

# Town Of Rye

# 2012/2013 Municipal Energy Report

By Michele Sopher Co-chair, Rye Energy Committee September 26, 2013





Town of

# **Rye, New Hampshire**

# **Rye Energy Committee**

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The Rye Energy Committee normally meets on the first Tuesday of the month at 6:30 p.m. in the Rye Public Library. View our website at:

http://www.town.rye.nh.us/Pages/RyeNH\_BComm/Energy/index

The Rye Energy Committee wishes to express their appreciation to all town staff and commissioners who provided the data for this report, with special thanks to Dennis McCarthy for his meticulous record keeping. We are also grateful for the continued support of Town Administrator Mike Magnant.

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## **INTRODUCTION**

#### **Purpose of Report**

In April 2013, the Rye Board of Selectmen renewed the charge of the Rye Energy Committee (REC) for three years. The REC, originally formed in 2007, generally works in three areas: Home Energy, Municipal Energy, and Local Food. Our charge from the Selectmen includes assessing municipal energy use and making recommendations. This report represents the REC's continuing effort to benchmark and track energy use of all municipal operations.

Aside from this report, the Energy Committee accomplished several significant tasks in the Municipal Energy area in 2012 and 2013. Working with the Rockingham Planning Commission and the Rye Long Range Planning Committee, the REC developed the first Energy Chapter for the next version of the Rye Master Plan. The REC also cooperated with the Capital Improvements Committee to educate them on how energy projects can be combined with capital improvements, opening access to rebates and low-interest loans and insuring lower operating costs. Currently, the REC is represented on the Town Hall Committee, which is overseeing the historic building's renovation and expansion, in an energy advisory role.

Included in this document are an inventory and analysis of the energy use and greenhouse gas emissions of the municipal sector of Rye for the year 2012, with energy tracking of Rye's seven largest buildings into the summer months of 2013. The purpose of this report is to:

- assess current energy use,
- track energy reduction progress,
- assist in prioritizing future energy-saving projects.

This report does not address residential, commercial, or industrial energy use.

#### **Report Background**

#### **Tools Used**

The inventory is based on data gathered by the REC with the assistance of municipal staff. Data comes from monthly electricity bills from Public Service of New Hampshire (PSNH), from bills for each building's heating fuel deliveries, and from the vehicle fuel use of the municipal fleets. This data was analyzed using three software and online tools, as below.

Software/Online Tool	Developed by	Results
Small Town Carbon	Clean Air-Cool Planet	Total energy use, costs, and greenhouse
Calculator (STOCC)	& Univ. of New	gas emissions for all buildings, vehicles,
	Hampshire	and streetlights for one year (2012).
Portfolio Manager	EPA	Energy benchmarking and tracking over
		multiple years for buildings and
		operations only
Excel	Microsoft	Other trend graphs and pie charts

The STOCC calculator contains an inventory of every municipal energy use in Rye. It provides an overall energy snapshot for one year only, in this case the calendar year 2012. It divides Rye's energy use, cost and carbon emissions into three main municipal sectors: Buildings, Vehicles, and Streetlights.

All kilowatt-hours of electricity and gallons of oil, propane, gasoline, and diesel are converted to a common unit of energy, MMBtu (million British Thermal Units), for direct comparison.

Rye's account in EPA Portfolio Manager (PM), on the other hand, tracks energy use of buildings over several years. However, our PM account currently only tracks the energy use of the seven largest energy-consuming buildings in town, which in 2012 accounted for 72% of Rye's energy use and 55% of Rye's energy cost.

#### **Data Sources**

The main body of this report analyzes the energy use from six Rye budgets: Rye Municipal, Rye Beach Precinct, Jenness Beach Precinct, Rye School District, Rye Water District, and Rye Sewer District. Appendix B contains the results of the STOCC software for only Rye Municipal energy useage for use by the Selectmen, who oversee the Rye Municipal budget.

The overall energy analysis for the entire municipal sector (all six budget areas) is important in that all budget areas may mutually benefit from working together should they decide to move forward on energy efficiency or conservation projects. Such cooperation occurred this year when the Selectmen approved the Rye Water District request to purchase their gasoline and diesel from the Transfer Station, a recommendation from the 2011 Rye Energy Report.

Table 1 outlines the categories covered by this report, the type of energy used, and the board or commission responsible for each area.

C. A.			
Category	Type of Energy Used	Overseen by	Data From
Rye Municipal Energy	8 buildings* using	Board of Selectmen	Dennis McCarthy
Usage	electricity and heating		(electricity and fuel
C	oil or propane;		use, vehicles,
	gasoline and diesel		outdoor lights):
	vehicles: area lights: 9		Cyndi Gillespie (fuel
	streetlights		records): Andy
	streetingints		Dishmond (Due
			Public Library)
Rye Beach Precinct	Electricity and heating	Rye Beach Precinct	Tyson Dines,
	oil for Precinct Office,	Board	treasurer
	3 streetlights, 68 post		
	lights lining streets		
Jenness Beach Precinct	69 streetlights	Jenness Beach	Deb Crapo
		District Board	
Rye Water District	Electricity and propane	Rye Water District	Ralph Hickson
	for office, 3 gasoline	Commission	
	trucks, electricity for		
	area lights and		
	pumping water		
Rve Sewer District	Propane for pump	Rve Sewer	Lee Arthur
	houses electricity for	Commission	
	numping	Commission	
Dere Elementeren 11	Floot visites hooting '1	Deve Calca al	L'un Kathin Daai
Kye Elementary and Jr.	Electricity, heating oil,	Kye School	Jim Katkin, Business
High Schools	and propane	Board/SAU50	Administrator

Table 1: Rye Municipal, Precinct and District Categories and the Type of Energy Used

\*The eight buildings in the Rye Municipal category included in this report are the Town Hall, the Public Safety Building, the Public Works Garage, the Recycling Center, the Swap Shop, the Recreation Complex, the Soccer Snack Shack, and the Rye Public Library.

Collecting, verifying, entering, and analyzing the data for this annual report is very timeconsuming. In 2014, the REC hopes to develop a data collection process for each budget area to track its own energy data. The REC will then train town personnel to use this process and/or enter data directly into Portfolio Manager.

#### **Energy Projects Completed to Date**

The seven buildings with the highest energy use underwent energy audits in 2008-2011, as shown below. Electronic copies of these audits are available on the REC page of the town website.

