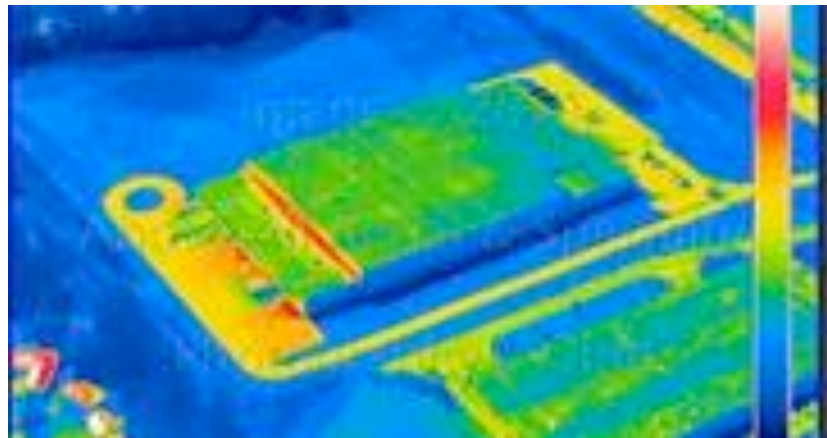


Town of Nantucket: Efforts to Reduce Municipal Energy Consumption



Presented by Lauren Sinatra, Energy Coordinator
Civic League “Energy Matters” Public Forum
January, 28 2013

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Overview:

Town of Nantucket Energy Baseline

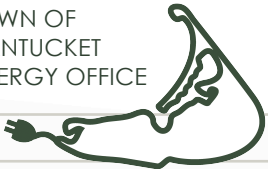
In fiscal-year 2012 (October 1, 2011- September 30, 2012):

- Town of Nantucket spent over \$1.8 million on electricity used by municipal buildings and facilities
 - **12,000 MWh** of electricity at 77 metered electric accounts
- The 100-kw wind turbine at Nantucket High School generated **194 MWh** of electricity
- The remaining **11,800 MWh** of electricity was imported via two underground cables that connect the New England regional electric grid on Cape Cod with National Grid's Candle Street Substation

