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June 29, 2010

Local Government Energy Program
Energy Audit Draft Report

Borough of Frenchtown

Borough Hall
29 2nd Street
Frenchtown, NJ 08825

Project Number: LGEA61

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EXECUTIVE SUMMARY

The Borough of Frenchtown Borough Hall is a two-story building with an attic and partial basement comprising a total conditioned floor area of 3,000 square feet. The original structure was built in 1867, and there have been numerous renovations since then. The LGEA contract with Steven Winter Associates was limited to an energy audit of only the Borough Hall building; however the Borough Hall building shares an electric meter and #2 fuel oil tank with the Fire Department. All major equipment affecting energy usage at the Fire Department has been taking into account and an inventory list is included as an Appendix to this report. Recommendations have been made for the Fire Department as well as the Borough Hall building.

The following chart provides an overview of current energy usage in the building based on the analysis period of December 2008 through November 2009:

Table 1: State of Building—Energy Usage

	Electric Usage, kWh/yr	Gas Usage, therms/yr	#2 fuel oil usage, gal/yr	Current Annual Cost of Energy, $	Site Energy Use Intensity, kBtu/sq ft yr	Joint Energy Consumption, MMBtu/yr
Current	18,737	0	4,863	15,216	97.0	662
Proposed	11,626	5,576	0	10,128	75.3	515
Savings	7,111	-5,576	4,863	5,088	21.7	147
% Savings	38	N/A	100	33	22	22

There may be energy procurement opportunities for the Borough of Frenchtown to reduce annual utility costs, which are $4,232 higher, when compared to the average estimated NJ commercial utility rates.

SWA has entered energy information about the Borough Hall in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* energy benchmarking system. The building is categorized as a non-eligible ("Other") space type. Because it is an "Other" space type, there is no rating available. Consequently, the building is not eligible to receive a national energy performance rating at this time. The Site Energy Use Intensity is 97.0 $\frac{kBtu}{ft^2-yr}$ compared to the national average of a commercial building consuming 78.0 $\frac{kBtu}{ft^2-yr}$. The Borough Hall building shares an electric meter as well as a #2 fuel oil tank, which also limits the ability to determine Site Energy Use Intensity numbers for each building individually. See ECM section for guidance on how to improve the building's rating.

Based on the current state of the building and its energy use, SWA recommends implementing various energy conservation measures from the savings detailed in Table 1. The measures are categorized by payback period in Table 2 below:

Table 2: Energy Conservation Measure Recommendations

ECMs	First Year Savings ($)	Simple Payback Period (years)	Initial Investment, ($)	CO2 Savings, lbs/yr
0-5 Year	1,113	1.5	1,632	7,670
5-10 Year	599	7.9	4,760	3,269
>10 Year	3,376	12.3	41,629	55,298
Total	5,088	9.4	48,021	66,337

SWA estimates that implementing the recommended ECMs is equivalent to removing approximately 10 cars from the roads each year or avoiding the need of 205 trees to absorb the annual CO_2 generated.

Other recommendations to increase building efficiency pertaining to operations and maintenance and capital improvements are listed below:

Further Recommendations:

Capital Improvements

- Extend natural gas service from road to buildings
- Install premium motors when replacements are required
- Replace portions of damaged siding on the exterior wall
- Add insulation to under-insulated roof sections
- Openings around window air-conditioning units need airtight gaskets/sealants
- Replace all original, single-glazed windows with a low-E, double glazed type.

Operations and Maintenance

Operations and Maintenance measures consist of low/no cost measures that are within the capability of the current building staff to handle. These measures typically require little investment, and they yield a short payback period. These measures may address equipment settings or staff operations that, when addressed will reduce energy consumption or costs.

- Install/ repair and maintain roof flashing.
- Replace/repair and maintain damaged window units.
- Install/replace and maintain weather-stripping around all exterior doors and roof hatches.

- Maintain roofs
- Maintain exterior walls
- Maintain downspouts and cap flashing
- Provide weather-stripping/air-sealing
- Provide water-efficient fixtures and controls
- SWA recommends that the building considers purchasing the most energy-efficient equipment
- Use smart power electric strips
- Create an energy educational program

Note: The recommended ECMs and the list above are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for Borough of Frenchtown. Based on the requirements of the LGEA program, the Borough of Frenchtown must commit to implementing some of these measures, and must submit paperwork to the Local Government Energy Audit program within one year of this report's approval to demonstrate that they have spent, net of other NJCEP incentives, at least 25% of the cost of the audit (per building). The minimum amount to be spent, net of other NJCEP incentives, is $1,374.25.

Financial Incentives and Other Program Opportunities

There are various incentive programs that the Borough of Frenchtown could apply for that could also help lower the cost of installing the ECMs. Please refer to Appendix F for details.

SWA recommends that the Borough of Frenchtown Borough Hall proceed to follow the list of 10 ECMs that have been recommended within the scope of work. At the time of this report, the Direct Install program through the New Jersey Office of Clean Energy provides the most relevant and best suited incentives for this building. Since the Borough Hall building shares an electric meter as well as an oil tank with the Fire Department, SWA recommends that both buildings are addressed for energy efficiency. SWA recommends that the Borough of Frenchtown first contact the local natural gas utility company in order to have gas service extended from 2nd Street to each of the buildings. Once gas service is connected, all oil-fired equipment should be removed and replaced with gas-fired units. SWA also recommends that programmable thermostats are installed to give the Borough better control over each building and that all lighting improvements are implemented.

INTRODUCTION

Launched in 2008, the Local Government Energy Audit (LGEA) Program provides subsidized energy audits for municipal and local government-owned facilities, including offices, courtrooms, town halls, police and fire stations, sanitation buildings, transportation structures, schools and community centers. The Program can subsidize up to 100% of the cost of the audit. The Board of Public Utilities (BPUs) Office of Clean Energy has assigned TRC Energy Services to administer the Program.

Steven Winter Associates, Inc. (SWA) is a 38-year-old architectural/engineering research and consulting firm, with specialized expertise in green technologies and procedures that improve the safety, performance, and cost effectiveness of buildings. SWA has a long-standing commitment to creating energy-efficient, cost-saving and resource-conserving buildings. As consultants on the built environment, SWA works closely with architects, developers, builders, and local, state, and federal agencies to develop and apply sustainable, 'whole building' strategies in a wide variety of building types: commercial, residential, educational and institutional.

SWA performed an energy audit and assessment for the Borough Hall at 29 2nd Street. The process of the audit included facility visits on April 13th, benchmarking and energy bills analysis, assessment of existing conditions, energy modeling, energy conservation measures and other recommendations for improvements. The scope of work includes providing a summary of current building conditions, current operating costs, potential savings, and investment costs to achieve these savings. The facility description includes energy usage, occupancy profiles and current building systems along with a detailed inventory of building energy systems, recommendations for improvement and recommendations for energy purchasing and procurement strategies.

The goal of this Local Government Energy Audit is to provide sufficient information to the Borough of Frenchtown to make decisions regarding the implementation of the most appropriate and most cost-effective energy conservation measures for the Municipal building.

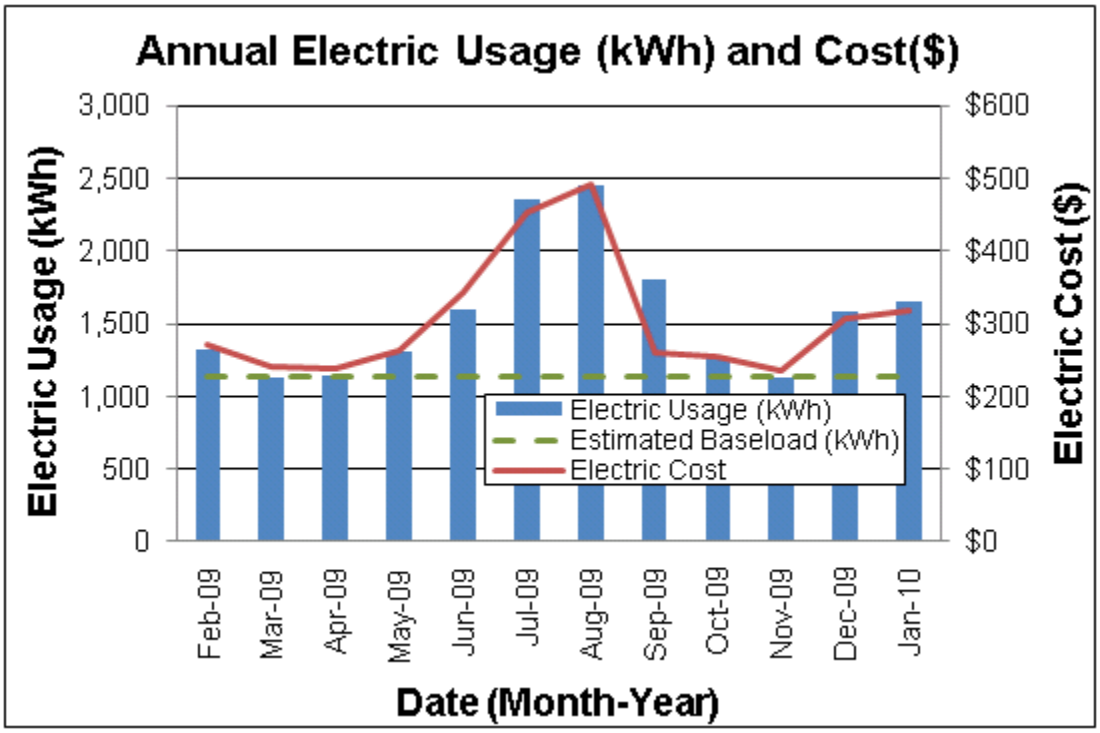
HISTORICAL ENERGY CONSUMPTION

Energy usage, load profile and cost analysis

SWA reviewed utility bills from March 2008 through January 2010 that were received from the utility companies supplying the Borough Hall with electricity and #2 fuel oil. A 12 month period of analysis from December 2008 through November 2009 was used for all calculations and for purposes of benchmarking the building.

Electricity - The Borough Hall is currently served by one electric meter. This electric meter also supplies the Fire Department building, located adjacent to the Borough Hall, with electricity. The buildings currently buy electricity from JCP&L at **an average aggregated rate of $0.196/kWh**. The building purchased **approximately 18,737 kWh, or $3,675 worth of electricity,** in the previous year.

The chart below shows the monthly electric usage and costs. The dashed green line represents the approximate base load or minimum electric usage required to operate the Borough Hall and Fire Department buildings.

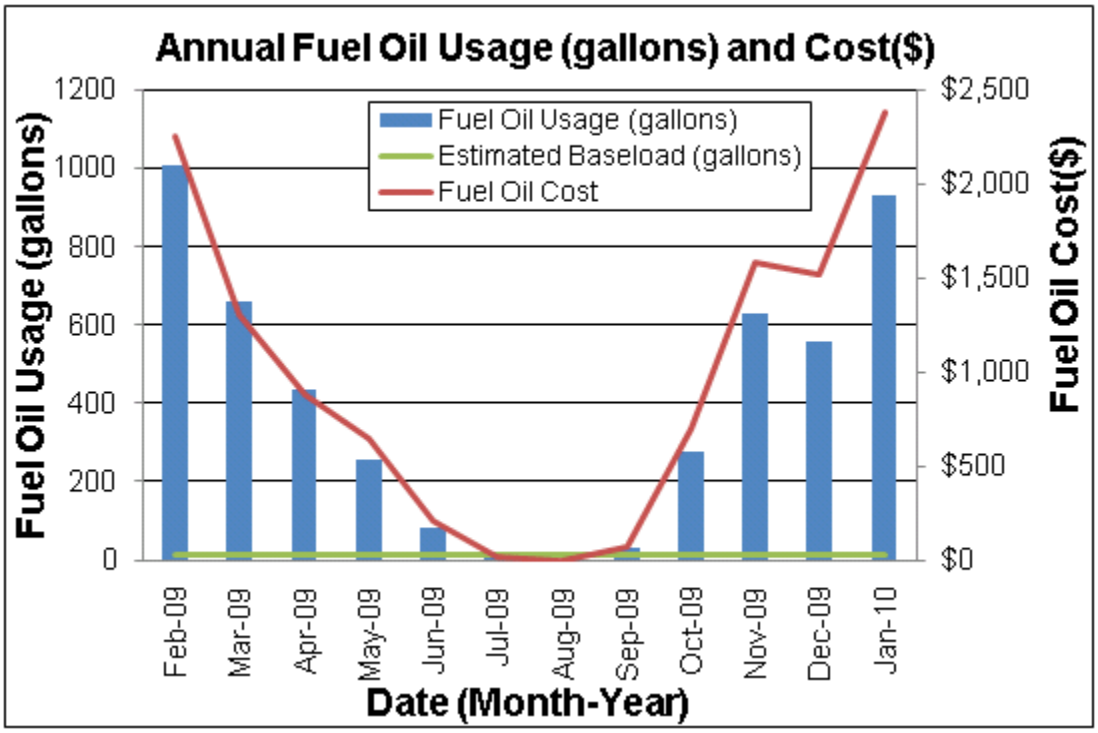


The above chart shows that the electricity usage increases during the summer when electricity is used for air conditioning. There is a slight peak during winter months as well that indicate that there is some electric heating within the building as well. Electric costs appear to be in line with electricity use.