Date	Building	Audit Level	Performed by	Minimum Potential Savings
2008	Rye Elementary and Rye Jr. High Schools	Comprehensive	Jordan Institute, Inc.	55%
2009	Rye Public Library	Comprehensive	Tim Nichols (anix)	61%
2009	Public Works	Comprehensive	Tim Nichols (anix)	28%
2009	Rye Recreation	Comprehensive	Tim Nichols (anix)	16%
2009	Town Hall	Comprehensive	Tim Nichols (anix)	31%
2011	Town Hall	Level 3 –	Lakes Region Thermal	53%
	(weatherization)	Detailed Analysis	Scan	(fuel)
2011	Public Safety	Level 1 -	Sustainable Development	30%
	Complex	Preliminary	& Energy Systems (SDES)	

Table 2: Energy Audits Performed on Rye Municipal Buildings

Completion of the earlier audits put Rye in a favorable position when the Energy Efficiency and Community Block Grants (EECBG) became available in 2009. Rye was awarded a total of \$399,561 for five energy reduction projects, more than any other town in NH, which eventually transformed into the four projects shown in Table 3. These projects were all completed as of June 2012.

Table 3: Energy Efficiency and Community Block Grant (EECBG) Projects

Building	Project Description	Funds Awarded	Completion Date
Town Hall	Installation of a ground source heat	\$160,052	June 2012
	pump system for heating & cooling		
Town Hall	Installation of photovoltaic-powered	\$4,649	June 2012
	attic ventilation fans		
Public Library	Upgrade attic insulation	\$67,208	February 2012
Elementary	New oil boiler and controls	\$167,652	June 2010
School			

In addition to the EECBG projects, the town completed several other efficiency projects. Rye Elementary and Rye Jr. High received lighting upgrades and envelope improvements (air sealing and insulation). Town Hall projects included efficient lighting, ceiling insulation in the Recreation wing, and a more efficient refrigerator. Several town buildings completed lighting upgrades from T-12 to T-8 fluorescent lighting through PSNH's Smart Start program, a paywith-your-savings program, as shown in Table 4. All of these contracts were paid off as of June 2013.

		8 8 18
Building	Monthly Cost	Final Payment Made
Public Library	\$71.87	Final month unknown
Town Hall	\$95.57	Feb. 2012
Recreation	\$35.85	Oct. 2012
DPW	\$59.36	June 2013
Swap Shop	\$10.01	Oct. 2012

 Table 4: PSNH Smart Start Contracts for Energy-Efficient Lighting Upgrades

Finally, the DPW purchased a waste oil boiler to heat the formerly unheated garages to 50°F using recycled waste oil from the Recycling Center. Heating the garages lowers the heating oil requirements for the adjacent offices which share a common wall with the garages.

## **RYE 2012 ENERGY USE**

During 2012, the town's efforts to save energy really start to show payback. Energy savings are clearly evident in buildings with completed energy efficiency projects, while the energy profiles in buildings that have not had energy upgrades show flat or increasing energy use.

Tables 5 and 6 show the results from the STOCC calculator for 2012 and 2011, respectively. Annual fuel expense dropped 15% and annual energy use decreased by 25% in 2012. Some of this reduction can be accounted for by the fact that 2012 had about 9% fewer Heating Degree Days than 2011, i.e. 2011 was colder than 2012, but a significant fraction of the improvement is the direct result of the deliberate energy reduction projects.

2012 Rye Energy Summary							
	Buildi	ngs	Vehic	les	Street	lights	
	#	% of total	#	% of total	#	% of total	Grand Total
Annual Fuel	\$265,276	73%	\$74,928	21%	\$24,902	7%	\$365,106
Expense Annual CO2							
Emissions (lbs)	1,560,508	74%	495,529	23%	53,476	3%	2,109,513
Annual Energy Use (MMBtu)	7,984	71%	3,130	28%	197	2%	11,311

#### Table 5: 2012 Energy Use, Cost, and Carbon Emissions, by Municipal Sector

Table 6: 2011 Energy Use, Cost, and Carbon Emissions, by Municipal Sector

2011 Rye Energy Summary							
	Buildi	ngs	Vehic	les	Street	lights	
	#	% of total	#	% of total	#	% of total	Grand Total
Annual Fuel Expense	\$319,774	75%	\$79,849	19%	\$24,650	6%	\$424,273
Annual CO2 Emissions (lbs)	2,138,720	79%	518,881	19%	54,252	2%	2,711,853
Annual Energy Use (MMBtu)	11,557	77%	3,272	22%	200	1%	15,029









## **BUILDINGS AND OPERATIONS**

Figures 1 through 3 show that again this year, the buildings and operations in Rye account for the greatest energy use, cost, and carbon emissions, but the portions due to buildings has decreased since last year. We are making good progress, but we should continue to place high priority on making Rye's buildings more energy efficient.

Figure 4 compares the energy use of the Rye municipal buildings and operations using the STOCC calculator. We have added the Cemetery electricity, which was missed in the 2011 report, and the Goss Farm, a new energy user in town.

Rye Junior High School and Rye Elementary School, the largest buildings in town, still dominate the chart in Fig. 4. Although the schools have been quite successful in lowering their energy use over the last few years, we should keep our focus on them because they account for the largest total energy usage and cost. In 2012 approximately \$218 per student for Rye Elementary and \$339 per student for Rye Junior High went toward energy costs. These figures have dropped about 21% from 2011.



Figure 4: STOCC Comparison of Building Energy Use for 2012

EPA Portfolio Manager (PM) is an online, interactive tool that allows us to benchmark and track the energy consumption of a portfolio of buildings over a period of years. It also provides a more detailed analysis of building energy use than STOCC. Our seven buildings with the highest energy use are currently entered into PM. It is a requirement of the Energy Efficiency and Conservation Block Grants (EECBG) awarded to the town of Rye that the buildings receiving grants be tracked using PM.

While examination of Building Energy Use from Fig. 4 informs us which buildings use the most

energy in town, the Energy Intensity, a measure of energy used per square foot, gives an idea of how efficient each building is. Portfolio Manager can adjust the Energy Intensity for weather and compare it to other buildings of the same type. For example, the Library is compared to other libraries, the schools are compared to other K-12 schools, and the Town Hall is compared to other offices.



