Town of Warren

Strategic Energy Plan

March 2011

Highlights and Key Recommendations

- The Town of Warren has had energy audits completed at two of its facilities, identifying important recommendations for improving energy efficiency. The Town should pursue having energy audits done for all of its buildings. While this Plan provides some general recommendations (*see Recommended Energy Reduction Strategies section*), an in-person energy audit can identify more specific weaknesses in building performance, recommend improvements, and provide cost and savings estimates.

- In order to prioritize the order in which buildings are audited and become targeted for efficiency improvements, the Town must have a solid understanding of the existing energy *performance* of its facilities. The data in this Plan provides information on energy consumption, but the Town needs to supplement this data with complete building information, including accurate square footage details. With square footage information, the buildings can be measured for their energy intensity and the least efficient buildings can be prioritized for earlier investment in energy upgrades. An initial review of energy intensity by building has been provided in this Plan and indicates that the Town's fire stations would be the most appropriate next set of buildings to be audited, as current data and information indicates that these buildings are the most energy intensive in the Town. However, as stated, the Town should confirm this information and all building information before finalizing any building prioritization.

- Using the baseline Calendar Year 2009, the Town of Warren's total energy consumption was equivalent to **26,804 MMBTU**. This amount of energy consumption results in the emission of **2,485 metric tons of carbon dioxide equivalent.**

- Through the process of collecting the Town's energy data and developing this Plan, the Town now has a complete list of its 82 utility accounts. The accounts and associated data have been mapped to specific Town facilities and entered into Energy Star's Portfolio Manager web-based tool. This will facilitate the benchmarking and tracking of Town energy consumption for the future.

Energy Conservation Efforts to Date

This Strategic Energy Plan provides a comprehensive look at energy use in all Town facilities and vehicles, suggests energy reduction goals, and offers recommendations for achieving these goals. With the strategies outlined in this Plan, the Town aims to reduce costs associated with the energy consumed in its facilities and vehicle fleet. Reducing energy costs is a significant goal for the Town, and the Town recognizes that reducing energy consumption will save money and also reduce the Town's environmental impact, specifically its contribution to emitting greenhouse gases, which are known to cause climate change.

In 2008, the Town Manager initiated an evaluation of energy usage and opportunities for reduction in all of its municipal facilities and fleet. National Grid conducted energy audits at Town Hall and the Government Center building. Specific recommended measures for each of these two facilities are in two audit reports, each entitled "2008 Energy Action Plan." In 2010, the Town received an ARRA-funded Energy Efficiency and Conservation Block Grant (EECBG) to implement several of the energy conservation measures outlined in the 2008 audits. Additionally, in 2010, Demand Management Institute in coordination with National Grid conducted an energy audit on the Warren Wastewater Treatment Facility. The purpose of the audit was to identify energy saving opportunities and information on National Grid's Price Response Program. While the facility is not currently eligible to participate in this program, the report provides a number of key energy efficiency opportunities. The recommendations from all of these studies are summarized in this report.

In addition to energy conservation measures, the Town should look to renewable energy sources. In 2006, ESS Group, Inc. prepared a Preliminary Feasibility Study for proposed siting of a Tidal In-Stream Energy Conversion (TISEC) system in the Warren River. While further studies are required, this preliminary study indicated that the project area proposed (confluence of the Warren and Palmer Rivers) is suitable for a TISEC system that could provide renewable energy to power municipal operations. Warren's participation in the East Bay Energy Consortium (EBEC), a 9 town consortium of East Bay towns formed in 2009 may also provide opportunities for renewable energy resources. EBEC is currently working to secure a site in Tiverton to install eight to ten 2.5 megawatt wind turbines to benefit the EBEC communities. If successful, and depending on the scale, the project has the potential to offset the Town's entire electrical load. In addition, the EBEC is working to explore brightfields (the conversion of property to solar farms), the privatization of streetlights and other efforts where pooled municipal resources may further reduce costs and conserve energy.

Current Municipal Energy Use

This section of the Strategic Energy Plan summarizes data collection efforts and establishes the Town's official **energy use baseline**, from which all future energy reduction efforts will be measured.

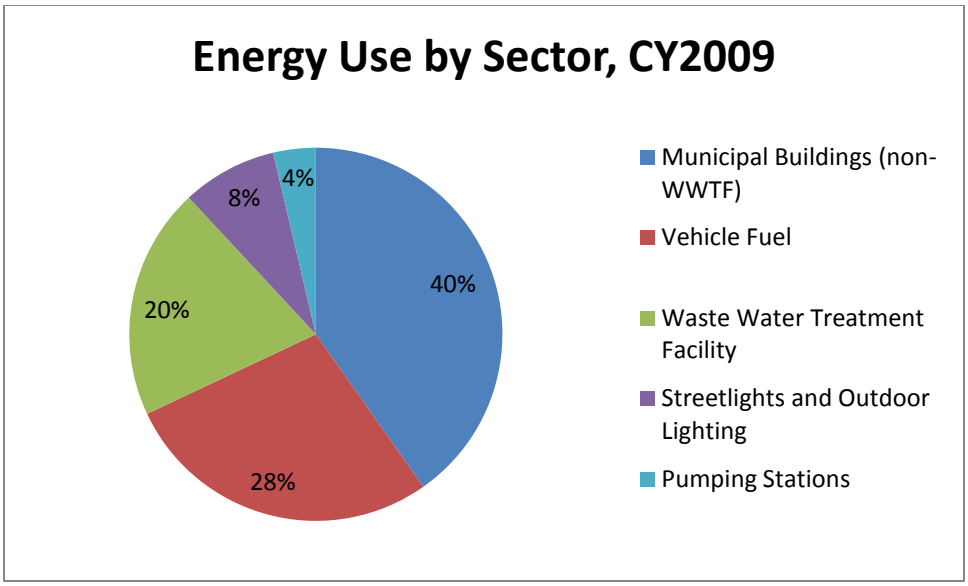
To determine the annual energy use of municipal operations, the Town of Warren collected data on electricity, natural gas, heating oil, propane, gasoline and diesel fuel use for all of its facilities, vehicles, sewer pumps, and outdoor lighting. The Town selected Calendar Year (CY) 2009 as the baseline year from which to measure all progress. In addition, the Town's facilities have been entered into the Environmental Protection Agency's **Energy Star Portfolio Manager** web-based tool. This online tool enables the Town to enter building information (type, square footage, location), as well as monthly energy consumption data, creating a record that benchmarks energy use over time. The Town can use Portfolio Manager to earn the **Energy Star** rating, which demonstrates that facilities have reached above-average energy efficiency levels. When a facility receives an Energy Star rating of 75 or higher, it becomes eligible for Energy Star designation[1]. It is recommended that the Town review the Portfolio Manager data to ensure it is complete and updated (no more than 3 months old) to be eligible for an Energy Star rating.