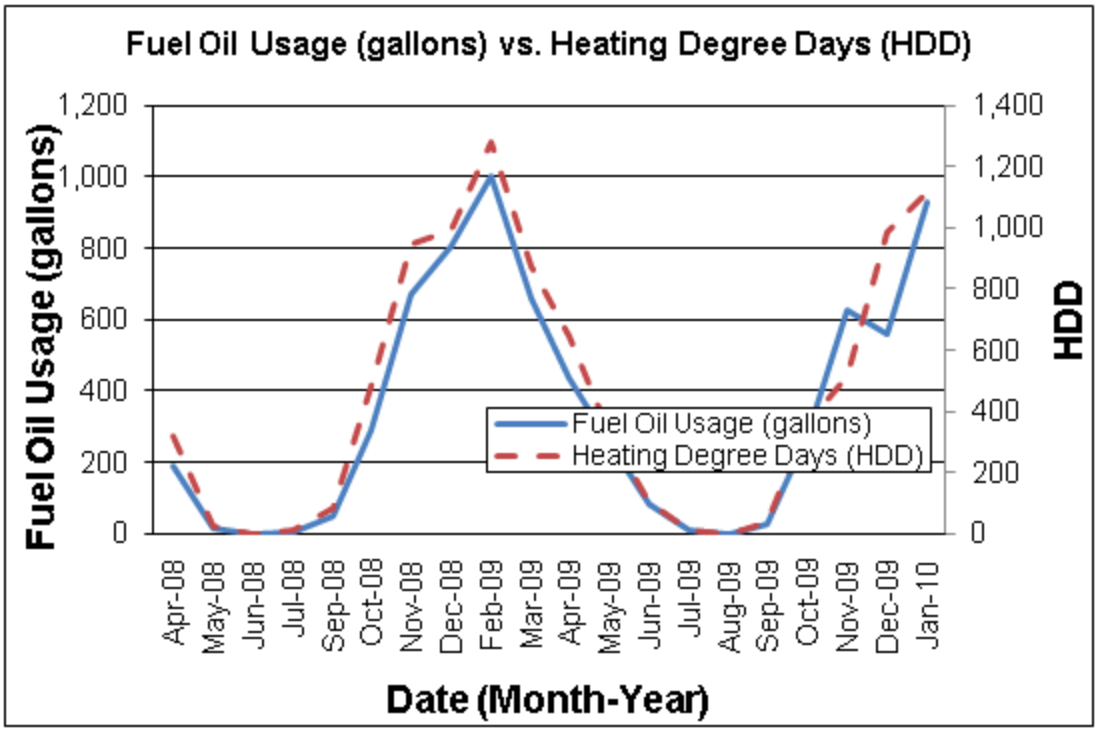
#2 Fuel Oil - The Borough Hall is currently served by one meter for #2 fuel oil. The Borugh Hall building shares a 1,000 gallon oil tank with the Fire Department that is located adjacent to the

building. Since the buildings share an oil tank, it is impossible to determine usage individually for each building without the installation of metering equipment. Together, they currently buy oil from Stem Brothers Oil at **an average aggregated rate of $2.373/gallon**. The Borough Hall purchased **approximately 4,863 gallons, or $11,541 worth of oil,** in the previous year.

The chart below shows the monthly oil usage and costs. The green line represents the approximate base load or minimum oil usage required to operate the Borough Hall.



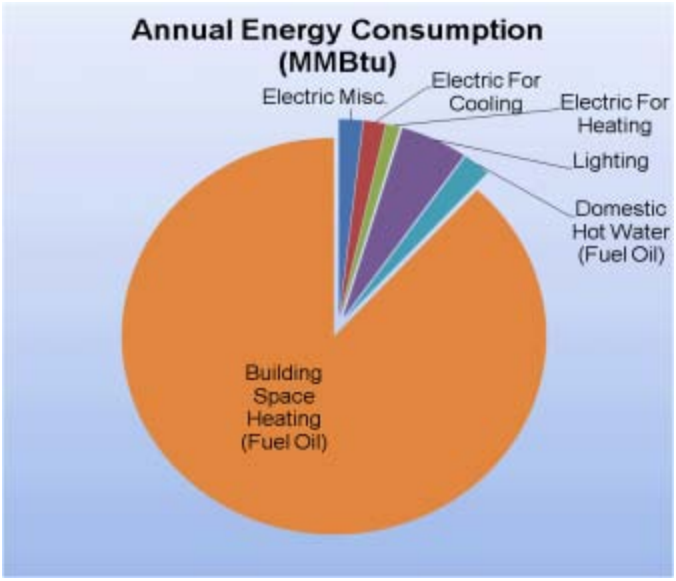
The above chart shows oil deliveries throughout the year. Due to the nature of oil being a delivered product and not metered, monthly utility data may be skewed slightly. Fuel oil use used primarily for heating and increases during the colder months. The Municipal building uses indirect-fired domestic hot water, which requires the oil boiler to be used year round, although usage during summer months is minimal.

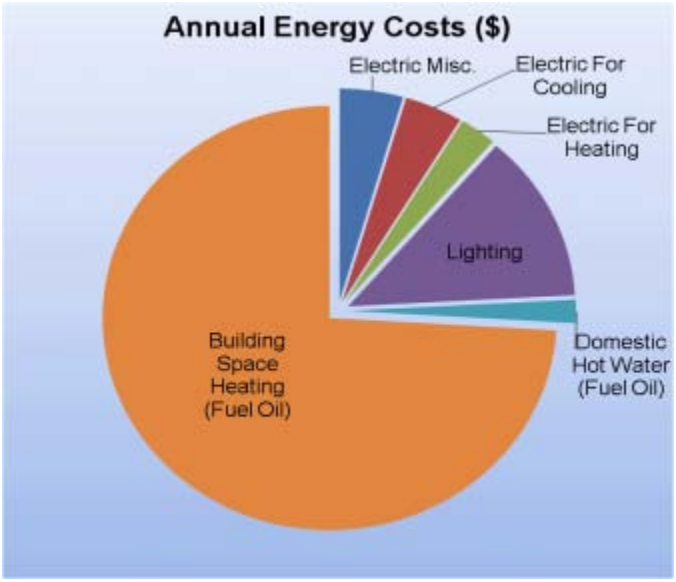


The above chart shows fuel oil usage compared to Heating Degree Days (HDD). Heating degree days is the difference of the average daily temperature and a base temperature, on a particular day. The heating degree days are zero for the days when the average temperature exceeds the base temperature. SWA's analysis used a base temperature of 65 degrees Fahrenheit. Comparing usage to HDD, we can determine whether actual oil usage corresponds with outside temperatures, which can act as an indicator for the required heating load.

The following graphs, pie charts, and table show energy use for the Borough Hall based on utility bills for the 12 month period. Note: electrical cost at $57/MMBtu of energy is more than 2 times as expensive as natural gas at $19/MMBtu.

Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	$	% $	$/MMBtu
Electric Miscellaneous	12	2%	$689	5%	57
Electric For Cooling	11	2%	$632	4%	57
Electric For Heating	7	1%	$402	3%	57
Lighting	34	5%	$1,952	13%	57
Domestic Hot Water (Fuel	14	2%	$270	2%	19
Building Space Heating	584	88%	$11,271	74%	19
Totals	662	100%	$15,216	100%	
Total Electric Usage	64	10%	$3,675	24%	57
Total Fuel Oil Usage	598	90%	$11,541	76%	19
Totals	662	100%	$15,216	100%	

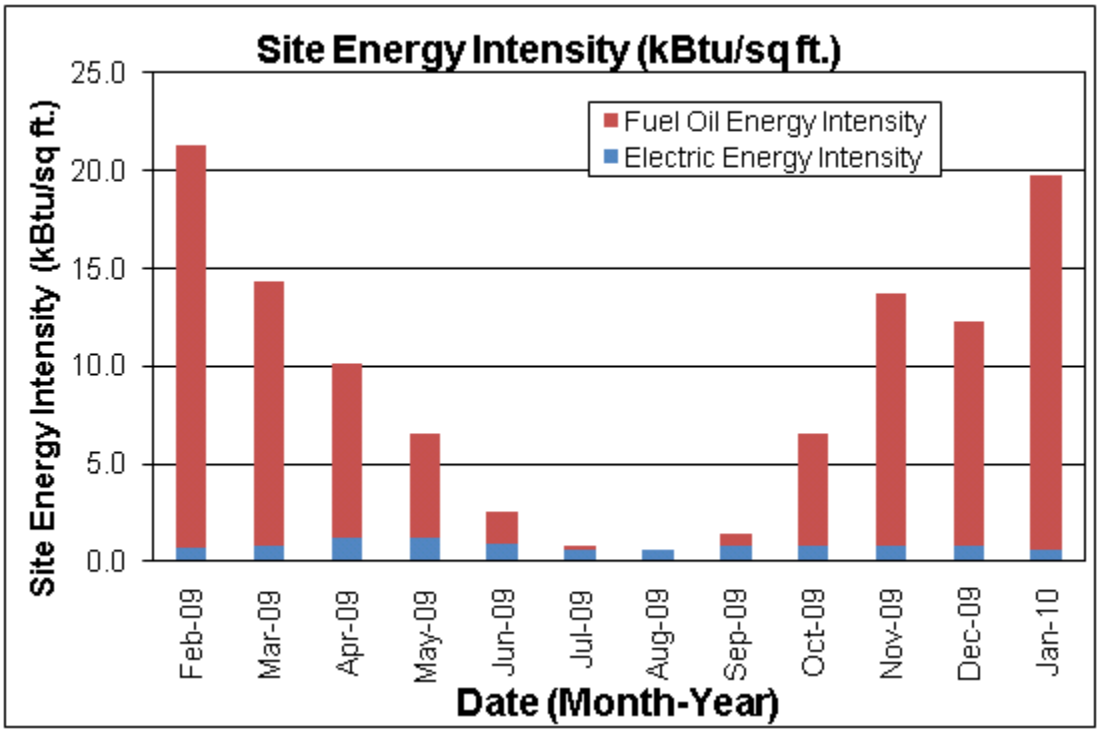




Energy benchmarking

SWA has entered energy information about the Borough Hall in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* energy benchmarking system. The plant is categorized as a non-eligible ("Other") space type. Because it is an "Other" space type, there is no rating available. Consequently, the building is not eligible to receive a national energy performance rating at this time. The Site Energy Use Intensity is 97.0 $\frac{kBtu}{ft^2-yr}$ compared to the national average of a commercial building consuming 78.0 $\frac{kBtu}{ft^2-yr}$. The Borough Hall building shares an electric meter as well as a #2 fuel oil tank, which also limits the ability to determine Site Energy Use Intensity numbers for each building individually. See ECM section for guidance on how to improve the building's rating.

Due to the nature of its calculation based upon a survey of existing buildings of varying usage, the national average for "Other" space types is very subjective, and is not an absolute bellwether for gauging performance.



The above chart shows the amount of energy per square foot increases greatly during cool months when fuel oil is used most for heating purposes.

Per the LGEA program requirements, SWA has assisted the Borough of Frenchtown to create an *ENERGY STAR® Portfolio Manager* account and share the Police Department facilities information to allow future data to be added and tracked using the benchmarking tool. SWA has shared this Portfolio Manager Account information with the Municipality (user name of "BOROUGHOFFRENCHTOWN" with a password of *"FRENCHTOWN")* and TRC Energy Services (user name of "TRC-LGEA").

Tariff analysis

As part of the utility bill analysis, SWA evaluated the current utility rates and tariffs. Tariffs are typically assigned to buildings based on size and building type.