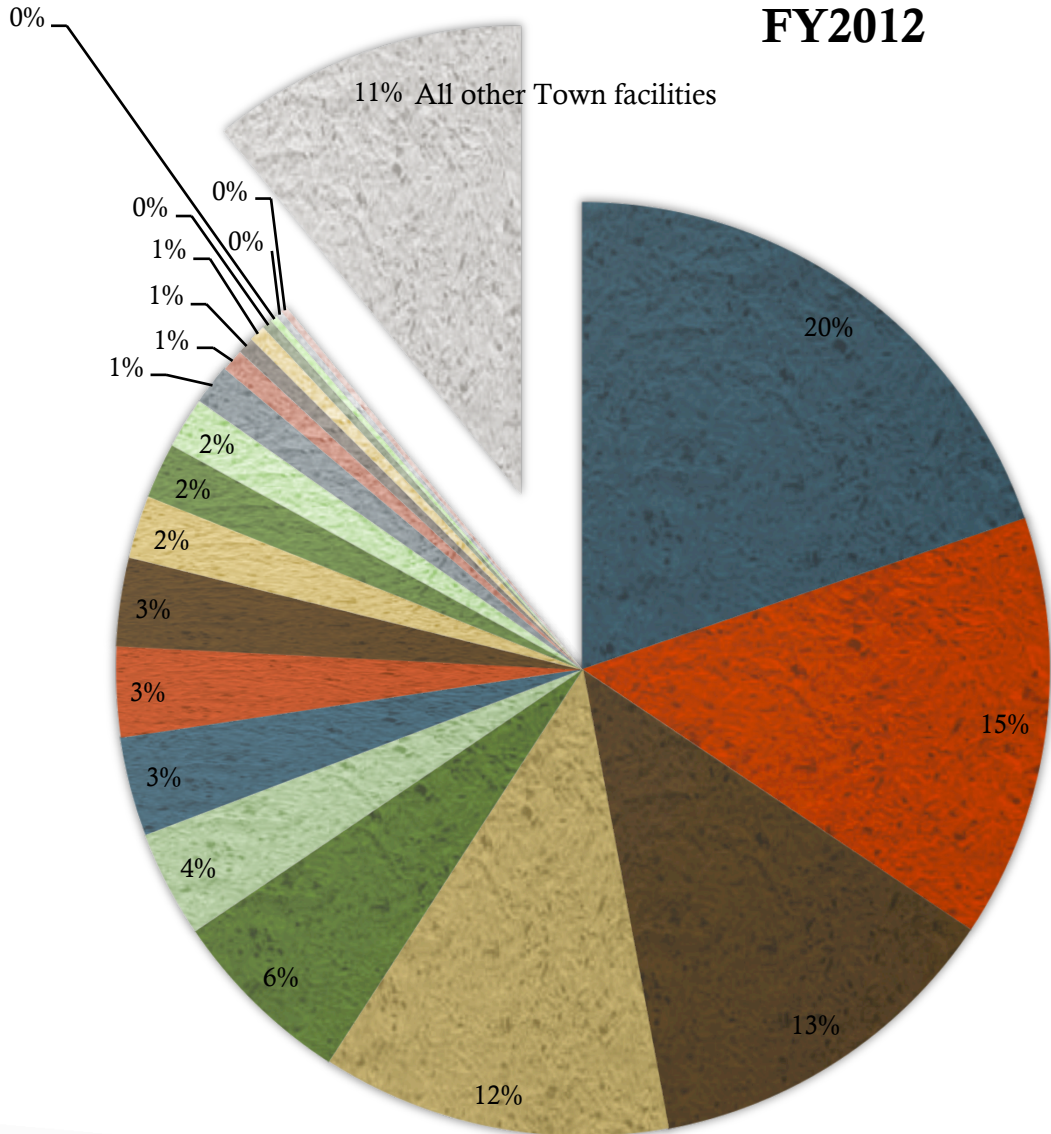


Efforts to Reduce Municipal Facility Energy Consumption

- Using data, Energy Office compiled a ranked list of the Town's "Top 20" electricity consuming facilities, which account for 89.1% of ALL electricity used by the Town.
- Strategy: Focus on Town's "Top 20" to identify & implement energy cost saving measures with rapid paybacks
- <http://www.ackenergy.org/Top20Facilities.html>



Town of Nantucket Electric Consumption per Facility FY2012



- #1: Surfside Wastewater Treatment Plant
- #2: Landfill Composter Building
- #3: Nantucket High School
- #4: Nantucket Memorial Airport (Terminal)
- #5 Public Safety Facility - 4 Fairgrounds Road
- #6 Nantucket Elementary School
- #7 Our Island Home, 142 Orange St
- #8 Airport "Rescue & Fire Building"
- #9 Siasconset Wastewater Treatment Plant
- #10 Wannacomet Water Co. (Plant)
- #11 Materials Recycling Facility (Landfill)
- #12 Planning & Land Use - 2 Fairgrounds Road
- #13 Nantucket Town Building, 16 Broad St
- #14 DPW Compound, 188 Madaket Rd
- #15 Nantucket Memorial Airport, 30 Macy's Ln FAA
- #16 Nantucket Fire Dept, 135 Pleasant St
- #17 Town of Nantucket, 37 Washington St
- #18 NRTA • Nantucket Regional Transit Authority; 11 Bunker Rd
- #19 LORAN BLDG, 56 Low Beach Rd
- #20 Saltmarsh Senior Center, 81 Washington
- All Other Town Facilities

“Top 10”

FACILITY	kWh FY 2012	% OF TOTAL
#1: Surfside Wastewater Treatment Plant	2368800	19.8%
#2: Landfill Composter Building	1753800	14.6%
#3: Nantucket High School	1517778	12.7%
#4: Nantucket Memorial Airport (Terminal)	1445760	12.1%
#5 Public Safety Facility - 4 Fairgrounds Road	767600	6.4%
#6 Nantucket Elementary School	443520	3.7%
#7 Our Island Home, 142 Orange St	414160	3.5%
#8 Airport "Rescue & Fire Building"	372480	3.1%
#9 Siasconset Wastewater Treatment Plant	365040	3.0%
#10 Wannacomet Water Co. (Plant)	261241	2.2%

