Steven Winter Associates, Inc.
Building Systems Consultants
www.swinter.com

293 Route 18, Suite 330
East Brunswick, NJ 08816

Telephone (866) 676-1972
Facsimile (203) 852-0741

August 20, 2010

Local Government Energy Program
Energy Audit Report-FINAL

The Township of Millburn

Short Hills Train Station building
15 Chatham Rd
Short Hills, NJ 07078

Project Number: LGEA58

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The single-story 1,296 square feet Short Hills Train Station was originally constructed in 1907 with recent renovations in 2008, including interior finishes, new windows, doors, and ceramic roofing tiles. It houses a waiting room, restrooms, refreshment kiosks, train ticket sales office, and a partial basement with mechanical equipment. The following chart provides an overview of current energy usage in the building based on the analysis period of February 2009 through January 2010:

Table 1: State of Building—Energy Usage

	Electric Usage, kWh/yr	Gas Usage, therms/yr	Current Annual Cost of Energy, $	Site Energy Use Intensity, kBtu/sq ft yr	Joint Energy Consumption, MMBtu/yr
Current	28,516	1,759	6,970	211	205
Proposed	21,337	1,791	5,280	195	184
Savings	7,179	-32	1,690	16	21
% Savings	25	-2	24	8	10

There may be energy procurement opportunities for the Short Hills Train Station building to reduce annual utility costs. The Township of Millburn electric costs are $671 higher than the average estimated NJ commercial utility rate of $0.150/kWh, while natural gas costs are $704 lower than the average rate of $1.550/therm. Overall the utility costs are $33 lower, when compared to the average estimated NJ commercial utility rates.

SWA has also entered energy information about the Short Hills Train Station in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This building is comprised of a mixture of "Other" space types. The building did not receive a performance rating due to it's categorization as "Other" space type. SWA recommends the Township of Millburn continue to insert utility billing information as the building may receive a rating as the (EPA) *ENERGY STAR® Portfolio Manager* database grows. The site energy use intensity is 205.0 kBtu/ft^2/yr when compared to the national average site energy use intensity of 104.0 kBtu/ft^2/yr.

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	1,377	0.5	695	9,691
5-10 Year	800	5.5	800	1,547
>10 year	166	14.5	2,416	1,259
Total	1,690	2.3	3,911	12,497

SWA estimates that implementing the recommended ECMs is equivalent to removing approximately 1 car from the roads each year or avoiding the need of 30 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

SWA recommends that the Township of Millburn further explore the following list for the Short Hills Train Station building:

- Capital Improvements
  - Consider reducing heating load to restrooms
  - Replace gas-fired ceiling-mounted space heater
  - Investigate insulation levels and insulate exterior wall sections
  - Investigate attic/ceiling insulation and confirm minimum of R30 insulation. Before (additional) insulation is installed SWA recommends air sealing.
  - Consider installing exterior glass vestibule around exterior waiting room doors

- Operations and Maintenance
  - Maintain exterior wall assemblies
  - Inspect and maintain all roof surfaces on a regular basis
  - Maintain weather-stripping around all exterior doors
  - Maintain sealants and caulks at all windows for airtight performance
  - Perform and maintain air-sealing
  - Remove birds' nestings and regularly maintain rafter netting
  - Purchase the most energy-efficient equipment, including ENERGY STAR® labeled appliances, when equipment is installed or replaced
  - Maintain downspouts and cap flashing
  - Use smart power electric strips
  - Create an energy educational program

Financial Incentives and Other Program Opportunities

The recommended ECMs and the list above are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for the Township of Millburn. Based on the requirements of the LGEA program, the Township of Millburn 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 per building, net of other NJCEP incentives, is $651.75. The table below summarizes the recommended ECMs that Township of Millburn can undertake for achieving this purpose. It is important to note that the required 25% expenditure is per building and after the other implementation incentive amounts.

Table 3: Next Steps for the Short Hills Train Station

Recommended ECMs	Incentive Program (Please refer to Appendix F for details)
Install 1 programmable thermostat	None
Install 2 new CFL lamps	None
Re-connect existing gas DHW heater	None
Install 3 new Pulse Start Metal Halide Fixtures	NJ Clean Energy – Direct Install, SmartStart program
Install 2 new T8 fluorescent fixtures	NJ Clean Energy – Direct Install, SmartStart program

There are various incentive programs that the Township of Millburn could apply for that could help lower the cost of installing the ECMs. For the Short Hills Train Station, and contingent upon available funding, SWA recommends the following incentive programs:

Direct Install 2010 Program: Commercial buildings with peak electric demand below 200kW can receive up to 60% of installed cost of energy saving upgrades.

Smart Start: Most energy savings equipment and design measures have moderate incentives under this program.

Utility Sponsored Programs: See available programs with JCP&L and PSEG.

Energy Efficiency and Conservation Block Grant Rebate Program: Provides up to $20,000 per local government toward energy saving measures.

Please refer to Appendix F for further details.

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 will 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 Short Hills Train Station building at 15 Chatham Rd, Short Hills, NJ 07078. The process of the audit included a facility visit on April 8th, 2010, 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 Township of Millburn to make decisions regarding the implementation of the most appropriate and cost-effective energy conservation measures for the Short Hills Train Station building.

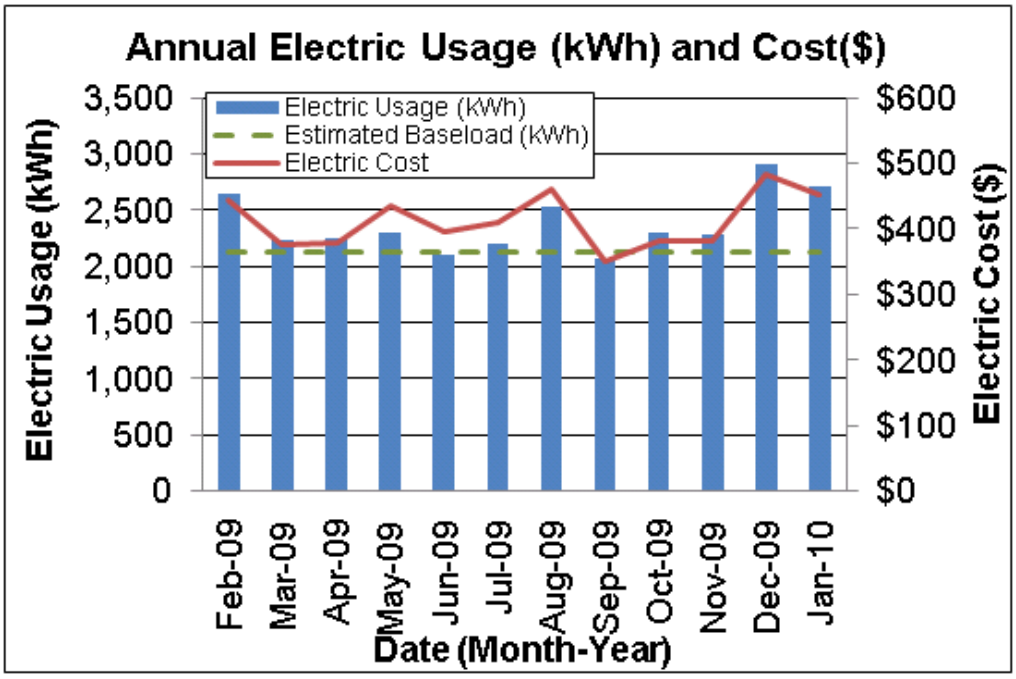
HISTORICAL ENERGY CONSUMPTION

1.1 Energy usage, load profile and cost analysis

SWA reviewed utility bills from February 2008 through January 2010 that were received from the utility companies supplying the Short Hills Train Station building with electricity and natural gas. A 12 month period of analysis from February 2009 through January 2010 was used for all calculations and for purposes of benchmarking the building.