Tariff analysis is performed to determine if the rate that a municipality is contracted to pay with each utility provider is the best rate possible resulting in the lowest costs for electric and oil provisions. Typically, the oil prices increase during the heating months when oil is used by the furnace and electricity prices increase during the cooling months when electricity is used by the air conditioners.

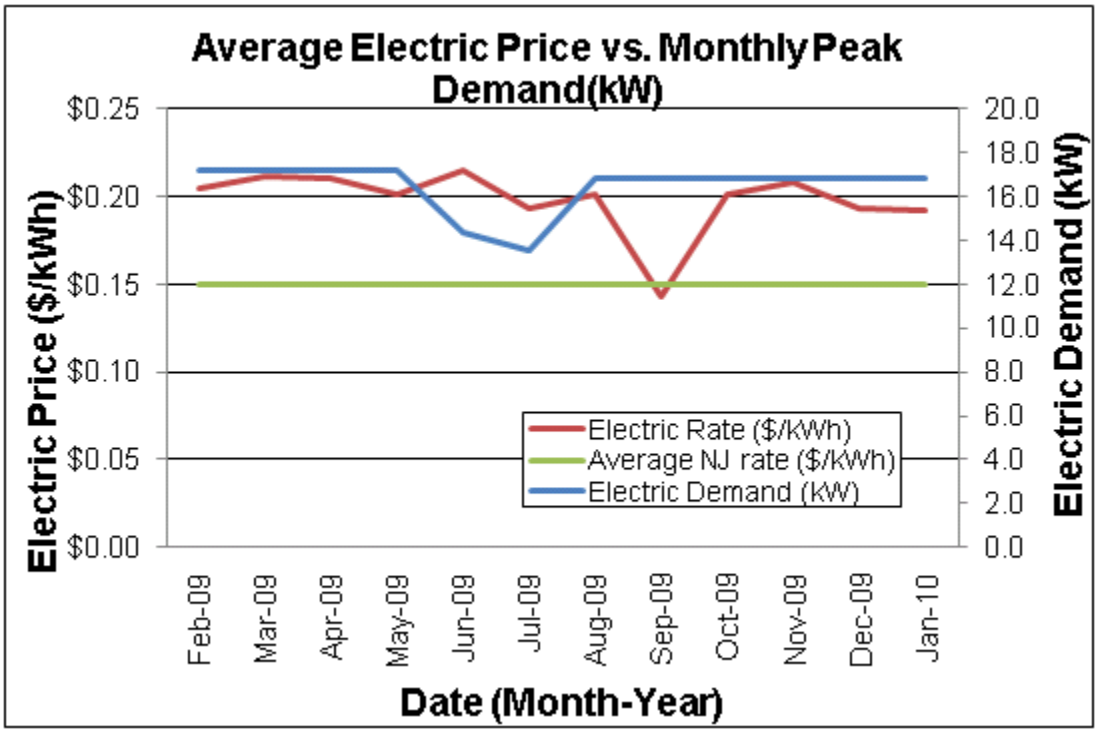
The supplier charges a market-rate price based on use and market prices, and the billing does not break down demand costs for all periods because usage and demand are included in the rate. Currently, the Borough of Frenchtown is paying a general service rate for oil. Demand is

not broken out in the bill. The building is direct metered and currently purchases electricity at a general service rate for usage with an additional charge for electrical demand factored into each monthly bill. There general service rate for electric charges are market-rate based on use. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year.

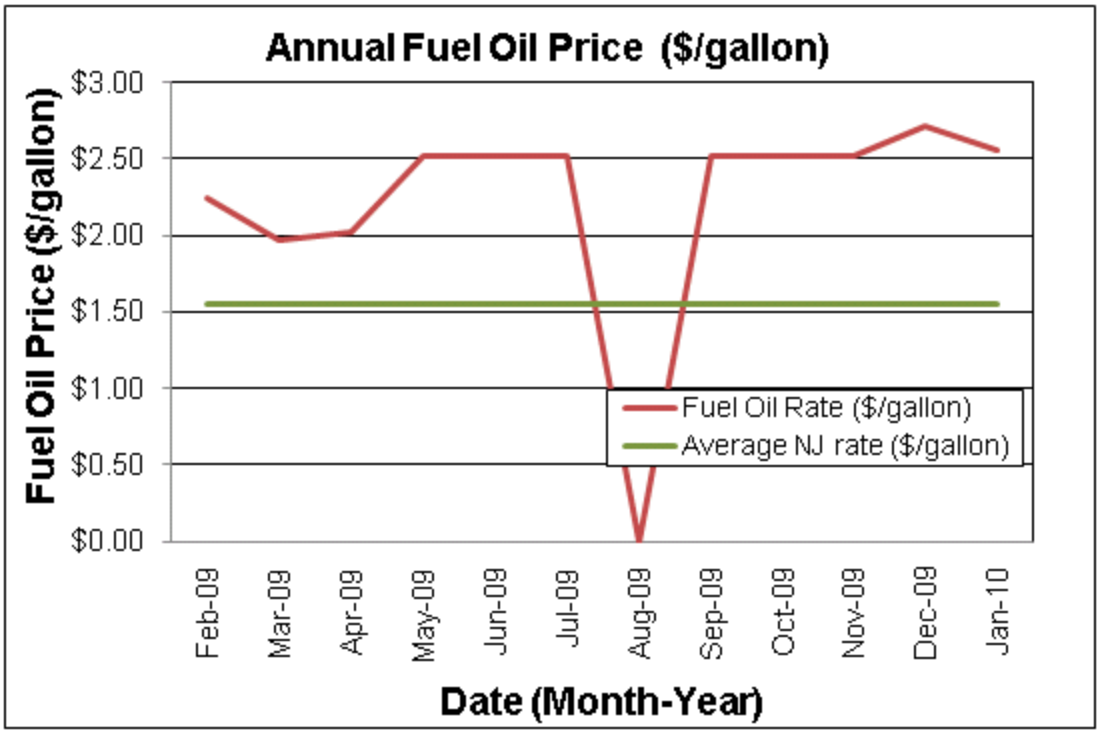
Energy Procurement strategies

Billing analysis is conducted using an average aggregated rate that is estimated based on the total cost divided by the total energy usage per utility per 12 month period. Average aggregated rates do not separate demand charges from usage, and instead provide a metric of inclusive cost per unit of energy. Average aggregated rates are used in order to equitably compare building utility rates to average utility rates throughout the state of New Jersey.

The average estimated NJ commercial utility rates for electric are $0.150/kWh, while the Borough Hall pays a rate of $0.196/kWh. The Borough Hall annual electric utility costs are $862 higher, when compared to the average estimated NJ commercial utility rates. Electric bill analysis shows fluctuations up to 33% over the most recent 12 month period.



The average estimated NJ commercial utility rates for oil are $1.680/gallon, while the Borough Hall pays a rate of $2.373/gallon. Oil bill analysis shows fluctuations up to 30% over the most recent 12 month period. The Borough Hall annual oil utility costs are $3,370 higher, when compared to the average estimated NJ commercial utility rates



The above chart shows that the average fuel price ($/gallon) is much greater than the NJ average cost, except during August when there was minimal usage reported.

Utility rate fluctuations may have been caused by adjustments between estimated and actual meter readings; others may be due to unusual high and recent escalating energy costs.

SWA recommends that the Borough Hall further explore opportunities of purchasing both oil and electricity from third-party suppliers in order to reduce rate fluctuation and ultimately reduce the annual cost of energy for the Borough Hall. Appendix C contains a complete list of third-party energy suppliers for the Borough of Frenchtown service area.

EXISTING FACILITY AND SYSTEMS DESCRIPTION

This section gives an overview of the current state of the facility and systems. Please refer to the Proposed Further Recommendations section for recommendations for improvement.

Based on visits from SWA on Tuesday, April 13, 2010, the following data was collected and analyzed.

Building Characteristics

The two-story, slab-below-grade including a partial basement and attic, 3,000 square feet Borough Hall and Library Building was originally constructed in 1870 with numerous alterations over the years. It houses a public meeting hall, offices, library and records room.


North Façade


South Façade


East Façade


West Façade

Building Occupancy Profiles

Its occupancy is approximately 6 employees daily plus a varying amount of visitors to the library and borough hall. The building opens at 9:00 AM with the offices closing at 5:00 PM and the Library closing at 9:00 PM.

Building Envelope

Due to unfavorable weather conditions (min. 18 deg. F delta-T in/outside and no/low wind), no exterior envelope infrared (IR) images were taken during the field audit.

General Note: All findings and recommendations on the exterior envelope (base, walls, roofs, doors and windows) are based on the energy auditors' experience and expertise, on

construction document reviews (if available) and on detailed visual analysis, as far as accessibility and weather conditions allowed at the time of the field audit.

Exterior Walls

The exterior wall envelope is mostly constructed of vinyl clapboard siding over a ribbed concrete veneer base and vinyl clapboard siding over 3-1/2" wood stud framing with 0 inches of assumed insulation. The interior is mostly painted gypsum wallboard. There is also a partial crawl space with R-19 fiberglass batt insulation recorded.

Note: Wall insulation levels *could not be verified in the field or on construction plans, and are based upon similar wall types and time of construction.*

Exterior and interior wall surfaces were inspected during the field audit. They were found to be in overall good, age-appropriate condition with only a few signs of uncontrolled moisture, air-leakage or other energy-compromising issues detected on all facades.

The following specific exterior wall problem spots and areas were identified:


Damaged exterior wall finish with a damaged vinyl siding that exposes the interior wall to the elements and is a source of infiltration. Cracked concrete base and signs of water damage.


Damaged exterior walls with signs of water damage, sections with vegetation overgrowth and insect infestation.

Roof

The building's roof is predominantly a medium-pitch gable type over a wood structure, with an asphalt shingle finish. It is not known when the last roof replacement occurred. Three inches of fiberglass batt ceiling insulation, and zero inches of detectable roof insulation were recorded.

Note: Roof insulation levels could visually be verified in the field by non-destructive methods.

Roofs, related flashing, gutters and downspouts were inspected during the field audit. They were reported to be in overall acceptable, age-appropriate condition, with only a few signs of uncontrolled moisture, air-leakage or other energy-compromising issues detected on all roof areas.

The following specific roof problem spots were identified:

Sections of roof with damaged or displaced asphalt shingles and an improperly sealed cupola.

Base

The building's base is composed of a below-grade basement with a slab floor and partial crawl space floor with a perimeter footing with poured concrete foundation walls and no detectable slab edge/perimeter insulation.

Slab/perimeter insulation levels could not be verified in the field or on construction plans, and are based upon similar wall types and time of construction.

The building's base and its perimeter were inspected for signs of uncontrolled moisture or water presence and other energy-compromising issues. Overall the base was reported to be in good/ age appropriate condition with no signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues detected in some areas inside.

Windows

The building contains basically four different types of windows:

1. Fixed type windows with a wood frame, clear single glazing and interior mini blinds. The windows are located throughout the building and some of these are installed with horizontal bars.

2. Fixed type windows with a non-insulated aluminum frame, clear single glazing and interior mini blinds. The windows are located throughout the building

3. Double-hung type windows with a wood frame, clear single glazing and interior mini blinds. The windows are located throughout the building

4. Double-hung type windows with a non-insulated aluminum frame, clear single glazing and interior mini blinds. The windows are located throughout the building

Windows, shading devices, sills, related flashing and caulking were inspected as far as accessibility allowed for signs of moisture, air-leakage and other energy compromising issues. Overall, the windows were found to be in poor/ age appropriate condition with numerous signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues.

The following specific window problem spots were identified:

Damaged/aged window frame and air-leakage at sleeved window/wall air-conditioning units. Single-glazed window with ineffective frame

Damaged/aged window frame and single-glazed window with ineffective frame

Exterior doors

The building contains two different types of exterior doors:

1. Paneled solid metal type exterior doors. They are located throughout the building and were installed recently.

2. Solid metal type exterior doors. They are located throughout the building and were installed recently.

All exterior doors, thresholds, related flashing, caulking and weather-stripping were inspected for signs of moisture, air-leakage and other energy-compromising issues. Overall, the doors were found to be in acceptable/ age appropriate condition with only a few signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues.

The following specific door problem spots were identified:

Missing/worn weather-stripping

Building air-tightness

Overall the field auditors found the building to be reasonably air-tight, considering the building's use and occupancy, as described in more detail earlier in this chapter.

