COMPREHENSIVE ENERGY STRATEGY

Endorsed by the Town Council on December 1, 2014

Prepared by the Enfield Clean Energy Committee

Supported by Peregrine Energy Group, Inc.
with funds received from the State of Connecticut

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Endorsement Resolution by Enfield Town Council

WHEREAS, the Town Council of the Town of Enfield is dedicated to reducing energy use and increasing operational efficiency in its activities; and

WHEREAS, the Town Council encourages residents and businesses to become smarter energy users and incorporate use-reduction strategies into their operational activities; and

WHEREAS, the Town Council is dedicated to a structured energy use and reduction strategy advocated by the Enfield Clean Energy Committee;

NOW, THEREFORE BE IT RESOLVED, the Town Council of the Town of Enfield hereby formally endorses the Comprehensive Energy Strategy prepared by the Clean Energy Committee with support from Peregrine Energy Group, Inc., dated November 17, 2014.

Unanimously approved on December 1, 2014

Acknowledgements

The following groups and people worked to produce this energy strategy for the Town of Enfield and deserve recognition for their efforts:

Enfield Clean Energy Committee

http://www.enfieldcleanenergy.net

- Valerie Bak
- Ann Marie Dooley
- Melissa Everett, Ph.D., Chair
- Suzanne Giwoyna
- Dan Glogowski
- Doug Lombardi
- Greg Mark

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http://www.enfield-ct.gov

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Overview

Today, energy costs are a significant budget item for many households and businesses, as they are for the Town of Enfield. This Comprehensive Energy Strategy has been developed by the Enfield Clean Energy Committee (ECEC) to encourage and assist the Town of Enfield to formally adopt policies and practices that reduce energy consumption and increase the use of clean renewable energy sources in municipal operations to the extent practical; and, further, to take action that facilitates increased energy efficiency and the use of renewable energy by Town residents and local businesses. The Strategy is divided into three separate sections, Municipal, Residential, and Commercial/Institutional. The Municipal Strategy is the most detailed of the three for a number of reasons: First, the ECEC has access to more detailed information about energy consumption for municipal operations than it would have for all residences and all businesses. Second, there is consensus that reducing energy expense is a shared objective for municipal operations. And third, there is more information available about opportunities and needs in Town facilities.

The Strategy targets the five-year period from 2015 – 2019, providing the most detail for the first two years. As we describe below, ECEC believes that focused action by Town government in this arena is critical to broad Town-wide success. We hope a commitment to this path by Town government can motivate near-term action in all sectors, while encouraging long-term planning and adoption of emerging opportunities. This will help ensure that Enfield thrives as an efficient, secure and sustainable community.

About the Enfield Clean Energy Committee

The Enfield Clean Energy Committee is composed of citizen volunteers appointed by the Town and supported by Town staff and representatives of Town Council. The Committee's mission is to support and encourage decisions that increase energy efficiency and use of renewables Town-wide, by Town residents and businesses, as well as in Town and school operations. In 2014, the ECEC began this initiative to encourage and assist municipal government to achieve immediate and long-term energy savings and increase its use of alternative and ideally renewable, sources of energy. It also wants Town government to be a resource to Town residents, businesses, and other organizations to help them adopt clean energy strategies, such as increased efficiency and use of energy resources to minimize greenhouse gas emissions. The Committee has been assisted by Peregrine Energy Group, Inc., a consulting firm specializing in municipal energy management solutions, that was competitively selected by the Town in Spring 2014 and engaged using a $15,000 Bright Ideas grant from the State of Connecticut, earned by the volunteer activities of the Enfield Clean Energy Committee. Peregrine attended ECEC meetings, did background research and walk-through analysis of Town buildings, prepared reports for Committee review, and facilitated discussion and decision making by the Committee.

A Sustainable Energy Vision for Enfield

The Enfield Energy Strategy is built on a four-point vision for our community:

- We can achieve town-wide cost savings and greenhouse-gas emissions reduction through an integrated strategy of conservation, energy-efficiency and the use of renewable energy.

- The Town and schools must lead by example in day-to-day operations, demonstrating best practices to the public and business community while generating savings for taxpayers every day.
- Plans need to be developed and put in play to ensure the continued provision of vital services in the event of energy supply disruptions, through the combination of renewable energy supply, high-efficiency backup power and energy storage, including micro-grids, and adoption of best practices in managing energy demand and grid interconnection.
- The Town, supported by the Clean Energy Committee, will provide ongoing, high-quality education about energy issues and options in the schools and to the public, building an energy-smart community with educated consumers and voters who understand the tools and tactics that contribute to a clean, efficient energy future.

This Energy Strategy provides a broad frame work to allow flexibility in rapidly changing circumstances. We developed our vision and approaches to achieving it, to guide the Town's management of energy resources through policy, infrastructure planning, government operations, Town services and public educational programming. The Energy Strategy provides the back bone for more detailed planning and ongoing action by town staff and the Committee, guided by Town Council. It provides a concrete path to advance a Town commitment to a clean, secure, affordable energy future.

Municipal Energy Strategy

Introduction

The Clean Energy Committee recommends that Town Council adopt and embrace the following goals and strategies to reduce greenhouse gas emissions associated with energy use by Town operations, including buildings and other facilities, street lighting, and transportation.

Overall, we suggest that Town Council mandate policies and practices that:

- Reduce energy consumption whenever practical without interfering with satisfying the Town's responsibilities and providing a comfortable work environment for employees
- Invest in more energy-efficient systems, equipment, and technology whenever it is cost-effective or if end-of-life equipment must be replaced
- Favor life cycle cost, including lifetime energy and maintenance expense, as a criteria in purchasing, rather than first cost
- Consider options for municipal operations to increase the use of energy sources that do not require combustion of conventional carbon based fuels nor result in greenhouse gas emissions.

The result of these policies and practices will not only be a cleaner environment, but also cost savings for taxpayers and better working condition for employees and students.

Further, we believe that the Town and Board of Education, by pursuing this course of action and publicizing its goals, strategies, and accomplishments, can lead by example and influence the actions of local residents and businesses.

Baseline for the Municipal Energy Strategy: Current Energy Use

Any plan of action involves establishing goals and strategies to achieve the objectives we have established for ourselves. In this case, with reduction of greenhouse gas emissions in addition to cost savings as the goals, we have selected two primary approaches: 1) reducing our use of energy overall and 2) make greater use of energy sources that do not create additional greenhouse gas emissions.

The best goals are quantitative. They allow us to measure our success over time by comparing where we are now to where we started when we set our goal. This point where we began our efforts is generally called the "baseline." We can select either of two metrics for our baseline: energy use or energy expense. We consider both of these in this analysis and both are important. While there are things we can and should do to influence the price we pay for energy, such as purchase in bulk, shop around and change suppliers, or use alternative fuel sources, prices are generally set outside of our community. On the other hand, Town government policies and practices can have a significant immediate and long-term effect on the amount of energy consumed to accomplish a specified amount of work (e.g. keep us comfortable in buildings, ensure that we have fresh air in classrooms, illuminate our streets at night).Therefore, the focus of our energy strategy is primarily on energy use.

The Town presently uses electricity, natural gas, fuel oil, gasoline, and diesel fuel as its energy sources, all of which are primarily carbon-based and contribute to greenhouse gas emissions. Non-carbon based energy sources used in Enfield's energy supply, generally in the mix of electricity received from Connecticut Light and Power, are nuclear power, solar-generated electricity (known as photovoltaic or PV power), hydropower generated by turning an electric turbine with moving water such as a river, and wind power which is generated by turbines that turn in the wind to generate electricity.

Other non-carbon energy sources are solar generated hot water (known as solar thermal);geothermal energy which is extracted from the ground or from groundwater using water or some other medium as a heat exchanger; air source heat pumps; and sustainably sourced biofuels including combustible pellets and natural gas produced by anaerobic digestion of biomass. Of all of these non-carbon sources, solar energy is the most generally available for use in Enfield: PV and thermal systems can be placed on structurally suitable, south facing roofs; PV systems can also be ground-mounted as renewable energy farms. To date, there has been little or no solar energy use in municipal operations.

Enfield's municipal energy use baseline is the amount of energy in native units (i.e. therms of natural gas; gallons of fuel oil, propane, diesel fuel, or unleaded gasoline; and kilowatt hours of electricity) the Town used for buildings, street lighting, and transportation in a baseline year. For this plan, the Clean Energy Committee has selected Fiscal year 2013, which began July 1, 2012 and ended June 30, 2013, as the Town's baseline year. This is the most recent year for which the Town had complete information for all energy sources when the ECEC began this initiative.