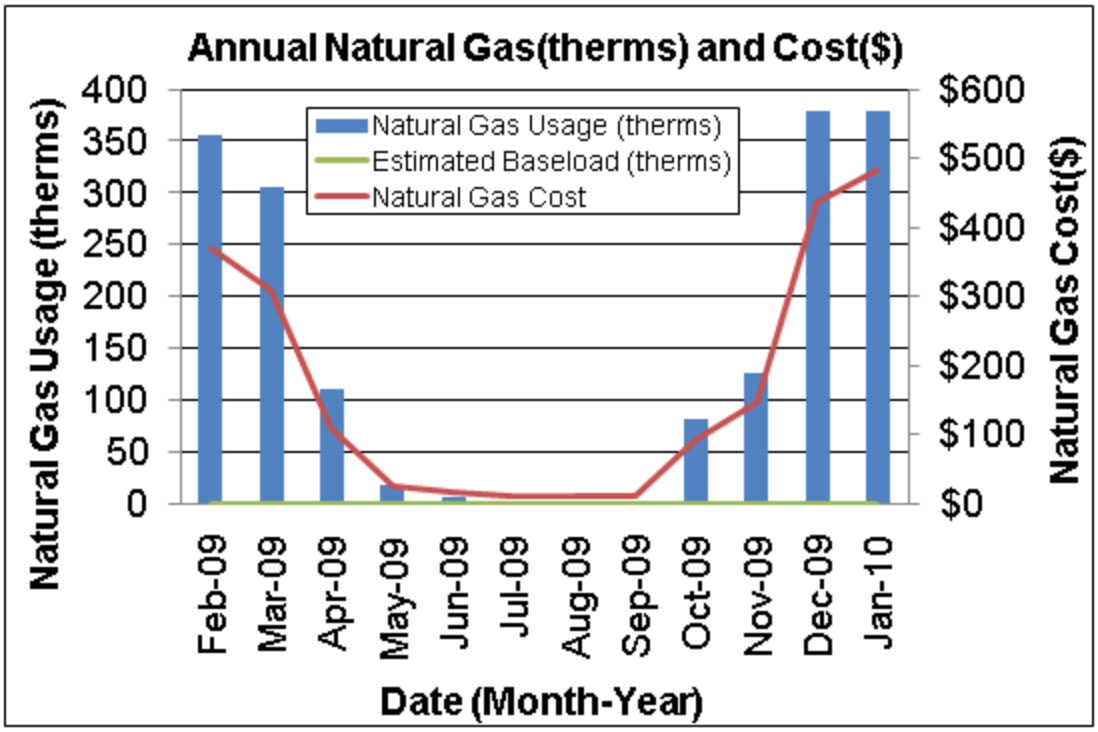
Electricity - The Short Hills Train Station building is currently served by one electric meter. The Township currently buys electricity for the Short Hills Train Station building from JCP&L at **an average aggregated rate of $0.174/kWh**. The Township purchased **approximately 28,516 kWh, or $4,949 worth of electricity,** for the Short Hills Train Station building in the previous year. The average monthly demand was 11.0 kW and the annual peak demand was 11.4 kW.

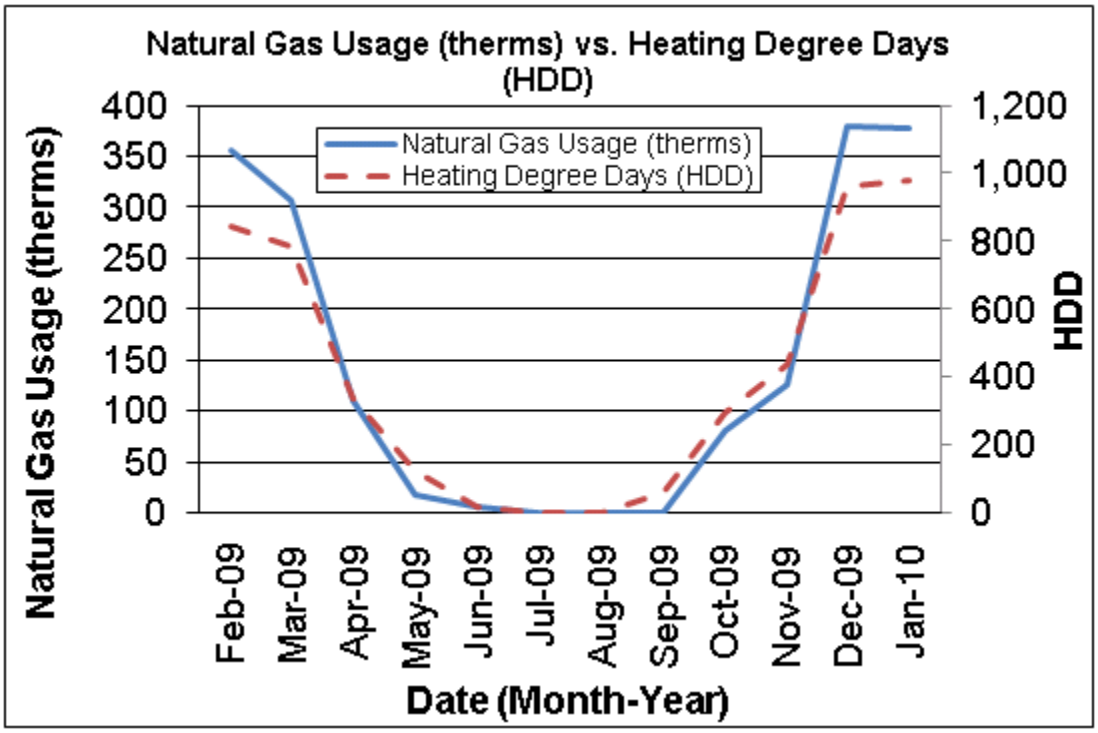
The chart below shows the monthly electric usage and cost. The dashed green line represents the approximate baseload or minimum electric usage required to operate the Short Hills Train Station building.



Natural gas - The Short Hills Train Station building is currently served by one meter for natural gas. The Township currently buys natural gas from PSE&G for the Short Hills Train Station building at **an average aggregated rate of $1.149/therm**. The Township purchased **approximately 1,759 therms, or $2,021 worth of natural gas,** in the previous year for the Short Hills Train Station building.

The chart below shows the monthly natural gas usage and cost. The green line represents the approximate baseload or minimum natural gas usage required to operate the Short Hills Train Station building.