The air tightness of buildings helps maximize all other implemented energy measures and investments, and minimizes potentially costly long-term maintenance, repair and replacement expenses.

Mechanical Systems

Heating Ventilation Air Conditioning

The building has no reported major heating or cooling comfort issues that were reported by building staff. In previous years, there were issues that allowed the central AC system to freeze up and cause disruptions with building cooling but all problems were reconciled during the previous cooling season.

Equipment

The Borough Hall building is heated primarily by a 37 year old, oil-fired boiler. This boiler is showing signs of extreme wear and should be replaced immediately. It was observed that the burner of this boiler is partially detached from the boiler, allowing gas vapors as well as heat to escape the boiler and reduce the efficiency. It was also noted by building staff that a local HVAC contractor had evaluated this boiler and determined that the inside is corroding and is falling apart from the inside out. In addition to the boiler, there are two newer, oil-fired Trane air handling units installed in the attic that provide forced air for heating as well as DX cooling. There are three Trane condensing units outside of the building that serve the two Trane air handlers. The garage area is served by one Modine unit heater that is connected to a hot water loop.

Weil-McLain boiler (L); Burner dislodge from boiler (R)

Modine unit heater in Garage

In addition to the Trane air handling units that provide central cooling to the Borough Hall offices and meeting area, there are two Samsung split air conditioning units for the Library space. These units each have an 11,500 Btuh cooling capacity and a SEER value of 10.0. The Library area also contains one GE with 11,000 Btuh cooling capacity and an EER value of 9.0.

View of (3) Trane condensers (L); Typical Samsung evaporative unit in Library (R)


GE window AC unit in Library

Outside air is provided to the various spaces of the building through the air handlers located in the attic. The two bathrooms for the building are located in the meeting area and contain exhaust fans that are operated using the same switch as the bathroom lights. In previous years, the Trane air handlers were freezing over and not providing adequate air conditioning to the spaces of the building A local HVAC contractor assessed the situation and determined that the attic was not properly ventilated, causing the Trane units to essentially overcool themselves and freeze the equipment components. In the past cooling season, a ventilation fan was added to the attic space that has appeared to remedy the problem.

Distribution Systems

The Weil-McLain boiler provides hot water heating via piping and baseboards throughout the entire building. One area of concern is at the staging area inside of the meeting room. This staging area is built out of a platform that was added to the space in order to elevate the front area to stage a desk. This platform was built in a way that the baseboard heaters in the front of the room are obstructed. This obstruction prevents the front perimeter area from being heated properly and can cause comfort complaints. Conditioned air is served by the Trane air handling units and is distributed through a network of ducts and diffusers. They are embedded into the floors and walls of the building, but most diffusers are found in the walls near ceiling height. Hot water is distributed by insulated copper piping.

Examples of typical diffuser and distribution system in the basement

Controls

All HVAC equipment is controlled by non-programmable thermostats with the exception of the two split air conditioning systems in the Library.

Domestic Hot Water

The domestic hot water (DHW) for the Borough Hall is provided by an indirect heating coil within the main heating boiler. This indirect-fired coil has no controls and requires the heating boiler to be operated all year long.

Electrical Systems

Lighting

See attached lighting schedule in Appendix B for a complete inventory of lighting throughout the building including estimated power consumption and proposed lighting recommendations.

Interior Lighting - The Borough Hall currently contains mostly inefficient T12 fixtures, and incandescent fixtures. Based on measurements of lighting levels for each space, there are no vastly over-illuminated areas. All lighting is controlled by manual switches.

Typical Ceiling Mounted Fixture with T12 Magnetically Ballasted Bulbs

Exit Lights - Exit signs were found to be LED and incandescent type. SWA recommends that the fluorescent exit signs should be replaced with LED exit signs.

Exterior Lighting - The exterior lighting surveyed during the building audit was found to be a mix of incandescent, metal halide and halogen fixtures. Exterior lighting is controlled by photocell sensors.

Appliances and process

SWA has conducted a general survey of larger, installed equipment. Appliances and other miscellaneous equipment account for a significant portion of electrical usage within the building. Typically, appliances are referred to as “plug-load” equipment, since they are not inherent to the building’s systems, but rather plug into an electrical outlet. Equipment such as process motors, computers, computer servers, radio and dispatch equipment, refrigerators, vending machines, printers, etc. all create an electrical load on the building that is hard to separate out from the rest of the building’s energy usage based on utility analysis.

Elevators

The Municipal building does not have an installed elevator.

Other electrical systems

There are not currently any other significant energy-impacting electrical systems or process equipment installed at the Municipal Building.

RENEWABLE AND DISTRIBUTED ENERGY MEASURES

Renewable energy is defined as any power source generated from sources which are naturally replenished, such as sunlight, wind and geothermal. Technology for renewable energy is improving, and the cost of installation is decreasing, due to both demand and the availability of state and federal government-sponsored funding. Renewable energy reduces the need for using either electricity or fossil fuel, therefore lowering costs by reducing the amount of energy purchased from the utility company. Technology such as photovoltaic panels or wind turbines, use natural resources to generate electricity on the site. Geothermal systems offset the thermal loads in a building by using water stored in the ground as either a heat sink or heat source. Solar thermal collectors heat a specified volume of water, reducing the amount of energy required to heat water using building equipment. Cogeneration or CHP allows you to generate electricity locally, while also taking advantage of heat wasted during the generation process.

Existing systems

Currently there are no renewable energy systems installed in the building.

Evaluated Systems

Solar Photovoltaic

Photovoltaic panels convert light energy received from the sun into a usable form of electricity. Panels can be connected into arrays and mounted directly onto building roofs, as well as installed onto built canopies over areas such as parking lots, building roofs or other open areas. Electricity generated from photovoltaic panels is generally sold back to the utility company through a net meter. Net-metering allows the utility to record the amount of electricity generated in order to pay credits to the consumer that can offset usage and demand costs on the electric bill. In addition to generation credits, there are incentives available called Solar Renewable Energy Credits (SRECs) that are subsidized by the state government. Specifically, the New Jersey State government pays a market-rate SREC to facilities that generate electricity in an effort to meet state-wide renewable energy requirements.

Based on utility analysis and a study of roof conditions, the Borough Hall building is not a good candidate for Solar Panel installation. The building is currently oriented North to South, with the sloped roof facing West-East. Based on roof orientation and the amount of limited roof area for solar panels, solar photovoltaic panels are not recommended.

Solar Thermal Collectors

Solar thermal collectors are not cost-effective for this building and would not be recommended due to the insufficient and intermittent use of domestic hot water throughout the building to justify the expenditure.

Geothermal

The Borough Hall building is not a good candidate for geothermal installation since it would require replacement of the entire existing HVAC system, of which major components still have between 65% and 86% remaining useful life.

Combined Heat and Power

The Borough Hall building is not a good candidate for CHP installation and would not be cost-effective due to the size and operations of the building. Typically, CHP is best suited for buildings with a high electrical base load to accommodate the electricity generated, as well as a means for using waste heat generated. Typical applications include buildings with an absorption chiller, where waste heat would be used efficiently.

PROPOSED ENERGY CONSERVATION MEASURES

Energy Conservation Measures (ECMs) are recommendations determined for the building based on improvements over current building conditions. ECMs have been determined for the building based on installed cost, as well as energy and cost-savings opportunities.

Recommendations: Energy Conservation Measures

ECM#	Description of Highly Recommended 0-5 Year Payback ECMs
1	Borough Hall – Install (4) CFL lamps
2	Fire Department – Install (7) new CFL lamps
3	Borough Hall – Install (3) LED exit signs
4	Borough Hall – Install (5) programmable thermostats
5	Borough Hall – Install (7) new occupancy sensors
	Description of Recommended 5-10 Year Payback ECMs
6	Borough Hall – Install (52) new T8 fluorescent fixtures
	Description of Recommended >10 Year Payback ECMs
7	Borough Hall – Install (2) Pulse Start Metal Halide fixtures
8	Fire Department – Install (28) new T8 fluorescent fixtures
9	Borough Hall/Fire Department – Replace oil-fired boilers with gas-fired units
10	Borough Hall/Fire Department – Install (2) separate gas-fired DHW heaters

Assumptions: Discount Rate: 3.2%; Energy Price Escalation Rate: 0%
Note: A 0.0 electrical demand reduction/month indicates that it is very low/negligible

ECM#1: Borough Hall – Install (4) CFL lamps

On the day of the site visit, SWA completed a lighting inventory of the Borough of Frenchtown Borough Hall (see Appendix B). The existing lighting inventory contained 4 inefficient incandescent lamps. SWA recommends that each incandescent lamp is replaced with a more efficient, Compact Fluorescent Lamp (CFL). CFLs are capable of providing equivalent or better light output while using less power.

Installation cost:

Estimated installed cost: $60 (includes $20 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

ECM #	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	Gallons of #2 oil, 1st year savings	Therms of Natural gas, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
1	60	643	0.1	0	0	0.3	79	205	5	2,339	0.3	3,798	75,956	342	874	1,151

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis.

Rebates/financial incentives:

- *None*

Please see Appendix F for more information on Incentive Programs.

ECM#2: Fire Department – Install (7) CFL lamps

On the day of the site visit, SWA completed a lighting inventory of the Borough of Frenchtown Fire Department (see Appendix B). The existing lighting inventory contained 7 inefficient incandescent lamps. SWA recommends that each incandescent lamp is replaced with a more efficient, Compact Fluorescent Lamp (CFL). CFLs are capable of providing equivalent or better light output while using less power.

Installation cost:

Estimated installed cost: $105 (includes $35 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

ECM #	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	Gallons of #2 oil, 1st year savings	Therms of Natural gas, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
2	105	989	0.2	0	0	0.5	88	282	5	2,340	0.4	2,128	42,565	268	1,178	1,771

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis.

Rebates/financial incentives:

- *None*

Please see Appendix F for more information on Incentive Programs.

ECM#3: Borough Hall – Install (3) LED exit signs

On the day of the site visit, SWA completed a lighting inventory of the Borough of Frenchtown Borough Hall(see Appendix B). The existing lighting inventory contained 3 inefficient incandescent exit signs. SWA recommends that each incandescent lamp is replaced with a more efficient, LED fixture. LED exit signs will save energy consumption and money while providing necessary lighting outputs using less energy.

Installation cost:

Estimated installed cost: $257 (includes $45 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

ECM #	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	Gallons of #2 oil, 1st year savings	Therms of Natural gas, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
3	257	907	0.2	0	0	0.5	22	200	15	2,339	1.3	810	5,400	78	2,094	1,624

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis.

Rebates/financial incentives:

- *None*

Please see Appendix F for more information on Incentive Programs.

ECM#4: Borough Hall - *Install (5) Programmable Thermostats*

On the day of the site visit, SWA observed that the Modine unit heater and all hot water baseboards located at the Borough Hall building are all controlled with 5 non-programmable thermostats. SWA recommends retro-fitting the building with 5 programmable thermostats that can reduce setpoint temperatures at night when the building is not being used. SWA recommends that programmable thermostats with a manual override are installed. The manual override option would allow any employees that needed to work outside of typical hours to override the automatic programming and would allow them to adjust the setpoint for a period of 2 hours. Once the building is well-sealed, the thermostat temperature should also be lowered to a reasonable temperature such as 70ºF.

Installation cost:

Estimated installed cost: $650 (includes $150 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program, ENERGY STAR®*

Economics:

ECM #	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	Gallons of #2 oil, 1st year savings	Therms of Natural gas, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
4	650	513	0	67	0	1.6	0	260	15	603	2.5	-7	-48	40	2,404	1,657

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA assumed that temperatures would be setback based on the operation schedule of the building.

Rebates/financial incentives:

- *None*

Please see Appendix F for more information on Incentive Programs.

ECM#5: Borough Hall - *Install (7) new Occupancy Sensors*

On the day of the site visit, SWA observed that the Borough of Frenchtown Borough Hall did not contain any lighting that was operated via occupancy sensors. SWA identified 7 areas within the Borough of Frenchtown Borough Hall that could benefit from the installation of occupancy sensors. Please see Appendix B for a detailed lighting inventory.

Installation cost:

Estimated installed cost: $560 (includes $105 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program, ENERGY STAR®*

Economics:

ECM #	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	Gallons of #2 oil, 1st year savings	Therms of Natural gas, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
5	560	819	0.2	0	0	0.4	6	166	15	2,495	3.4	346	2,303	29	1,397	1,466

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis.