65.6%

81.1%

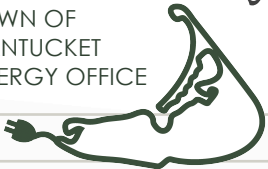
Top 11-20

FACILITY	kWh FY 2012	% OF TOTAL
#11 Materials Recycling Facility (Landfill)	231280	1.9%
#12 Planning & Land Use - 2 Fairgrounds Road	211520	1.8%
#13 Nantucket Town Building, 16 Broad St	167040	1.4%
#14 DPW Compound ,188 Madaket Rd	92400	0.8%
#15 Nantucket Memorial Airport,30 Macy's Ln FAA	70365	0.59%
#16 Nantucket Fire Dept, 135 Pleasant 8t	69557	0.58%
#17 Town of Nantucket, 37 Washington St	42360	0.35%
#18 NRTA· Nantucket Regional Transit Authority; 11 Bunker Rd	28953	0.24%
#19 LORAN BLDG, 56 Low Beach Rd	28336	0.24%
#20 Saltmarsh Senior Center, 81 Washington	27058	0.23%
All Other Town Facilities	1299649	10.90%
TOTAL:	11,978,697kWh	100%

Mass Save: Utility-sponsored Rebates & Incentives

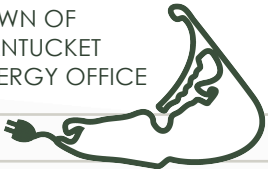
“No-Cost” Energy Efficiency Assessments

1. Lighting & Lighting Control Upgrades:
 - Up to 70% incentive utility, rapid paybacks
 - **Direct Install Program** (<300 kW of demand)
 - No upfront costs, costs financed on monthly electric bill
 - 24-month, 0% interest financing plan → cash net-positive
 - Energy Savings essentially pay for upgrade costs
2. “Non-Lighting” Energy Efficiency Opportunities:
 - HVAC equipment and controls, refrigeration systems, variable speed drive motors, geothermal system operations



Targeting the “Top 20”: Status

- Energy efficiency audits, scoping studies or post-commissioning studies have been coordinated for each of the “Top 10” and for several within “Top 20”
- Lighting upgrade projects in progress:
 - Composter (Installation completed in December)
 - Nantucket Memorial Airport Terminal (February Installation)
 - Saltmarsh Senior Center (February Installation)



Case-Study: Nantucket Memorial Airport

NORTHERN ENERGY SERVICES

CUSTOMER NAME: NANTUCKET AIRPORT

Lighting Systems Recommendations Summary

<u>EXISTING SYSTEM</u>		<u>PROPOSED SYSTEM</u>	
CONNECTED LOAD (WATTS):	71254	CONNECTED LOAD (WATTS):	39748
ANNUAL KWH USAGE:	295956	ANNUAL KWH USAGE:	134122
ANNUAL LIGHTING COST:	\$44,393.39	ANNUAL LIGHTING COST:	\$20,118.35
ENERGY COST (\$/KWH):	\$0.150		
<u>ESTIMATED (KWH) REDUCTION PER YEAR:</u>		<u>161,834</u>	
<u>ANNUAL COST REDUCTION:</u>		<u>54.68%</u>	
<u>TOTAL ESTIMATED SAVINGS/YR*:</u>		<u>\$24,275.04</u>	
<u>TOTAL PROJECT COST**:</u>		<u>\$68,109.21</u>	
<u>UTILITY'S INCENTIVE:</u>		<u>\$40,458.50</u>	
<u>COST AFTER INCENTIVE:</u>		<u>\$27,650.71</u>	
<u>ESTIMATED PAYBACK (YR):</u>		<u>1.14</u>	
<u>ESTIMATED CARBON FOOTPRINT REDUCTION :</u>		<u>225272.3712</u>	<u>CO2 LBS/YR</u>