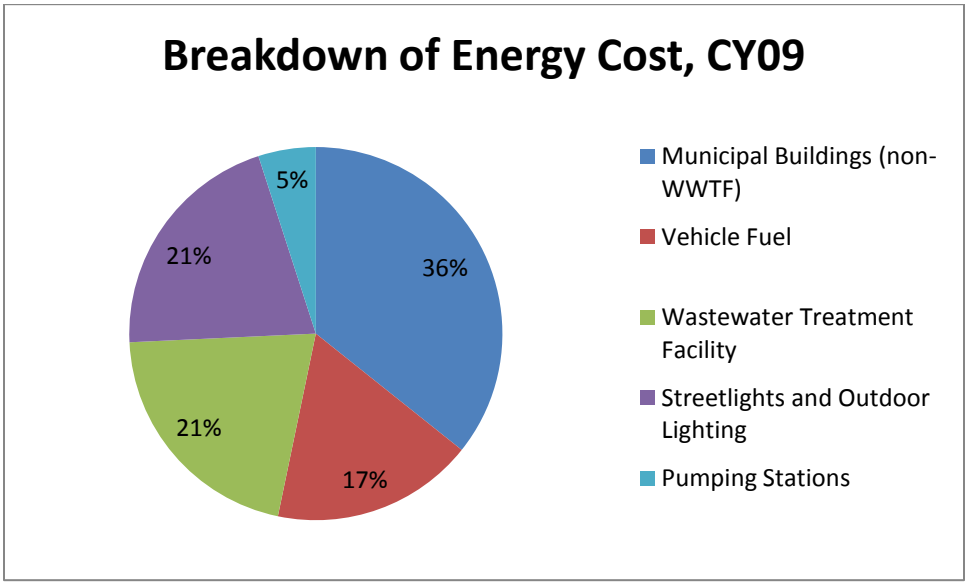
Using the baseline Calendar Year 2009, the Town of Warren's total energy consumption was equivalent to **26,804 MMBTU** (units of energy are expressed in MMBTU, or one million British Thermal Units to allow for consumption comparisons among fuels that are measured in different units.) This amount of energy consumption results in the emission of **2,485 metric tons of carbon dioxide equivalent**. That amount of greenhouse gas emissions would require 530 acres of pine forest to absorb it in one year[2] (imagine 400 football fields of pine trees).

Energy Baseline - CY09			
Facility	**MMBTU - Total**	**Energy Cost - Total**	**Total CO2e (metric tons)**
Municipal Buildings (non-WWTF)	10,781	$ 295,983.98	1008
Vehicle Fuel	7,443	$ 145,466.00	538
Wastewater Treatment Facility	5,386	$ 174,010.42	557
Streetlights and Outdoor Lighting	2,208	$ 172,082.34	274
Pumping Stations	985	$ 41,276.89	108
TOTAL	**26,804**	**$ 828,819.63**	**2,485**

[1] Additional application procedure is required to receive designation from EPA Energy Star and plaque of recognition.

[2] U.S. EPA Greenhouse Gas Equivalencies Calculator (http://www.epa.gov/cleanenergy/energy-resources/calculator.html#results)


Energy Use by Sector, CY2009
40%
28%
20%
8%
4%
Municipal Buildings (non-WWTF)
Vehicle Fuel
Waste Water Treatment Facility
Streetlights and Outdoor Lighting
Pumping Stations

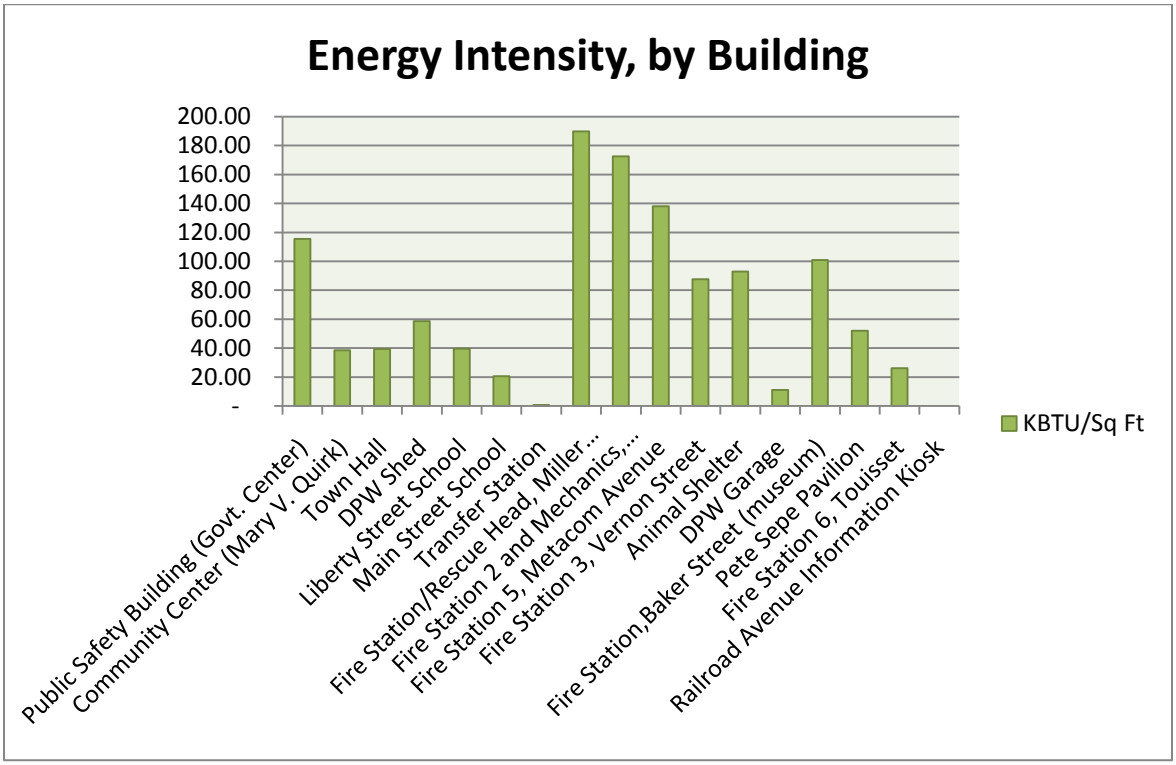

Breakdown of Energy Cost, CY09
36%
17%
21%
21%
5%
Municipal Buildings (non-WWTF)
Vehicle Fuel
Wastewater Treatment Facility
Streetlights and Outdoor Lighting
Pumping Stations