Figure 5 shows the Source Energy Intensity trend for

Rye's portfolio of seven buildings. The Source EUI for 2012 improved dramatically,

demonstrating an overall increase in the efficiency of our buildings.

Figure 6 shows the Source EUI for each of the seven buildings, normalized for the weather. This chart compares the energy intensity for the most current year to that of the baseline year, before any energy projects were completed. Source EUI is an important metric due to the fact that it accounts for the energy used in the building in addition to that used to generate and transport the fuel oil and electricity to the building. The buildings in which energy projects were done, ie. The six buildings on the left of the chart, show the most improvement (lower EUI).

Fig. 5: Rye Portfolio Source EUI, (kBtu/sq.ft.)



Fig. 6 Weather-Normalized Source Energy Intensity<sup>1</sup>

<sup>1</sup>*Source Energy Intensity* refers to the amount of energy expended per floor area based on the type of fuel used and the efficiency of that fuel type. It includes the energy required to produce and transport the electricity or fuel. For example, the electricity purchased from the grid is inefficient; the power plant has to feed in over 3 kilowatts of fuel in order to deliver 1 kilowatt of electricity to the end user. Measures to reduce source energy intensity could include changing the type of fuel used or producing energy onsite from renewable sources, such as solar, wind, geothermal or biomass systems. As a matter of fact, clean electricity produced onsite from, for example, solar panels, can save more than 3 times as much fuel from being used at the power plant, along with the associated carbon, sulfur, and mercury emissions.

*Site* Energy Intensity, on the other hand, accounts only for the energy actually used in the building for each square foot of space. A look at Site Energy Intensity can reveal which of our buildings are most and least efficient. By comparing this metric from the most recent year to that of the baseline year, we can see which buildings have reduced their energy use. A look at the blue bars in Fig. 7 show that the Town Hall, the schools, and the Public Library were our least efficient buildings (highest EUI) when we first started keeping track of their energy use in the baseline year, before any energy projects were done. If we now look at the red bars, the most current year's EUI, we can see that the Town Hall, the schools, and the Public Library have all become much more efficient (lower EUI). Now the Public Safety Building is our least efficient building. Although these buildings have different functions, we can still use this comparison of Site EUI for prioritizing energy projects.

Fig. 7 Weather-Normalized Site EUI<sup>2</sup>



<sup>2</sup>Site Energy Intensity is the amount of energy expended to heat, cool, and electrify the floor area of a building – it uses the gallons of oil and the kilowatt-hours of electricity shown on the monthly bills. This measurement fluctuates directly with how much energy is being used, such as how thermostats are set, how much lighting is used, and how well-insulated and sealed the building is. Site Energy Intensity can be lowered through actions such as lowering a thermostat at night or through motion-sensor lighting.

What caused the four buildings on the left of Fig. 7 to become so much more efficient? If you recall from the Introduction, three of these buildings were recipients of EECBG grants. The Town Hall installed a ground-source heat pump and a solar-powered attic fan, Rye Elementary installed a more efficient boiler and controls, and the Library upgraded its attic insulation. The schools also performed building envelope improvements and lighting upgrades. The Town Hall and Library also installed more efficient lighting, appliances, and copy machines. These four buildings have stayed focused on reducing energy use.

Although the Public Safety Complex is our newest building, it has now become our least efficient building, along with being one of the highest energy users in town. Public Works and Recreation have seen some improvement in their energy efficiency due to converting to more efficient lighting and installation of a waste oil boiler for the DPW garages. Public Works remains one of most efficient buildings overall, i.e. it has the lowest EUI.

PM provides several metrics for comparing building energy consumptions, presented in Table 7, ranked by Total Energy Use.

Building	Total	Energy	Current	Source	% Better	Current	Cost per
Name	Energy	Cost	Source	EUI %	than	Energy	sq. ft %
	Use		Energy	Better	National	Cost per	Better
	(kBtu)		Use	Than	Median	Square	Than
			Intensity <sup>3</sup>	<b>2011<sup>5</sup></b>	Source	Foot	<b>2011<sup>5</sup></b>
			(kBtu/sqft)		EUI <sup>4</sup>		
Rye	2,557,092	\$74,997	91.6	17%	31%	\$1.49	12%
Elementary							
Rye Jr.	3,348,275	\$52,298	92.3	14%	28%	\$0.97	43%
High							
Public	1,384,959	\$40,208	125.8	3%	19%	\$2.03	-9%
Safety							
Rye Public	361,133	\$14,813	64.6	37%	73%	\$1.19	25%
Library							
Town Hall	209,450	\$8,168	92.1	18%	24%	\$1.35	28%
Public	185,737	\$5,701	49	38%	51%	\$0.86	35%
Works							
Recreation	95,538	\$3,330	65.4	6%	32%	\$1.54	13%

 Table 7: Building Energy Performance Comparison

Energy Performance Measurement Definitions:

3. Source Energy Intensity – amount of energy expended per square foot based on the type of fuel used and the efficiency of that fuel type.

4. % Better than National Median Source EUI – difference from the national median source energy intensity for that particular building type, eg. the library is compared to other libraries, Town Hall to other offices.

5. Source EUI % Better Than 2011 and Cost per sq. ft. % Better Than 2011 – negative is worse than 2011.

Like last year, our seven largest buildings all are more efficient than the national median for their particular building type, probably because we use less electricity for air conditioning than most of the country, and electricity generation is inefficient. When considering cost per square foot, once again the Public Safety Complex is the least efficient building.

Aside from the schools, which use the most total energy, the Public Safety Complex should be the next priority for energy projects due to the facts that it is the least efficient, it has a high total energy use, and its energy costs are increasing.

The energy audits recommend lighting upgrades and controls, HVAC system upgrades and controls, and building envelope improvements to achieve significant energy usage reductions. These actions are first steps to improve the efficiency of buildings, and the potential savings can be quite high, as evident in the charts above. The next step in energy efficiency would be to install some type of renewable energy onsite, such as solar electric panels, a solar thermal system, a biomass system or a geothermal system. Renewable energy systems have high initial costs, but these costs can sometimes be offset by grants or by savings realized through first-step actions such as those recommended in the audits. Every unit of energy produced at the building

where it is used has more than a threefold value<sup>7</sup> for source energy savings at the power plant due to the significant inefficiencies in centralized generation, transmission, and distribution of electricity.