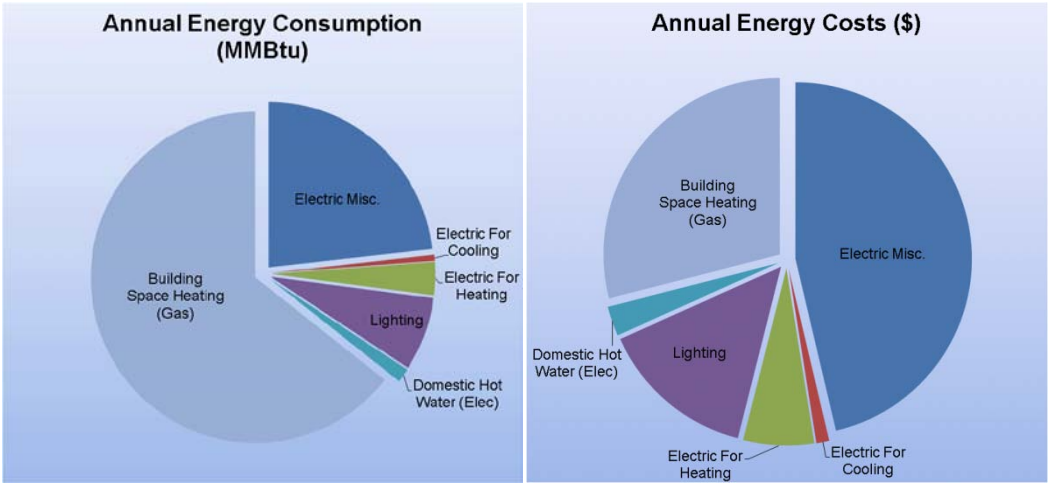


The chart above shows the monthly natural gas usage along with the heating degree days or HDD. Heating degree days is the difference of the average daily temperature and a base temperature, on a particular day. The heating degree days are zero for the days when the average temperature exceeds the base temperature. SWA's analysis used a base temperature of 65 degrees Fahrenheit. According to the chart, the natural gas usage curve closely

resembles the HDD curve, representing that the building is being heated at appropriate times during the season, and the building is not heated out of heating season.

The following table and pie charts show energy use for the Short Hills Train Station building based on utility bills for the 12 month period. Note: electrical cost at $51/MMBtu of energy is more than 4.5 times as expensive as natural gas at $11/MMBtu

Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	$	% $	$/MMBtu
Electric Miscellaneous	63	23%	$3,227	46%	51
Electric For Cooling	2	1%	$82	1%	51
Electric For Heating	9	3%	$451	6%	51
Lighting	20	7%	$1,000	14%	51
Domestic Hot Water (Elec)	4	1%	$189	3%	51
Domestic Hot Water (Gas)	0	0%	$0	0%	
Building Space Heating	176	64%	$2,021	29%	11
Totals	273	100%	$6,970	100%	
Total Electric Usage	97	36%	$4,949	71%	51
Total Gas Usage	176	64%	$2,021	29%	11
Totals	273	100%	$6,970	100%	

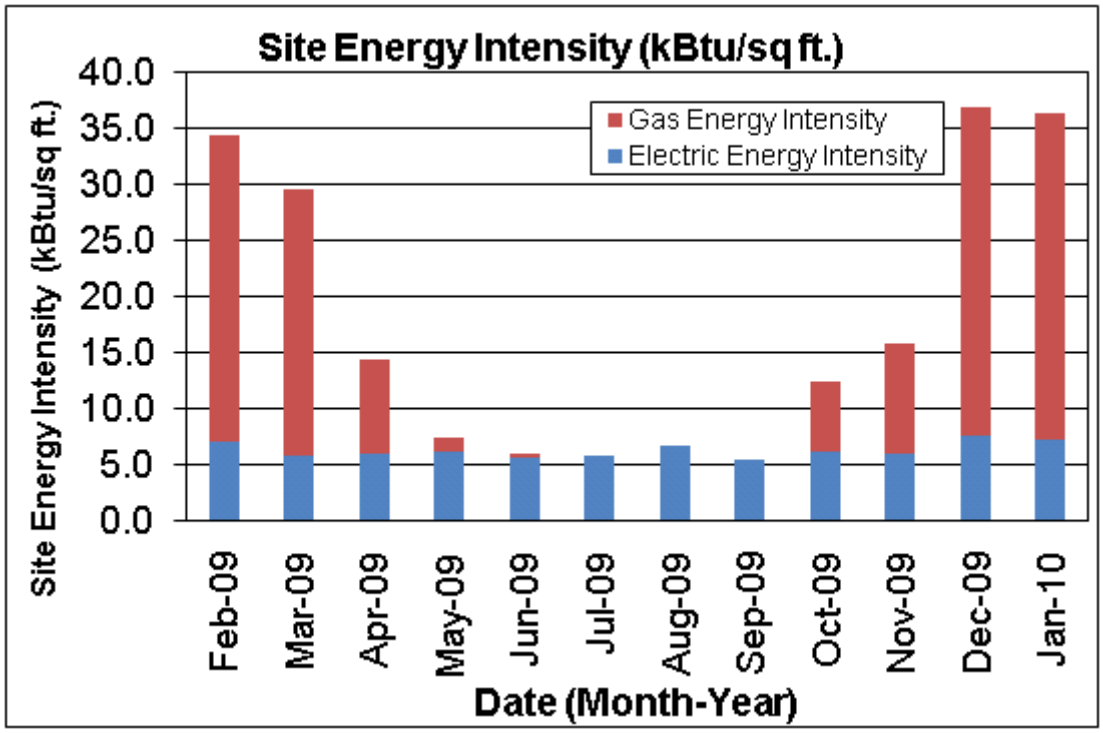


1.2. Energy benchmarking

SWA has entered energy information about the Short Hills Train Station in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. The building did not receive a performance rating due to its categorization as "Other" space type. SWA recommends the Township of Millburn continue to insert utility billing information, as the building may receive a rating as the (EPA) *ENERGY STAR® Portfolio Manager* database grows.

Additionally, should the Township desire to reach beyond average there are other large scale and financially less advantageous improvements that can be made, such as envelope window, door and insulation upgrades that would help the building reach this goal.

The Site Energy Use Intensity is 205 kBtu/ft^2-yr compared to the national average of "Other" type buildings consuming 104 kBtu/ft^2-yr. See ECM section for guidance on how to improve the building's rating.



Per the LGEA program requirements, SWA has assisted the Township to create an *ENERGY STAR® Portfolio Manager* account and share the Short Hills Train Station building 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 "MillburnTownship" with a password of "MILLBURNTOWNSHIP") and TRC Energy Services (user name of "TRC-LGEA")

1.2.1. 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.