Rebates/financial incentives:

- *NJ Clean Energy – Smart Start – Wall-mounted occupancy sensors ($20 per sensor).*

Please see Appendix F for more information on Incentive Programs.

ECM#6: *Borough Hall - Install (52) new T8 Fluorescent Fixtures*

On the day of the site visit, SWA completed a lighting inventory of the Borough of Frenchtown Borough Hall (see Appendix B). The existing lighting inventory contained mostly inefficient T12 fluorescent fixtures with magnetic ballasts. SWA recommends replacing each existing fixture with more efficient, T8 fluorescent fixtures with electronic ballasts. T8 fixtures with electronic ballasts provide equivalent or better light output while reducing energy consumption by 30% when compared to a T12 fixture with magnetic ballast.

Installation cost:

Estimated installed cost: $4,760 (includes $1,560 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

ECM #	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	Gallons of #2 oil, 1st year savings	Therms of Natural gas, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
6	4,760	1,826	0.4	0	0	0.9	241	599	15	8,983	7.9	89	591	9	2,287	3,269

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA also assumed an aggregated 5 hrs/yr to replace aging burnt out lamps vs. newly installed.

Rebates/financial incentives:

- *NJ Clean Energy – Smart Start – T8 fixtures with electronic ballasts ($15 per fixture)*

Please see Appendix F for more information on Incentive Programs.

ECM#7: *Borough Hall - Install (2) new Pulse Start Metal Halide fixtures*

On the day of the site visit, SWA completed a lighting inventory of the Borough of Frenchtown Borough Hall (see Appendix B). The existing exterior lighting inventory contained 2 Probe Start Metal Halide fixtures. SWA recommends replacing each existing fixture with more efficient Pulse Start Metal Halide technology. Probe Start Metal Halide fixtures can be installed at lower wattages since they do not degrade over time.

Installation cost:

Estimated installed cost: $4,760 (includes $1,560 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

ECM #	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	Gallons of #2 oil, 1st year savings	Therms of Natural gas, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
7	1,400	425	0.1	0	0	0.2	41	124	12	1,492	11.3	7	55	1	-177	761

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA also assumed an aggregated 5 hrs/yr to replace aging burnt out lamps vs. newly installed.

Rebates/financial incentives:

- *NJ Clean Energy – Smart Start – Metal Halide with Pulse Start ($25 per fixture)*

Please see Appendix F for more information on Incentive Programs.

ECM#8: *Fire Department - Install (28) new T8 Fluorescent Fixtures*

On the day of the site visit, SWA completed a lighting inventory of the Borough of Frenchtown Fire Department (see Appendix B). The existing lighting inventory contained mostly inefficient T12 fluorescent fixtures with magnetic ballasts. SWA recommends replacing each existing fixture with more efficient, T8 fluorescent fixtures with electronic ballasts. T8 fixtures with electronic ballasts provide equivalent or better light output while reducing energy consumption by 30% when compared to a T12 fixture with magnetic ballast.

Installation cost:

Estimated installed cost: $3,614 (includes $840 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

ECM #	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	Gallons of #2 oil, 1st year savings	Therms of Natural gas, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
8	3,614	989	0.2	0	0	0.5	120	314	15	2,339	11.5	-35	-235	4	79	1,771

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA also assumed an aggregated 5 hrs/yr to replace aging burnt out lamps vs. newly installed.

Rebates/financial incentives:

- *NJ Clean Energy – Smart Start – T8 fixtures with electronic ballasts ($15 per fixture)*

Please see Appendix F for more information on Incentive Programs.

ECM#9: *Borough Hall/Fire Department – Replace oil-fired boilers with gas-fired units*

On the day of the site visit, SWA completed a mechanical inventory of the Borough of Frenchtown Borough Hall and Fire Department (see Appendix B). Both buildings relied on inefficient, oil-fired boilers to meet their primary heating needs. Each boiler was observed to be at the end of its useful life cycle and should be replaced with newer, more efficient units. Recently, natural gas service has been extended through the Town and is available to both buildings. This will first require that the Borough of Frenchtown contact the natural gas supplier and have lines extended onto the property and a gas meter installed at each building.

Installation cost:

Estimated installed cost: $33,505 (includes $4,294 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

ECM #	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	Gallons of #2 oil, 1st year savings	Therms of Natural gas, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
9	33,505	0	0	4679	-5477	15.8	100	2,714	15	40,709	12.3	22	143	3	-1,570	51,577

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA assumes that existing oil-fired boilers are 77% efficient based on combustion efficiency test results and assumes replacement gas-fired units will be 85% efficient.

Rebates/financial incentives:

- *NJ Clean Energy – Smart Start – Gas-fired boilers <300 MBH ($300 per unit)*
- *NJ Clean Energy – Smart Start – Gas-fired boiler >300 MBH ($1.75 per MBH)*

Please see Appendix F for more information on Incentive Programs.

ECM#10: ***Borough Hall/Fire Department – Install separate gas-fired DHW heaters***

On the day of the site visit, SWA completed a mechanical inventory of the Borough of Frenchtown Borough Hall and Fire Department (see Appendix B). Both buildings relied on inefficient, oil-fired boilers to meet their primary heating needs. In addition to supply hot water heating throughout the buildings, these boilers also have an indirect coil installed within each boiler. This indirect coil has no control and requires the heating boiler to be fired all year long to meet a minimal DHW load. SWA recommends that when these boilers are replaced, separate gas-fired DHW units are installed. These units should be correctly sized to match the DHW load for each building and will give the building the ability to completely shut down the larger heating boilers during the summer. This will first require that the Borough of Frenchtown contact the natural gas supplier and have lines extended onto the property and a gas meter installed at each building.

Installation cost:

Estimated installed cost: $3,110 (includes $800 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

ECM #	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	Gallons of #2 oil, 1st year savings	Therms of Natural gas, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
10	3,110	0	0	117	-99	1.0	100	224	15	3,363	13.9	8	54	1	-472	1,290

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA assumes that existing domestic hot water usage is based on existing oil-fired boilers that are 77% efficient based on combustion efficiency test results and assumes replacement gas-fired units will be 85% efficient.

Rebates/financial incentives:

- *NJ Clean Energy – Smart Start – Natural Gas Water Heating <50 gallons ($50 per unit)*

Please see Appendix F for more information on Incentive Programs.

PROPOSED FURTHER RECOMMENDATIONS

Capital Improvements

Capital Improvements are recommendations for the building that may not be cost-effective at the current time, but that could yield a significant long-term payback. These recommendations should typically be considered as part of a long-term capital improvement plan. Capital improvements should be considered if additional funds are made available, or if the installed costs can be shared with other improvements, such as major building renovations. SWA recommends the following capital improvements for the Police Department:

- Extend natural gas service from road to buildings – SWA noted that natural gas lines are now run down 2nd Street, directly in front of the Borough property. SWA recommends that the Borough of Frenchtown contact the Natural Gas supplier for their area in order to have meters installed and gas service extended onto the property.

- Install premium motors when replacements are required - Select NEMA Premium motors when replacing motors that have reached the end of their useful operating lives.

- Replace portions of damaged siding on the exterior wall

- Add insulation to under-insulated roof sections. SWA suggests a minimum of R-30 to the underside of the attic roof structure.

- Openings around window air-conditioning units need airtight gaskets/sealants for optimal all year performance. Insulated hoods should be installed during winter months if removing the units is not an option.

- Replace all original, single-glazed windows with a low-E, double glazed type. SWA noted that the front façade of this building is considered historic by the Town Historical society. Any work affecting the look of this front façade should be approved by the Historical society in order to maintain historic status. This includes the single pane windows on the front façade.

Operations and Maintenance

Operations and Maintenance measures consist of low/no cost measures that are within the capability of the current building staff to handle. These measures typically require little investment, and they yield a short payback period. These measures may address equipment settings or staff operations that, when addressed will reduce energy consumption or costs.

- Install/ repair and maintain roof flashing.

- Replace/repair and maintain damaged window units.

- Install/replace and maintain weather-stripping around all exterior doors and roof hatches.

- Maintain roofs - SWA recommends regular maintenance to verify the condition of the roof shingles and proper water drainage.

- Maintain exterior wall – SWA recommends regular maintenance to verify the condition of the siding and to identify signs of water damage and sources of infiltration.

- Maintain downspouts and cap flashing - Repair/install missing downspouts and cap flashing as needed to prevent water/moisture infiltration and insulation damage. SWA recommends round downspout elbows to minimize clogging.

- Provide weather-stripping/air-sealing - SWA observed that exterior door weather-stripping was beginning to deteriorate in places. Doors and vestibules should be observed annually for deficient weather-stripping and replaced as needed. The perimeter of all window frames should also be regularly inspected, and any missing or deteriorated caulking should be re-caulked to provide an unbroken seal around the window frames. Any other accessible gaps or penetrations in the thermal envelope penetrations should also be sealed with caulk or spray foam.

- Provide water-efficient fixtures and controls - Adding controlled on/off timers on all lavatory faucets is a cost-effective way to reduce domestic hot water demand and save water. Building staff can also easily install faucet aerators and/or low-flow fixtures to reduce water consumption. There are many retrofit options, which can be installed now or incorporated as equipment is replaced. Routine maintenance practices that identify and quickly address water leaks are a low-cost way to save water and energy. Retrofitting with more efficient water-consumption fixtures/appliances will reduce energy consumption for water heating, while also decreasing water/sewer bills.

- SWA recommends that the building considers purchasing the most energy-efficient equipment, including ENERGY STAR® labeled appliances, when equipment is installed or replaced. More information can be found in the “Products” section of the ENERGY STAR® website at: http://www.energystar.gov.

- Use smart power electric strips - in conjunction with occupancy sensors to power down computer equipment when left unattended for extended periods of time.

- Create an energy educational program - that teaches how to minimize energy use. The U.S. Department of Energy offers free information for hosting energy efficiency educational programs and plans. For more information please visit: http://www1.eere.energy.gov/education/.

Note: The recommended ECMs and the list above are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for Borough of Frenchtown. Based on the requirements of the LGEA program, the Borough of Frenchtown must commit to implementing some of these measures, and must submit paperwork to the Local Government Energy Audit program within one year of this report’s approval to demonstrate that they have spent, net of other NJCEP incentives, at least 25% of the cost of the audit (per building). The minimum amount to be spent, net of other NJCEP incentives, is $1,251.

APPENDIX A: EQUIPMENT LIST

Borough Hall Inventory

Building System	Description	Location	Make/ Model	Fuel	Space Served	Date Installed	Estimated Remaining Useful Life %
Heating	Weil-McLain boiler, 77% thermal efficiency, no nameplate info	Boiler room, Partial Basement	Weil-McLain, Model #NA, Serial #75-2358-H	#2 fuel oil	All Areas	1973	0%
Heating	Four circulation pumps, covered in oil, could not read nameplates, 4 loops to serve office, garage, library and meeting area	Boiler room, Partial Basement	No nameplate info	Electricity	All Areas	1998	0%
Heating	One Modine unit heater in garage area, no nameplate info, ceiling-mounted	Garage area	Modine, no nameplate info	hot water loop	Garage	2002	68%
Heating/ Cooling	Trane air handling unit, split ac system, oil-fired with DX cooling,10.1 EER, 2.5 tons	Attic, above Borough offices	Trane, Model #TWE024C14080, Serial #Z303KD12V	#2 fuel oil/ electricity	Office areas	2001	64%
Heating/ Cooling	Trane air handling unit, split ac system, oil-fired with DX cooling,10.1 EER, 5 tons	Attic, above meeting area	Trane, Model #TWE048C140c0, Serial #Z24284S2V	#2 fuel oil/ electricity	Meeting Area	2001	64%
Cooling	CU-5; Samsung condensing unit, 11,500 Btuh cooling capacity, SEER 10.0, 1280W power input, R-22 refrigerant	Exterior, next to library section	Samsung, Model #US12A2VC, Serial #P1AN800221	Electricity	Library	2001	64%
Cooling	CU-1; Trane condensing unit, 1 ph, R-22 refrigerant, 10.0 EER	Exterior, side of building near Police Department	Trane, Model #2TTR2042A1000AA, Serial #2075KAF1F, Series XE1200	Electricity	All Areas	2002	68%
Cooling	CU-2; Trane condensing unit, 1 ph, R-22 refrigerant, 10.0 EER	Exterior, side of building near Police Department	Trane, Model #2TTR2048A1000AA, Serial #2075KAF1F, Series XR 12	Electricity	All Areas	2002	68%
Cooling	CU-3; Trane condensing unit, 1 ph, R-22 refrigerant, 10.0 EER	Exterior, side of building near Police Department	Trane, Model #2TTR2048A1000AA, Serial #2061LTE2F, Series XR 12	Electricity	All Areas	2002	68%
Cooling	CU-4; Samsung condensing unit, 11,500 Btuh cooling capacity, SEER 10.0, 1280W power input, R-22 refrigerant	Exterior, next to library section	Samsung, Model #US12A2VC, Serial #P1AN800027	Electricity	Library	2001	64%
Cooling	Samsung evaporative unit, connected to CU-5	Library, interior	Samsung, Model #AS12A2VC, Serial #P2FN800274	Electricity	Library	2001	64%
Cooling	Samsung evaporative unit, connected to CU-4	Library, interior	Samsung, Model #AS12A2VC, Serial #P2FH800279	Electricity	Library	2001	64%
Cooling	GE window AC unit, 11,000 Btuh cooling, 1220 W input, 9.0 EER	Library, interior	GE, Model #ACM11AAT1, Serial #663951	Electricity	Library	1999	56%
Domestic Hot Water	DHW is provided by an indirect-fired coil located in the shell of the boiler	Boiler room, Partial Basement	No nameplate info	hot water loop	All Areas	1973	0%
Lighting	See Appendix B	-	-	-	-	-	-