#### **Energy Costs**

A look at how energy costs have changed for each of the seven PM buildings is shown in Fig. 8. For example, the School District spent \$16,106 less on energy for Rye Elementary during the 2012-2013 school year than it did during the 2004-2005 school year. We can clearly see that we have saved a significant amount of money where we have done energy efficiency projects – at the schools, the Town Hall, and the Public Library. This is especially remarkable considering that energy prices have gone up since the baseline years.



#### Fig. 8: Annual Energy Cost Change from Baseline Year\*

<sup>\*</sup>Baseline year is in parentheses.

To fully understand the impact of these energy savings, Fig. 9 shows that during the 2012-2013 heating season, Rye avoided paying \$97,580 for heating oil, the extra amount we would have paid during this period if we were still using oil at the same rate as the baseline years. Rye's 2012-2013 heating oil bills would have been more than twice as much for the six buildings in Portfolio Manager that heat with oil.

<sup>7</sup> Source Energy and Emission Factors for Energy Use in Buildings, National Renewable Energy Laboratory, June, 2007.



#### Fig. 9: 2012-2013 Avoided Cost for Heating Oil

Appendix C contains electricity and fuel oil trend charts for these six Rye buildings, plus the Recreation Complex, which heats with propane.

#### **Operations - Water Pumping**

Pumping water is energy intensive. Efficient equipment and strategies should be used to reduce operating costs. Managers of these facilities should consult the EPA's *Energy Management Guidebook for Water and Wastewater Utilities* for guidance on how to reduce energy use.

Recently, the NH Department of Environmental Services (NHDES) encouraged the Sewer District to benchmark and track their energy use with a tool such as Portfolio Manager. The Rye Energy Committee can assist the Rye Water and Sewer Districts in entering their data into Portfolio Manager to start tracking their energy performance. The NHDES Clean Water State Revolving Fund has a loan principal forgiveness program to encourage water facilities to conduct energy audits and implement energy improvements. PSNH can provide energy audits and rebates on efficient equipment.

Table 7: Rye Water/Sewer 2012 Energy Usage and Costs						
Service	Propane (gal.)	Electricity (kWh)	Total Annual Cost	% Change in Cost from 2011		
Water District electricity		158,880	\$28,562	0%		
Water District propane	996		\$2,613	-5.7% (for heat)		
Water District Fuel Oil	406		\$1,405	See above		
WATER TOTAL ENERGY COST			\$32,580			
Sewer District electricity		46,990	\$7000	-16%		
Sewer District propane	420		\$1560	-36%		
SEWER TOTAL ENERGY COST			\$8560			

The Water and Sewer Districts used energy in 2012 as shown in Table 7.

### VEHICLES

The municipal fleet accounted for 28% of energy use in town in 2012. Figure 10 shows the gasoline and diesel vehicle costs by department. As expected, the Public Works and the Police vehicles have the highest fuel costs, with the Rye Water District also spending a significant amount for gasoline for its trucks.



Figure 10: 2012 Rye Municipal Vehicles Energy Cost by Department

Table 8 details the vehicle fuel usage and cost by department. In total, Rye used about 4% more gasoline and about 13% less diesel than in 2011. Total vehicle fuel cost was about 6% less than in 2011.

Department	Gasoline	Gasoline	Diesel	Diesel	Annual
	(gal.)	Change from	(gal.)	Change	Cost
		2011		from 2011	
Police - gas	9161.6	3.9%			\$26,981
Public Works - gasoline	1095.6	95.9%			\$3,227
Public Works - diesel					
			5888.3	-33.2%	\$20,038
Fire - gasoline	815.2	-3.8%			\$2,401
Fire - diesel			893.7	-1.9%	\$3,041
Ambulance - diesel			1206	-1.1%	\$4,104
Cemetery - gas	404.4	-2.8%			\$1,191
Beach - diesel			61.7	-46.7%	\$210
Transfer Center - diesel			1482.4	1890%	\$5,045
Miscellaneous - gas	253.2	31.7%			\$746
Water District - gas	2617	-11.5%			\$7,719
Public Safety Generator			66	N/A	\$226
Totals	14347		9598		\$74,928

Table 8:	2012 Municipal	<b>Vehicle Fuel</b>	<b>Use and Cost</b>
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Appendix F contains the NH State Policy for Clean Fleets. Rye may want to consider adopting a similar policy for its municipal fleet. Vehicles using alternative fuels, such as natural gas, hydrogen fuel cell, and propane, are expected to become more available in the next few years, including trucks and heavy duty equipment. Vehicle purchasers may want to view the NHDES's Resource webpage on Alternative Fuels/Advanced Technology Vehicles to keep up to date on what is available (http://des.nh.gov/organization/divisions/air/tsb/tps/msp/afatvp/).

## STREETLIGHTS

All Rye outdoor lighting is represented within the Streetlight Category in the STOCC software, including streetlights, post lights, area and parking lot lights, and pedestrian flashers at crosswalks. In 2012 Rye spent \$24,902 on outdoor lighting, about \$250 more than in 2011. The REC is not aware of any efficiency improvements made to outdoor lights in Rye during this period.

While Rye does have some of the more efficient high pressure sodium and metal halide streetlights, the majority of the town's outdoor lights are inefficient mercury fixtures. Rye, especially the Jenness Beach Precinct, should replace its mercury lights, but it may make more sense to wait until LED streetlights are available through PSNH. If chosen carefully, LED lights are more efficient, have better quality light, and have a much longer life than the other types of outdoor lamps, without any toxic mercury. LED lamps are also more compatible with controls, such as timers and motion detectors, that can further lower electricity costs. Because the LED lighting industry is still evolving, only Energy Star-rated lamps from major manufacturers, such as GE, Philips, and Cree, should be considered.

Alternatively, it may make sense to buy the LED fixtures outright and meter their electric use on the PSNH G rate instead of paying the OL rate. The G rate requires a meter and is comprised of a monthly customer charge and a charge for electricity used. The OL rate is a standard monthly "rental" charge based on the type and size of outdoor light that includes initial cost and anticipated maintenance charges and is charged whether the light is working or not. If the switch is made to the G rate, maintenance of the lights would then become the town's responsibility, but LED lamps have a long life of 15-20 years.

