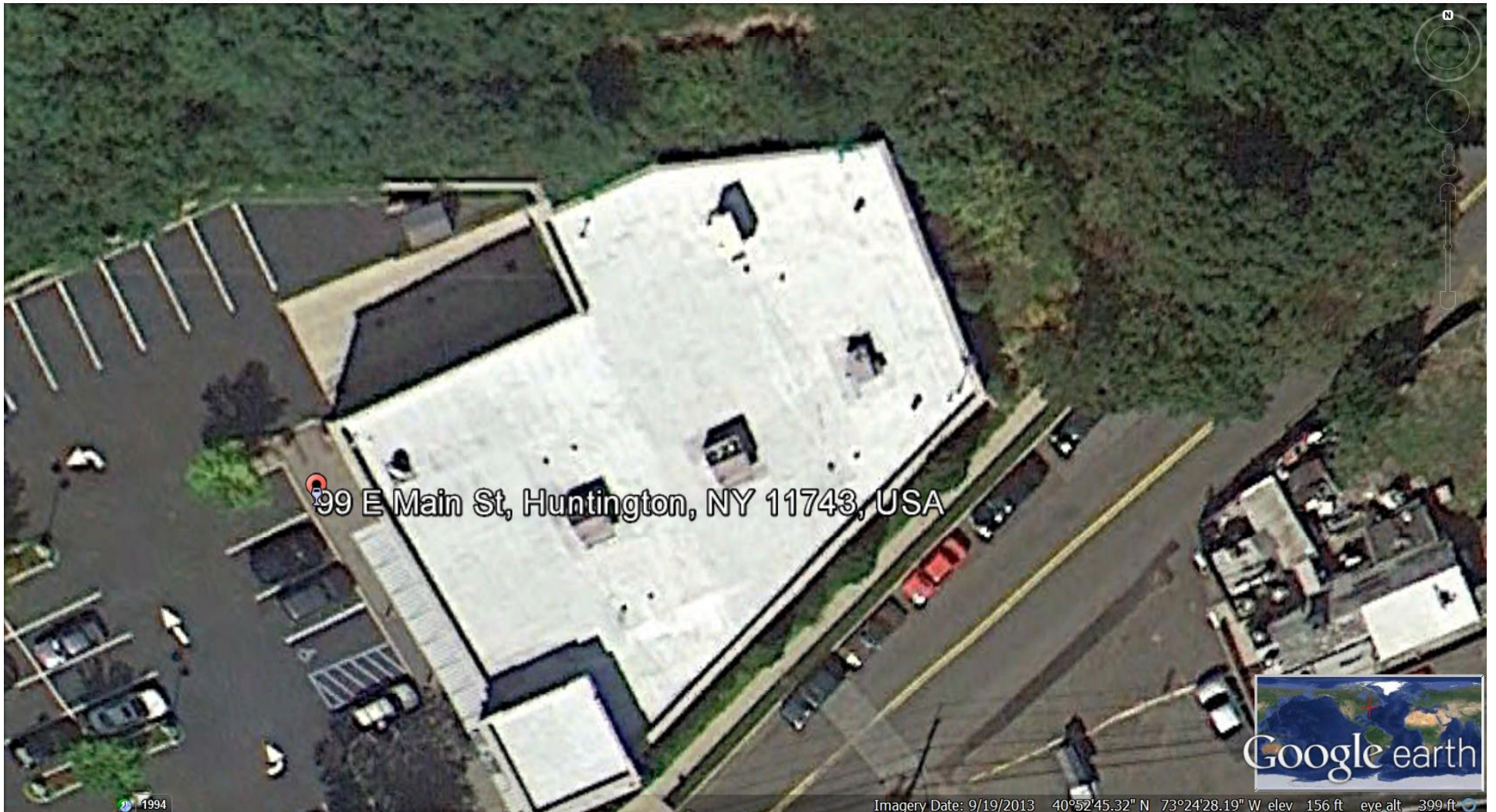
Case Study 1 – First year utility bill

FORT SALONGA - ALL ELECTRIC						
2013-2014						
Bill Date	Days in Bill	Usage kWh	Recorded Demand	Billed Demand	LIPA Bill	Usage/Day
2/25/2014	29	9,840	28	28	\$1,942.89	339.31
1/27/2014	37	11,280	31	31	\$2,166.53	304.86
12/21/2013	30	9,040	29	29	\$1,543.58	301.33
11/21/2013	28	5,760	29.5	29.5	\$1,036.07	205.71
10/24/2013	30	6,400	32	32	\$1,194.10	213.33
9/24/2013	28	5,360	32	32	\$1,262.17	191.43
8/27/2013	28	5,440	31	31	\$1,224.13	194.29
7/30/2013	39	7,920	32	32	\$1,716.68	203.08
6/21/2013	28	4,000	29.5	29.5	\$933.62	142.86
5/24/2013	30	3,040	27	27	\$734.45	101.33
4/24/2013	30	3,040	26.5	26.5	\$745.92	101.33
3/25/2013	26	6,080	29	29	\$1,247.22	233.85
Total	363	77,200			\$ 15,747	213

Case Study 1 conventional sister utility bills

ELECTRICITY ONLY			Demand months	ratchet in BOLD		
2013-2014						
Bill Date	Days in Bill	Usage kWh	Recorded Demand	Billed Demand	LIPA Bill	Usage/ Day
2/3/2014	27	8,960	32	46.5	\$1,894.77	331.85
1/7/2014	39	13,040	45	46.5	\$2,495.72	334.36
11/29/2013	25	9,360	40	46.5	\$1,612.17	374.4
11/4/2013	34	14,960	55	55	\$2,467.12	440
10/1/2013	27	13,760	62.5	62.5	\$2,933.88	509.63
9/4/2013	34	18,800	59	59	\$3,788.48	552.94
8/1/2013	27	17,040	66.5	66.5	\$3,276.77	631.11
7/5/2013	32	17,280	65	65	\$3,435.63	540
6/3/2013	31	14,400	57	57	\$2,643.91	464.52
5/3/2013	34	12,880	40	46	\$2,378.45	378.82
3/30/2013	25	9,680	38.5	46	\$1,951.50	387.2
3/5/2013	32	11,920	36	46	\$2,245.65	372.5
Electricity	367	162,080			\$ 31,124	442
Natural Gas					\$ 2,028	
		Total: Electricity & Natural Gas			\$ 33,152	
		Near zero energy store:			\$ 15,747	
		Annual Savings on utilities			\$ 17,405	

Case Study 1 – sister store aerial view



99 E Main St, Huntington, NY 11743, USA



Imagery Date: 9/19/2013 40°52'45.32" N 73°24'28.19" W elev 156 ft eye alt 399 ft

1994



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