Fire Department Inventory

Building System	Description	Location	Make/ Model	Fuel	Space Served	Date Installed	Estimated Remaining Useful Life %
Heating	Burnham cast iron sectional boiler, 450,000 input, 81% thermal efficiency	Mechanical closet, next to Fire Department kitchen	Burnham, no nameplate info	#2 fuel oil	All Areas	1985	0%
Heating	Three circulation pumps, standard efficiency, covered in oil, could not read nameplates, 3 loops to serve baseboard heaters on first floor, second floor, garage	Mechanical closet, next to Fire Department kitchen	No nameplate info	Electricity	All Areas	1985	0%
Cooling	Whirlpool window AC unit, 8.5 EER, R-22 refrigerant	Kitchen window	Whirlpool, Model #ACQ214XM0, Serial #QP2814995	Electricity	Kitchen	2003	72%
Cooling	Kenmore window AC unit, 17,500 cooling Btuh, 10.7 EER, R-22 refrigerant, energy star unit	Second floor window	Kenmore, Model #25372175200, Serial #JK22531701	Electricity	Second floor	2003	72%
Domestic Hot Water	DHW is provided by an indirect-fired coil located in the shell of the boiler	Mechanical closet, next to Fire Department kitchen	No nameplate info	hot water loop	All Areas	1985	0%
Lighting	See Appendix B	-	-	-	-	-	-

Note: The remaining useful life of a system (in %) is an estimate based on the system date of built and existing conditions derived from visual inspection.

Appendix B: Lighting Study

Borough Hall inventory

Location			Existing Fixture Information												Retrofit Information												Annual Savings		
Marker	Floor	Room Identification	Fixture Type	Ballast	Lamp Type	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Controls	Operational Hours per Day	Operational Days per Year	Ballast Wattage	Total Watts	Energy Use kWh/year	Category	Fixture Type	Lamp Type	Ballast	Controls	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Operational Hours per Day	Operational Days per Year	Ballast Watts	Total Watts	Energy Use kWh/year	Fixture Savings (kWh)	Controls Savings (kWh)	Total Savings (kWh)
1	Bsmt	Record Room	abolic Ceiling Mour	M	4'T12	1	2	40	Sw	2	261	12	92	48	T8	ilic Ceiling M	4'T8	E	Sw	1	2	32	2	261	5	69	36	12	0	12
2	1	Admin Office	abolic Ceiling Mour	M	4'T12	3	4	40	Sw	6	261	12	516	808	T8	ilic Ceiling M	4'T8	E	Sw	3	4	32	6	261	5	399	625	183	0	183
3	1	Admin Office	Exit Sign	S	Inc	1	2	20	N	24	365	0	40	350	LEDex	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	302	0	302
4	1	File/Copy Room	Recessed Paraboli	M	4'T12	2	4	40	Sw	6	261	12	344	539	T8	essed Parab	4'T8	E	Sw	2	4	32	6	261	5	266	417	122	0	122
5	1	Admin Office 2	Recessed Paraboli	M	4'T12	2	4	40	Sw	6	261	12	344	539	T8	essed Parab	4'T8	E	Sw	2	4	32	6	261	5	266	417	122	0	122
6	1	Lower Level Admin Office	Recessed Paraboli	M	4'T12	3	4	40	Sw	1	261	12	516	135	T8	essed Parab	4'T8	E	Sw	3	4	32	1	261	5	399	104	31	0	31
7	1	Lower Level Admin Office	Exit Sign	S	Inc	2	2	20	N	24	365	0	80	701	LEDex	Exit Sign	LED	S	N	2	1	5	24	365	1	11	96	604	0	604
8	1	Meeting Rm	Exit Sign	S	LED	2	6	5	N	24	365	1	61	534	N/A	Exit Sign	LED	S	N	2	6	5	24	365	1	61	534	0	0	0
9	1	Meeting Rm	Recessed Paraboli	M	4'T12	16	2	40	N	8	261	12	1,472	3,074	T8	essed Parab	4'T8	E	OS	16	2	32	6	261	5	1104	1729	768	576	1345
10	1	Bathroom Men	Wall Mounted	S	Inc	1	2	60	Sw	4	261	0	120	125	CFL	Wall Mounted	CFL	S	OS	1	2	20	1	261	0	40	10	84	31	115
11	1	Bathroom Women	Wall Mounted	S	Inc	1	2	60	Sw	4	261	0	120	125	CFL	Wall Mounted	CFL	S	OS	1	2	20	1	261	0	40	10	84	31	115
12	Ext	Exterior	Wall Mounted	S	CFL	3	1	23	T	6	365	0	69	151	N/A	Wall Mounted	CFL	S	T	3	1	23	6	365	0	69	151	0	0	0
13	Ext	Exterior Side Door	Ceiling Mounted	S	CFL	1	1	23	T	6	365	0	23	50	N/A	ailing Mounte	CFL	S	T	1	1	23	6	365	0	23	50	0	0	0
14	Bsmt	Boiler Rm	Ceiling Mounted	S	CFL	1	1	14	Sw	4	365	0	14	20	C	eiling Mounte	CFL	S	OS	1	1	14	1	365	0	14	5	0	15	15
15	Bsmt	Boiler Rm	Ceiling Mounted	S	Inc	1	1	100	Sw	4	365	0	100	146	CFL	eiling Mounte	CFL	S	OS	1	1	35	1	365	0	35	13	95	38	133
16	1	Garage	Ceiling Mounted	M	8'T12	6	2	48	N	2	365	12	108	473	T8	eiling Mounte	8'T8	E	N	6	2	36	2	365	12	84	368	105	0	105
17	1	Garage	Exit Sign	S	LED	1	1	5	N	24	365	1	6	53	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	53	0	0	0
18	Ext	Exterior	Wallpack	S	MH	1	1	150	T	6	365	42	192	420	PSMH	Wallpack	PSMH	S	T	1	1	100	6	365	20	120	263	158	0	158
19	Ext	Exterior	Wallpack	S	MH	1	1	150	PC	12	365	42	192	841	PSMH	Wallpack	PSMH	S	PC	1	1	100	12	365	20	120	526	315	0	315
20	Ext	Exterior	Flood	S	Hal	1	1	100	PC	12	365	22	122	534	CFL	Flood	CFL	S	PC	1	1	35	12	365	0	35	153	381	0	381
21	Ext	Exterior Front	Wall Mounted	S	Fl.	2	1	13	PC	12	365	1	29	125	N/A	Wall Mounted	FL.	S	PC	2	1	13	12	365	1	29	125	0	0	0
22	1	Library	abolic Ceiling Mour	M	4'T12	12	2	40	Sw	4	261	12	1,104	1,153	T8	ilic Ceiling M	4'T8	E	Sw	12	2	32	4	261	5	828	864	288	0	288
23	1	Library Childrens Room	abolic Ceiling Mour	E	4'T12	6	2	40	Sw	4	261	12	552	576	T8	ilic Ceiling M	4'T8	E	OS	6	2	32	3	261	5	414	324	144	108	252
24	1	Bathroom	Recessed Paraboli	E	3 U-Sha	1	2	32	Sw	9	261	5	69	162	N/A	essed Parab	3 U-Sha	E	Sw	1	2	32	9	261	5	69	162	0	0	0
25	1	Storage Closet	Recessed Paraboli	E	3 U-Sha	1	2	32	Sw	2	261	5	69	36	N/A	essed Parab	3 U-Sha	E	Sw	1	2	32	2	261	5	69	36	0	0	0
26	1	Library	Exit Sign	S	LED	1	6	5	N	24	365	1	31	267	N/A	Exit Sign	LED	S	N	1	6	5	24	365	1	31	267	0	0	0
27	1	Library Childrens Room	Exit Sign	S	LED	1	6	5	N	24	365	1	31	267	N/A	Exit Sign	LED	S	N	1	6	5	24	365	1	31	267	0	0	0
28	1	Library Back Room	abolic Ceiling Mour	M	4'T12	1	2	40	Sw	4	261	12	92	96	T8	ilic Ceiling M	4'T8	E	OS	1	2	32	3	261	5	69	54	24	18	42
						75	67	1,225				240	6,507	#####						75	65				112	4,705	7,709	3,822	819	4,641
Totals:																														

Fire Department inventory

Location			Existing Fixture Information												Retrofit Information												Annual Savings		
Marker	Floor	Room Identification	Fixture Type	Ballast	Lamp Type	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Controls	Operational Hours per Day	Operational Days per Year	Ballast Wattage	Total Watts	Energy Use kWh/year	Category	Fixture Type	Lamp Type	Ballast	Controls	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Operational Hours per Day	Operational Days per Year	Ballast Watts	Total Watts	Energy Use kWh/year	Fixture Savings (kWh)	Controls Savings (kWh)	Total Savings (kWh)
1	1	Boiler Rm	iling Mount	S	Inc	1	1	60	Sw	2	365	0	60	44	CFL	ng Mou	CFL	S	Sw	1	1	20	2	365	0	20	15	29	0	29
2	1	Kitchen	essed Parat	M	4'T12	9	4	40	Sw	24	365	12	1,548	13,560	T8	sed Pa	4'T8	E	Sw	9	4	32	24	365	5	1197	10486	3075	0	3075
3	1	Kitchen	essed Parat	M	2 U-Sha	1	2	40	Sw	24	365	12	92	806	T8	sed Pa	U-Sha	E	Sw	1	2	32	24	365	5	69	604	201	0	201
4	1	Kitchen	Exit Sign	S	LED	2	6	5	N	24	365	1	61	534	N/A	Exit Sig	LED	S	N	2	6	5	24	365	1	61	534	0	0	0
5	1	Staircase	Exit Sign	S	LED	1	6	5	N	24	365	1	31	267	N/A	Exit Sig	LED	S	N	1	6	5	24	365	1	31	267	0	0	0
6	1	Storage Closet	Wall Mounte	S	Inc	2	1	100	Sw	2	365	0	200	146	CFL	ll Moun	CFL	S	Sw	2	1	35	2	365	0	70	51	95	0	95
7	1	Staircase	Wall Mounte	S	Inc	2	1	60	Sw	24	365	0	120	1,051	CFL	ll Moun	CFL	S	Sw	2	1	20	24	365	0	40	350	701	0	701
8	2	Main Room	lic Ceiling M	M	8'T12	6	2	80	Sw	24	365	20	1,080	9,461	T8	Ceiling	8'T8	E	Sw	6	2	59	24	365	7	750	6570	2891	0	2891
9	2	Main Room	Exit Sign	S	LED	1	6	5	N	24	365	1	31	267	N/A	Exit Sig	LED	S	N	1	6	5	24	365	1	31	267	0	0	0
10	2	Main Room Closet	Wall Mounte	S	Inc	1	1	100	Sw	2	365	0	100	73	CFL	ll Moun	CFL	S	Sw	1	1	35	2	365	0	35	26	47	0	47
11	2	Main Room Closet	iling Mount	M	cline - T	1	2	40	Sw	2	365	12	92	67	N/A	ng Mou	rcline -	M	Sw	1	2	40	2	365	6	86	63	4	0	4
12	1	Garage	lic Ceiling M	M	8'T12	4	2	80	Sw	24	365	20	720	6,307	T8	Ceiling	8'T8	E	Sw	4	2	59	24	365	7	500	4380	1927	0	1927
13	1	Garage	lic Ceiling M	M	8'T12	8	2	80	Sw	8	365	20	1,440	4,205	T8	Ceiling	8'T8	E	Sw	8	2	59	8	365	7	1000	2920	1285	0	1285
14	1	Garage	Exit Sign	S	LED	1	6	5	N	24	365	1	31	267	N/A	Exit Sig	LED	S	N	1	6	5	24	365	1	31	267	0	0	0
15	1	Bathroom	Recessed	S	Inc	1	1	60	Sw	8	365	0	60	175	CFL	ecesse	CFL	S	Sw	1	1	20	8	365	0	20	58	117	0	117
Totals:						41	43	760				98	5,665	37,231						41	43				39	3,940	26,859	10,372	0	10,372