In North Hampton, one town working to lower street lighting costs, they have determined that streetlights are only required for safety reasons at intersections and curves in the road, but not on straight sections of road. In the main part of Rye there are only 9 streetlights and a few parking lot lights and area lights, but there is a high concentration of lights in the beach precincts. In the Jenness Beach Precinct, there are 69 streetlights lining the streets, and in the Rye Beach Precinct there are 68 post lights lining all the streets in addition to three streetlights. The beach precincts may consider reducing the number of lights to only those necessary for safety.

Fifty-nine of the 69 Jenness Beach streetlights are the inefficient mercury type. This precinct would benefit the most from conversion to more efficient lighting.

Fig. 11 shows the cost distribution for lighting in Rye.

Fig. 11: 2012 Rye Outdoor Lighting Costs



The Jenness Beach Precinct accounts for the highest proportion of energy use and cost for streetlights in Rye. Jenness Beach has the greatest number of mercury streetlights, and they are billed on the costly OL rate. Rye Beach actually has a few more outdoor lights than Jenness Beach, but they have switched to more efficient bulbs in their post lights, and they are billed on the G rate instead of the OL rate. Notice in Fig. 10 how much less the Rye Beach precinct pays for their lights compared to the Jenness Beach Precinct (\$3706 vs \$15,099). However, because Rye Beach's power lines are underground and they maintain their own lights, they have incurred significant costs of \$5000-\$9000 annually in recent years as they are required to bury the lines deeper whenever they need to dig up a line.

The 2011 Rye Energy Report gives a detailed description of outdoor lighting types and efficiencies, the types currently in use in Rye, a comparison of PSNH rates for streetlights, and the Rye Master Plan recommendations for lighting.

The REC recommends:

- 1. That Rye Municipal and the two beach precincts pursue the PSNH EOL rate for their outdoor lights, with preference for the LED lighting program when available. All mercury lamps would need to be changed to high pressure sodium, metal halide, or LED (future) to be eligible for this much lower rate.
- 2. Or purchase LED outdoor fixtures and meter their electric use on the G rate. This case would involve the town handling maintenance of the lamps, which have a life of 15-20 years.

# RECOMMENDATIONS

# <u>General</u>

Recommendation	Responsibility	Year
Complete Small Town Carbon Calculator (STOCC) inventory each	REC	Annual
year.		
Present an energy update to the town each year using STOCC and	REC	Annual
Portfolio Manager charts, graphs, and reports.		
Adopt an Energy Star <sup>®</sup> procurement policy for all energy-	Selectmen	2014
consuming equipment, lighting, electronics, etc.		
( <u>www.energystar.gov</u> ). See Appendix F for the NH Energy Star		
Procurement Policy.		
Develop data collection process to aid in tracking and reporting	REC	2014
town energy data.		
Train town personnel to use energy data collection process and keep	REC,	2014
EPA Portfolio Manager accounts for buildings up to date.	Selected	
	personnel	
Adopt a policy of energy-conscious decision making for all capital	Selectmen, CIP	2014
improvement projects and encourage residents and businesses to do	Committee,	
the same.	REC	

## <u>Buildings</u>

Recommendation	Responsibility	Year
Complete energy projects as specified by the energy audits.	Selectmen,	On-
	Voters	going
	REC	
Arrange energy audit of Public Safety Building by PSNH.	REC	Early
Investigate funding through NH Pay for Performance (sunsets June	D. McCarthy	2014
2014).	Fire & Police	
	Chiefs	
Meet with Rye School District to inform them of energy efficiency	REC	2014
incentives and opportunities.		
Work under the NH Pay 4 Performance program to continue energy	School District	Start
reductions at the schools. Combine funds from this program with		2014
those from PSNH programs and other sources.		
Consider setting up a revolving energy savings fund, in which	Selectmen	2014
energy savings are invested in other efficiency or renewable energy		
projects.		
Once energy-efficiency is maximized, investigate installation of	Selectmen	2014
solar photovoltaic systems on south-facing rooftops. Ideal	REC	
candidates are the Town Hall site, Public Safety, Recreation, Public		
Works and the schools. Seek grant funds to supplement rebates.		

For all major building renovations and new buildings, maximize	Selectmen,	future
energy savings and consider pursuing a nationally-recognized	Voters,	
certification of energy efficiency/sustainability, such as Energy Star,	Building	
LEED (Leadership in Energy and Environmental Design), Living	Committees,	
Building Challenge, or Passive House certifications.	REC	
Use knowledge of PSNH Rate Structure to minimize demand	Building	Start
charges.	Managers	2014

# Vehicles

	D	<b>X</b> 7
Recommendation	Responsibility	y ear
Develop criteria within the Town's vehicle replacement policy to	Selectmen,	Future
gradually phase in more fuel efficient, alternative fuel or hybrid	Water District,	
vehicles. See Appendix F for NH policy on Clean Fleets. Use the	Fire, Police,	
NHDES's Resource webpage on Alternative Fuels/Advanced	Public Works,	
Technology Vehicles to keep up to date on what is available.	Cemetery,	
http://des.nh.gov/organization/divisions/air/tsb/tps/msp/afatvp/	Beach	
Establish an anti-idling policy to encourage municipal fleet users as		In place
well as the general public to turn off their engines when the vehicle		
is not in use. NH state regulations under RSA 125-C:6, XII specify		
that when temperatures are above 32°F vehicles may not idle for		
more than 5 minutes. At temperatures between -10F and 32°F		
vehicles may not idle for more than 15 minutes. Contact the Nashua		
Green Team for information about the anti-idling policies they put in		
place for the city.		