To make it easier to compare the use of energy for different purposes by the Town, Peregrine converted energy use from native units (i.e. kWh of electricity, CCF or therms of natural gas, gallons of fuel oil, and gallons of unleaded gasoline and diesel fuel) that energy is sold in to an equivalent scale based on heat value of the source (i.e. British thermal units) that allows the energy value of different energy types to be combined.[1]

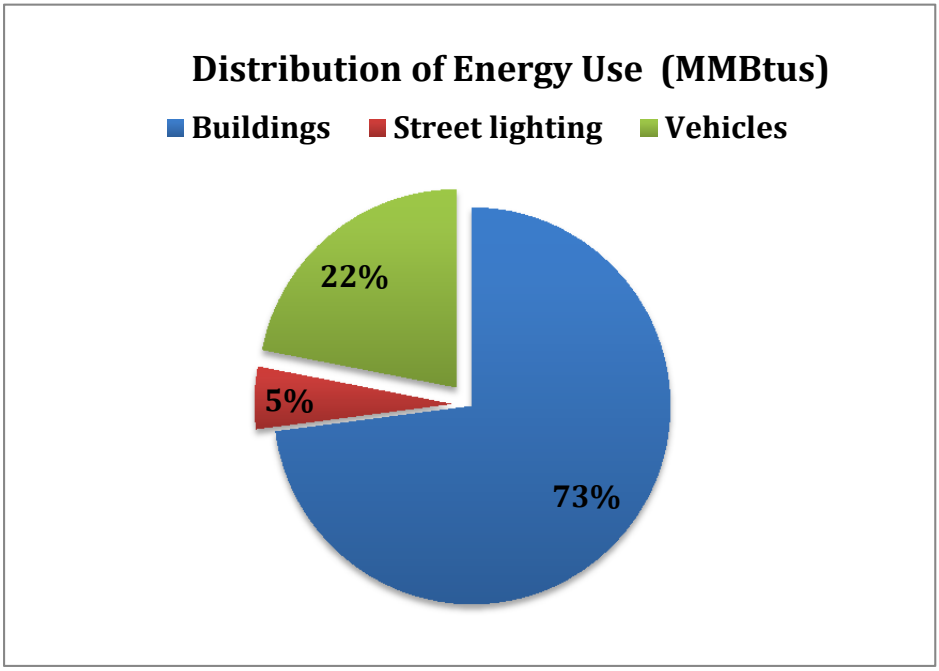
- Energy use in buildings, based on information provided to Peregrine, was13,532,951 kWhof electricity (42,521 MMBtus), 608,130 CCF or therms of natural gas (62,455 MMBtus), and 9,651 gallons of fuel oil (1,338 MMBtus). Building energy use, including wastewater treatment, totals 106,314 MMBtus.

- Streetlights accounted for 2,228,627 kWh of electricity (7,604 MMBtus).

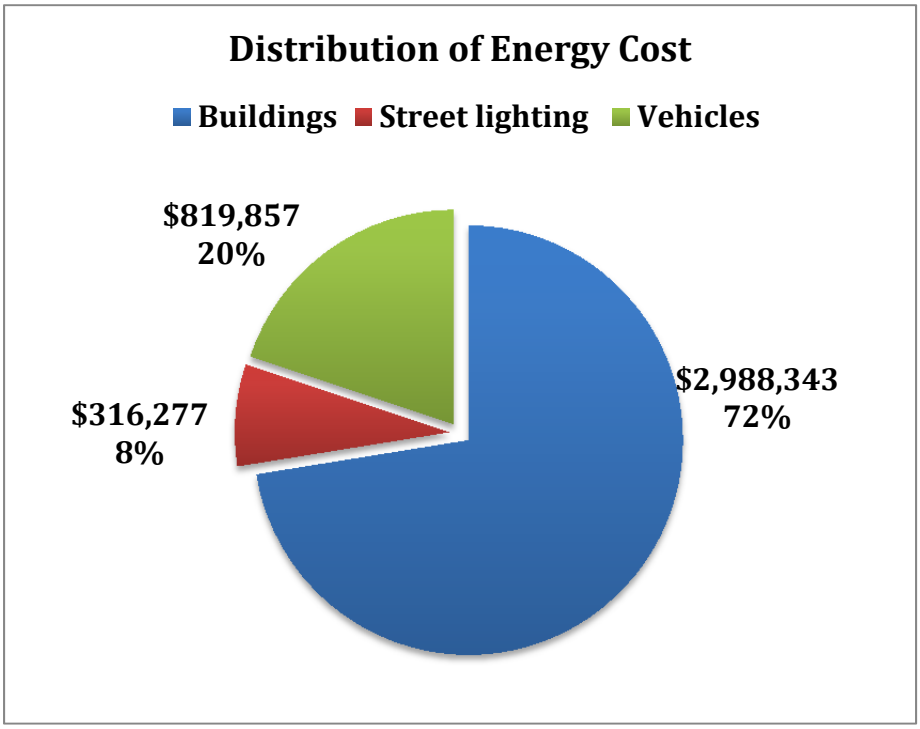
- Vehicles consumed126,536gallons of unleaded gasoline (15,721MMButus) and 119,182 gallons of diesel fuel (16,291MMBtus), for a total of 32,012MMBtus. [Note that vehicle information is for calendar year 2013.]

[1]Conversion factors from native units to British thermal units (Btus):
- A kWh or kilowatt hour of electricity equals 3412 Btus;
- A CCF or therm of natural gas equals 102,700 Btus, while a gallon of #2 fuel oil equals 138,690 Btus. This means that there is more heat value in a gallon of fuel oil than a therm of natural gas
- A gallon of unleaded gasoline equals 124,238 Btus, while a gallon of diesel fuel equals 138,690 Btus. This means that there is more heat value in diesel fuel per gallon than unleaded gasoline.

The percentage distribution of Town energy use, on a BTU basis, for buildings, vehicles, and street lighting is summarized in the following chart:



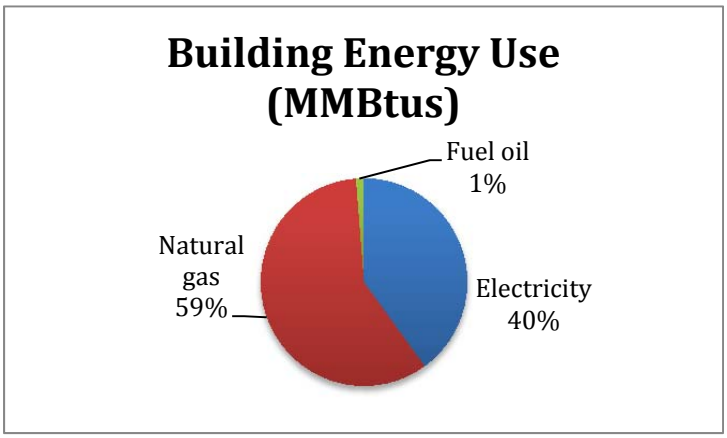
Compare this with the distribution of energy cost for the same end uses:

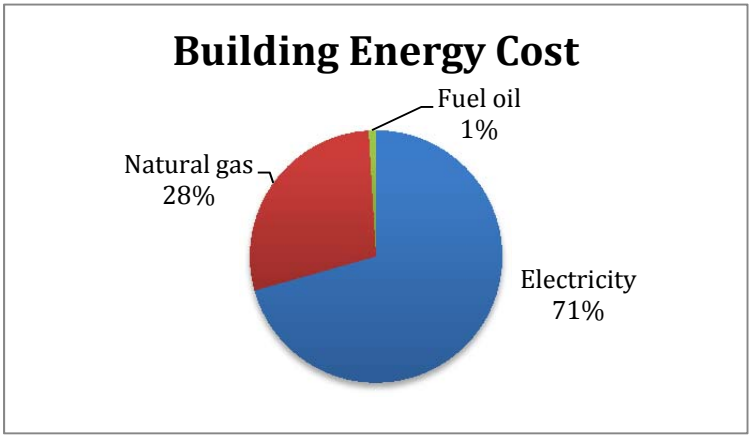


Achieving Energy Objectives in Town and School Buildings

Facility Energy Use and Cost

While natural gas delivers the majority of energy consumed in buildings on an MMBtu basis, electricity is the major expense. Electricity efficiency improvements will yield the greatest economic benefit.





Benchmarking the performance of Enfield facilities

Most of Enfield's public buildings were constructed in the middle of the 20th century, at a time of limited concern about energy efficient construction. In general, Town and school buildings have older equipment for lighting, cooling, heating, and other needs, resulting in higher energy use and expense.

The Town engaged Peregrine Energy Group in Spring 2014 to support the planning effort and conduct a "walk-through" analysis of buildings owned by the Town of Enfield and Enfield Schools and broadly assess them for energy-efficiency and renewable energy opportunities. Peregrine considered the natural energy-intensiveness of the activities in each building. They also considered building use patterns, hours of operation, and temperature settings. Peregrine benchmarked the relative performance of Enfield buildings compared to each other and to similarly purposed buildings in other communities with energy efficient equipment, building envelope, and usage patterns. For the

buildings comparison, Peregrine looked at energy use in kBtus (thousands of Btus) per square foot of building area. This shows the relative energy intensiveness of different buildings. Energy engineers call this the Energy Use Index or EUI. Electricity and heating fuel use are presented separately and then combined to look at the total building energy use. The following table, produced by Peregrine, includes provides a color key that shows where the greatest potentials for energy use reduction are likely to be.