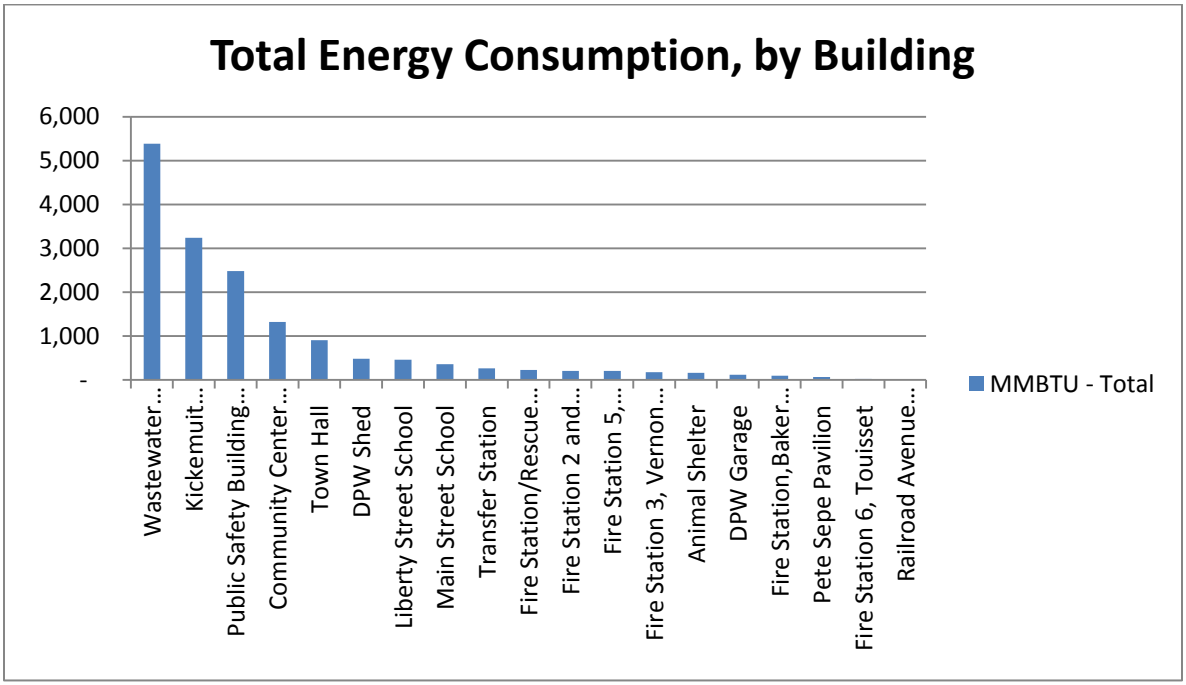
Buildings Energy Use and Costs				
Buildings	**KBTU/Sq Ft**	**MMBTU - Total**	**Energy Cost - Total**	**Total CO2e (metric tons)**
Wastewater Treatment Facility	NA[3]	5,386	$ 174,010.42	557
Kickemuit Village/Senior Center	NA[4]	3,242	$ 106,362.96	403
Public Safety Building (Govt. Center)	115.49	2,478	$ 57,511.74	191
Community Center (Mary V. Quirk)	38.59	1,319	$ 34,612.45	107
Town Hall	39.36	903	$ 21,232.52	85
DPW Shed	58.71	481	$ 13,275.49	37
Liberty Street School	39.63	459	$ 11,748.43	35
Main Street School	20.71	356	$ 8,361.15	26
Transfer Station	0.71	265	$ 7,867.95	25
Fire Station/Rescue Head, Miller Street	189.70	228	$ 5,507.37	16
Fire Station 2 and Mechanics, Water Street	172.48	205	$ 4,278.34	13
Fire Station 5, Metacom Avenue	137.93	204	$ 4,669.53	13
Fire Station 3, Vernon Street	87.61	174	$ 4,115.22	12
Animal Shelter	92.84	162	$ 4,310.31	12
DPW Garage	11.20	121	$ 5,693.87	15
Fire Station,Baker Street (museum)	100.85	93	$ 1,803.34	5
Pete Sepe Pavilion	51.99	66	$ 3,239.86	8
Fire Station 6, Touisset	26.21	24	$ 1,238.17	3

[3] Because wastewater treatment is an energy-intensive process, it is not typically recommended to analyze energy use by square feet.

[4] Square footage was only provided for one building, while data is for multiple. Use per sq ft would be improperly skewed.

Railroad Avenue Information Kiosk	-	-	$ 155.28	0
TOTAL	**1,685.25**	**16,167**	**$ 469,994.40**	**1,565**





Recommended Energy Reduction Strategies

This section of the Strategic Energy Plan outlines **Energy Reduction Strategies** for buildings, vehicles, outdoor lighting that can assist the Town of Warren in reaching its energy reduction goals, both internally and throughout the community it serves. In most cases, the Department of Public Works is responsible for the installation of energy conservation measures, although these activities can be contracted. The following caveats should be considered when reviewing the strategies:

- Each strategy should be considered independently. Two measures that could reduce energy by 20% will not necessarily equal a 40% reduction if implemented together.
- In some cases, cost estimates or energy savings estimates cannot be provided without more detailed information. This report estimates cost and energy savings wherever possible.
- Some strategies provided below may only be applicable to some buildings.

As the Town continues its energy reduction efforts, it is recommended that it works closely with National Grid to conduct energy audits and evaluate potential energy conservation measures in all of its facilities (as it has done in Government Center and Town Hall) to identify measures that may qualify for utility incentives and rebates. Moreover, the Town should prioritize upgrades to address those facilities that consume the most energy annually and/or those that are least efficient, as outlined in the Overview of Municipal Energy Use section.

Buildings and Operations

Install computer power management tools at municipal buildings.

- **Estimated Cost:** Free
- **Estimated Energy and GHG savings:** 700 to 750 kWh per computer annually

If Warren were to join **EPA's Low Carbon IT Challenge**, the Town would gain access to various tools and resources designed to assist in determining the best way to incorporate effective PC Power Management in their specific IT environment. The Energy Star Program's Computer Power Management Tool allows for each computer within a facility or on a shared network to have specific settings for powering down during periods of extended inactivity. EPA estimates this program can save as much as $75 annually per computer.[5]

[5] http://www.energystar.gov/index.cfm?c=power_mgt.pr_power_management

Install municipal-wide Energy Management Systems (or Energy Management and Control System)

- **Estimated Cost:** Varies
- **Estimated Energy and GHG savings:** Typically a minimum of 10% savings in facilities[6]. If implemented in all municipal facilities, would be a minimum 1,078 MMBTU savings, or $29,598. (This is a conservative estimate. Savings are often higher depending on the type of EMS implemented – 15-30%).

The Town should install an energy management system to monitor the ongoing energy use in all of its buildings. Ideally, this system will have remote controls allowing facility managers to adjust temperatures in various buildings remotely for maximum control. Energy management systems range significantly in what they offer and how they function, but would ideally use sensors, direct digital controls, setbacks, resets, etc. to optimize efficiency of all energy-consuming equipment in facilities.[7] The Town should investigate its options and determine what specific features are most appropriate for its operation.

Install municipal-wide Computerized Maintenance Monitoring System (CMMS)

- **Estimated Cost:** Varies, but can have payback of just over one year
- **Estimated Energy and GHG savings:** 19% savings in materials costs; 20% reduction in equipment downtime; 28% increase in maintenance productivity

A computerized maintenance monitoring system (CMMS) improves operations and maintenance of facilities through the tracking of work orders, equipment tracking and monitoring, maintenance scheduling, storing of procedures and technical documents, capital and labor cost tracking, and reduced material costs. There are numerous benefits to using a CMMS, but overall it streamlines the operation and maintenance of facilities and equipment, which will improve equipment efficiency and reduce unnecessary labor time and costs. Technology is also improving such that and EMS system as described above can be integrated with a CMMS system.

[6] "HVAC Optimization for Energy Savings," http://www.buildings.com/tabid/3413/ArticleID/9111/Default.aspx.
[7] "Operations and Maintenance Best Practices Release 3.0," Federal Energy Management Program, Ch 9.6.

Install Programmable Thermostats

- **Estimated Cost:** $90-$110 per thermostat with National Grid rebate[8]
- **Estimated Energy and GHG savings:** 10% reduction in heating and cooling costs

Installation of digital programmable thermostats can result in an estimated savings of 10% of heating and cooling costs because they allow temperatures to be set for particular times, which are adjusted during periods of occupancy or non-occupancy.

Envelope Improvements

- **Estimated Cost:** Varies, but sprayed foam or batt insulation (improving insulation of walls or roof) typically runs $1.20 to $2.50 per square foot[9]. Incentives are available through National Grid for many envelope improvements.
- **Estimated Energy and GHG savings:** Varies by improvement measure, but generally, envelope improvements, such as installing insulation, can improve efficiency by 10-40%.

There are numerous opportunities to improve the envelope of any building. Filling in gaps in insulation, insulating attic spaces or basements, exterior walls, replacing windows with Energy Star rated windows, sealing leaks at doors and windows. The Town should pursue auditing all of its buildings to identify the best opportunities for envelope improvements, prioritizing the least efficient buildings first.