# Outdoor Lighting

Recommendation	Responsibility	Year
Convert inefficient mercury fixtures to LED or High Pressure	Selectmen	Start
Sodium lamps. Preference should be given to installing LED lamps	Jenness Beach	2014
due to their long life and high efficiency.		
Use efficient and fully shielded "dark sky" fixtures for all outdoor	Townwide	Start
lighting to minimize glare and light pollution, protect wildlife, and		2014
cut energy waste.		
Meet with all users to inform them of outdoor lighting options	REC	2014
Consider reducing the number of streetlights and post lights lining	Jenness Beach	Start
streets to those required for safety only (intersections and curves in	and Rye Beach	2014
road).	Precincts	

# Water and Sewer Pumping

Recommendation	Responsibility	Year
Enter Rye Water District and Rye Sewer District energy use into	water & wewer	2014
Portfolio Manager as recommended by the NH DES.	districts with	
	REC assistance	
Consult the EPA's Energy Management Guidebook for Water	water district	Start
and Wastewater Utilities for guidance on how to reduce energy.	sewer district	2014
Arrange for a facility energy audit through PSNH	water & sewer	
	districts	
Detect and promptly repair leaks	water & sewer	ongoing
Use correctly sized pumps.	water & sewer	ongoing
Modulate flow rate with variable frequency drives	water & sewer	ongoing
Use efficient motors, such as brushless DC motors.	water & sewer	ongoing
Educate customers on differences in seasonal flow rates and	water and	
how to conserve water.	sewer districts	
Educate customers on water-efficient fixtures.	water and	
	sewer districts	

# Appendix A Rye Municipal Overview

#### **Municipal Overview**

Town population: 5298, 2010 census, from NH OEP Population growth since 2000: 2.2% Area of municipality: 12.6 square miles Population density: 420.5 persons per sq. mile Number of municipal buildings: Rye Water Precinct: 8 Rye School District: 2 Rye Beach Precinct: 0.5 Rye Water District: 1 Jenness Beach Precinct: 0 Rye Sewer District: 0 Number of vehicles in fleet: 35 Number of streetlights: Rye Municipal: 9 streetlights, 9 area Rye School District: 1 and parking lot lights, 4 flashers Rye Water District: 1 Rye Beach Precinct: 68 post, 3 street Rye Sewer District: 0 Jenness Beach Precinct: 69

Municipal budget in 2012: \$8,848,267 Total municipal energy cost in 2012: \$365,106 Total municipal energy use in 2012: 11,311 MMBtu, or 11.3 billion Btu Total municipal CO2 emissions in 2012: 2,109,513 lbs.

#### **Community Profile**

The town of Rye is on the coast in Rockingham County. It is bordered by New Castle, Portsmouth, Greenland, and North Hampton. Rye is the only town in New Hampshire with Atlantic islands, having annexed four of the Isles of Shoals islands. Rye had 5298 residents in 2010, which ranked it 64<sup>th</sup> among New Hampshire's incorporated cities and towns.

Rye has six budget categories: Rye Municipal, Rye Beach Precinct, Jenness Beach Precinct, Rye Water District, Rye Sewer District, and Rye School District. The town has a number of elected Boards and Commissions, including the Board of Selectmen, the Planning Board, Sewer Commission, Zoning Board, and Budget Committee. Other Commissions include Conservation, Heritage, Historic District, Recreation, Sewer, Mosquito, and Beach. There are three committees: Rye Energy, Town Hall Renovation, and the Capital Improvements Program Committees. The town Master Plan was adopted in 2007, amended in 2009, and is currently under revision. The latest version of the Master Plan will include an Energy Chapter developed through a collaboration of the Energy Committee and the Long Range Planning Committee.

The Rye Energy Committee was formed in 2007. Since its inception the REC has focused its programs and activities on home energy, municipal energy, and local food. It has a page on the Rye town website at <u>www.town.rye.nh.us</u>, and its email newsletter is called Rye Eats Local.

# **Appendix B**

Small Town Carbon Calculator (STOCC) Results for Selectmen-controlled portion of Rye only.

2012 STOCC Summary - Selectmen											
	Buildings		Vehic	les	Street						
	#	% of total	#	% of total	#	% of total	Grand Total				
Annual Fuel Expense	\$88,510	55%	\$67,209	42%	\$6,101	4%	\$161,820				
Annual CO2 Emissions (lbs)	501,842	52%	444,330	46%	12,920	1%	959,091				
Annual Energy Use (MMBtu)	2,550	47%	2,802	52%	47.5	1%	5,399				









# Appendix C

Energy Trend Charts

For

Rye Municipal Buildings

& Operations











## Public Safety Complex



Rye Public Library





Rye Town Hall













# **Appendix D**

# **PSNH Rates as of July 1, 2013**

#### **Rate G, General Service**

Primarily for small commercial customers whose demand does not exceed 100 kilowatts (KW).

Customer Charge		
Single-Phase Service	\$14.59	Per Month
Three-Phase Service	\$29.16	Per Month
KW Distribution Charge	\$8.54	Per KW of demand above 5 KW
KWH Distribution Charges		
First 500 KWH	6.846	Cents per KWH
Next 1,000 KWH	1.696	Cents per KWH
All Additional KWH	0.600	Cents per KWH
KW Transmission Charge	\$4.81	Per KW of demand above 5 KW
KWH Transmission Charges		
First 500 KWH	1.734	Cents per KWH
Next 1,000 KWH	0.653	Cents per KWH
All Additional KWH	0.350	Cents per KWH
Stranded Cost Recovery Charges		
KW	\$0.07	Per KW of demand above 5 KW
KWH	0.109	Cents per KWH
System Benefits Charge	0.330	Cents per KWH
Electricity Consumption Tax	0.055	Cents per KWH
Energy Charge	8.62	Cents per KWH

#### SUMMARY

Cust. Charge – 1 Phase Cust. Charge – 3 Phase	\$14.59 per month \$29.16 per month
Demand Charge	\$13.42 per KW above 5 KW
Electricity Charge: 1 <sup>st</sup> 500 kWh Next 1000 kWh All Additional kWh	17.694 Cents per kWh 11.463 Cents per kWh 10.064 Cents per kWh