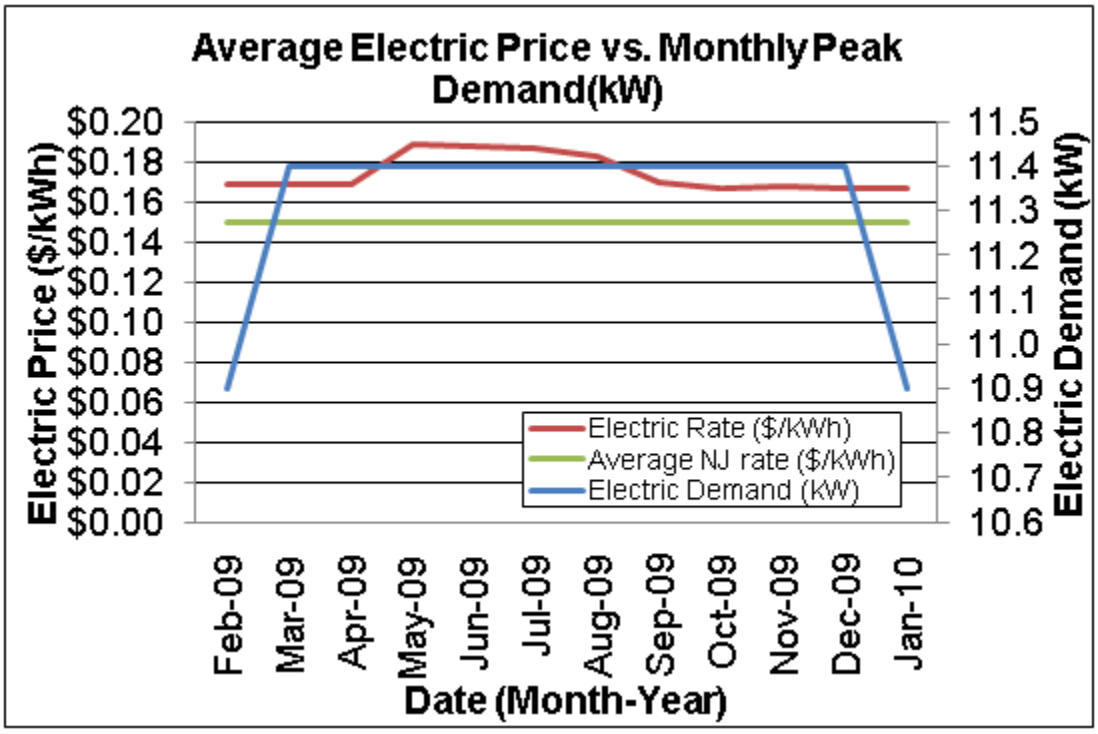
Tariff analysis is performed to determine if the rate that a municipality is contracted to pay with each utility provider is the best rate possible resulting in the lowest costs for electric and gas provision. Typically, the natural gas prices increase during the heating months when natural gas is used by the hot water boiler units. Some high gas price per therm fluctuations in the summer may be due to high energy costs that recently occurred and low use caps for the non-heating months. Typically, electricity prices also increase during the cooling months when electricity is used by the HVAC condensing units.

The supplier charges a market-rate price based on use, and the billing does not break down demand costs for all periods because usage and demand are included in the rate. Currently, the Township is paying a general service rate for natural gas. Demand pricing is not broken out in the bill. Thus the building pays for fixed costs such as meter reading charges during the summer months. 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. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year.

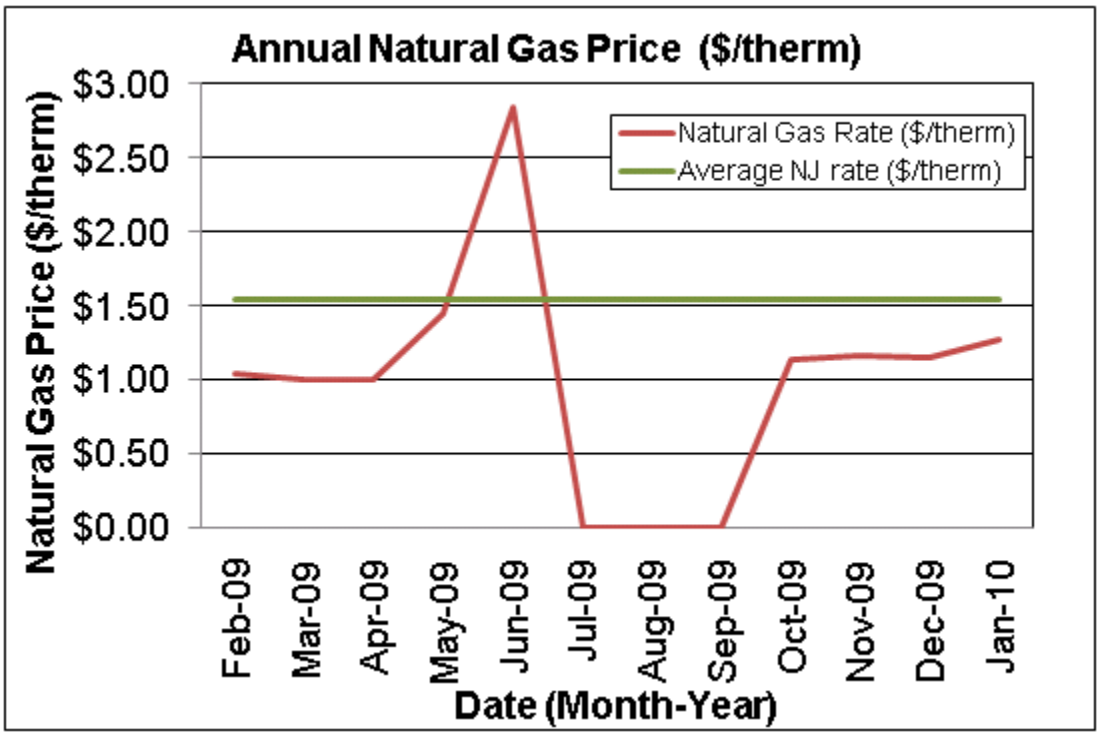
1.2.2. Energy Procurement strategies

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 Township pays a rate of $0.174/kWh for the Short Hills Train Station building. The Short Hills Train Station building annual electric utility costs are $671 higher, when compared to the average estimated NJ commercial utility rates. Electric bill analysis shows fluctuations of up to 12% over the most recent 12 month period.



The average estimated NJ commercial utility rates for gas are $1.550/therm, while the Township pays a rate of $1.149/therm for the Short Hills Train Station building. The Short Hills Train Station building annual natural gas utility costs are $704 lower, when compared to the average estimated NJ commercial utility rates. Natural gas bill analysis shows fluctuations of up to 65% over the most recent 12 month period.



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. High summer rates may be due to low therms usage and fixed meter charges, such as that in June 2009 rate reflected in the chart above.

SWA recommends that the Township further explore opportunities of purchasing electricity from third-party suppliers in order to reduce rate fluctuation and ultimately reduce the annual cost of energy for the Short Hills Train Station building. Appendix C contains a complete list of third-party energy suppliers for the Millburn 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 a visit from SWA on April 8th, 2010, the following data was collected and analyzed.

2.1. Building Characteristics

The single-story (including a partial basement), 1,296 square feet Short Hills Train Station was originally constructed in 1907 with recently renovated interior finishes, new windows, doors, and ceramic roofing tiles. It houses a waiting room, restrooms, refreshment kiosks, a train ticket sales office, and a partial basement with mechanical equipment.

Front Façade

2.2. Building occupancy profiles

The building occupancy is one employee, Monday through Friday, from 4:45am to 1:15pm. There are approximately 10-15 people that filter through the building during the occupied hours.following the train schedules.

2.3. 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.

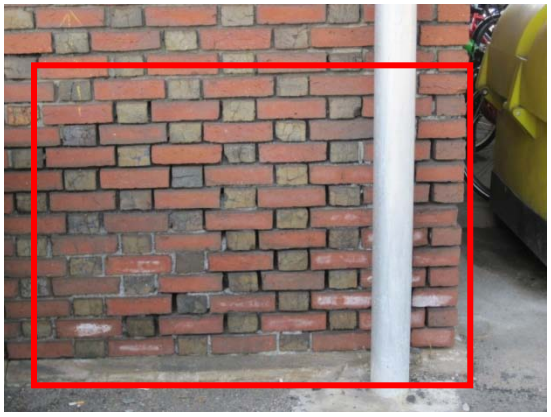
2.3.1. Exterior Walls

The exterior wall envelope is mostly constructed of brick veneer over 3-1/2" wood stud framing with no detectable insulation. The interior wall surfaces are a mixture of gypsum wall board, lath and plaster, and subway ceramic tiles.