TABLE: ENERGY USE BY ENFIELD BUILDINGS

	Building	SF	Electricity		Gas		Oil		EUI
			kWh	kBtu/SF	Therm	kBtu/SF	Gallons	kBtu/SF	kBtu/SF
Town Buildings	Emergency Medical Services	2,371	71,000	102	200	8	-	-	111
	Enfield Waste Water Control Facility	12,000	3,049,000	867	-	-	-	-	867
	Enfield Senior Center		320,000	NA	9,500	NA	-	NA	NA
	Pearl Street Library	4,982	39,000	27	2,300	46	-	-	73
	Central Library	18,244	284,000	53	-	-	4,380	34	87
	Angelo Lamagna Activity Center	15,000	242,000	55	12,100	81	-	-	136
	Enfield Town Hall	22,850	680,000	102	14,300	63	-	-	164
	Department of Public Works	29,850	326,000	37	16,700	56	-	-	93
	Enfield Police Department	22,358	657,000	100	11,000	49	-	-	149
	Adult Day Care	4,200	69,000	56	-	-	5,030	170	226
	Family Resource Center	4,865	328,000	230	1,800	37	-	-	267
	Village Center of Thompsonville	20,223	129,000	22	11,000	54	-	-	76
	Buildings and Grounds	10,800	59,000	19	5,500	51	600	8	77
School Buildings	Enfield High School	186,026	1,697,000	31	97,100	52	-	-	83
	Enrico Fermi High School	202,400	1,897,000	32	90,700	45	-	-	77
	JFK Middle School	157,152	1,097,000	24	102,900	65	-	-	89
	Eli Whitney School	58,633	266,000	15	27,100	46	-	-	62
	Hazardville Memorial School	54,316	298,000	19	49,200	91	-	-	109
	Nathan Hale School	46,295	285,000	21	30,300	65	-	-	86
	Henry Barnard School	70,182	503,000	24	38,500	55	-	-	79
	Edgar Parkman School	60,327	324,000	18	23,000	38	-	-	56
	Prudence Crandall School	60,417	362,000	20	34,500	57	-	-	78
	Enfield Street School	48,439	167,000	12	5,400	11	-	-	23
	Thomas Alcorn School	53,950	378,000	24	25,100	47	-	-	70
	Harriet Beecher Stowe School	49,234	6,000	0	-	-	-	-	0

Opportunity for Reduction
High Potential
Good Potential
Moderate Potential
Less Potential
Unclear: missing or suspect data

The table shows that there are many buildings that have significant savings potential, determined based o on Peregrine's direct observation of equipment being used and from discussions with building staff about operations and maintenance practices, and based on the relative energy performance of Enfield buildings compared to what Peregrine has see in other communities,

The EUI scores for buildings in the table shows that different buildings in Enfield have different levels of energy intensiveness. Sometimes these relative differences are due to the purpose for which the building is used. For example, the Wastewater Control Facility is the largest energy user and, by far, the most energy intensive. This is because wastewater treatment is an industrial process that is, by its nature, a big energy user. The Town is embarking on a Wastewater Facility renovation that should result in significant energy use reductions.

But other times, these different scores for levels of energy intensiveness reflect differences in building efficiency that can be adjusted by a range of strategies. Among the causes of these

differences and where changes can be made are hours of operation, temperatures maintained for heating and cooling, and efficiency of equipment and infrastructure. Town Hall is particularly energy intensive, perhaps in part due to the IT server being hosted there and the cooling requirements this creates or perhaps due to extensive evening use. Also, different schools vary significantly in their intensiveness of energy use. Peregrine believes that most schools use more energy than they could, with some schools appearing to be particularly inefficient.

Peregrine has advised the ECEC that a goal of 20% reduction[2] in building energy use is realistic and achievable with commitment and high-quality technical guidance. Benefits created for the Town would include saving money, improving occupant health and comfort, increasing building control, and reducing repairs. Three investment strategies were recommended to achieve these benefits:

- Immediately and continuously pursue low-cost and no-cost energy conservation measures that can be easily implemented, such as controlling lights, managing building schedules and temperatures, and installing weatherization improvements;
- Over the next two years, plan for, fund, and complete efficiency upgrades to many pieces of energy equipment, as well as buildings themselves, resulting in a large combined reduction in consumption and other related benefits; and
- Going forward, whenever replacing major energy consuming equipment at the end of its design life, invest in the most energy-efficient alternative possible.

Goals and Strategies

To translate this vision into measurable results, a series of goals were set for Town operations, and strategies for achieving them were identified.

Goal #1: Reduce energy use in Town and school buildings by 20% within five years.

Using the energy baseline for FY 2013 as a starting point, the Town can reduce the total energy requirement for Town and school buildings using a variety of strategies. In doing so, the Town will not compromise the quality of service it provides and will, in fact, achieve energy and cost savings while:

- Upgrading and replacing older building energy infrastructure and equipment
- Increasing the reliability of building systems and reducing the threat of system failures
- Lowering repair and maintenance costs
- Improving occupant comfort

Strategy 1.1: Confirm the potential for energy use reduction in current operations and pursue approaches to achieve that potential

Confirming the potential for energy use reduction involves both determining what the technical potential is (i.e. is there technology available for this purpose) and evaluate that potential in light of future plans for buildings (staying open indefinitely/closed soon/use changing/unknown) and financial capabilities (availability of capital funds, utility incentives, alternative financing strategies, etc.).

[2] Compared to baseline year of July 1, 2012 through June 30, 2013.

Actions required:

1. Evaluate performance of all buildings
2. Confirm the 10 year plans for each building to ensure investments are aligned with future use
3. Identify opportunities for energy reduction and analyze the economics of changes in terms of costs and savings achieved
   - improvements to operations and scheduling
   - replacement of equipment with more energy efficient alternatives
   - improved maintenance practices
4. Evaluate alternative approaches to financing the energy reduction initiatives and weigh the merits of each in terms of cost, savings, and other benefits over time
   - Use of incentives and services from Connecticut Light and Power and Energize-CT
   - Replacing failing equipment with the most efficient possible upgrades
   - Financing projects proactively through operating budgets and CIP process
   - Performance contracting
5. Establish a detailed plan for proceeding with each project
   - Assign responsibilities
   - Confirm budget
   - Establish a timeline
   - Agree on performance indicators
   - Implement
   - Commission new equipment installations as appropriate
6. Measure and report regularly on progress and adjust approach as needed to optimize results

Current status:

As noted earlier, the Town secured Peregrine Energy Group's services in Spring 2014 to develop an Opportunities Assessment for Energy Reduction in Town and School Buildings. Peregrine completed a high-level performance evaluation of all buildings, which is included above in the baseline discussion.

With respect to the Town's current ten year plans, near term plans for buildings include:

- The combination of Enfield High School and Enrico Fermi High School into a single modernized and expanded facility at Enfield High School. Peregrine recommends that no improvements be made at Fermi until the future use of the school is determined. While there are certainly opportunities for energy reduction long term, given the building's age and construction, any changes to energy systems should be driven by the ultimate needs of the Town. In the meantime, planning should begin for how that building will be maintained and operated, in terms of energy use, until a decision about its final disposition is finalized. Empty buildings need some space conditioning to avoid their deterioration and the emergence of a mold problem. On the other hand, the Town may not want to run an empty building at the same cost it had when it was occupied.

- A planned Wastewater Facility renovation. State-of-the-art energy improvements should be integrated into the Wastewater Facility renovation project, removing the need for a separate energy reduction program for that building.

Peregrine found that there are significant opportunities for energy savings across Enfield's building portfolio. Excluding, for the most part, the energy use at Enfield High School, Fermi High School, and the wastewater facility, they identified opportunities to reduce energy consumption in buildings by over20%.Closure of Fermi High School after the high school consolidation would result in over 5% in additional reductions.

Peregrine proposed a three-pronged strategy for energy use reduction:

- Pursuing relatively low cost and no cost improvements to buildings and operations ("Priority 1"),
- Investing in energy efficient technology that would pay for themselves relatively quickly ("Priority 2"), and
- Replacing old and end-of-life building equipment and systems with state of the art systems that would also create some energy savings ("Priority 3").

The following table summarizes the impact of energy reductions suggested by Peregrine by building. A Report summarizing Peregrine's findings is attached to this plan.