# **APPENDIX E**

# **PSNH Accounts for Rye**

			PSNH	ACCOUN	ITS for RY	É, NH - 2	012				pg. 1/3
PSNH	PSNH	Meter					Pole		Rye	2012	
Acct. No.	Service Ref.	Number	Dept.	Address	Location	Use	Number	Rate	Account	Charges	
56172141012	780560000	W01868180	Town Hall	10 Central Rd.	Building	meter		G - 3 Phase	01-4194-07-480	\$5,729.14	
56172141012	276560006		Town Hall	10 Central Rd.	Parking Lot	Outside Light	5/3A	OL 5800L HPS	01-4194-07-480	\$214.45	
56172141012	324560005		Town Hall	10 Central Rd.	Parking Lot	Area Light	5/3A1/2	OL 3500L Merc.	01-4194-07-480	\$207.07	
56172141012	944170007	G23765209	Public Works	309 Grove Rd.	Garage	meter		G - 3 Phase	01-4194-06-480	\$3,839.73	
56098641061	963901002	D80788226	Transfer Sta	309 Grove Rd.	Swap Shop	meter		G - 3 Phase	01-4323-33-480	\$872.47	
56172141012	439070009	S38163422	Transfer Sta	309 Grove Rd.	Recycl. Bldg.	meter		G - 3 Phase	01-4323-33-480	\$1,644.11	
56500551015	105711006	S38493839	Public Safety	Wash. Rd.	Police/Fire	meter		G - 3 Phase	01-4194-08-480	\$18,904.31	
56172141012	966280007	S34691875	Recreation	S34691875	Rec Building	meter		G - 1 Phase	01-4520-50-480	\$1,171.33	
56544341027	906601008	G15825284	Recreation	G15825284	Snack Shack	meter		G - 1 Phase	01-4520-50-480	\$272.56	
56172141012	717280005		Recreation	Recreation Rd.	Road	2 Area Lites	74/4,74/5	OL 3500L Merc.	01-4520-50-480	\$414.03	
56172141012	487280006		Recreation	Recreation Rd.	Parking Lot	Area Light	74/6	OL 13500L MH	01-4520-50-480	\$442.84	
56172141012	076280007		Recreation	Recreation Rd.	Parking Lot	Area Light	74/7	OL 36000L MH	01-4520-50-480	\$554.37	
56588831008	621301009	W01868237	Sewer	25 Church Rd.		Pump Station		G - 3 Phase	02-4326-90-480	\$3,386.00	
56779731017	885201008	G23577025	Sewer	Ocean Blvd.	Jenness	Pump Station		G - 3 Phase	02-4326-90-480	\$2,967.96	
56735731085	738201006	W78561850	Sewer	Central Rd.	Abenaki	Pump Station		G - 3 Phase	02-4326-90-480	\$645.99	
56075721043	735590004	G71377769	Cemetery	Central Rd.		meter		G - 1 phase		\$309.56	
	328590000		Cemetery	Central Rd.		area light		OL 9500L HPS	\$292.88	included	
56950606061	131033008	S74816769	Goss Farm	Harbor Road		meter		G - 1 phase		\$148.55	
8001076-01-2-4			Street Lights	see below	see below	9 Street Lights		see below	01-4316-27-480	\$2,260.91	
				Wash. Rd	at Wayside Lane		2/82	OL 3500L Merc			
				Wash. Rd	at Central Rd.		2/87	OL 7000L Merc			
				Wash. Rd	at Congo Church		2/91	OL 3500L Merc			
				Wash. Rd	Opp. Old Parish		2/94	OL 3500L Merc			

PSNH	PSNH	Meter					Pole		Rye	2012	pg. 2/3
Acct. No.	Service Ref.	Number	Dept.	Address	Location	Use	Number	Rate	Account	Charges	
<mark>8001076-01-2-</mark> 4	Ļ		Street Lights	Wash. Rd			2/97	OL 3500L Merc			
(cont.)				Wash. Rd	Opp. Lang Rd.		2/100	OL 3500L Merc			
				Wash. Rd	at TD Bank		2/103	OL 4000L HPS			
				Wallis Rd.	at Wash. Rd.	Grange Park	43/127	OL 3500L Merc			
				Wentworth Rd.	at bridge		13/53AL1	OL 30,000L HPS			
56220141089	717401000		Street Lights	10 Central Rd.	Town Hall	2 Area Lites	5/3A1/Y	OL 11000 Merc.	01-4194-27-480		
not used	489501003	D24095246		37 Central Rd.		sign			01-4316-27-480		
56172141012	809460009	D94313720	Street Lights	37 Central Rd.	Old Police Bldg.	meter		G - 1 Phase	01-4316-27-480	\$165.77	
56798421061	729801000	G82445488	Street Lights	Ocean Blvd.	at Wallis (N)	Ped. Flasher	7/208A	G - 1 Phase	01-4316-27-480	\$174.59	
56798421061	565901003	G77198282	Street Lights	Ocean Blvd.	at Wallis (S)	Ped. Flasher	7/206	G - 1 Phase	01-4316-27-480	\$188.68	
56119005015	192303005	D99464426	Street Lights	Ocean Blvd.	at Perkins (S)	Ped. Flasher	7/34/A	G - 1 Phase	01-4316-27-480	\$187.35	
56692641004	404901005	G77198559	Street Lights	Ocean Blvd.	at Perkins (N)	Ped. Flasher	7/37/4JT	G - 1 Phase	01-4316-27-480	\$165.20	
56798421061	146401009	S23698183	Area Light	Wallis Rd.	Grange Park			G - 1 Phase	01-4316-27-480	\$185.00	
56798421061	145390002	D22560426	Area Light	Wash. Rd	Parsons Field			G - 1 Phase	01-4316-27-480	\$178.62	
56172141012	939413004	Town	Hall, 10 Centr	al Rd.	Energy Efficiency	Lighting		SSP Smart Start	01-4316-27-480	\$191.14	
56172141012	117513006	Rec A	Rec Area, Recreation Rd.			Lighting		SSP Smart Start	01-4316-27-480	\$394.35	
56172141012	253513005	Highway	/ Garage, 309 (	Grove Rd.	Energy Efficiency	Lighting		SSP Smart Start	01-4316-27-480	\$831.37	
56172141012	323513000	Swap	Shop, 309 Gro	ve Rd.	Energy Efficiency	Lighting		SSP Smart Start	01-4316-27-480	\$305.28	
56531731040	524201001	S66227598	Public Library	581 Wash. Rd.	building	meter		G - 3 Phase		\$11,070.75	
			Public Library	581 Wash. Rd.	Energy Efficiency	Lighting		SSP Smart Start		?	
8005121-02-9-4	 -		Elem. School	461 Sagamore	building	meter		G - 3 Phase		\$41,730.20	
5613314036	990701009	\$36498323	Middle Sch.	501 Wash. Rd.	building	meter		G - 3 Phase		\$32,359.16	
	738601004		Middle Sch.	501 Wash. Rd.	area light			OL 3500L Merc.	\$209.80	included	
56799311030	314480001	G46461028	Water	60 Sagamore	office bldg.	meter		G - 3 Phase		\$1,650.00	
56996290078	219460009	W01868141	Water	Garland Rd.	pump station	meter		G - 3 Phase		\$9,452.45	
	867460002		Water	Garland Rd.	area light			OL 3500L Merc.	\$209.80	included	
56928290055	586560006	D74779790	Water	BailBrk/Cedar	pump station	meter		G - 3 Phase		\$13,123.04	
56470341041	379501002	G99215318	Water	Breakfast Hill	tank	meter		G - 1 Phase		\$247.20	
56461341000	038601001	S54098062	Water	Wash. Rd.	booster pump	meter		G - 3 Phase		\$3,879.40	
56153311055	161480006	G82313378	Rye Beach	Sea Road	post lights	meter		G - 1 Phase		\$281.33	
56086980091	160260002	G46581991	Rye Beach	Central Rd.	post lights	meter		G - 1 Phase		\$330.56	
56944931021	970301002	G42707384	Rye Beach	Central Rd.	post lights	meter		G - 1 Phase		\$322.11	