Rows Highlighed Yellow Indicate an Energy Conservation Measure is recommended for that space

Legend:

Fixture Type	Lamp Type	Control Type	Ballast Type	Retrofit Category
Exit Sign	LED	N (None)	N/A (None)	N/A (None)
Screw-in	Inc (Incandescent)	S (Switch)	E (Electronic)	T8 (Installl new T8)
Pin	1'T5	OS (Occupancy Sensor)	M (Magnetic)	T5 (Install new T5)
Parabolic	2'T5	T (Timer)		CFL (Install new CFL)
Recessed	3'T5	PC (Photocell)		LEDex (Install new LED Exit)
2'U-shape	4'T5	D (Dimming)		LED (Install new LED)
Circiline	2'T8	DL (Daylight Sensor)		D (Delamping)
Exterior	3'T8	M (Microphonic Sensor)		C (Controls Only)
HID (High Intensity Discharge)	4'T8			
	6'T8			
	8'T8			
	2'T12			
	3'T12			
	4'T12			
	6'T12			
	8'T12			
	CFL (Compact Fluorescent Lightbulb)			
	MR16			
	Halogen			
	MV (Mercury Vapor)			
	MH (Metal Halide)			
	HPS (High Pressure Sodium			
	LPS (Low Pressure Sodium)			

APPENDIX C: THIRD PARTY ENERGY SUPPLIERS

http://www.state.nj.us/bpu/commercial/shopping.html

Third Party Electric Suppliers for JCPL Service Territory	Telephone & Web Site
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com
BOC Energy Services, Inc. 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 www.boc.com
Commerce Energy, Inc. 4400 Route 9 South, Suite 100 Freehold, NJ 07728	(800) 556-8457 www.commerceenergy.com
Constellation New Energy, Inc. 900A Lake Street, Suite 2, Ramsey, NJ 07446	(888) 635-0827 www.newenergy.com
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com
FirstEnergy Solutions 300 Madison Avenue, Morristown, NJ 07926	(800) 977-0500 www.fes.com
Glacial Energy of New Jersey, Inc. 207 LaRoche Avenue Harrington Park, NJ 07640	(877) 569-2841 www.glacialenergy.com
Integrys Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830	(877) 763-9977 www.integrysenergy.com
Liberty Power Delaware, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(866) 769-3799 www.libertypowercorp.com
Liberty Power Holdings, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(800) 363-7499 www.libertypowercorp.com
Pepco Energy Services, Inc. 112 Main St. Lebanon, NJ 08833	(800) 363-7499 www.pepco-services.com
PPL EnergyPlus, LLC 811 Church Road, Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.com
Sempra Energy Solutions 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 www.semprasolutions.com
South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 756-3749 www.southjerseyenergy.com
Suez Energy Resources NA, Inc. 333 Thornall Street, 6th Floor, Edison, NJ 08837	(888) 644-1014 www.suezenergyresources.com
UGI Energy Services, Inc. 704 East Main Street, Suite 1 Moorestown, NJ 08057	(856) 273-9995 www.ugienergyservices.com

APPENDIX D: GLOSSARY AND METHOD OF CALCULATIONS

Net ECM Cost: The net ECM cost is the cost experienced by the customer, which is typically the total cost (materials + labor) of installing the measure minus any available incentives. Both the total cost and the incentive amounts are expressed in the summary for each ECM.

Annual Energy Cost Savings (AECS): This value is determined by the audit firm based on the calculated energy savings (kWh or Therm) of each ECM and the calculated energy costs of the building.

Lifetime Energy Cost Savings (LECS): This measure estimates the energy cost savings over the lifetime of the ECM. It can be a simple estimation based on fixed energy costs. If desired, this value can factor in an annual increase in energy costs as long as the source is provided.

Simple Payback: This is a simple measure that displays how long the ECM will take to break-even based on the annual energy and maintenance savings of the measure.

ECM Lifetime: This is included with each ECM so that the owner can see how long the ECM will be in place and whether or not it will exceed the simple payback period. Additional guidance for calculating ECM lifetimes can be found below. This value can come from manufacturer's rated lifetime or warranty, the ASHRAE rated lifetime, or any other valid source.

Operating Cost Savings (OCS): This calculation is an annual operating savings for the ECM. It is the difference in the operating, maintenance, and / or equipment replacement costs of the existing case versus the ECM. In the case where an ECM lifetime will be longer than the existing measure (such as LED lighting versus fluorescent) the operating savings will factor in the cost of replacing the units to match the lifetime of the ECM. In this case or in one where one-time repairs are made, the total replacement / repair sum is averaged over the lifetime of the ECM.

Return on Investment (ROI): The ROI is expresses the percentage return of the investment based on the lifetime cost savings of the ECM. This value can be included as an annual or lifetime value, or both.

Net Present Value (NPV): The NPV calculates the present value of an investment's future cash flows based on the time value of money, which is accounted for by a discount rate (assumes bond rate of 3.2%).

Internal Rate of Return (IRR): The IRR expresses an annual rate that results in a break-even point for the investment. If the owner is currently experiencing a lower return on their capital than the IRR, the project is financially advantageous. This measure also allows the owner to compare ECMs against each other to determine the most appealing choices.

Gas Rate and Electric Rate ($/therm and $/kWh): The gas rate and electric rate used in the financial analysis is the total annual energy cost divided by the total annual energy usage for the 12 month billing period studied. The graphs of the monthly gas and electric rates reflect the total monthly energy costs divided by the monthly usage, and display how the average rate fluctuates throughout the year. The average annual rate is the only rate used in energy savings calculations.

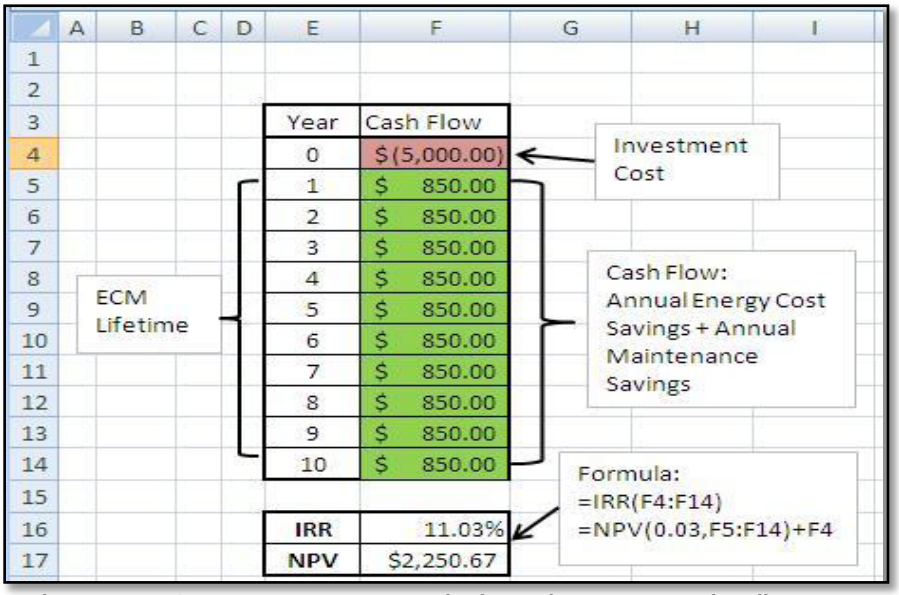
Calculation References

Term	Definition
ECM	Energy Conservation Measure
AOCS	Annual Operating Cost Savings
AECS	Annual Energy Cost Savings
LOCS*	Lifetime Operating Cost Savings
LECS	Lifetime Energy Cost Savings
LCS	Lifetime Cost Savings
NPV	Net Present Value
IRR	Internal Rate of Return
DR	Discount Rate
Net ECM Cost	Total ECM Cost – Incentive
LECS	AECS X ECM Lifetime
AOCS	LOCS / ECM Lifetime
LCS	LOCS+LECS
Simple Payback	Net ECM Cost / (AECS + AOCS)
Lifetime ROI	(LECS + LOCS – Net ECM Cost) / Net ECM Cost
Annual ROI	(Lifetime ROI / Lifetime) = [(AECS + OCS) / Net ECM Cost – (1 / Lifetime)]

* The lifetime operating cost savings are all avoided operating, maintenance, and/or component replacement costs over the lifetime of the ECM. This can be the sum of any annual operating savings, recurring or bulk (i.e. one-time repairs) maintenance savings, or the savings that comes from avoiding equipment replacement needed for the existing measure to meet the lifetime of the ECM (e.g. lighting change outs).

Excel NPV and IRR Calculation

In Excel, function =IRR (values) and =NPV(rate, values) are used to quickly calculate the IRR and NPV of a series of annual cash flows. The investment cost will typically be a negative cash flow at year 0 (total cost - incentive) with years 1 through the lifetime receiving a positive cash flow from the annual energy cost savings and annual maintenance savings. The calculations in the example below are for an ECM that saves $850 annually in energy and maintenance costs (over a 10 year lifetime) and takes $5,000 to purchase and install after incentives:



Solar PV ECM Calculation

There are several components to the calculation:

Costs:	Material of PV system including panels, mounting and net-metering + Labor
Energy Savings:	Reduction of kWh electric cost for life of panel, 25 years
Incentive 1:	NJ Renewable Energy Incentive Program (REIP), for systems of size 50kW or less, $1/Watt incentive subtracted from installation cost
Incentive 2:	Solar Renewable Energy Credits (SRECs) – Market-rate incentive. Calculations assume $600/Megawatt hour consumed per year for a maximum of 15 years; added to annual energy cost savings for a period of 15 years. (Megawatt hour used is rounded to nearest 1,000 kWh)
Assumptions:	A Solar Pathfinder device is used to analyze site shading for the building and determine maximum amount of full load operation based on available sunlight. When the Solar Pathfinder device is not implemented, amount of full load operation based on available sunlight is assumed to be 1,180 hours in New Jersey.

Total lifetime PV energy cost savings =
kWh produced by panel * [$/kWh cost * 25 years + $600/Megawatt hour /1000 * 15 years]

ECM and Equipment Lifetimes

Determining a lifetime for equipment and ECM's can sometimes be difficult. The following table contains a list of lifetimes that the NJCEP uses in its commercial and industrial programs. Other valid sources are also used to determine lifetimes, such as the DOE, ASHRAE, or the manufacturer's warranty.

Lighting is typically the most difficult lifetime to calculate because the fixture, ballast, and bulb can all have different lifetimes. Essentially the ECM analysis will have different operating cost savings (avoided equipment replacement) depending on which lifetime is used.

When the bulb lifetime is used (rated burn hours / annual burn hours), the operating cost savings is just reflecting the theoretical cost of replacing the existing case bulb and ballast over the life of the recommended bulb. Dividing by the bulb lifetime will give an annual operating cost savings.

When a fixture lifetime is used (e.g. 15 years) the operating cost savings reflects the avoided bulb and ballast replacement cost of the existing case over 15 years minus the projected bulb and ballast replacement cost of the proposed case over 15 years. This will give the difference of the equipment replacement costs between the proposed and existing cases and when divided by 15 years will give the annual operating cost savings.