SAVINGS OPPORTUNITIES BY BUILDING – PRIORITIES 1, 2, AND 3

Priority 1 - Building Summary

Building	Approximate Implementation Cost	Utility Incentive Available	Potential Utility Savings				Annual Cost Avoidance	Baseline EUI kBtu/sf	Projected EUI kBtu/sf	Overall Savings	Simple Payback Yr
			Demand kW	Electric kWh/yr	Gas Therm/yr	Oil Gal/yr					
Enfield High School	$0	TBD	(1,100)	180,000	31,100	-	$61,200	83	63	24.0%	-
Enrico Fermi High School	$0	TBD	-	-	-	-	$0	77	77	0.0%	NA
JFK Middle School	$289,500	TBD	400	192,400	12,100	-	$42,300	89	77	13.3%	6.8
Henry Barnard School	$23,000	TBD	-	77,000	8,000	-	$20,300	79	64	19.1%	1.1
Prudence Crandall School	$78,250	TBD	100	48,600	3,900	-	$11,600	78	68	11.9%	6.7
Enfield Street School	$54,500	TBD	50	24,100	1,100	-	$4,800	62	58	6.4%	11.4
Nathan Hale School	$89,000	TBD	110	55,000	5,700	-	$14,500	86	70	18.9%	6.1
Hazardville Memorial School	$95,000	TBD	110	56,000	6,700	-	$15,700	109	93	14.5%	6.1
Adult Day Care	$7,500	TBD	32	10,500	-	230	$2,500	226	210	7.2%	3.0
Family Resource Center	$5,000	TBD	3	9,000	480	-	$1,800	94	78	17.1%	2.8
Angelo Lamagna Activity Center	$25,250	TBD	21	9,600	200	-	$1,690	136	132	2.6%	14.9
Department of Public Works	$85,000	TBD	214	80,400	(500)	-	$11,500	93	86	8.1%	7.4
Enfield Police Department	$28,250	TBD	-	15,400	800	-	$3,300	149	143	4.0%	8.6
Enfield Senior Center	$20,500	TBD	27	18,500	-	-	$2,800	102	118	-15.5%	7.3
Enfield Town Hall	$26,000	TBD	515	357,000	-	-	$53,500	164	111	32.5%	0.5
Total	***$826,750***	***$0***	***482***	***1,133,500***	***69,580***	***230***	***$247,490***	***88***	***77***	***13.0%***	***3.3***

Priority 2 - Building Summary

Building	Approximate Implementation Cost	Utility Incentive Available	Potential Utility Savings				Annual Cost Avoidance	Baseline EUI kBtu/sf	Projected EUI kBtu/sf	Overall Savings	Simple Payback Yr
			Demand kW	Electric kWh/yr	Gas Therm/yr	Oil Gal/yr					
Enfield High School	$0	TBD	-	-	-	-	$0	63	63	0.0%	NA
Enrico Fermi High School	$0	TBD	-	-	-	-	$0	77	77	0.0%	NA
JFK Middle School	$181,000	TBD	10	90,000	900	-	$14,500	77	75	3.3%	12.5
Henry Barnard School	$25,000	TBD	-	15,000	800	-	$3,100	64	62	2.9%	8.1
Prudence Crandall School	$0	TBD	-	-	-	-	$0	68	68	0.0%	NA
Enfield Street School	$10,000	TBD	54	3,400	(100)	-	$400	58	58	0.1%	25.0
Nathan Hale School	$5,000	TBD	-	4,000	(100)	-	$500	70	70	0.1%	10.0
Hazardville Memorial School	$50,000	TBD	100	7,000	-	-	$1,000	93	93	0.5%	50.0
Adult Day Care	$56,000	TBD	-	-	(6,200)	4,900	$10,300	210	192	8.6%	5.4
Family Resource Center	$0	TBD	-	-	-	-	$0	78	78	0.0%	NA
Angelo Lamagna Activity Center	$70,800	TBD	-	13,000	2,400	-	$4,600	132	113	14.3%	15.4
Department of Public Works	$107,500	TBD	-	29,000	1,100	-	$5,550	86	79	8.2%	19.4
Enfield Police Department	$0	TBD	-	-	-	-	$0	143	143	0.0%	NA
Enfield Senior Center	$207,000	TBD	33	47,000	1,300	-	$8,500	118	110	6.8%	24.4
Enfield Town Hall	$535,000	TBD	10	72,000	2,800	-	$13,800	111	88	20.8%	38.8
Total	***$1,247,300***	***$0***	***207***	***280,400***	***2,900***	***4,900***	***$62,250***	***77***	***76***	***1.7%***	***20.0***

Priority 3 - Building Summary

Building	Approximate Implementation Cost	Utility Incentive Available	Potential Utility Savings				Annual Cost Avoidance	Baseline EUI kBtu/sf	Projected EUI kBtu/sf	Overall Savings	Simple Payback Yr
			Demand kW	Electric kWh/yr	Gas Therm/yr	Oil Gal/yr					
Enfield High School	$0	TBD	-	-	-	-	$0	63	63	0.0%	NA
Enrico Fermi High School	$15,500,000	TBD	30	109,000	23,800	-	$42,500	77	63	17.7%	364.7
JFK Middle School	$1,400,000	TBD	-	11,000	8,000	-	$10,500	75	70	7.1%	133.3
Henry Barnard School	$800,000	TBD	3	2,000	3,300	-	$3,900	62	57	7.7%	205.1
Prudence Crandall School	$455,000	TBD	-	3,000	4,600	-	$5,600	68	61	11.4%	81.3
Enfield Street School	$750,000	TBD	(10)	(2,600)	4,300	-	$4,300	58	50	14.9%	174.4
Nathan Hale School	$640,000	TBD	-	-	5,500	-	$6,100	70	58	17.0%	104.9
Hazardville Memorial School	$1,400,000	TBD	-	(6,000)	14,000	-	$14,500	93	68	27.3%	96.6
Adult Day Care	$0	TBD	-	-	-	-	$0	192	193	-0.5%	NA
Family Resource Center	$0	TBD	-	-	-	-	$0	78	78	0.0%	NA
Angelo Lamagna Activity Center	$300,000	TBD	-	-	1,900	-	$2,100	113	101	11.2%	142.9
Department of Public Works	$20,000	TBD	-	-	800	-	$900	79	76	3.4%	22.2
Enfield Police Department	$75,000	TBD	-	-	1,600	-	$1,800	143	136	5.0%	41.7
Enfield Senior Center	$0	TBD	-	-	-	-	$0	110	110	0.0%	NA
Enfield Town Hall	$0	TBD	-	-	-	-	$0	88	88	0.0%	NA
Total	***$21,340,000***	***$0***	***23***	***116,400***	***67,800***	***-***	***$92,200***	***76***	***68***	***10.1%***	***231.5***

Priority 1, 2 and 3 - Building Summary

Building	Approximate Implementation Cost	Utility Incentive Available	Potential Utility Savings				Annual Cost Avoidance	Baseline EUI kBtu/sf	Projected EUI kBtu/sf	Overall Savings	Simple Payback Yr
			Demand kW	Electric kWh/yr	Gas Therm/yr	Oil Gal/yr					
Enfield High School	$0	TBD	(1,100)	180,000	31,100	-	$61,200	83	63	24.0%	-
Enrico Fermi High School	$15,500,000	TBD	30	109,000	23,800	-	$42,500	77	63	17.7%	364.7
JFK Middle School	$1,870,500	TBD	410	293,400	21,000	-	$67,300	89	70	22.1%	27.8
Henry Barnard School	$848,000	TBD	3	94,000	12,100	-	$27,300	79	57	27.5%	31.1
Prudence Crandall School	$533,250	TBD	100	51,600	8,500	-	$17,200	78	61	21.9%	31.0
Enfield Street School	$814,500	TBD	94	24,900	5,300	-	$9,500	62	50	20.4%	85.7
Nathan Hale School	$734,000	TBD	110	59,000	11,100	-	$21,100	86	58	32.8%	34.8
Hazardville Memorial School	$1,545,000	TBD	210	57,000	20,700	-	$31,200	109	68	38.1%	49.5
Adult Day Care	$63,500	TBD	32	10,500	(6,200)	5,130	$12,800	226	192	15.2%	5.0
Family Resource Center	$5,000	TBD	3	9,000	480	-	$1,800	94	78	17.1%	2.8
Angelo Lamagna Activity Center	$96,050	TBD	21	22,600	4,500	-	$8,390	136	101	25.9%	11.4
Department of Public Works	$492,500	TBD	214	109,400	1,400	-	$17,950	93	76	18.4%	27.4
Enfield Police Department	$48,250	TBD	-	15,400	2,400	-	$5,100	149	136	8.8%	9.5
Enfield Senior Center	$302,500	TBD	60	65,500	1,300	-	$11,300	102	84	17.3%	26.8
Enfield Town Hall	$561,000	TBD	525	429,000	2,800	-	$67,300	164	88	46.5%	8.3
Total	***$23,414,050***	***$0***	***712***	***1,530,300***	***140,280***	***5,130***	***$401,940***	***88***	***68***	***23.1%***	***58.3***

Strategy 1.2: Establish performance standards for new equipment purchases and for new building construction and major renovations

Reducing energy consumption by 20% over the next five years and sustaining and increasing those reductions beyond that will require that Town government and the Board of Education commit to a set of policies that ensure that future energy use is a criteria in purchasing and design decisions for buildings.