Demand Controlled Ventilation (DCV) System

- **Estimated Cost:** $700 to $900 per zone[10]. National Grid Efficiency Program Incentive may apply but more specific building information is required to provide a quote.
- **Estimated Energy and GHG savings: $0.05 to more than $1.00 per square foot of space; estimated paybacks of 0.4 to 2.2 years; 27-42% savings from heating energy[11]**

---

[8] Based on estimates provided in Town Hall and Government Center energy audit reports.

[9] http://www.toolbase.org/ToolbaseResources/level3.aspx?BucketID=1&CategoryID=35

[10] "Demand-Controlled Ventilation Using CO2 Sensors," Federal Technology Alert, Federal Energy Management Program. http://www1.eere.energy.gov/femp/pdfs/fta_co2.pdf

[11] "Demand-Controlled Ventilation Using CO2 Sensors," Federal Technology Alert, Federal Energy Management Program. http://www1.eere.energy.gov/femp/pdfs/fta_co2.pdf

Install a DCV system with proper controls for appropriate sections of the buildings. "DCV saves energy by avoiding the heating, cooling, and dehumidification of more ventilation air than is needed. CO_2 sensors are the most widely accepted technology currently available for implementing DCV."[12] Additional benefits include improved air quality and improved humidity conditions. This strategy may be applicable to some of Warren's buildings, but an energy audit would be recommended to evaluate the best opportunities.

Energy/Heat Recovery Ventilation (ERV/HRV)

- **Estimated Cost:** $700 - $2,000 installed for HRV, higher for ERV[13]. National Grid Efficiency Program Incentive may apply but more specific building information is required to provide a quote.
- **Estimated Energy and GHG savings:** 30% of facility baseline natural gas use[14]

Install an ERV unit to take exhaust fan generated air and pass it through to an air to air exchanger to recover 70-80% of air exiting and deliver that energy to incoming air. This strategy may be applicable to some of Warren's buildings, but an energy audit would be recommended to evaluate the best opportunities.

Lighting Retrofits

- **Estimated Cost:** Unknown. National Grid Lighting and Controls Incentive Program may apply, but has not been quoted.
- **Estimated Energy and GHG savings:** Varies, but Super T8 lamps and ballast are 10-15% more efficient that the T8s of eight years ago[15].

Even if lighting has been upgraded in the last 5 to 10 years, an upgrade can be cost-effective. Similarly, T8s are 40% more efficient than T12s, while T5s are 51% more efficient than T12s. It may also be worth evaluating overall lighting needs in the various spaces of the Town's buildings. Reducing lighting where it is not needed is an easy, no-cost, way to reduce electricity

---

[12] *Ibid*

[13] Toolbase (Energy and Heat Recovery Ventilators): http://www.toolbase.org/Technology-Inventory/HVAC/energy-recovery-ventilators

[14] This estimate provided in a National Grid audit done for a municipal building in neighboring Barrington, RI.

[15] "Operations and Maintenance Best Practices," Federal Energy Management Program (FEMP), Release 3.0, August 2010, p.150

consumption from lighting, which typically accounts for 30% or more of a building's electricity use.

Boiler System Upgrades

- **Estimated Cost:** Varies
- **Estimated Energy and GHG savings:** 50% of boiler's fuel usage

Boiler load management measures, improving combustion efficiency, and trending boiler stack temperatures are common measures for improving energy efficiency of boiler systems. Proper sizing alone can save 50% of a boiler's fuel usage. A lower boiler stack temperature will result in more heat energy going into the water instead of being exhausted into the air. Every 40 degree reduction in stack temperature can reduce boiler fuel usage by 1-2%.[16]

Lighting Occupancy Sensors

- **Estimated Cost:** Varies - $15 to $200 depending on product and application[17]. May be eligible for rebates from National Grid.
- **Estimated Energy and GHG savings:** Depending on the settings and location, savings from 17 to 60%[18]

Lighting occupancy sensors may be appropriate for a variety of spaces in the Town's buildings. Greatest savings are often achieved in spaces which are intermittently occupied, such as bathrooms, conference rooms, kitchen spaces, etc, where turning off lights in an unoccupied space after a 5 to 20-minute delay could result in electric savings by reducing lighting demand.

Convert Streetlight Fixtures to LED

- **Estimated Cost:** Unknown
- **Estimated Energy and GHG savings:** 40-50% of annual kWh (based on estimates from other local governments)[19] , potentially saving 251,253 kWh and $67,255 annually.

---

[16] "Operations and Maintenance Best Practices Release 3.0," Federal Energy Management Program, Ch 9.2.9.

[17] http://www.nextag.com/serv/main/buyer/OutPDir.jsp?search=leviton+occupancy+sensor&psort=12

[18] "Demand Reduction and Energy Savings Using Occupancy Sensors," NEMA, http://www.nema.org/download.cfm?isRedirect=false&docTypeId=0&docId=17670&filename=/lsd22.pdf

With the success of light emitting diode (LED) traffic light installations across the country, LED streetlights are fast becoming the new technology of choice. With various incentives and energy savings of up to 50%, the economics might make sense. This measure has also proven to be effective for GHG emissions reductions. The Town of Warren should investigate its opportunities to install LED streetlights throughout the Town. It may be worth considering a pilot program for testing the applicability of LED streetlights in the Town. The Clinton Climate Initiative has been working closely with cities and towns throughout the country to move LED streetlight projects forward. More information can be found at: http://www.clintonfoundation.org/what-we-do/clinton-climate-initiative/our-approach/cities/lighting.

Additional No- and Low-Cost Measures:

The following were recommendations made specifically for Town Hall and Government Center, but these are low-cost strategies that should be considered for any municipal facility.

- Seal leaks in insulation, ducts, walls, around windows and doors
- Replace office equipment with Energy Star labeled equipment
- Purchase Energy Star appliances
- Replace incandescent light bulbs with compact fluorescent bulbs
- Clean and/or replace filters in the HVAC system frequently – once or twice per season
- Use ceiling fans in both winter (to distribute heat downward) and summer (for cooling)

[19] www.haverfordtownship.com/egov/docs/1239295902_125946.pdf, http://govpro.com/public_works/highways/content/LED_San_Jose_0518/, and LA http://bsl.lacity.org/

Recommended Town Government Policy and Programming

Enact an energy efficiency policy for Town and incorporate this policy into the Comprehensive Plan and the Capital Improvements Program for the annual budget

- **Estimated Cost:** N/A
- **Estimated Energy and GHG savings:** N/A

In an effort to institutionalize energy efficiency into daily work routines and influence overall behavior, the Town must develop written energy efficiency policy for the Town and ensure that it enforces this policy. The most effective way is to include measures for energy efficiency in the Town's Comprehensive Plan (Facilities and Services estimate). This policy should address energy use throughout municipal operations as well as through contracted services.

Adopt Environmentally Preferable Purchasing (EPP) Program policies.

- **Estimated Cost:** Unknown
- **Estimated Energy and GHG savings:** Will have tremendously different results depending on how it is implemented and what is included in the program. For example, Haverford Township, PA estimated a 30% reduction in energy use by electronic devices[20]

Develop and implement an environmentally preferable purchasing (EPP) program that includes purchase of Energy Star equipment and requires taking various energy and sustainability principles into account when purchasing or contracting for the Town. This should complement or be incorporated into the energy efficiency policy.