New Jersey Clean Energy Program Commercial & Industrial Lifetimes

Measure	Life Span
Commercial Lighting — New	15
Commercial Lighting — Remodel/Replacement	15
Commercial Custom — New	18
Commercial Chiller Optimization	18
Commercial Unitary HVAC — New - Tier 1	15
Commercial Unitary HVAC — Replacement - Tier 1	15
Commercial Unitary HVAC — New - Tier 2	15
Commercial Unitary HVAC — Replacement Tier 2	15
Commercial Chillers — New	25
Commercial Chillers — Replacement	25
Commercial Small Motors (1-10 HP) — New or Replacement	20
Commercial Medium Motors (11-75 HP) — New or Replacement	20
Commercial Large Motors (76-200 HP) — New or Replacement	20
Commercial VSDs — New	15
Commercial VSDs — Retrofit	15
Commercial Comprehensive New Construction Design	18
Commercial Custom — Replacement	18
Industrial Lighting — New	15
Industrial Lighting — Remodel/Replacement	15
Industrial Unitary HVAC — New - Tier 1	15
Industrial Unitary HVAC — Replacement - Tier 1	15
Industrial Unitary HVAC — New - Tier 2	15
Industrial Unitary HVAC — Replacement Tier 2	15
Industrial Chillers — New	25
Industrial Chillers — Replacement	25
Industrial Small Motors (1-10 HP) — New or Replacement	20
Industrial Medium Motors (11-75 HP) — New or Replacement	20
Industrial Large Motors (76-200 HP) — New or Replacement	20
Industrial VSDs — New	15
Industrial VSDs — Retrofit	15
Industrial Custom — Non-Process	18
Industrial Custom — Process	10
Small Commercial Gas Furnace — New or Replacement	20
Small Commercial Gas Boiler — New or Replacement	20
Small Commercial Gas DHW — New or Replacement	10
C&I Gas Absorption Chiller — New or Replacement	25
C&I Gas Custom — New or Replacement (Engine Driven Chiller)	25
C&I Gas Custom — New or Replacement (Gas Efficiency Measures)	18
O&M savings	3
Compressed Air (GWh participant)	8

APPENDIX E: STATEMENT OF ENERGY PERFORMANCE FROM ENERGY STAR®

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Borough of Frenchtown - Borough Hall

Building ID: 2281466
For 12-month Period Ending: December 31, 2009[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: May 04, 2010

Facility	Facility Owner	Primary Contact for this Facility
Borough of Frenchtown - Borough Hall 27 2nd Street Frenchtown, NJ 08825	N/A	N/A

Year Built: 1870
Gross Floor Area (ft²): 6,800

Energy Performance Rating[2] (1-100) N/A

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	62,574
Fuel Oil (No. 2) (kBtu)	599,902
Natural Gas - (kBtu)[4]	0
Total Energy (kBtu)	662,476

Energy Intensity[5]	
Site (kBtu/ft²/yr)	97
Source (kBtu/ft²/yr)	120

Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	54

Electric Distribution Utility
FirstEnergy - Jersey Central Power & Lt Co

National Average Comparison	
National Average Site EUI	78
National Average Source EUI	157
% Difference from National Average Source EUI	-24%
Building Type	Fire Station/Police Station

Stamp of Certifying Professional

Based on the conditions observed at the time of my visit to this building, I certify that the information contained within this statement is accurate.

Certifying Professional
N/A

Meets Industry Standards[6] for Indoor Environmental Conditions:	
Ventilation for Acceptable Indoor Air Quality	**N/A**
Acceptable Thermal Environmental Conditions	**N/A**
Adequate Illumination	**N/A**

Notes:
1. Application for the ENERGY STAR must be submitted to EPA within 4 months of the Period Ending date. Award of the ENERGY STAR is not final until approval is received from EPA.
2. The EPA Energy Performance Rating is based on total source energy. A rating of 75 is the minimum to be eligible for the ENERGY STAR.
3. Values represent energy consumption, annualized to a 12-month period.
4. Natural Gas values in units of volume (e.g. cubic feet) are converted to kBtu with adjustments made for elevation based on Facility zip code.
5. Values represent energy intensity, annualized to a 12-month period.
6. Based on Meeting ASHRAE Standard 62 for ventilation for acceptable indoor air quality, ASHRAE Standard 55 for thermal comfort, and IESNA Lighting Handbook for lighting quality.

The government estimates the average time needed to fill out this form is 6 hours (includes the time for entering energy data, PE facility inspection, and notarizing the SEP) and welcomes suggestions for reducing this level of effort. Send comments (referencing OMB control number) to the Director, Collection Strategies Division, U.S., EPA (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460.

EPA Form 5900-16

APPENDIX F: INCENTIVE PROGRAMS

New Jersey Clean Energy Pay for Performance

The NJ Clean Energy Pay for Performance (P4P) Program relies on a network of Partners who provide technical services to clients. LGEA participating clients who are not receiving Direct Energy Efficiency and Conservation Block Grants are eligible for P4P. SWA is an eligible Partner and can develop an Energy Reduction Plan for each project with a whole-building traditional energy audit, a financial plan for funding the energy measures and an installation construction schedule.

The Energy Reduction Plan must define a comprehensive package of measures capable of reducing a building's energy consumption by 15+%. P4P incentives are awarded upon the satisfactory completion of three program milestones: submittal of an Energy Reduction Plan prepared by an approved Program Partner, installation of the recommended measures and completion of a Post-Construction Benchmarking Report. The incentives for electricity and natural gas savings will be paid based on actual savings, provided that the minimum 15%performance threshold savings has been achieved.

For further information, please see: http://www.njcleanenergy.com/commercial-industrial/programs/pay-performance/existing-buildings .

Direct Install 2010 Program

Direct Install is a division of the New Jersey Clean Energy Programs' Smart Start Buildings. It is a turn-key program for small to mid-sized facilities to aid in upgrading equipment to more efficient types. It is designed to cut overall energy costs by upgrading lighting, HVAC and other equipment with energy efficient alternatives. The program pays **up to 80%** of the retrofit costs, including equipment cost and installation costs.

Eligibility:

- Existing small and mid-sized commercial and industrial facilities with peak electrical demand **below 200 kW** within 12 months of applying
- Must be located in New Jersey
- Must be served by one of the state's public, regulated or natural gas companies
    - Electric: Atlantic City Electric, Jersey Central Power & Light, Orange Rockland Electric, PSE&G
    - Natural Gas: Elizabethtown Gas, New Jersey Natural Gas, PSE&G, South Jersey Gas

For the most up to date information on contractors in New Jersey who participate in this program, go to: http://www.njcleanenergy.com/commercial-industrial/programs/direct-install

Smart Start

New Jersey's Smart Start Building Program is administered by New Jersey's Office of Clean Energy. The program also offers design support for larger projects and technical assistance for smaller projects. If your project specifications do not fit into anything defined by the program, there are even incentives available for custom projects.

There are a number of improvement options for commercial, industrial, institutional, government, and agricultural projects throughout New Jersey. Alternatives are designed to enhance quality while building in energy efficiency to save money. Project categories included in this program are New Construction and Additions, Renovations, Remodeling and Equipment Replacement.

For the most up to date information on how to participate in this program, go to: http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings.

Renewable Energy Incentive Program

The Renewable Energy Incentive Program (REIP) provides incentives that reduce the upfront cost of installing renewable energy systems, including solar, wind, and sustainable biomass. Incentives vary depending upon technology, system size, and building type. Current incentive levels, participation information, and application forms can be found at the website listed below.

Solar Renewable Energy Credits (SRECs) represent all the clean energy benefits of electricity generated from a solar energy system. SRECs can be sold or traded separately from the power, providing owners a source of revenue to help offset the cost of installation. All solar project owners in New Jersey with electric distribution grid-connected systems are eligible to generate SRECs. Each time a system generates 1,000 kWh of electricity an SREC is earned and placed in the customer's account on the web-based SREC tracking system.

For the most up to date information on how to participate in this program, go to: http://www.njcleanenergy.com/renewable-energy/home/home.

Utility Sponsored Programs

Check with your local utility companies for further opportunities that may be available.

Energy Efficiency and Conservation Block Grant Rebate Program

The Energy Efficiency and Conservation Block Grant (EECBG) Rebate Program provides supplemental funding up to $20,000 for eligible New Jersey local government entities to lower the cost of installing energy conservation measures. Funding for the EECBG Rebate Program is provided through the American Recovery and Reinvestment Act (ARRA).

For the most up to date information on how to participate in this program, go to: http://njcleanenergy.com/EECBG

Other Federal and State Sponsored Programs

Other federal and state sponsored funding opportunities may be available, including BLOCK and R&D grant funding. For more information, please check http://www.dsireusa.org/.

APPENDIX G: ENERGY CONSERVATION MEASURES

	ECM #	ECM description	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	Gallons of oil, 1st year savings	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
0-5 Year Payback	1	**Borough Hall - Install (4) CFL lamps**	0	60	643	0.1	0	0	0.3	79	205	5	2,339	0.3	3,798	75,956	342	874	1,151
	2	**Fire Department - Install (7) new CFL lamps**	0	105	989	0.2	0	0	0.5	88	282	5	2,340	0.4	2,128	42,565	268	1,178	1,771
	3	**Borough Hall - Install (3) LED exit signs**	60	257	907	0.2	0	0	0.5	22	200	15	2,339	1.3	810	5,400	78	2,094	1,624
	4	**Borough Hall - Install (5) programmable thermostats**	0	650	513	0	67	0	1.6	0	260	15	603	2.5	-7	-48	40	2,404	1,657
	5	**Borough Hall - Install (7) new occupancy sensors**	140	560	819	0.2	0	0	0.4	6	166	15	2,495	3.4	346	2,303	29	1,397	1,466

5-10	6	**Borough Hall - Install (52) new T8 fluorescent fixtures**	780	4,760	1,826	0.4	0	0	0.9	241	599	15	8,983	7.9	89	591	9	2,287	3,269
<10 Year Payback (End of Life Measures)	7	**Borough Hall - Install (2) Pulse Start Metal Halide fixtures**	50	1,400	425	0.1	0	0	0.2	41	124	12	1,492	11.3	7	55	1	-177	761
	8	**Fire Department - Install (28) new T8 fluorescent fixtures**	420	3,614	989	0.2	0	0	0.5	120	314	15	2,339	11.5	-35	-235	4	79	1,771
	9	**Borough Hall/Fire Department - Replace oil-fired boilers with gas-fired units**	1,087	33,505	0	0	4679	-5477	15.8	100	2,714	15	40,709	12.3	22	143	3	-1,570	51,577
	10	**Borough Hall/Fire Department - Install (2) separate gas-fired DHW heaters**	100	3,110	0	0	117	-99	1.0	100	224	15	3,363	13.9	8	54	1	-472	1,290

APPENDIX H: METHOD OF ANALYSIS

Assumptions and tools

Energy modeling tool:	Established/standard industry assumptions, E-Quest
Cost estimates:	RS Means 2009 (Facilities Maintenance & Repair Cost Data) RS Means 2009 (Building Construction Cost Data) RS Means 2009 (Mechanical Cost Data) Published and established specialized equipment material and labor costs Cost estimates also based on utility bill analysis and prior experience with similar projects

Disclaimer

This engineering audit was prepared using the most current and accurate fuel consumption data available for the site. The estimates that it projects are intended to help guide the owner toward best energy choices. The costs and savings are subject to fluctuations in weather, variations in quality of maintenance, changes in prices of fuel, materials, and labor, and other factors. Although we cannot guarantee savings or costs, we suggest that you use this report for economic analysis of the building and as a means to estimate future cash flow.

THE RECOMMENDATIONS PRESENTED IN THIS REPORT ARE BASED ON THE RESULTS OF ANALYSIS, INSPECTION, AND PERFORMANCE TESTING OF A SAMPLE OF COMPONENTS OF THE Police Department SITE. ALTHOUGH CODE-RELATED ISSUES MAY BE NOTED, SWA STAFF HAVE NOT COMPLETED A COMPREHENSIVE EVALUATION FOR CODE-COMPLIANCE OR HEALTH AND SAFETY ISSUES. THE OWNER(S) AND MANAGER(S) OF THE Police Department(S) CONTAINED IN THIS REPORT ARE REMINDED THAT ANY IMPROVEMENTS SUGGESTED IN THIS SCOPE OF WORK MUST BE PERFORMED IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL LAWS AND REGULATIONS THAT APPLY TO SAID WORK. PARTICULAR ATTENTION MUST BE PAID TO ANY WORK WHICH INVOLVES HEATING AND AIR MOVEMENT SYSTEMS, AND ANY WORK WHICH WILL INVOLVE THE DISTURBANCE OF PRODUCTS CONTAINING MOLD, ASBESTOS, OR LEAD.