** TOTAL PROJECT COST INCLUDES LABOR AND MATERIALS.

* ESTIMATED SAVINGS PER YEAR ARE BASED ON THE CURRENT HOURS OF OPERATION AND CURRENT RATE (\$/KWH).

nationalgrid
Energy Initiative Program

- National Grid pays 60% total cost. Airport finances 40% balance for 0% over 24-months
- Airport's electric bill will be charged \$1152.11 more per month to finance lighting upgrades, but their bill will decrease by \$2,022.92 per month.
- Average energy savings of **\$870.81 per month, or \$10,449.72 per year.**

After 24-month period, Airport reaps all the energy savings

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Case-Study: Saltmarsh Senior Center

	Estimated Annual Savings (Energy)
Electric (kWh)	13,100.69
Gas (Therms)	0.00

	Estimated Annual Savings (Dollars)
Electric	\$1,456.80
Gas	\$0.00
Total	\$1,456.80

You pay only 30% of the installation cost - National Grid pays the rest.

	Estimated Job Cost	Prevailing Wage	Lift Charge	Estimated National Grid Contribution @ 70%	Estimated Customer Contribution @ 30%
Electric	\$3,802.12	--	--	\$2,661.48	\$1,140.64
Gas	\$0.00	--	--		\$0.00

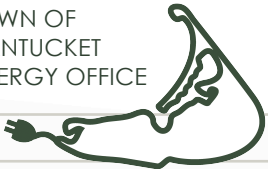
Payback Period in Months
9

Under Direct Install Plan (24-month 0% interest financing):

- National Grid pays 70% of total cost, Elder Affairs finances 30% balance
- Elder Affairs will be charged an extra \$47.50 more per month to finance lighting upgrades, but their bill will decrease on average by \$121.40 per month.
- Average energy savings of **\$74.00 per month/\$887.00 per year**. After 24-month, all savings will benefit Saltmarsh Center (\$1,456.80/year).

High Efficiency LED Replacement Bulb Program

- The Town of Nantucket is participating in the “**Leading By Example Program: LED Replacement Bulb Project**”—a program made possible through the DOER, in cooperation with National Grid and Phillips Lighting.
- This program provides Town offices and departments with **FREE LED** light bulbs to **REPLACE** all existing incandescent and CFLs
- These LED bulbs are mercury free and highly efficient. Also highly priced at \$50-100/bulb.
- **Energy Office Goal:** Submit order for at least 300 LED bulbs (\$15,000 value), which will result in further energy cost savings for the Town.



Other Efforts: LED Replacement Bulb Project

Switch from:



Standard 60W Incandescent



Standard 65W BR30
Incandescent reflector



Standard 75W PAR38
halogen reflector



Standard 32W T8 linear
fluorescent



To Save:



10W A-Lamp LED
Save \$33 per year



13W BR 30 LED
Save \$34 per lamp/ per year



17W PAR38 LED
Save \$38 per lamp/ per year



Energy Advantage 28W T8
linear fluorescent
Save \$2.63 per lamp/ per year



Nantucket High School 100kW Wind Turbine: Overview of Energy and Income generated

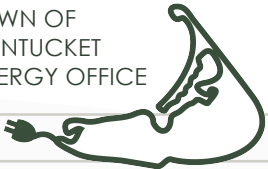


Nantucket High School Wind Turbine: Overview

- Proposed in 2008
- Installed in 2010 for approximately \$600,000
 - Funded through collaboration efforts: Students for Sustainability, MassCEC (Massachusetts Clean Energy Center – formally MRET), National Grid and the Schmidt Family Foundation.
 - Other Nantucket residents and businesses also provided project support
- Purpose: To provide Nantucket High School with renewable energy *and* educational value.
- In operation since October 2010, and generating REC Sales since October 2011 through the Nantucket Energy Office
- “The 156-foot turbine is expected to generate more than 10 percent of the high school's electric demand, which equals around \$30,000 in annual savings.” [PR Newswire \(http://s.tt/1xMDC\)](http://s.tt/1xMDC)

Nantucket High School Wind Turbine: Overview of Metrics

- Total Energy generated to date: > 438,200kWh
- Monitored by going on the wind turbine website:
<http://northernpower.kiosk-view.com/nantucket>
- Environmental Benefits: 832 lbs NO_x, 2103lbs CO₂ avoided since installation
- In FY2012, Turbine produced 13.1% of the schools electricity and generated **\$33,236.39 in energy-savings**



Quantifying Savings

To quantify savings, we look at:

1. Savings from avoided National Grid electricity charges

- For supply charges (Constellation)
- Delivery charges for distribution, transition and transmission services, the energy conservation and renewables charges, etc.