Actions:

1. Identify and implement policies to guide future purchases of equipment
   - Make life cycle energy use a criterion in product selection
   - Require that all new equipment meet a minimum energy standard (e.g. Energy Star)
   - Identify who is making buying decisions now and what their criteria are
   - Determine who will have authority to make future buying decisions and educate them as to the policies that have been adopted
   - Establish a mechanism for reporting and measuring adherence
2. Establish policies that govern energy performance of all new construction and major rehabilitation of buildings
   - Require that all new construction meets a documented and measurable performance standard (e.g. Energy Star, LEED, etc.)
   - Incorporate the performance standard in requirements documents for new construction
   - Engage an independent engineer to complete design reviews of all projects prior to construction
   - Engage a clerk of the works to oversee construction to ensure it is consistent with designs
   - Engage a commissioning agent to oversee building commissioning prior to acceptance and final signoff and payments

Current status:

The Town has not adopted formal policies regarding energy and new construction.

That being said, the design for the High School renovation is an example of savings that can be achieved by a forward-looking strategy and how building upgrades must be managed to preserve those savings. As a result of changes to state building codes and the advocacy of the Building Committee, the renovated High School incorporates technology that potentially will make it significantly more energy efficient than either of the two current high schools. On the other hand, the decision to include building-wide air conditioning capacity in the building creates the potential for the erosion of the energy reductions achieved. Effective energy management requires a combination of attention to equipment selection and operation. Putting appropriate schedules and controls in place to avoid unnecessary energy use will be critical to achieving the building's design potential.

Goal #2: Maximize the Town's cost-effective use of available renewable and non-greenhouse gas producing energy sources in Town and school buildings

As buildings are becoming more efficient, the Clean Energy Committee recommends that the Town investigate where and how renewable energy sources and particularly those sources that do not contribute to greenhouse gas emissions can be incorporated into energy supply strategies.

Strategy 2.1: Identify and pursue opportunities to incorporate renewable energy generation into the design of existing and future buildings

The Clean Energy Committee believes that the primary opportunities for using renewable energy sources in buildings are with solar electric and solar thermal technologies, ground-source heating and cooling, and recovery and use of methane generated by wastewater treatment.

Actions:

1. Inventory the availability of renewable energy sources to help supply the energy needs of individual buildings
2. Determine the feasibility of using the sources, including identifying any site constraints that might impact the appropriateness of using available sources and whether those constraints can be resolved (e.g. structural limitations to adding the weight of a solar system to a roof)
3. Where the project is feasible and constraints have a solution (e.g. increasing the structural capacity of a roof), evaluate the economics of adding the technology required to tap the renewable energy source
4. Identify funding sources for the project (e.g. grants, bond issues, developer financing and ownership with a power purchase agreement)
5. If the project is feasible and there is an acceptable financial path forward, develop a plan to proceed, as with any other construction project
6. For new construction, even if there are no funds available for including solar as part of the original construction, all buildings should as a minimum be designed as "solar ready."

Current status:

The Town has yet to complete a comprehensive inventory of renewable potential and opportunity. However, the design for the High School renovation project now in process did include elements that make that building "solar ready" in terms of having sufficient structural strength to carry solar panels and having considered where solar can be placed and including pathways for necessary electrical interconnections. Adding solar photovoltaic to the High School can be straightforwardly done using either ZREC financing from Connecticut Light and Power, or the Municipal Solar Lease program of Energize-CT. This should be done as soon as possible.

Strategy 2.2: Identify and pursue opportunities to develop renewable energy generation on Town land (but not associated with buildings or facilities) and then use the energy produced in Town buildings

It is possible to move electricity generated from renewable energy sources from a location where it can be produced to a location where it can be consumed. Transmission of this electricity uses the

electric distribution lines owned by CL&P, and interconnection procedures are regulated by the State. Many communities are capitalizing on the availability of municipally-owned brownfield sites within their boundaries (primarily capped former landfills) for repurposing as solar energy "farms." Most often, these farms are developed, owned, and operated by a private developer who sells the power produced to the community at an advantageous rate. Some communities have identified other excess property that is suitable for this purpose.

Actions:

1. Inventory potential locations for renewable energy generation to be sited and developed within the Town's boundaries
2. Consider other possible uses of the property under consideration to determine if there are other potential uses that are more attractive or create more value for the Town
3. Consider the technical feasibility of siting renewable energy generation at specific locations
4. Where renewable energy generation seems feasible and is potentially the best use for the site, engage in a public dialogue to gauge public opinion and particularly the perspectives of abutters and other nearby residents
5. If the project appears to be feasible and the site is acceptable to the community, proceed with identifying potential developers who would be interested in entering into a long-term ground lease and power purchase agreement with the Town

Current status:

To date, Enfield has taken no actions to pursue this strategy.

Financing Building Improvements

State and Utility Programs

Fortunately, in many cases where savings can be documented, there will be utility incentives available from CL&P. Connecticut's electric ratepayers have contributed surcharges into a fund that now provides financial assistance for municipalities (as well as homes and businesses) to improve their energy-efficiency and lock in long-term savings. Connecticut's Green Bank (the first in the nation) also provides well-designed financing programs with favorable terms for municipal and business energy upgrades. State and utility incentives can offset costs of most of the energy improvement priorities recommended by Peregrine, such as:

- High Efficiency Lighting
- HVAC Upgrades
- New automated building and HVAC controls
- Variable speed drives (VSDs) on motors fans and pumps
- High efficiency chillers, boilers, and furnaces
- High efficiency hot water heating systems
- Combustion and burner upgrades
- Water conservation
- Renewable energy systems

Also, with respect to renewables, Connecticut provides a leasing program for solar power systems on public buildings and schools, and an annual auction of financing known as ZRECs (Zero Emissions Renewable Energy Credits). A special funding program also supports micro-grid development, which might be able to support investment in energy upgrades for a cluster of buildings close together. As no-cost financing resources, these should be given priority to defray energy investments.

Local Capital Improvement Program

Unfortunately, these programs will not cover all of the costs for energy efficiency, renewable energy development, and replacement of major energy conversion equipment like boilers and chillers. Achieving the full, long-term savings potential by upgrading the Town's buildings will require significant investment. Building repairs and equipment replacement is inevitable over time, and funding these major improvements may require tapping the Town's CIP over a number of years. These improvements will need to compete with all other requests for capital, which could mean that savings from energy upgrades will come slowly. Pursuing these options in a piecemeal fashion means the Town will remain vulnerable to catastrophic equipment failures and rising repair costs.

Performance Contracting

An alternative, which the Town is exploring in detail, is to enter into an Energy Savings Performance Contract or "ESPC." The ESPC bundles together multiple projects into a single package and uses savings from efficiency improvements to pay for capital improvements. In such contracts, savings are guaranteed by the energy services company (or "ESCO") that does the work. By reinvesting guaranteed annual savings to pay for the project, the Town can reduce energy use and replace old and out-of-date equipment without raising taxes.

Enfield's Clean Energy Committee believes that the performance contract mechanism could be an excellent fit for the Town. This proven strategy has been and is currently being used by many Connecticut cities and towns, by the State of Connecticut, by the Federal government, and by others elsewhere in New York, New England, and across the country. Nationally, energy saving performance contracting is a decades-old, $4.1 billion industry. Since 1990, performance contracts have led to $40 billion in completed projects and $50 billion in savings for the building owners. They have provided 330,000 person-years of direct employment for engineers, technicians, finance and administrative professionals and others, while cutting CO^2emissions by 420 million tons.

Connecticut has recently kicked off its own statewide Energy Savings Performance Contracting program, developed by an inter-agency workgroup and run by CEFIA and DEEP. Performance contracting is available to school systems as well as municipal governments. The program's resources include a pre-qualified vendor list, technical support, financing, and standardized contracts to provide a repeatable, transparent process for towns and vendors alike. A well-managed performance contract will allow Enfield to capture energy savings, increase building comfort, and protect against maintenance crises, while making the best use of resources by bundling building upgrades together for focused professional attention.

The following Connecticut communities have or are currently using performance contracts: Bethel, Bolton, Bridgeport, Bristol, East Hartford, Fairfield, Farmington, Middletown, Milford, Naugatuck, New Britain, Norwalk, South Windsor, Stamford, Stratford, Waterbury, West Hartford, Windham.

Energy Savings Case Study[3]

The Town of Fairfield received the 2014 Power of Change Award (a public-private partnership between the state and three foundations) for Overall Excellence for its leadership in municipal building upgrades. The highest efficiency HVAC equipment was installed through a $7 million performance contract with Johnson Controls. Large buildings were equipped with dual fuel capability, lighting upgrades, and a fully automated computerized system for energy maintenance. Town employees were trained to operate the new equipment. Two new energy generation facilities were constructed - one producing 590kW and the other 50kw, through multiple means of alternative energy production. Adding to the town's carbon emissions reduction was a purchase of 20% green power through Renewable Energy Credits, and an improvement in recycling to achieve a 50% rate.