Exterior and interior wall surfaces were inspected during the field audit. There were a number of locations where the brick and mortar joints are missing or have deteriorated due

to water damage. These areas warrant attention to prevent water infiltration in the wall assembly. The image below shows damage to a lath and plaster interior wall treatment due to water damage. Areas such as those seen in the images below should be investigated and corrected.

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



Deteriorated mortar joints due to water damage at perimeter walls and ineffective site drainage

Damaged lath and plaster on interior wall section

2.3.2. Roof

The building's roof is a medium-pitch gable type over a wood structure, with a ceramic tile finish. No insulation was detected in the ceiling, as accessed from the women's restroom dropped ceiling.

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

Ceramic tile roof in good condition

Birds nesting on rafter

Netting to prevent nesting

2.3.3. Base

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

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.

2.3.4. Windows

The building contains wood framed, double hung, low-e, double glazed windows. Windows are in good condition with no obvious signs of damage.

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 good/age-appropriate condition with no signs of uncontrolled moisture, air-leakage and/or other energy-compromising issues.

Typical window

2.3.5. Exterior doors

The building contains newly installed wood doors. 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 good/age-appropriate condition with no signs of uncontrolled moisture, air-leakage and/or other energy-compromising issues.

Exterior door good condition

2.3.6. Building air tightness

Overall, the field auditors found the building to be reasonably air-tight with only a few areas of suggested improvements, 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.

2.4. Mechanical Systems

Heating Ventilation Air Conditioning

Heating for the Short Hills Train Station is provided by a hot water boiler utilizing two pumps for distribution and a split system heat pump. The only area with active cooling is the ticket office with a ductless mini split heat pump. Both systems are operated by manual thermostats.

Equipment

The Short Hills Train Station is heated by a natural gas-fired boiler located in the basement of the building. The boiler was estimated to be installed in 2004. The atmospheric boiler is naturally drafting, drawing makeup air or needed combustion air from the basement. The boiler appears to be in good working condition with no signs of rust or deterioration.

Natural gas-fired boiler in basement

The ticket office is the only area of the building with an active cooling system. A Mitsubishi Mr Slim mini split heat pump serves to heat and cool the ticket office area. The mini split unit is a ductless system with a wall-mounted condenser outside and the blower located on the interior wall in the office. The unit is in good condition and has approximately 92% of useful operating life left. The system is operated from a remote hand held thermostat, and turned on manually if required. Reportedly, the unit is turned off by the person last leaving the space. A comprehensive Equipment List can be found in Appendix A.

There are two exhaust fans located in each restroom, which serve the bathrooms. In general, the building exhaust fans have an estimated 80% useful operating life left.

Distribution Systems

Heating is distributed via hot water pipes to the radiators located between the waiting room benches. A pump helps to distribute heated water from the basement to its final location.

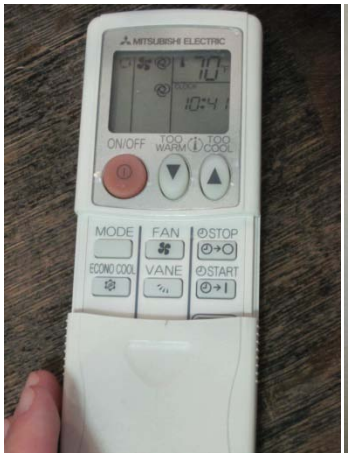
Radiators between waiting room benches

There are two pumps – one working and one standby. Both pumps are 1/3 horsepower and in good working condition. The pump motors were manufactured in 2007 and 2002.

The mini split heat pump system is ductless with the blower of the unit distributing heated or cooled air directly to the space.

Controls

There is one heating zone in the building. The heating and cooling equipment is controlled by manual thermostats. The heating thermostat is located in the hallway nearest the restrooms. The thermostat operates the entire building. SWA recommends the installation of programmable thermostats in order to better control the building temperature.



Hand held Mitsubishi thermostat for mini-split; Manual Honeywell thermostat for heating

Domestic Hot Water

The domestic hot water (DHW) for the Short Hills Train Station building is provided by an electrically heated Ruud water heater with 30 gal storage and one electric coil heating element. The unit is located above the ceiling in the women's restroom. It serves both restrooms with hot water. The water heater was manufactured in 2008 and installed during the time of other interior renovations. It is in very good condition with no signs of rust.

There is also a 40 gallon DHW unit located in the basement. It is fired and fueled by natural gas and was manufactured in 2002. The water heater is an AO Smith FCG 40 248 with an input rating of 38kBtu. Combustion air passes through the heating chamber located in the center of the tank via natural draft. This unit is no longer used to heat DHW for the building. In 2008, an electric DHW unit was installed closer to the restrooms to replace the old gas-fired unit. SWA recommends switching back to the natural gas-fired unit.

DHW tank in basement

This heater has 45% estimated useful operating life remaining and appears in satisfactory condition.

2.5. 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 interior lighting system at the Millburn Short Hills Train Station building consists of mostly T8 fixtures with electronic ballasts. There are a few less efficient T12 lamps with magnetic ballasts and incandescent bulbs. SWA recommends upgrading T12 fixtures to T8 fluorescent fixtures with electronic ballasts. T8 fixtures reduce wattage and produce the same lumen output. SWA also recommends replacing the screw-in incandescent bulbs with compact fluorescent bulbs (CFLs).

Based on measurements of day light and artificial lighting levels for each space, there are no vastly over-illuminated areas.

Exterior Lighting - The exterior lighting surveyed during the building audit was found to contain metal halide bulb type fixtures. SWA recommends replacing the metal halides with pulse start metal halides.

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 Short Hills Train Station building does not have an installed elevator.

Other electrical systems

There are currently no other significant energy-impacting electrical systems installed at the Short Hills Train Station 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. Photovoltaic panels or wind turbines technology 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

Based on utility analysis and a study of roof conditions, the Short Hills Train Station building is not a good candidate for a Solar Panel installation. There is insufficient roof space for panels to reasonably supplement the power consumption of the building.

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 Short Hills Train Station 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 76% and 92% remaining useful life.

Combined Heat and Power

The Short Hills Train Station building is not a good candidate for CHP installation, as it 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 baseload 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	Install 1 programmable thermostat
2	Install 11 new CFL lamps
	Description of Recommended 5-10 Year Payback ECMs
3	Re-connect existing gas DHW unit
	Description of Recommended > 10 Year Payback ECMs
4	Install 3 new Pulse Start Metal Halide fixtures
5	Install 2 new T8 fluorescent fixtures

ECM#1 – Install 1 programmable thermostat

On the days of the site visits, SWA completed a mechanical inventory of the Short Hills Train Station building (see Appendix A). The building's heating system is currently operated as a single zone with one non-programmable thermostat. The office cooling system is also operated using a single non-programmable thermostat. SWA recommends combining the controls for the heating and cooling system with one programmable thermostat in order to control the temperatures of the building by a set schedule. Temperatures can be slightly reduced during low occupancy times such as nights and weekends.