2. Proceeds of the sales of Renewable Energy Credits (RECs):

- “Tradable, non-tangible energy commodities in the United States that represent proof that 1 megawatt hour (MWh) of electricity was generated from an eligible renewable source.
- When the green energy is fed into the electrical grid (by mandate), the accompanying RECs can then be sold on the open market.”



Wind Turbine Generated Savings: In Electricity Costs (Oct 2011-Dec 2012)

Based on the **249,000 kWh** generated from the start of October-2011 to the end of December-2012, the turbine saved the school: **\$25,803.72** in avoided electric charges

From National Grid bill:

- (Constellation) Supply charges: $249,000 \times .0681 \text{ kWh} = \mathbf{\$13,143.30}$
- Delivery charges: (see below) = **\$12,660.42**
 - Distribution Charge: (avg. of offpeak & peak rates):
 - $\$0.008705/\text{kWh} \times 249,000 = \mathbf{\$2165.07}$
 - Transition Charge: $\$0.00067/\text{kWh} \times 249,000 = \mathbf{\$166.83}$
 - Transmission Charge : $\$0.01411/\text{kWh} \times 249,000 = \mathbf{\$3,513.39}$
 - Energy Efficiency Chg: $\$0.0066/\text{kWh} \times 249,000 = \mathbf{\$1643.40}$
 - Renewable Energy Chg: $\$0.0005/\text{kWh} \times 249,000 = \mathbf{\$124.50}$
 - Cable Facility Surcharge: $\$0.02027/\text{kWh} \times 249,000 = \mathbf{\$5,047.23}$



Wind Turbine Generated Savings: REC Sales (Oct 2011-Dec 2012)

Nantucket Public School Wind Turbine: Generating Unit # 34019

Energy Production and Basis for REC calculations

Data taken from the Northern Power SmartView system

for readings from the meter at the base of the wind turbine (net of internal losses)

Meter is an ABB TypeA1D, Reg Type D, S/N 01-167-800, FM 165 watt-hour meter, CL200 (120v to 480v, 60Hz)

REC data

	RECs	MWh	Month end Meter	Month start Meter	Total for Quarter	Buyer	Price	Amount
Oct-11	17	17	189,367	172,201				
Nov-11	22	22	211,605	189,367				
Dec-11	22	22	233,237	211,605	61	Nat Grid	\$56	\$ 3,416.00
Jan-12	22	22	255,321	233,237				
Feb-12	19	19	273,888	255,321				
Mar-12	21	21	295,076	273,888	62	Nat Grid	\$52	\$ 3,224.00
Apr-12	15	15	310,042	295,076				
May-12	13	13	322,693	310,042				
Jun-12	13	13	336,002	322,693	41	Nat Grid	\$52	\$ 2,132.00
Jul-12	9	9	345,152	336,002				
Aug-12	8	8	352,993	345,152				
Sep-12	12	12	365,225	352,993	29	Nat Grid	\$52	\$ 1,508.00
Oct-12	15	15	380,238	365,225				
Nov-12	20	20	400,241	380,238				
Dec-12	21	21	421,397	400,241	56	Nat Grid	\$52	\$2,912.00
Jan-13								

REC SALES TOTAL= \$13,192.00

Wind Turbine Generated Savings: (Oct 2011-Dec 2012)

- Savings on the National Grid bill: **\$25,803.72**
- Proceeds from the sales of RECs: **\$13,192.00**

Actual Savings Total: \$38,995.72

- **\$2,600.00 a month**
 - **\$85.33/day**