Through these measures, Fairfield was able to reduce electricity use by 22% and fuel oil consumption by 86% while cutting building maintenance costs 20%. As a result, the town's total heating bill (paid for by taxpayers) is now less than it was in 1996.

[3] Source: www.sustainablect.com, used with permission.

Achieving Energy Objectives for Town and School Vehicles

Baseline

During calendar year 2013, Town of Enfield vehicles used 126,536 gallons of unleaded gasoline and 119,182 gallons of diesel fuel. Vehicles accounted for 22% of Town energy use on an MMBtu basis and 20% of Town energy expense during this period. The distribution of this fuel use by department, with cost, is as follows:

Department/Division	Gas/Gallons	Total Cost/Gas	Dsl/Gallons	Total Cost/Dsl	Total Fuel Cost
B & G	12,843	$ 40,150	12,440	$ 38,489.44	$ 78,639
Building Code Enforcement	750	$ 2,345	0		$ 2,345
Community Dev. Block Grant	446	$ 1,404	0		$ 1,404
Custodial	899	$ 2,816	53	$ 164.73	$ 2,981
Dial-A-Ride	21,935	$ 68,540	0		$ 68,540
Emergency Management	252	$ 776	0		$ 776
Emergency Medical Services	1,677	$ 5,243	18,640	$ 57,654.82	$ 62,898
Engineering	0		0		
Equipment Maint. & Repair	805	$ 2,515	251	$ 776.88	$ 3,292
Highway Maintenance	2,866	$ 8,943	14,555	$ 45,043.34	$ 53,987
Information Technology	438	$ 1,369	0		$ 1,369
Magic Bus	11,426	$ 35,822	0		$ 35,822
Planning	28	$ 89	0		$ 89
Enfield PD	68,251	$ 213,277	55	$ 168.44	$ 213,446
Public Works Admin	756	$ 2,369	0		$ 2,369
Recreation Administration	121	$ 374	0		$ 374
Refuse Collection & Disposal	1,023	$ 3,191	63,231	$ 195,590.15	$ 198,781
WPC (DIESEL)	0		9,957	$ 30,796.71	$ 30,797
WPC (GAS)	2,020	$ 6,297	0		$ 6,297
TOTAL	**126,536**	**$ 451,172**	**119,182**	**$ 368,684**	**$ 819,856**

Opportunity Assessment

The Town of Enfield has both special purpose vehicles with limited opportunity for replacement with more efficient models, as well as a number of more-or-less general-purpose vehicles. Special purpose vehicles include Public Safety pursuit vehicles, snowplows, construction equipment, heavy trucks, street cleaning vehicles, etc. Many of these vehicles use diesel fuel.

While fuel-efficient alternatives are not available for some of these vehicles, their operating efficiency can generally increase through the adoption of energy efficient operating and maintenance practices.

Goals and Strategies

Goal #1: Reduce energy use by Town vehicles by at least 20% in five years

The Clean Energy Committee recommends that the Town make every effort to continuously improve the overall fuel efficiency of its vehicle fleet. We suggest three strategies to consider in pursuing this goal: adherence to proven energy efficient operations and maintenance practices and replacement of vehicles with more fuel-efficient models.

Strategy 1.1: Adopt operations and maintenance policies and practices that reduce fuel use

Driving habits, route selection, maintenance practices, and motor oil and tire choices all affect fuel efficiency.

Actions:

1. Acquire a fuel management system that tracks fuel use by vehicle and driver and review reports for patterns that indicate opportunities for improvements
2. Adopt maintenance procedures, in terms of when vehicles are serviced, what service they receive, and what supplies are used, that improve fuel efficiency and extend vehicle life
3. Provide training as appropriate for employees that drive Town-owned vehicles in energy-conscious driving habits
4. Develop policies to reduce vehicle idling and conserve fuel
5. Review vehicle routes for plowing, pick-up and drop-off of bus and van passengers, refuse pick-up etc. to determine if there are more efficient alternatives
6. Encourage contractors who provide transportation or other vehicular services to the Town to adopt practices and procedures that will reduce fuel use
7. Continue to monitor the fuel efficiency performance of all vehicles to identify further opportunities for improvements.

Current status:

Town-owned vehicles are managed and maintained by the Public Works department under the direction of the Town's Fleet Manager. Public Works provides centralized maintenance services for vehicles and maintains a central fuel depot where all Town vehicles get their unleaded gasoline or diesel fuel.

The Town has had a fuel management system for a number of years that was recently upgraded to FuelMaster, one of the leading products available, which has the capability for detailed reporting by department, fuel, vehicle, and by driver, if needed. The Town also employs a vehicle maintenance software package to track mileage and service of individual vehicles.

To date, there is no idling policy in place, though it has been the subject of discussion. So far, the Town has not included fuel efficiency as a criterion for selecting replacement vehicles, but should start using these considerations going forward.

Strategy 1.2: Replace vehicles with the most energy efficient models available to accomplish the purpose for which the vehicle is to be used.

Given tight municipal budgets, low first cost is often a criterion for vehicle purchase, and finding the most expeditious solution is a typical operating procedure for providing vehicles and transportation. When energy-inefficient police department pursuit vehicles are retired after some number of years, those that still run may be passed on at no cost to another department even though that department's driving needs may be very different. Similarly, large, less energy-efficient multi-task vehicles may be purchased when a sedan may do as well, just in case the occasion comes up when more space is needed.

Action:

1. Inventory vehicle needs and performance for all departments
2. Establish a plan for vehicle replacement based on vehicle age, performance, and number of annual vehicle miles

3. When the need arises to replace an existing vehicle or add a new one, evaluate what the vehicle requirements are and match those needs to the specifications of available vehicles
4. Purchase a replacement vehicle that meets that need that is as fuel efficient as possible

Current status:

To date, the Town has not taken a comprehensive approach to vehicle purchasing with an eye toward reducing fuel use.

Achieving Energy Objectives for Street Lighting

Streetlights

The Town of Enfield owns its streetlights, having purchased them from CL&P more than five years ago. There are 3,691 high-pressure sodium (HPS) cobra head style streetlights with wattages of 70W, 100W, 250W, and 400W. The majority of the lights are 70W. In addition, there are a total of 9270W decorative streetlights, two with double heads, in Hazardville and Thompsonville. These are HPS technology.

Streetlight use is typically not metered; consumption is calculated using an average number of hours of operation assumed for each month from sunset to sunrise that is multiplied by the wattage of individual lights. Total annual energy use for streetlights billed to Enfield in FY2014 was $316,277.

Streetlight maintenance is supervised by the Public Works department and contracted out to Siemens. The current contract has just been awarded and is for a single year with the option of two one-year extensions. The contract value is $61,500 annually plus additional charges for emergency costs.

Traffic signals

Traffic signals are owned and maintained by the Town. Each of these signals is metered. They are mostly incandescent technology. Eight local intersections are signaled with Town equipment, with a total of 31 sets of lights, all with multiple signals. There are additional blinking yellow signals, which are state-owned.

Goals and Strategies

Goal #1: Reduce energy use by streetlights by 50% over the next five years

The Town should apply its policy of replacing older equipment with more energy efficiency state-of-the-art technology to streetlights as well. CL&P has, in the last couple of years, adopted new rate structures that will apply to the latest light emitting diode (LED) streetlights. Like the current streetlight rates, these new rates are based on calculated consumption by streetlights of various wattages.

Strategy 1.1: Review the current streetlight inventory to identify lights that could be eliminated and locations where reduced lighting levels might be appropriate and desirable

Streetlight placement typically occurs in a gradual, organic way without an overall plan. Intersections at lit as are long stretches of roadway. Streetlights are included in new subdivisions and other developments and then ownership passes to the Town. Lighting levels are established with particular objectives in mind which may or may not still be appropriate. Changes in technology over time may not have been reflected in lighting designs. Technology available today may create opportunities for reassessment of what the requirements are for "effective" lighting.

Strategy 1.2: Convert all street and parking lot lighting owned by the Town to LED

Conversion of streetlights to state-of-the-art light emitting diode technology will reduce energy use by 50% on average. LED streetlights last more than twice as long as older high-pressure sodium technology, reducing maintenance expense. LED technology provides much more natural color rendition (which is an aid to law enforcement), and LED lighting can be configured to eliminate the shadowing effect that is common to HPS streetlights.

Goal #2: Convert all traffic signals to best available technology to achieve reductions

If the Town has any traffic signals that have not yet been converted to LED from incandescent, these conversions should be implemented as soon as possible. Savings from conversions from incandescent to LED are around 90% of energy use.

Residential Energy Strategy

Enfield's residential energy strategy supports improvements to existing homes and new construction with all forms of ownership and residents with all income levels. Enfield's housing stock includes owner-occupied detached homes and multi-unit condominiums, as well as a range of rental housing types. Households have a broad spectrum of incomes, with the majority middle income. The Enfield population is stable, but there is ongoing new home construction.