Institute a Green Fleets Program for municipal operations

- **Estimated Cost:** Varies
- **Estimated Energy and GHG savings:** To be determined. Haverford Township, PA estimated that their Green Fleets Program will result in a 25% energy savings. 25% of Warren's gasoline/diesel use would be a reduction of 1,861 MMBTU and a cost savings of $36,367.

[20] www.haverfordtownship.com/egov/docs/1239295902_125946.pdf

The Town of Warren could implement a Green Fleets program based on the Town's priorities for the purchase and maintenance of vehicles within the municipal fleet. This program could seek to establish fuel efficiency standards for all new municipal vehicles purchased, based on the job they are needed for. Additionally, the Town could pursue alternative fueled vehicles. The Ocean State Clean Cities Coalition is a good resource for the Town to learn what alternative fuels are readily available and at what cost. The Clean Cities Coalitions also are available to connect stakeholders to funding opportunities. The components of a successful green fleet program usually include:

• An established replacement schedule for vehicles
• A requirement to meet certain MPG standards by class
• Incorporation of alternative fuel vehicles
• A No-Idling policy

Pursue installation of solar Photovoltaic and/or hot water for municipal facilities.

- **Estimated Cost:** Varies
- **Estimated Energy and GHG savings:** To be determined

While the Town is implementing the various energy efficiency strategies it should also, where feasible, pursue the installation of a solar photovoltaic (PV) or hot water system for specific buildings. The Town will find that, depending on the load, the solar hot water system will provide a shorter payback period. Incentives exist for the installation of renewable energy technologies. Refer to the Funding section of this Plan for more information.

Continue to pursue regional renewable energy projects, including wind and solar projects.

- **Estimated Cost:** Varies
- **Estimated Energy and GHG savings:** To be determined

Warren, as one of nine cities and towns that comprise the East Bay Energy Consortium (EBEC), might have an opportunity to participate in the development of a wind farm in the East Bay area near the coast, where the wind resource is suitable for wind turbine installations. The Town's potential share of the estimated 20- to 25-megawatt project would offset the Town's entire electrical load.

Establish a Revolving Energy Fund

- **Estimated Cost:** Varies
- **Estimated Energy and GHG savings:** Varies

A revolving energy fund has become one way in which local governments create a more sustainable funding stream for energy efficiency and clean energy programs. This municipal pool of funds capitalizes a loan fund and loan repayments recapitalize the fund to allow additional lending on an ongoing basis. Revolving funds can be managed directly by the Town or by a third party. There are state requirements that will need to be reviewed before establishing such a fund.

Evaluate purchase of carbon offsets to supplement energy efficiency reduction measures.

- **Estimated Cost:** varies by supplier
- **Estimated Energy and GHG savings:** Purchasing carbon offsets does not reduce actual energy use. However, it has been used as an effective tool to supplement energy efficiency measures and reach overall GHG reduction goals.

If Warren chooses to identify a greenhouse gas reduction goal, this strategy might be considered an appropriate last resort to meet that goal if the Town is unable to meet it through actual implementation of reduction strategies.

Recommended Incentive Programs for Energy Conservation in the Community

A number of incentive programs for energy conservation are available to Warren's residents and businesses. Eligibility and funding are both dependent on the type of project as well as the availability of funding. At any given time, there are a number of programs available for energy efficiency and conservation projects, it is important to check these program sites frequently to learn of new opportunities. Many of the programs highlighted in this section have established end dates and others end once the funding has been exhausted.

Establish a Property Assessed Clean Energy (PACE) Financing Program

- **Estimated Cost:** To be determined
- **Estimated Energy and GHG savings:** Unknown

PACE lets homeowners utilize special property tax assessments to pay off the cost of energy efficiency and clean energy upgrades to their home. The PACE program could take various shapes depending on the local realities, including state enabling regulation requirements, ability of Town to implement and maintain a program, and overall political will to engage in such an initiative[21].

Consider establishing a "Green Business" program.

- **Estimated Cost:** To be determined
- **Estimated Energy and GHG savings:** Unknown

The Town of Warren could consider implementing a program that allows their local businesses to receive a "green" designation based on a set of previously identified criteria. Local governments across the country are utilizing a green business program as a means to motivate local businesses to take action on energy and climate protection by linking them to existing utility programs and other resources to enable them to improve the efficiency of their operations and save money. Oftentimes these programs are complemented with a recognition program involving everything from a sticker to place in their window to an awards ceremony.

[21] As of the writing of this document, the PACE program was undergoing significant scrutiny by national lenders and the ultimate fate of this program model has not yet been determined though many feel the lenders do not have a strong case.

Some examples of green business programs include the following:

• Cambridge GoGreen Awards http://www.cambridgema.gov/cdd/et/ggm/gg_bawhist.html

Consider measures to encourage community members to purchase and use fuel-efficient vehicles

- **Estimated Cost:** N/A
- **Estimated Energy and GHG savings:** Unknown.

The Town should identify additional[22] parking and purchase-related incentives to support use of hybrid vehicles and alternative fuel vehicles by municipal and school employees and/or community members. An example of action that other local governments have taken includes preferential parking for hybrids at certain locations throughout the town; the Town could amend its standards for commercial parking lots to encourage hybrid-priority parking.

National Grid Programs

National Grid offers a variety of programs to incentivize energy efficiency and demand reduction. Programs are available to residential, commercial and municipal customers. Many incentives are tailored to the specific project, so customers will need to contact National Grid with questions. To qualify for incentives, many projects must be pre-approved, so always check with National Grid before beginning any energy efficiency or conservation project.

Residential Programs
Rhode Island Gas Efficiency

The Rhode Island Gas Efficiency Program allows residential customers to receive a free in-home energy audit and rebates on subsequent weatherization and/or air sealing. Rebates are available for solar hot water systems; these rebates are 15% of cost (up to $1,500). National Grid recommends that anyone building a new home consider EnergyStar qualification.

[22] The Town currently offers a tax incentive for fuel efficient vehicles.

Program	Incentive	Website	Telephone
In-Home Energy Audit	Free	https://www.powerofaction.com/rireenergywise/	888.633.7947
Weatherization	50% (up to $1,500)	https://www.powerofaction.com/rirgweatherization/	888.633.7947
Air Sealing	100% (up to $750)	https://www.powerofaction.com/rirgweatherization/	888.633.7947
Solar Hot Water	15% (up to $1,500)	https://www.powerofaction.com/media/pdf/solar.pdf	800.292.2032
EnergyStar (New Construction)		https://www.powerofaction.com/rirgnewconstruction/	800.887.8841

Rhode Island Electric Efficiency

The Rhode Island Electric Efficiency Program offers a number of incentives for residential customers to reduce their individual need for electricity while also lowering their electric bills. National Grid offers free, in-home energy audits of electricity use and provides recommended actions to improve the home's efficiency. National Grid will pick up any second refrigerator or freezer for free and the customer will receive a rebate. In addition to the 2nd refrigerator or freezer turn-in program, National Grid offers rebates on a number of EnergyStar appliances and home electronics. Additionally, customers can purchase certain electronics at a reduced price through National Grid's online store or at participating retailers. The current promotions include compact fluorescent light bulbs and smart power strips. Customers who have a system check-up performed on their central air conditioning and heat pump receive an instant rebate on the check-up. Rebates are also available for central air conditioning and heat pumps and vary depending on the system's size and specifications. National Grid also provides rebates on certain swimming pool pumps, oil heating systems and room air cleaners. These rebates vary based on the model and specifications. For income-eligible customers, National Grid offers an Appliance Management Program designed to replace inefficient models with more efficient models to reduce the electricity bills of low-income customers. These programs are subject to change and new programs may begin at any time, so check the National Grid website frequently.