Installation cost:

Estimated installed cost: $130 (Estimated labor of $30)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM #	ECM description	Cost Source	Est. installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 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	Install 1 programmable thermostat	RS Means	130	0	130	3,810	0.9	18	11.4	0	683	10	6,832	0.2	52	5	5	5,638	7,016

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 savings approximate to 10% reduction in heating and cooling savings alone.

Rebates/financial incentives:

- *None*

Please see Appendix F for more information on Incentive Programs.

ECM#2 – Install 11 new CFL lamps

On the days of the site visits, SWA completed a lighting inventory of the Short Hills Train Station building (see Appendix B). The existing lighting at the Millburn Short Hills Train Station building consists of mostly electronic ballasted T8 fluorescent lighting fixtures. There are a few less efficient fixtures with fluorescent T12 lamps with magnetic ballasts and incandescent bulbs. SWA recommends replacing the screw-in incandescent bulbs with compact fluorescent bulbs (CFLs).

The labor in all these installations was evaluated using prevailing electrical contractor wages. The Township of Millburn may decide to perform this work with in-house resources from its Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor, to obtain savings.

Installation cost:

Estimated installed cost: $565 (Estimated labor of $55)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM #	ECM description	Cost Source	Est. installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 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	Install 11 new CFL lamps	RS Means	565	0	565	1,494	0.6	0	3.9	434	694	5	3,470	0.8	5	1	1	2,595	2,675

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 1/2 hrs/yr to replace aging burnt out lamps vs. newly installed.

Rebates/financial incentives:

- *None*

Please see Appendix F for more information on Incentive Programs.

ECM#3: *Re-connect existing gas DHW unit*

On the days of the site visits, SWA completed a mechanical inventory of the Short Hills Train Station building (see Appendix A). SWA was informed by building maintenance staff that an electric DHW heater was installed in 2008 above the men's and women's restrooms. This unit replaced a gas-fired DHW heater that is currently located in the basement. The existing gas-fired unit is still in good condition and exists in the building, however plumbing was disconnected as the unit was no longer used. Based on field observations and the manufacturer's date, the previously installed gas-fired unit still has 53% remaining life or approximately 6 years of useful life expectancy. SWA recommends that plumbing is changed back to how it was originally installed to accommodate the gas-fired DHW heater again. The existing electric DHW heater can be removed and used elsewhere by the Township of Millburn. The Short Hills Train Station currently pays more than 4.5 times more for electricity than natural gas per MMBtu. Converting back to natural gas will not save energy but will reduce operating costs for the building.

The labor in all these installations was evaluated using prevailing electrical contractor wages. The Township of Millburn may decide to perform this work with in-house resources from its Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor, to obtain savings.

Installation cost:

Estimated installed cost: $800 (Estimated labor cost of $680)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM #	ECM description	Cost Source	Est. installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 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	Re-connect existing gas DHW unit	RS Means	800	0	800	1,172	0.5	-50	-0.8	0	146	6	879	5.5	0	0	0	-12	1,547

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 electricity savings will be equivalent of current related electric DHW gas usage. SWA assumed that the existing natural gas usage will be increased based on the equivalent of an 80% gas fired DHW heater that requires the same amount of energy as a 100% efficient electric DHW heater.

Rebates/financial incentives:

- *None*

Please see Appendix F for more information on Incentive Programs.

ECM#4: *Install 3 new Pulse Start Metal Halide fixtures*

On the days of the site visits, SWA completed a lighting inventory of the Short Hills Train Station building (see Appendix B). The existing lighting at the Millburn Short Hills Train Station building consists of mostly electronic ballasted T8 fluorescent lighting fixtures. There are a few less efficient fixtures with fluorescent T12 lamps with magnetic ballasts and incandescent bulbs. The exterior lighting surveyed during the building audit was found contain 3 probe start metal halide bulb type fixtures. SWA recommends replacing the probe start metal halides with pulse start metal halides.

The labor in all these installations was evaluated using prevailing electrical contractor wages. The Township of Millburn may decide to perform this work with in-house resources from its Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor, to obtain savings.

Installation cost:

Estimated installed cost: $2,119 (Estimated labor cost of $1,100)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM #	ECM description	Cost Source	Est. installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 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	Install 3 new Pulse Start Metal Halide fixtures	RS Means	2,119	75	2,044	646	0.3	0	1.7	30	142	15	2,136	14.4	0	0	0	-368	1,157

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 1/2 hrs/yr to replace aging burnt out lamps vs. newly installed.

Rebates/financial incentives:

- *NJ Clean Energy – Pulse start metal halide fixtures ($25 per fixture) - Maximum incentive amount is $75.*

Please see Appendix F for more information on Incentive Programs.

ECM#5: *Install 2 new T8 fluorescent fixtures*

On the days of the site visits, SWA completed a lighting inventory of the Short Hills Train Station building (see Appendix B). The existing lighting at the Millburn Short Hills Train Station building consists of mostly electronic ballasted T8 fluorescent lighting fixtures. There are a few less efficient fixtures with fluorescent T12 lamps with magnetic ballasts and incandescent bulbs. SWA recommends upgrading T12 fixtures to T8 fluorescent fixtures with electronic ballasts. T8 fixtures reduce wattage and produce the same lumen output. There is a high payback period for the basement light fixture to be upgraded with T8 lamps and electronic ballasts, which is due to the low usage of the fixture. The client should note the U.S Department of Energy is phasing out T12 lamps starting July 2010.

The labor in all these installations was evaluated using prevailing electrical contractor wages. The Township of Millburn may decide to perform this work with in-house resources from its Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor, to obtain savings.

Installation cost:

Estimated installed cost: $372 (Estimated labor cost of $60)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM #	ECM description	Cost Source	Est. installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 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	Install 2 new T8 fluorescent fixtures	RS Means	402	30	372	57	0.0	0	0.2	14	24	15	359	15.6	0	0	0	-91	102

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 1/2 hrs/yr to replace aging burnt out lamps vs. newly installed.

Rebates/financial incentives:

- *NJ Clean Energy - T8 lamps with electronic ballast in existing facilities ($15 per fixture) Maximum incentive amount is $30.*

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 Short Hills Train Station building:

- Consider reducing heating load to restrooms. Based on field inspections and staff interviews, the restrooms at the Short Hills Train Station are constantly overheated during the winter time. SWA recommends hiring an HVAC contractor to either reduce the size of the restroom radiators to limit heat output or to create a separate heating zone for the restrooms that is regulated by a separate thermostat. This measure will not be cost-effective from an energy standpoint but can reduce comfort issues related to the overheating of the restrooms.

- Replace gas-fired ceiling mounted space heater. Based on site observations and manufacturer data, the ceiling-mounted space heater located in the basement has surpassed its useful lifetime. Currently, this unit is operating and would not be cost-effective to be replaced, however SWA recommends replacing this unit with a high efficiency unit when it fails.

- Investigate insulation levels and insulate exterior wall sections. SWA suggests applying 2" XPS rigid foam boards to the interior and covering it with gypsum wallboard or other preferred interior finish.

- Investigate attic/ceiling insulation and confirm minimum of R30 insulation. Before (additional) insulation is installed SWA recommends air sealing around all electrical, plumbing, and HVAC penetrations.

- Consider installing exterior glass vestibule around exterior waiting room doors. Creating a vestibule will help to reduce the amount of conditioned air lost by the opening and closing of waiting room doors.

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 will reduce energy consumption or costs.