Benchmarking Residential Properties

Primary energy end-uses include heating, cooling, hot water, lighting, and various plug loads, including appliances. Energy use in Enfield residences is assumed to be typical of other Connecticut housing stock of comparable age and construction. Newer residential property is assumed to be more efficient by design than older properties due to evolution in building practices and codes to include more insulation and better windows and doors and due to the fact that heating and cooling equipment and appliances are newer and subject to increased government standards.

Opportunity Assessment

Energy-efficiency and renewable energy are equally important priorities. Opportunities for energy efficiency improvement include weatherization (wall and ceiling insulation and whole building air sealing), adding mechanical ventilation, replacing older heating systems with more energy efficient technology, replacing older cooling equipment with more energy efficient technology, temperature setbacks and scheduling through automated controls, improving hot water heaters and better managing hot water use, making lighting upgrades to more efficient technologies, and replacing older inefficient appliances with Energy Star products. Additional benefits of these actions, beyond energy cost reduction, are improved household comfort and health. Energize-CT, a state program supported by electric rate surcharges and operated in partnership with the local investor-owned utility, offers a range of economically priced energy efficiency programs and services to assist residential customers to use energy supplied as efficiently as possible. Special government-subsidized programs are also available from Community Action Agencies to assist income-eligible residents.

Renewable energy opportunities in residential properties are primarily the installation of solar photovoltaic (electricity generating) systems and solar thermal (hot water generating) systems on south facing roofs. Some biomass options also exist, such as self-feeding pellet stoves. Air-source heat pumps, also known as "ductless mini-splits," can greatly reduce fossil fuel use; ground-coupled heat pumps can also be cost effective in some situations. The economics of renewable energy systems for households are different from utility-generated power in that the entire system is purchased upfront and owned by the user; even when the systems are highly cost-effective over the long term, financing is an issue. Group purchasing programs and state-sponsored loans are beginning to make these purchases more economical.

Goals and Strategies

Existing homes

Goal #1: Assist at least 20% of households to achieve 20% energy reductions over five years

The Town and ECEC will develop an effective methodology for expanding household participation in energy upgrades, targeting residents of existing housing stock and assisting them to use programs, services, and methods, as appropriate to their ownership status to reduce energy consumption and expense.

Strategy 1: Make energy information and inspiration available to all residents on a regular basis.

Create a formal public outreach initiative that is organized as appropriate by market segments, such as owner-occupied single-family homes, tenants and landlords, condominiums, and low-income households.

Specific actions can include:

- Incorporate creative educational and social marketing strategies to help people understand energy-saving opportunities and inspire them to act. Use Challenge campaigns, Energy Expos, Town website, Town-sponsored events, newsletters, etc., and address resident groups such as homeowner and neighborhood associations.
- Promote websites such as Energizect.com, EPA.gov, Department of Energy's Energy Saver section
- Engage local vendors of energy products and services in events to make presentations.
- Engage community volunteers who already have installed energy-efficiency measures, solar or geothermal systems, heat pumps and other new technologies as "ambassadors" to answer questions and address concerns of prospective buyers.
- Collaborate with local non-governmental organizations engaged in energy outreach.

Strategy 2: Encourage residents to use existing resources for energy efficiency and track participation

1. Partner with utilities and agencies to bring certified auditors and technicians from established efficiency programs to Enfield's homes, and target groups with specific needs and opportunities.

    - **Owner-occupied homes:** Supplement direct outreach by service providers with locally initiated neighborhood, block-based, market channel outreach strategies, partnering with Home Energy Solutions contractors, civic associations and other membership organizations to engage households at a significant scale. Consider organizing a neighborhoods competition to spark interest in home energy audits throughout the neighborhoods in town.
    - **Tenants:** Develop specialized service packages for tenants based on steps they can take on their own with landlords on energy initiatives. Reach out to and educate larger landlords.
    - **Condominiums:** Approach condominium associations to identify opportunities and mitigate constraints for energy efficiency upgrades that benefit entire buildings as well as individual units. Bring educational presentations to condominium residents in a coordinated manner.
    - **Low-income residents:** Help publicize the Home Energy Solutions-Income Eligible (HES-IE) program of Energize-CT that provide free home assessments and energy-

saving services; collaborate with Neighborhood Services to bundle and integrate energy outreach with healthy home services such as asbestos and mold removal.

2. Supporting energy-efficiency upgrades in renovations by providing information through the building department when permits are issued. If possible, fast track those permits and inspections involving energy efficient upgrades.

3. Track and publicize how much and what has been done by Enfield residents by market segment to reduce their energy use.

Goal #2: Increase the number of solar installations in town by at least 50% per year

The ECEC had a successful Solarize Enfield campaign in 2013 and 2014, tripling the penetration of photovoltaic systems in the Town. As solar systems become more widespread, familiar with their appearance and public acceptance should grow, with early adopters being joined by "just plain folks".

Strategy 1: Evaluate success and challenges of Solarize Enfield 2013-14 and develop an annual outreach campaign incorporating lessons learned and new incentives.

Strategy 2: Integrate outreach for solar PV with complementary technologies that reduce fossil fuel consumption such as air source heat pumps.

There are electric-based heating and cooling technologies that can be cost effective alternatives to conventional fuels if the electricity required is generated from a renewable source. Integrating PV with such technologies can be attractive.

Strategy 3: Investigate and market cost-effective solar thermal technologies for dedicated outreach campaigns.

Solar thermal is widely in use in many countries and even other areas of the U.S. It was a growing technology here in the 1980's and 1990's until market changes caused vendors and suppliers to disappear. New technologies and vendors are bringing solar thermal back, but outreach is needed to bring consumers back to it.

Strategy 4: Address any zoning or regulatory barriers to PV installation

Examples include: working with the Planning and Zoning Commission to establish guidelines for virtual net metered solar installations on farms and the Historic District Commission to establish guidelines for renewable energy installation in the historic district.

New Construction

Goal #1: Have all new residences constructed in Enfield going forward qualify for ENERGY STAR status

In Connecticut, there have been **9,750** ENERGY STAR certified homes built to date. **432** ENERGY STAR certified homes have been built in 2014 thus far, and **361** ENERGY STAR certified homes were built in 2013. To earn the ENERGY STAR, a home must meet strict guidelines for energy efficiency set

by the U.S. Environmental Protection Agency (EPA). Homes achieve this level of performance through a complete package of building science measures including:

- A Complete Thermal Enclosure System – Comprehensive air sealing, properly installed insulation, and high-performance windows work together to enhance comfort, improve durability, reduce maintenance costs, and lower monthly utility bills.
- A Complete Heating and Cooling System – High-efficiency systems are engineered and installed to deliver more comfort, better moisture control, improved indoor air quality, quieter operation.
- A Complete Water Management System – A comprehensive package of best building practices and materials protects roofs, walls and foundations from water damage, provides added protection, and reduces the risk of indoor air quality problems.
- Energy-Efficient Lighting and Appliances – ENERGY STAR certified lighting, appliances, and fans are commonly installed throughout ENERGY STAR certified homes, helping to reduce monthly utility bills, while providing high-quality performance.

To ensure that a home meets ENERGY STAR guidelines, third–party verification by a certified Home Energy Rater (or equivalent) is required. This Rater works closely with the builder throughout the construction process to help determine the needed energy-saving equipment and construction techniques and conduct required on-site diagnostic testing and inspections to document that the home is eligible to earn the ENERGY STAR label.

Strategy 1: Identify who is building residential properties in Enfield, educate them about ENERGY STARhomes, and encourage them to join the program and follow Energy Star guidelines in new projects.

Strategy 2: Provide incentives such as accelerated and/or streamlined permitting, discounted or delayed permit fees, priority field inspections, priority with code processing, increased density allowance, and reduced grid hookup fees for ENERGY STAR certified homes.

Goal #2: Make all new construction "solar-ready"

Solar-ready homes have been built with roofs facing south, roof structures strong enough to accommodate the weight of solar equipment, and plans for wiring requirements of systems. Enfield can facilitate solar adoption in new construction by establishing solar-friendly zoning and design guidelines that are in line with community aesthetics and that require solar-readiness in new construction.

Resources for Financing Residential Energy Improvements

Small loan pilot: CL&P customers can borrow$1000-$3000, 0% interest for insulation, certain water heaters. Repayment is on electric bill. No credit check is required if electric bill has been paid on time.

Insulation and Appliances: (CL&P offers low-interest (2.99% to 6.99%) loans for measures recommended by Home Energy Solutions. $3000 to $25,000 loans for insulation, heating/ cooling systems, water heaters. Up to 20% for necessary non-energy improvements.

CT Housing Investment Fund Energy Conservation Loans: Low interest, income guidelines apply. Info: http://www.chif.org/page/energy-conservation-loan-program.

Smart–E: http://www.energizect.com/smartefinances many energy efficiency or renewable energy measures. Up to 20% of the borrowed amount can be used for health and safety upgrades (i.e. asbestos or lead remediation), roof repair, EnergyStar small appliances, or other related measures.