Program	Incentive	Website	Telephone
2nd Refrigerator or Freezer Turn-In	Free Pick up and $50 rebate	https://jacoinc.net/weborder/rebatex.aspx?ProgramID=57	877.545.4113
Central Air Conditioning and Heat Pump System Check-up Instant Credit	$100 rebate	https://www.powerofaction.com/rirecentralairconditioningandheatpumps/	877.333.8153
Central Air Conditioning and Heat Pump System: New Equipment	up to $500	https://www.powerofaction.com/rirecentralairconditioningandheatpumps/	877.333.8153
Appliance Management Program		https://www.powerofaction.com/rireappliancemanagementprogram/	401.574.9100, Option 7

EnergyStar Refrigerators and Freezers Rebate	$50	https://www.powerofaction.com/ri/refrigerators/	877.886.2539
Smart Power Strips		https://www.powerofaction.com/ri/powerstrips/	800.473.9150
EnergyStar CFL light bulbs		https://www.powerofaction.com/ri/lighting/	800.473.9150
EnergyStar Computers and Monitors Rebate	$10 - $20	https://www.powerofaction.com/ri/computers/	877.886.2539
Oil Heating Systems	$200	https://www.powerofaction.com/rireoilheatingsystems/	886.915.9941
EnergyStar Room Air Cleaners	$20	https://www.powerofaction.com/ri/aircleaners/	877.886.2539
EnergyStar Lighting Fixtures		https://www.powerofaction.com/ri/fixtures/	800.473.9150

Commercial Programs

In addition to the incentives National Grid offers their residential customers, there are energy efficiency and conservation incentives available to both large and small commercial customers.

As a Large Business customer, facilities have access to a number of incentive programs. Commercial, industrial, institutional, educational and municipal buildings are eligible for the Large Business Programs. For existing buildings and for new construction, which includes major renovations and replacing failed equipment, National Grid offers lighting, HVAC, motors, compressed air and variable speed drives programs. If the proposed project does not fit into one of these categories, a Custom Projects Program is also available. For companies interested in energy services, National Grid offers assistance with services such as technical assistance, turnkey services, retro-commissioning and lamp and ballast recycling. National Grid also offers a buyers alliance as well as financing for certain projects. The Energy Solutions Service Office is available to answer questions and help develop a program to suit each business' needs.

Small Business customers performing lighting upgrades, installing energy efficient time clocks, photo cells for outdoor lighting, occupancy sensors or programmable thermostats and/or upgrading walk-in coolers can receive assistance from National Grid. Generally, National Grid will pay up to 70% of the installation and allows customers to finance the remaining 30% through their utility bill interest free for 2 years. See www.thinksmartgreen.com/smallbusiness or call 800.332.3333 for more information and to begin the approval process for specific projects.

Clean Energy Programs

In addition to participating in the GreenUp program, many clean energy companies offer other programs to promote renewable sources. Sterling Planet and Community Energy offer Renewable Energy Certificates and carbon offsets to individuals and businesses to reduce their personal environmental impact. Sterling Planet offers a number of other programs to help the community decrease its environmental impact including assisting with onsite solar and other renewable energy projects. Sterling Planet works with a large number of governments to green their communities and may be a good resource for the Town of Warren.

Company	Website	Telephone Number
Sterling Planet	www.sterlingplanet.com	877.457.2306
Community Energy	www.communityenergyinc.com	866.WIND.123
People's Power and Light	www.ripower.org	401.861.6111

Monitoring, Verification, and Data Management

Now that the Town has established a baseline year of energy use, it will be important to continue to monitor the data for the purposes of tracking reductions and identifying future targets for reduction measures. The Town has taken advantage of the free online energy tracking tool, Portfolio Manager. This tool will be of most use to the town moving forward if kept up to date on a monthly or quarterly basis. As of the writing of this report, due to some missing data in Portfolio Manager and limitations on building-type eligibility in the Energy Star program, the Town's buildings have not been given any Energy Star rating. The system requires a minimum of one year of data and data must be up to date (no more than 3 months old). Relevant staff should coordinate a streamlined process by which energy consumption and cost data for all facilities and fuel types is collected on a routine basis and uploaded into the Portfolio Manager program. Portfolio Manager provides templates for the upload of this data to simplify the collection process. Ideally, one staff member should be delegated this as a monthly or quarterly task. In Portfolio Manager, the facilities will be given a score based on energy performance. A score of 75 or above will make the facility eligible for an Energy Star rating. The Town can then apply to have the building officially rated, receive a plaque, and demonstrate to the community its commitment to energy efficiency and achievement on that front.

The regular updates of this data will be useful for the Town in prioritizing energy reduction strategies and in managing its cost and usage data. In addition to the consumption data, Portfolio Manager should be updated whenever there is a change of utility accounts, meters, changes to building square footage, opening or closing or change of use of a facility, etc.[23] The Town will need to coordinate internally to make sure this information is communicated to relevant staff and to the primary staff person responsible for keeping Portfolio Manager up to date. It is recommended that the Town provide an annual report to the community on its progress in implementing these various recommended strategies and achieving their energy reduction goals.

Another useful process for the Town will be to set up all of its utility billing electronically. VHB has made some initial attempts to set up Warren's National Grid accounts online. However, due to some challenges beyond VHB's control, the process has not been completed. It is recommended that the Town continue to work with National Grid Customer Service to complete the process of moving its billing online. Unfortunately, as of the writing of this report, National Grid in Rhode Island only has online billing for electric accounts. However, it will be greatly beneficial to the Town with regards to tracking costs and data to bring all accounts online whenever possible. As a result of the data analysis completed for this Strategic Energy Plan, the

[23] It is recommended that the Town review all information about facilities as it is currently entered into Portfolio Manager to ensure that all accounts are listed, square footage is accurate, building use is specified, and year built is accurate. There may have been some gaps in information or assumptions made when this data was first entered into the system.

Town now has a comprehensive list of its 82 utility accounts – electric, natural gas, and heating oil. Whether in Energy Star, or any other software or internal spreadsheet or database, the Town should keep this comprehensive list of accounts and facility information up to date at all times and track changes in consumption over time.

Appendix A: Funding Resources

The utility sponsored programs are listed in the Recommended Strategies section of this Plan in connection with the specific strategies they relate to for government operations. The available utility incentives for the community are provided in the Community Engagement section of this Plan. This section of the Energy Plan specifically outlines some of the additional funding sources available for local government energy and sustainability programs from other entities, primarily state and federal agencies. Please note that some of the information in this section will be dated and only relevant to the timeframe in which this plan was completed (February 2011).

Federal

HUD Sustainable Communities

The HUD (Department of Housing and Urban Development) Sustainable Communities Planning Grant was established to encourage regional planning efforts that integrate housing and transportation decisions and promote more sustainable communities. $100 million will be available through this grant program for regional initiatives. As of the writing of this plan, this solicitation is closed, but it is anticipated that there will be a new round of funding through this program in FY2011. Announcements about the next round of funding will be made on www.hud.gov/sustainability.

HUD-DOT Community Challenge Grants

A joint program of HUD and the Department of Transportation (DOT), the Community Challenge Grant program's goal is to promote sustainability at the community level by supporting initiatives such as mixed-use development, affordable housing, and the reuse of older buildings and structures for new purposes. As of the writing of this plan, this solicitation is also closed, but it is anticipated that there will be a new round of funding through this program in 2011.[24] It is recommended that Warren continue to investigate sustainable planning grants that may become available through HUD and/or DOT in the future.