PSNH	PSNH	Meter					Pole		Rye	2012	pg. 3/3
Acct. No.	Service Ref.	Number	Dept.	Address	Location	Use	Number	Rate	Account	Charges	
56296201031	636370002	W58743026	Rye Beach	Central Rd.	post lights	meter		G - 1 Phase		\$243.44	
56223141037	777401008	G93925120	Rye Beach	Central Rd.	post lights	meter		G - 1 Phase		\$214.40	
56788980050	826260001	G31768584	Rye Beach	828 Central Rd	building	meter		G - 1 Phase		\$295.51	
56205541006	225801007	G93213438	Rye Beach	South Rd.	post lights	meter		G - 1 Phase		\$347.24	
56807201017	99370008	G90605373	Rye Beach	Church Rd.	post lights	meter		G - 1 Phase		\$225.33	
8001074-01-6-7			Rye Beach	Central Rd.	streetlights		various	OL - various		\$1,741.85	
8001075-01-4-1			Jenness Bch	district	69 street lights		various	OL - various		\$15,098.56	

C:\Users\MMSOPHER\Documents\Rye Energy Committee\Rye PSNH Accounts

# **APPENDIX F**

# **NH State Energy Efficiency Policies**

## • Clean Fleets Policy

Clearer copies of these documents can be accessed from: http://www.nh.gov/oep/energy/programs/initiatives.htm

Also available online:

- Energy Star Procurement policy
  - Plug Loads Policy
  - Building Operations

#### Clean Fleets Policy <sup>1</sup> Purchasing Procedure

Revised: December 10, 2010 for Vehicle Model Year 2011

#### VEHICLE PURCHASING PROCEDURE

The following conditions must be met relative to new vehicle purchases for model year 2011:

- Alternative Fueled Vehicles: Alternative fueled vehicles (e.g., compressed natural gas, propane, E-85 ethanol, electric) shall be considered whenever practical.
- All <u>passenger vehicles</u>, less than 8,501lbs Gross Vehicle Weight Rating (GVWR), shall have a highway fuel economy rating of 32 miles per gallon or better as rated by the U.S. Environmental Protection Agency.
- All light duty trucks [LDT1], with a gross vehicle weight rating (GVWR) less than 8,501lbs, shall have a highway fuel economy rating of 24 miles per gallon or better as rated by the U.S. Environmental Protection Agency.
- All passenger vehicles and light duty vehicles trucks [LDT1], less than 8,501lbs GVWR, shall have the following emissions classifications or better.
  - i. Small Cars: LEV-II SULEV (Super-Ultra Low Emissions Vehicle), Bin 2, Bin 3
  - ii, Midsize Cars: LEV-II ULEV (Ultra Low Emissions Vehicle), Bin 4
  - Large Cars (including Minivans, Station Wagons, Sport Utility Vehicles): LEV-II LEV (Low Emissions Vehicle), Bin 5
  - iv. Pickup Trucks: LEV-II LEV (Low Emissions Vehicle), Bin 5
- Appropriate Vehicle Choice: All departments shall ensure that the appropriate vehicle is selected depending on its intended use and shall purchase the most fuel efficient vehicle for that intended use.

#### Exemptions:

Law enforcement vehicles are exempt from the Clean Fleet Policy. However, when purchasing an exempted vehicle, agencies must give due consideration to #1 and #5 above. Law enforcement vehicles are used by a duly sworn employee of a governmental unit responsible for the prevention or investigation of crime, who is authorized by law to carry fire arms, execute warrants, and make arrests.

Vehicles with a GVWR exceeding 8,500lbs, and non-road vehicles are exempt from the Clean Fleet Policy. However, when purchasing an exempted vehicle, agencies must give due consideration to #1 and #5 above.

<sup>1</sup> As approved by the Interagency Energy Efficiency Committee

on August 8, 2008)

#### WAIVER PROCEDURES AND PURCHASING REQUIREMENTS

A "Vehicle Index List" shall be established each year by DAS Purchasing, including hybrids and alternative fuel vehicles. DAS Fleet Management shall annually edit the "Vehicle Index List" with Clean Fleets Policy MPG requirements to create the "Clean Fleets Approved Vehicle List". The "Clean Fleets Approved Vehicle List" shall be posted on the Fleet Management website and the DAS Purchasing website. In addition, DAS Fleet Management will also update the Clean Fleets Policy document including any changes in the waiver requirements and/or process. Agencies may purchase approved and/or exempt vehicles without a waiver.

Except for the exemptions listed above, agencies requesting the purchase of a vehicle other than a Clean Fleets Approved Vehicle must complete a waiver form and secure approval. Completed waiver forms shall be submitted to DAS Purchasing along with the RQ10 requisition and any other additional supporting documentation (e.g. P-11 Surplus form, Like or Similar justification, etc). For exempt vehicles, a statement must be included in the description of the vehicle on the RQ10 requisition as to why that vehicle is exempt from the Clean Fleets Policy. For example, for a law enforcement vehicle, the statement would read "Exempt from Clean Fleets Policy – law enforcement vehicle."

#### Waiver forms (see attached) will include the following information:

- 1. Department name
- What Division/Bureau/Section will be assigned the vehicle(s);
- 3. Name(s) of person(s) who will be assigned or responsible for the vehicle(s);
- 4. Requested vehicle(s)
- 5. What job responsibilities require this vehicle(s);
- 6. Statement as to why an approved vehicle(s) cannot be utilized; and
- 7. Statement demonstrating that this is the most fuel efficient vehicle(s) for this purpose.