Cozy Home: This program has same rules as Smart-E, but designed for residents earning below 80% of Area Median Income. Details at http://hdf-ct.org/lending-products/cozyhome or call (888) 232-3477.

Commercial & Institutional Energy Strategy

Enfield's commercial and institutional energy strategy targets commercial buildings occupied by businesses and by institutional users such as private schools, health-care, and other non-profit organizations. Occupants may be owners of properties or tenants within those properties. This market sector includes older existing properties, as well as recent or future new construction. For nonprofit institutions, the benefits of energy improvements are compelling because energy cost savings are available to be invested in service offerings and in other areas of business operations.

Benchmarking Commercial and Institutional Properties in Enfield

Primary energy end-uses in this market sector include heating, cooling, hot water, lighting, and various plug loads, and may also include business-specific process energy use. Energy use by Enfield's commercial and institutional buildings is assumed to be typical of other Connecticut properties of comparable age and construction.

Opportunity Assessment

Opportunities for energy efficiency improvement include weatherization (wall and ceiling insulation and whole building air sealing), adding mechanical ventilation, replacing older heating systems with more energy efficient technology, replacing older cooling equipment with more energy efficient technology, temperature setbacks and scheduling through automated controls, improving hot water heaters and better managing hot water use, making lighting upgrades to more efficient technologies, and replacing older inefficient equipment with Energy Star products. Energize-CT offers a range of economically priced energy efficiency programs and services to assist commercial customers to use energy as efficiently as possible.

Goals and Strategies

Goal: Reduce energy use by as many businesses as possible by 20% over the next five years

Strategy 1: Outreach and education

The Town, through its committee structure and in cooperation with the Clean Energy Committee, should develop and implement an outreach program for energy-efficiency and renewable energy upgrades, including business-oriented outreach through the Chamber of Commerce, Rotary and other service organizations, and town-sponsored events such as business breakfasts.

Strategy 2: Publicize local success stories

Engage local businesses and institutions that have implemented energy improvements as "energy ambassadors" who can inspire others to do the same. Focus on high-impact businesses such as restaurants, health clubs and other gathering places; hardware stores and other points where the building trades come together; high-profile commercial centers such as the malls; and well established institutions such as houses of worship. Develop case studies, gather testimonials, and wherever possible, involve business leaders as peer mentors with their colleagues.

Strategy 3: Encourage participation in utility programs and services and available financing programs

Advise businesses to take advantage of utility services and targeted financing options such as the Connecticut Green Bank's loan program, C-PACE, and integrate education about these options with the overall package of business services provided by the Town of Enfield.

Strategy 4: Encourage use of renewables

Recognizing that public policies can affect the ability of building operators to use renewable energy, the Enfield Clean Energy Committee will work with relevant agencies, boards and commissions to prepare for the Town Council specific policy recommendations to overcome barriers, and specifically to:

- Identify and remove any zoning barriers to the utilization of renewable energy for business sectors, such as agriculture
- To support local joint ventures in renewable energy and expand access for commercial and institutional building owners regardless of their orientation and shading conditions, advocate for expanded virtual net metering without restriction among Connecticut electric customers.

Resources for Financing Commercial and Institutional Energy Improvements

C-PACE: Commercial and Industrial Property Assessed Clean Energy: C-PACE is a financing program of Connecticut's Green Bank, designed to reduce energy costs and greenhouse gas emissions. It offers affordable financing to property owners to undertake energy efficiency and clean energy improvements on their buildings. Businesses who are approved for the program repay investments through a benefit assessment on their property tax. C-PACE requires no money down, providing 100% upfront financing to the owner for various energy efficient upgrades.

C-PACE payback schedules are specifically structured so that projects will be cash flow positive. The dollars saved through energy upgrades are sufficient to cover the loan payments. C-PACE repayment obligations are attached to the property, not the owner. If the facility changes ownership, the new owner takes on both the payback responsibility and the energy-saving benefits including permanent savings after the loan is repaid.

SBEA: Small Business Energy Advantage Program: Businesses interested in reducing energy usage and upgrading to energy efficient equipment can also take advantage of SBEA. The program offers no-cost, no obligation audits of business facilities and makes recommendations to save energy and money through energy efficient upgrades. The program offers incentives from Connecticut Light and Power, and low interest on-bill payment plans to make energy efficiency an achievable goal.

Next Steps

Guiding Principles

The ECEC recommends that the Council follow these guiding principles as it manages the Town's resources and addresses the needs and interests of Town residents and businesses.

Plan for our Energy Future

We suggest that energy considerations can be formally integrated into future planning, decision-making, and operations. This will ensure that energy impacts of decisions made are naturally and proactively addressed, rather than treated as a separate topic.

Specifically, we recommend:

1. Increasing energy efficiency and using clean energy sources is a formally addressed and considered in all Town planning and development efforts, focusing on life cycle cost benefits and other advantages that can be gained by this approach, and that all public sector building or renovation projects include renewable backup power and energy storage, to the extent that this is cost-effective.
2. Requiring an opportunity assessment for micro-grids in all neighborhood and district development plans, preparing to make full use of Connecticut's micro-grid funding program and attract private investment. The Town should make it a priority to develop a community-based energy security plan using renewable energy in combination with backup generators and energy storage, to ensure reliable access to electricity in any extended power outage.

Avoid lost opportunities for increasing energy efficiency and renewables in operations

The Town should make every effort to maximize energy efficiency and renewable energy deployment in new construction and renovation of schools and public buildings, and make results and benefits visible through performance monitoring, exhibits, and signage. To that end:

- Reduce lighting ,heating, cooling, and other electricity consumption wherever possible through improvements to operations and maintenance, the use best available energy technology, and the replacement of aging energy infrastructure with equipment with the lowest life cycle cost
- Embrace the use of natural lighting and green infrastructure (green, light or reflective roofs, living walls, rain gardens near usable outdoor spaces for natural cooling), and passive solar design in buildings
- Set a standard of solar-readiness for new buildings, and secure increasing percentages of energy from renewables from any workable combination of onsite generation, virtual net metering and purchase of Renewable Energy Credits.

Commit to Making Enfield an Energy-Smart Community

Energy improvements should not be made only once. There are continuous opportunities for improvement as technologies and project economics change. Enfield can distinguish itself by, not only promoting widespread participation in current state and utility-sponsored energy programs,

but also helping citizens become wiser users of energy and discriminating customers in the energy marketplace.

Partner with the schools for energy education at every learning level

The Town's investment in its schools is great and growing. We suggest that the Town create an energy curriculum that encourages and highlights energy topics in STEM education for K-12 and adult education, as well as providing community-based programs through the Enfield Clean Energy Committee.

Help Educate Consumers

Consumer education and fact-based advocacy should be a priority in the Enfield Energy Strategy. The marketplace is filled with energy products and services of inconsistent quality and claims. The Town should broadly distribute the useful educational resources available through Energize-CT, for "101 level" introduction to energy concepts and resources and build on these with advanced materials collected and developed by the Enfield Clean Energy Committee that address community needs and opportunities.

Implementation

The Clean Energy Committee recommends that Town Council formally endorse the vision and goals presented in this document.

Implementing Enfield's Energy Strategy will be a shared responsibility.

- Political leadership at the highest levels of town government will be required to encourage the use of sound energy criteria in government operations. Town Council approval is needed for policies and major investments.
- Town staff will make decisions that concretely integrate energy criteria into purchasing and operations, as well as developing recommendations for our future energy infrastructure, in consultation with the Council and Clean Energy Committee.

Enfield's Energy Strategy addresses not only government operations, but also making energy savings and cleaner choices easily available to the entire Enfield community. The Enfield Clean Energy Committee, tasked with promoting energy efficiency and renewable energy town-wide, envisions having an ongoing role in implementation.

Full implementation will include:

- Town Council by resolution applying the strategy to government operations, planning and development, and programming, and directing town staff accordingly;
- The Enfield Clean Energy Committee establishing implementation plans for the aspects of the strategy that involve residents, businesses and institutions;
- Committee, Council, and staff creating a timeline for actions, metrics for outcomes, and a mechanism for periodic evaluation of successes and refinement of strategies.

The research and conversations carried out to create the Enfield Energy Strategy have established a clear, realistic set of opportunities to pursue. The walk-through assessment conducted by Peregrine made it clear that more detailed, investment-grade building assessment is worthwhile, and the recommended savings goal of 20% should be pursued without delay. Fleet energy use is significant, and controllable, through the simple recommendations made by Peregrine. The same is true for street lights. Purchasing policy and facility use behavior are choices within the control of the Town that can build momentum for serious implementation of the Energy Strategy. In the residential and commercial/ institutional sectors, the Committee will continue developing and implementing outreach programming with a special focus on helping to stabilize energy costs for Enfield's low and moderate income residents, and establishing the foundation for "energy smart community" initiatives.

Energy planning is a powerful exercise in building consensus about local priorities and taking responsibility for the economic use of resources as a community. The Enfield Clean Energy Committee is pleased to endorse this Strategy and eager to support its implementation.