EPA Climate Showcase Communities Grant[25]

The Climate Showcase Communities Program provides funding for planning, demonstration, and/or implementation projects designed to address climate change by reducing GHG emissions. The program seeks to implement innovative programs which demonstrate quantifiable reductions in GHG emissions and are replicable elsewhere in the country. For the 2009 and 2010 programs, EPA made $100,000-$500,000 of funding available per project. A 50% match is required, which may include in kind support. This is a highly competitive program. The most recent solicitation for this grant is closed, but there is reason to believe that EPA may roll out another round of funding in summer 2011, so this will be worth tracking.

[24] http://www.planning.org/domesticpolicy/open/sep10.htm

[25] http://www.epa.gov/statelocalclimate/local/showcase/index.html

EPA Community Action for a Renewed Environment

CARE is a unique community based, community-driven, multimedia demonstration program designed to help communities understand and reduce risks due to toxic pollutants and environmental concerns from all sources. The CARE grant program works with the eligible entities to help their communities form collaborative partnerships, develop an understanding of the many local sources of toxic pollutants and environmental risks, set priorities, and identify and carry out projects to reduce risks through collaborative action at the local level. CARE's long-term goal is to help communities build self-sustaining, community-based partnerships that will continue to improve human health and local environments into the future. This opportunity is currently closed, but is typically an annual opportunity.

State

State Energy Program

The Rhode Island State Energy Program (SEP), administered through the RI Office of Recovery and Reinvestment, receives funding from the U.S. Department of Energy to support activities that will:

- "increase energy efficiency to reduce energy costs and consumption for consumers, businesses and government,
- reduce reliance on imported energy,
- improve the reliability of electricity and fuel supply and the delivery of energy services,
- and reduce the impacts of energy production and use on the environment."[26]

The SEP is likely to release solicitations for funding of projects around the above activities.

Renewable Energy Fund

The East Bay Energy Consortium, a group of cities and towns of the East Bay region of Rhode Island, received funding through the Renewable Energy Fund to exam the feasibility of a community scale wind project. They are currently examining multiple sites within the East Bay that could make for good wind turbine locations. This is funded in conjunction with the Rhode Island Foundation.

Additional funding may be available to Warren through the Renewable Energy Fund for:

- Business, commercial and institutional projects;
- Affordable housing developments;
- Municipal renewable energy projects;
- Technical and feasibility studies.

[26] RI Office of Recovery and Reinvestment: http://www.recovery.ri.gov/programs/energy/SEP.php

Private

The Rhode Island Foundation

The Rhode Island Foundation is focused on six sectors for their Strategy Grant program. Under the Environment Sector their primary goal is to maximize the conservation, restoration, and stewardship of Rhode Island's natural resources, and support local opportunities to address climate change. They have targeted the promotion of energy conservation and renewable energy as a top priority.

Appendix B

Recommended Strategies from Energy Audits

Town Hall Recommendations

National Grid provided several recommendations for energy conservation measures in Warren's 22,934 sq ft Town Hall. This Strategic Energy Plan recommends moving forward on implementation of several of these measures, especially those measures that will result in immediate energy savings with little or no up-front cost.

Low- or No-Cost Measures:

- Seal leaks in insulation, ducts, walls, around windows and doors
- Replace office equipment with Energy Star labeled equipment
- Purchase Energy Star appliances
- Replace incandescent light bulbs with compact fluorescent bulbs
- Clean and/or replace filters in the HVAC system frequently – once or twice per season
- Use ceiling fans in both winter (to distribute heat downward) and summer (for cooling)

Lighting Improvements:

National Grid has recommended retrofitting Town Hall's current T8 lighting by doing a re-lamp and re-ballast of all T8 fixtures to Super T8s. After estimated National Grid incentives[27], the net cost for this has been estimated at $5,000, with an estimated savings of 14,050 kWh and $1,528 annually. This would result in a 3.3 year payback.

Envelope Improvements:

National Grid has recommended installation of 376 square feet of drop ceiling at a cost of $4,000. They also recommend repairing existing insulation and adding an additional layer of insulation to the attic. After National Grid incentives, the net cost would be $6,300 with an annual savings of $1,878 and a payback of 3.4 years.

Control Improvements:

It is recommended that the Town installs a boiler reset control to ensure that optimal hot water temperature is distributed throughout the building, saving energy and improving occupant comfort. It is estimated that this measure could result in 3-7% heating-related energy savings. National Grid has estimated a net cost of $1,650 for installation after rebates.

[27] These incentive estimates were made in April 2010. New estimates should be sought from National Grid on program incentives before making final decisions about implementation.

The National Grid Energy Efficiency Program will offer an incentive to replace up to 5 thermostats with digital programmable thermostats. The net cost for replacing 5 thermostats is estimated at $450.

Mechanical System Improvements:

National Grid recommends installation of up to 500 linear feet of high density fiberglass insulation to the domestic hot water and heating pipes. This insulation will reduce heat loss in non-conditioned spaces and improve performance to conditioned areas, reducing overall energy required to heat the building, and therefore associated heating costs. National Grid offers an incentive of $1.50 per linear foot of pipe insulation.

When it is time to replace existing heating and domestic hot water equipment, it is recommended that it be replaced with properly sized equipment, including:

- High-efficiency (>92%) Gas Furnace
- High-efficiency condensing boiler, which can reduce heating related fuel usage by 15-35%
- On-demand tankless water heater.

More details on all of the above measures can be found in the RISE Engineering Energy Action Plan for Town Hall, dated April 3, 2010.

<u>East Bay Government Center Recommendations</u>

National Grid provided several recommendations for energy conservation measures in Warren's 24,899 square foot Government Center building. This Strategic Energy Plan recommends moving forward on implementation of several of these measures, especially those measures that will result in immediate energy savings with little or no up-front cost.

Low- or No-Cost Measures:

- Seal leaks in insulation, ducts, walls, around windows and doors
- Replace office equipment with Energy Star labeled equipment
- Purchase Energy Star appliances
- Replace incandescent light bulbs with compact fluorescent bulbs
- Clean and/or replace filters in the HVAC system frequently – once or twice per season
- Install low-flow water fixtures to reduce hot water consumption and, therefore, energy required to heat the water
- Install a timer for the domestic hot water circulator pump so that the system can be turned off during unoccupied hours.

Mechanical Improvements:

National Grid recommends installing a high-efficiency condensing boiler. Net cost after incentives is estimated to be $32,700, with an annual savings of $3,838, and a payback of 8.5 years.

Also recommended is overhead Low Intensity Infrared Heaters in the apparatus space to replace the existing hydronic fan coil units. This installation could result in gas savings of 15-25%. The net cost is estimated at $18,800 with an annual savings of $2,077 and a 9 year payback.

Installation of a high efficiency condensing unit heater at 90% efficiency or greater is recommended to replace the hydronic fan coil unit in the basement police garage. Net cost is estimated at $3,500 with an annual savings of $561 and a 6.2 year payback.

Control Improvements:

National Grid recommends installing 7 digital programmable thermostats to control the heating system. A relatively minimal net investment of $770 could result in $315 annual savings and a payback of 2.4 years.

It is recommended that the Town install a boiler reset control to ensure that optimal hot water temperature is distributed throughout the building, saving energy and improving occupant comfort. It is estimated that this measure could result in 3-7% heating-related energy savings. National Grid has estimated a net cost of $1,700 for installation after rebates, $1,576 in annual savings, and a short 1.1 year payback.