- Maintain exterior wall assemblies - SWA recommends as part of the maintenance program to re-point the exterior masonry wall, correct masonry efflorescence, and seal wall cracks and penetrations wherever necessary in order to keep insulation dry and effective. SWA recommends having any deteriorated or missing masonry cavities filled or re-pointed with mortar or appropriate caulk to minimize and prevent water and moisture infiltration into the envelope assemblies. Preventative maintenance should be performed on wall assemblies in

order to prevent water from entering the walls and causing further damage. Damaged interior lath and plaster finish on walls should be investigated for water point of entry.

- Inspect and maintain all roof surfaces on a regular basis. SWA recommends investigating the roof for leaks, deteriorating roof finishes and damaged or compromised roof and valley flashing.

- Maintain weather-stripping around all exterior doors. Doors and vestibules should be inspected annually for deficient weather-stripping, which should be replaced as needed.

- Maintain sealants and caulks at all windows for airtight performance. The perimeter of all window frames should also be inspected regularly, and any missing or deteriorated caulking should be re-caulked to provide an unbroken seal around the window frames.

- Perform and maintain air-sealing - Penetrations in the thermal envelope should be sealed with caulk or spray foam. Areas to investigate include HVAC, plumbing, and electrical penetrations, chimney and duct chases, and around windows and doors. Air-sealing will help to reduce energy loss of expensive conditioned air and prevent rodents or pests from entering the building.

- Remove bird nesting and regularly maintain rafter netting where birds tend to congregate.

- 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/

APPENDIX A: EQUIPMENT LIST

Inventory

Building System	Description	Model #	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Heating	Caravan Gas-fired boiler	no nameplate	Natural Gas	Basement	SH Train Station	2004	76%
Heating	Gas-fired ceiling mounted space heater	no nameplate, est 15Mbh heating capacity	Natural Gas	Basement	SH Train Station	1980	0%
Heating / Cooling	Mitsubishi Split system Heat Pump Condensor	Not readable	Electric	Exterior near ticket office	SH Train Station	2008	92%
Heating / Cooling	Mitsubishi Split system Heat Pump	MSZ-A12NA, serial 6009293	Electric	Ticket office	SH Train Station ticket office	2008	92%
Hot Water pump	Emerson Motor	S55JXDYD-2680, 1/3 HP, 1725 RPM	Electric	Basement	SH Train Station radiators	2002	20%
Hot Water pump	Weg Motor	1UMOICANXX1/304 E, Item: L070507479, 1/3 HP	Electric	Basement	SH Train Station radiators	2007	70%
Ventilation	Carnes bath exhaust fans	No nameplate info	Electric	Women's restroom	SH Train Station	2008	80%
Ventilation	Carnes bath exhaust fans	No nameplate info	Electric	Men's restroom	SH Train Station	2008	80%
Domestic Hot Water	40 gal storage, 38kBtu input, 70% est. eff.	AO Smith ProMax FCG 40 248, serial GH02-0890028-248	Natural Gas	Basement	SH Train Station	2002	53%
Domestic Hot Water	RUUD electric 30 gallon, 6000 kW heating coil - lower	EGSP30-8, serial 0906605819	Electric	Attic above women's bathroom	SH Train Station bathrooms	2008	86%
Lighting	See details - Appendix B	-	Electric	See details - Appendix B	SH Train Station	-	70%

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

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	Ext	Exterior	Recessed	S	Inc	10	1	75	T	8	365	0	750	2,190	CFL	ecesse	CFL	S	T	10	1	25	8	365	0	250	730	1460	0	1460
2	1	Waiting Room	ling Suspen	S	CFL	10	1	23	Sw	8	260	0	230	478	N/A	g Suspe	CFL	S	Sw	10	1	23	8	260	0	230	478	0	0	0
3	1	Kiosk	essed Parat	E	3 U-Sha	2	2	17	Sw	8	260	2	72	150	N/A	sed Pa	3 U-Sha	E	Sw	2	2	17	8	260	2	72	150	0	0	0
4	1	Kiosk 2	essed Parat	E	3 U-Sha	2	2	17	Sw	8	260	2	72	150	N/A	sed Pa	3 U-Sha	E	Sw	2	2	17	8	260	2	72	150	0	0	0
5	1	Waiting Room	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	nt / Fur	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
6	1	Bathroom Women	essed Parat	E	2'T8	2	4	17	OS	6	260	2	140	218	N/A	sed Pa	2'T8	E	OS	2	4	17	6	260	2	140	218	0	0	0
7	1	Bathroom Men	essed Parat	E	2'T8	2	4	17	OS	9	260	2	140	328	N/A	sed Pa	2'T8	E	OS	2	4	17	9	260	2	140	328	0	0	0
8	1	Ticket Booth	ling Suspen	S	CFL	2	1	23	Sw	8	260	0	46	96	N/A	g Suspe	CFL	S	Sw	2	1	23	8	260	0	46	96	0	0	0
9	1	Storage Room	eiling Mount	S	HPS	1	1	50	Sw	2	260	10	60	31	PSMH	ng Mou	PSMH	S	Sw	1	1	25	2	260	5	30	16	16	0	16
10	1	Storage Room	eiling Mount	S	Inc	1	1	100	Sw	2	260	0	100	52	CFL	ng Mou	CFL	S	Sw	1	1	35	2	260	0	35	18	34	0	34
11	Bsmt	Boiler Rm	eiling Mount	M	8'T12	2	2	80	Sw	2	260	20	360	187	T8	ng Mou	8'T8	E	Sw	2	2	59	2	260	7	250	130	57	0	57
12	Ext	Exterior	Spotlight	S	MH	2	1	150	PC	12	365	42	384	1,682	PSMH	Spotligh	PSMH	S	PC	2	1	100	12	365	20	240	1051	631	0	631
13	Ext	Platform	ounted Off E	S	CFL	1	1	23	T	12	365	0	23	101	N/A	nted Of	CFL	S	T	1	1	23	12	365	0	23	101	0	0	0
Totals:						39	22	597				81	2,388	5,759						39	22	386			41	1,539	3,562	2,197	0	2,197
Rows Highlighed Yellow Indicate an Energy Conservation Measure is recommended for that space																														

Legend

Fixture Type		Lamp Type			Control Type	Ballast Type	Retrofit Category
Ceiling Suspended	Recessed	CFL	3'T12	8'T5	Autom. Timer (T)	S (Self)	N/A (None)
Exit Sign	Sconce	Inc	3'T12 U-Shaped	8'T5 U-Shaped	Bi-Level (BL)	E (Electronic)	T8 (Install new T8)
High Bay	Spotlight	LED	3'T5	8'T8	Contact (Ct)	M (Magnetic)	T5 (Install new T5)
Parabolic Ceiling Mounted	Track	HPS	3'T5 U-Shaped	8'T8 U-Shaped	Daylight & Motion (M)		CFL (Install new CFL)
Parabolic Ceiling Suspended	Vanity	MH	3'T8	Circline - T5	Daylight & Switch (DLSw)		LEDex (Install new LED Exit)
Pendant	Wall Mounted	MV	3'T8 U-Shaped	Circline - T8	Daylight Sensor (DL)		LED (Install new LED)
Recessed Parabolic	Wall Suspended	1'T12	4'T5	Circline - T12	Delay Switch (DSw)		D (Delamping)
Ceiling Mounted	Wallpack	1'T12 U-Shaped	4'T5 U-Shaped	FI.	Dimmer (D)		C (Controls Only)
Chandelier		1'T5	6'T12	Hal	Motion Sensor (MS)		PSMH (Install new Pulse-Start Metal Halide)
Equipment / Fume Hood		1'T5 U-Shaped	6'T12 U-Shaped	Induction	Motion& Switch (MSw)		
Flood		1'T8	6'T5	Infrared	None (N)		
Landscape		1'T8 U-Shaped	6'T5 U-Shaped	LPS	Occupancy Sensor (OS)		
Low Bay		2'T12 U-Shaped	6'T8	Mixed Vapor	Occupancy Sensor - CM (OSCM)		
Parabolic Wall Mounted		2'T5	6'T8 U-Shaped	Neon	Photocell (PC)		
Pole Mounted		2'T5 U-Shaped	8'T12	Quartz Halogen	Switch (Sw)		
Pole Mounted Off Building		2'T8 U-Shaped	8'T12 U-Shaped				