More details on all of the above measures can be found in the National Grid Energy Action Plan for East Bay Government Center, dated May 5, 2010.

Wastewater Treatment Facility Recommendations

Demand Management Institute (DMI) completed a walkthrough audit of the Wastewater Treatment Facility in Spring 2010 and made recommendations for the following energy efficiency measures.

Plant Water Pump Control Retrofit:

DMI recommends installation of variable speed drives on the plant's water pumps, so as to allow the operating speed to be reduced for most of the year. An incentive of $2,900 may be available for each pump.

Motor Replacements:

Any motors that are nearing their useful life should be replaced with premium efficiency motors.

Lighting Control Retrofit:

Incentives are available for installation of occupancy sensors, but this measure should only be pursued if the energy savings opportunity is present. According to the DMI report, many lights were turned off in unoccupied areas and building users are typically attentive to turning off lights that aren't in use.

Secondary Area Boiler Retrofit:

The boiler serving the Secondary Are is nearing the end of its useful life. A new boiler of more than 85% efficiency should be installed to replace the old and inefficient boiler.

Cooling System Retrofit:

The Town may want to consider retrofitting its cooling system in the administration areas of the building. Incentives may be available to replace window air conditioning units with a high-efficiency ductless split system. If the Town does not want to consider the split system, it is recommended that window units be replaced with Energy Star units when they've reached the end of their useful life. Energy Star air conditioning units use approximately 10% less energy than conventional units[28].

More details on these measures and DMI's incentives estimates are available in the Warren Wastewater Treatment Facility Walkthrough Report, prepared by DMI, May 13, 2010.

[28] http://www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=AC

Appendix C: Summary of Energy Conservation Measures

Energy Conservation Measure	Location	Net Cost	Savings
Computer Power Management	All Buildings	No cost	700 to 750 kWh per computer annually
Clean and/or replace filters in HVAC system frequently	All Buildings	No- to low-cost	unknown
Install Low-flow water fixtures (savings from heating less hot water)	All Buildings	No- to low-cost	unknown
Replace incadescent bulbs with CFLs	All Buildings	No- to low-cost	unknown
Replace office equipment/appliances with Energy Star models (when replacing)	All Buildings	No- to low-cost	unknown
Seal leaks (in insulation, ducts, walls, windows, doors)	All Buildings	No- to low-cost	unknown
Use ceiling fans in winter (to distribute heat downward) and summer (for cooling)	All Buildings	No- to low-cost	unknown
Wall and roof insulation	All Buildings	$1.20 to $2.50 per sq ft for sprayed foam or batt insulation	10-40% energy savings
Occupancy Sensors for Lighting	All Buildings	$15 to $200 (depending on product and application)	17 to 60%
Demand Controlled Ventilation (DCV) System	All Buildings	$700- $900 per zone	$0.05 to more than $1.00 per sq ft of space; 27-42% heating energy savings
Energy/Heat Recovery Ventilation (ERV/HRV)	All Buildings	$700-$2,000	30% of baseline natural gas use
Programmable Thermostats	All Buildings	$90- $110 per thermostat (with rebate)	10% of heating and cooling costs
Computerized Maintenance Monitoring System (CMMS)	All Buildings	Varies	19% materials cost savings; 20% reduction in equipment downtime; 28% increase in maintenance productivity
Energy Management System (EMS)	All Buildings	Varies	minimum 10% savings; minimum 1,078 MMBTU savings, or $29,598 if implemented in all facilities
90% Efficiency Condensing Unit Heater	Government Center	$3,500	$561
Low Intensity Infrared Heaters (apparatus space)	Government Center	$18,800	$2,077
High Efficiency Condensing Boiler	Government Center	$32,700	$3,838
LED Streetlights	Streetlights	Varies	40% to 50% of annual kWh
Boiler Reset Control	Town Hall	$1,650	3-7% heating energy savings
Relamp and reballast from T8 to Super T8	Town Hall	$5,000	14,050 kWh or $1,528
Envelope Improvements (attic insulation, drop ceiling)	Town Hall	$6,300	$1,878
Insulate Domestic Hot Water & Heating Pipes	Town Hall	Unknown	
Replace Heating and Hot Water Equipment with Properly Sized Equipment	Town Hall	Unknown	15-35% heating energy savings

Appendix D: Key Conversion and Emission Factors

1 kWh = 3,412 Btu

1 therm = 100,000 Btu

1 metric ton = 2,204.62 lbs = 1,000 kg

Natural gas:	53.02 kg CO_2/MMBtu
	0.005 kg CH_4/MMBtu
	0.0001 kg N_2O/MMBtu
Fuel Oil # 2:	10.21 kg CO_2/gallon
	0.0015 kg CH_4/gallon
	0.0001 kg N_2O/gallon
Propane:	5.59 kg CO_2/gallon
	0.0010 kg CH_4/gallon
	0.0001 kg N_2O/gallon
Gasoline:	8.78 kg CO_2/gallon
	0.0014 kg CH_4/gallon
	0.0001 kg N_2O/gallon
Diesel:	10.21 kg CO_2/gallon
	0.0015 kg CH_4/gallon
	0.0001 kg N_2O/gallon

eGRID Sub-region NEWE, NPCC New England:

927.68 lbs CO_2/MWh

0.08649 lbs CH_4/MWh

0.01701 lbs N_2O/MWh

Glossary

Benchmark: A reference of energy use at a given time, by which reductions can be measured over time.

British Thermal Unit (BTU): A common unit of energy allowing different energy and fuel types, such as kilowatt hours of electricity and gallons of fuel oil, to be calculated together. In this report, one million BTU is most commonly used.

Carbon Dioxide Equivalent (CO_2e): A unit often used to report greenhouse gas emissions or reductions. Carbon Dioxide Equivalent is the standard value used to compare the potency of different greenhouse gases against carbon dioxide (CO_2), the primary greenhouse gas.

Energy Intensity: The ratio of energy consumption to a measure of the demand for services (for example, the amount of energy used per square foot of a building). This is often used as a measure of energy efficiency since it measures energy per a unit of space, rather than overall consumption where the amount of space is not a factor.

Greenhouse Gases (GHG): Gases, such as carbon dioxide, methane, and chlorofluorocarbons, that act as a shield and trap heat within the earth's atmosphere. While GHGs are needed for life to survive on this planet, like all natural systems, when there is too much, changes begin to occur. It is this increase in GHGs that is contributing to climate change.

Kilo British Thermal Units (KBTU): One thousand British Thermal Units.

Kilowatt- hour (kWh): A unit or measure of electricity supply or consumption of 1,000 Watts over the period of one hour. Most electricity from the consumer side is reported in kWh, such as on an electricity bill

Light-Emitting Diode (LED): A highly efficient light source often used for digital displays; LEDs are increasingly used for streetlights, traffic lights, exit signs and in other lighting fixtures. In addition to being more efficient overall than incandescent and other bulbs, LEDs also have a longer lifespan, allowing for savings in maintenance costs as well as straight energy reduction costs.

Megawatt-hour (MWh): One thousand kilowatt-hours. Large sources of electricity, particularly from power plants of large scale wind farms are measured in MWh.

Metric Ton: A unit of mass equal to 1,000 kilograms or 2,204.6 pounds. Greenhouse gases are often measured in metric tons.

Million British Thermal Units (MMBTU): One million British Thermal Units.

Therm: A unit of heat containing 100,000 British Thermal Units (BTU). Natural gas is often measured in therms.