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 NewEnergy, 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

Third Party Gas Suppliers for PSEG Service Territory	Telephone & Web Site
Cooperative Industries 412-420 Washington Avenue Belleville, NJ 07109	(800) 628-9427 www.cooperativenet.com
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com
Dominion Retail, Inc. 395 Highway 170, Suite 125 Lakewood, NJ 08701	(866) 275-4240 www.retail.dom.com
Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, NJ 08701	(800) 805-8586 www.gesc.com
UGI Energy Services, Inc. 704 East Main Street, Suite 1 Moorestown, NJ 08057	(856) 273-9995 www.ugienergyservices.com
Great Eastern Energy 116 Village Riva, Suite 200 Princeton, NJ 08540	(888) 651-4121 www.greateastern.com
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com
Hudson Energy Services, LLC 545 Route 17 South Ridgewood, NJ 07450	(877) 483-7669 www.hudsonenergyservices.com
Intelligent Energy 2050 Center Avenue, Suite 500 Fort Lee, NJ 07024	(800) 724-1880 www.intelligentenergy.org
Keil & Sons 1 Bergen Blvd. Fairview, NJ 07002	(877) 797-8786 www.systrumenergy.com
Metro Energy Group, LLC 14 Washington Place Hackensack, NJ 07601	(888) 536-3876 www.metroenergy.com
MxEnergy, Inc. 510 Thornall Street, Suite 270 Edison, NJ 08837	(800) 375-1277 www.mxenergy.com
NATGASCO (Mitchell Supreme) 532 Freeman Street Orange, NJ 07050	(800) 840-4427 www.natgasco.com
Pepco Energy Services, Inc. 112 Main Street 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
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	(800) 225-1560 www.spragueenergy.com
Stuyvesant Energy LLC 10 West Ivy Lane, Suite 4 Englewood, NJ 07631	(800) 646-6457 www.stuyfuel.com
Woodruff Energy 73 Water Street Bridgeton, NJ 08302	(800) 557-1121 www.woodruffenergy.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 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.

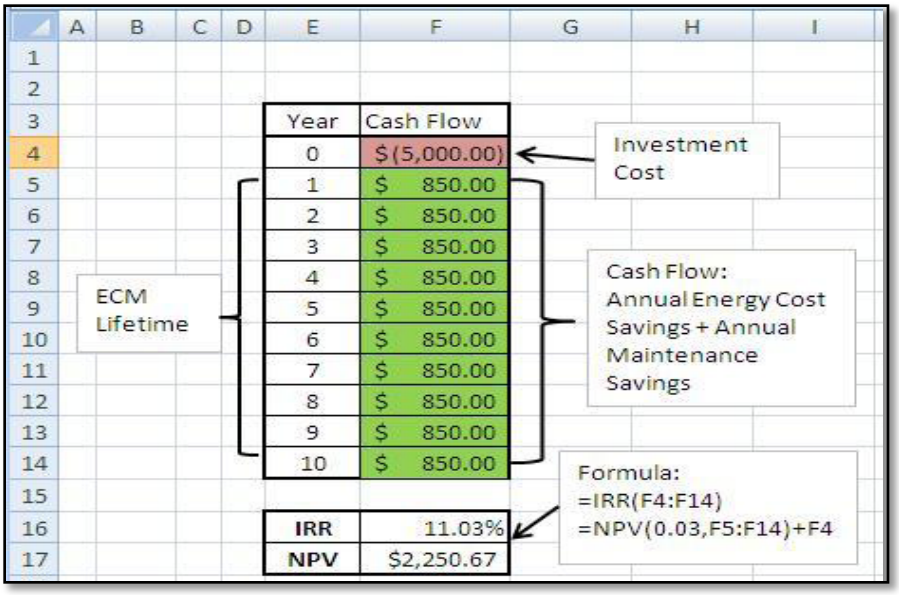
Calculation References

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
Township of Millburn - Short Hills Train Station

Building ID: 2244029
For 12-month Period Ending: January 31, 2010[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: June 17, 2010

Facility
Township of Millburn - Short Hills Train Station
15 Chatham Road
Short Hills, NJ 07041

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1907
Gross Floor Area (ft²): 1,296

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

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	96,114
Natural Gas (kBtu)[4]	169,521
Total Energy (kBtu)	265,635

Energy Intensity[5]

Site (kBtu/ft²/yr)	205
Source (kBtu/ft²/yr)	385

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	24

Electric Distribution Utility
FirstEnergy - Jersey Central Power & Lt Co

National Average Comparison

National Average Site EUI	104
National Average Source EUI	213
% Difference from National Average Source EUI	81%
Building Type	Other

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.

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 60%** 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 SmartStart 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.

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

Energy Conservation Measures																			
ECM #	ECM description	Cost Source	Est. installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 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	Install 1 programmable thermostat	RS Means	130	0	130	3,810	0.9	18	11.4	0	683	10	6,832	0.2	52	5	5	5,638	7,016
2	Install 11 new CFL lamps	RS Means	565	0	565	1,494	0.6	0	3.9	434	694	5	3,470	0.8	5	1	1	2,595	2,675
3	Re-connect existing gas DHW unit	RS Means	800	0	800	1,172	0.5	-50	-0.8	0	146	6	879	5.5	0	0	0	-12	1,547
4	Install 3 new Pulse Start Metal Halide fixtures	RS Means	2,119	75	2,044	646	0.3	0	1.7	30	142	15	2,136	14.4	0	0	0	-368	1,157
5	Install 2 new T8 fluorescent fixtures	RS Means	402	30	372	57	0.0	0	0.2	14	24	15	359	15.6	0	0	0	-91	102
	TOTALS		**4,016**	**105**	**3,911**	**7,179**	**2.3**	**-32**	**16.4**	**478**	**1,690**	-	**13,675**	**2.3**	-	-	-	**7,763**	**12,497**

Assumptions: Discount Rate: 3.2%; Energy Price Escalation Rate: 0%

Notes:

1. A 0.0 electrical demand reduction/month indicates that it is very low/negligible
2. In order to clearly present the overall energy opportunities for the building and ease the decision and choice of which ECM to implement, SWA calculated each ECM independently and did not incorporate slight/potential interaction between retrofits between some of the listed ECMs (i.e. lighting change influence on heating/cooling.

APPENDIX H: METHOD OF ANALYSIS

Assumptions and tools

Energy modeling tool:	Established/standard industry assumptions
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 BUILDING 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 BUILDING(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.