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August 20, 2010

Local Government Energy Program
Energy Audit Report-FINAL

The Township of Millburn

Bauer Community Center
100 Main St
Millburn, NJ 07041

Project Number: LGEA58

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EXECUTIVE SUMMARY

The Bauer Community Center Building is a two-story, (slab on grade), 9,532 square feet building, originally constructed in 1953 with additions/alterations completed in 1970s after a major fire destroyed much of the building. 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	Other fuel usage, gal/yr	Current Annual Cost of Energy, $	Site Energy Use Intensity, kBtu/sq ft yr	Joint Energy Consumption, MMBtu/yr
Current	57,360	4,817	N/A	16,556	69	677
Proposed	31,144	4,029	N/A	7,000	51	508
Savings	26,216	788	N/A	9,556	18	169
% Savings	45.7%	16.4%	N/A	57.7%	25.6%	24.9%

There may be energy procurement opportunities for the Bauer Community Center to reduce annual utility costs, which are $485 higher, when compared to the average estimated NJ commercial utility rates.

SWA has also entered energy information about the Bauer Community Center in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This public assembly facility is comprised of "Other - Recreation" space type. The building did not receive a performance rating due to it's categorization as "Other - Recreation" 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. In order to qualify for ENERGY STAR® the building's minimum eligibility score is 75. The site energy use intensity is 69 kBtu/ft^2/yr when compared to the national average site energy use intensity of 65 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	3,583	2.4	8,883	29,255
5-10 Year	881	6.2	5,500	8,451
>10 year	999	12.4	15,066	6,933
Total	5,463	5.4	29,449	44,639

(Please note that first year savings in the table above include both utility costs and maintenance costs savings).

SWA estimates that implementing the recommended ECMs is equivalent to removing approximately 2 cars from the roads each year or avoiding the need of 71 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 Bauer Community Center building:

- Capital Improvements
  - Replace Kitchen exhaust fan
  - Replace Kitchen electric heaters with a gas fired furnace
  - Slope roof surface to drain effectively at time of reroofing.
  - Slope perimeter grade away from building to maximize site drainage.
  - Replace uninsulated wood and metal doors with insulated and weather-stripped RFP door types
- Operations and Maintenance
  - Exterminate for insect nesting in exterior wall cracks and cavities.
  - Inspect and maintain all roof surfaces on a regular basis. Replace loose shingles.
  - Slope perimeter grade away from building to maximize site drainage. Especially at door locations to prevent water from flooding into building. Install gutters, downspouts and downspout deflectors in the rear of the building to minimize uncontrolled roof water run-off to help direct water away from building doorways.
  - Replace and maintain weather-stripping around all exterior doors and roof hatches.
  - Replace or repair damaged window units.
  - Add and maintain caulk around window frames and sills.
  - Replace 2.2gpm aerators on all faucets with 0.5gpm aerators
  - Use ENERGY STAR® labeled appliances
  - Air seal all electrical, HVAC, plumbing penetrations throughout the building
  - Preventative exterior wall maintenance
  - 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, 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, net of other NJCEP incentives, is $652. 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 BUILDING

Recommended ECMs	Incentive Program (Please refer to Appendix F for details)
Install new CFL fixtures	NJ Smart Start

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 Bauer Community Center, and contingent upon available funding, SWA recommends the following incentive programs:

Smart Start: Majority of energy saving equipment and design measures have moderate incentives under this program

Renewable Energy Incentive Program: Receive up to $0.8/Watt toward installation cost for PV panels upon available funding. For each 1,000 kWh generated by renewable energy, receive a credit between $475 and $600.

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 Bauer Community Center building at 100 Main St, Millburn, NJ 07041. The process of the audit included facility visits on March 23, 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 most cost-effective energy conservation measures for the Bauer Community Center.

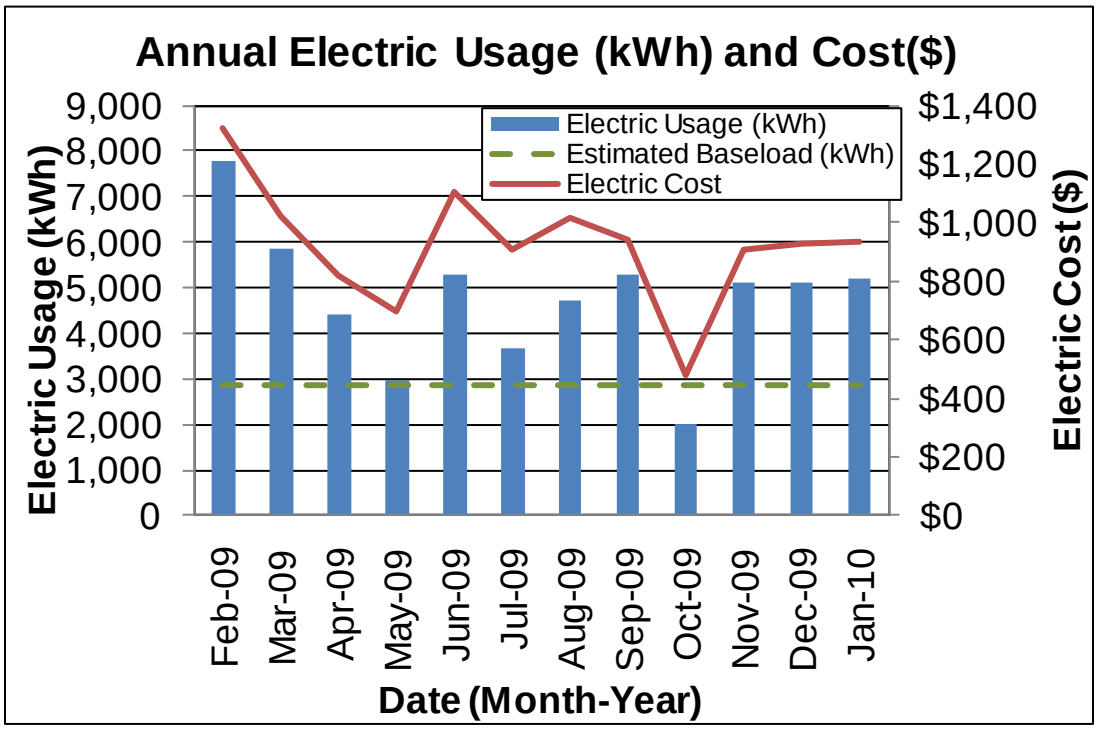
HISTORICAL ENERGY CONSUMPTION

Energy usage, load profile and cost analysis

SWA reviewed utility bills from February 2009 through January 2010 that were received from the utility companies supplying the Bauer Community Center building with electric 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.

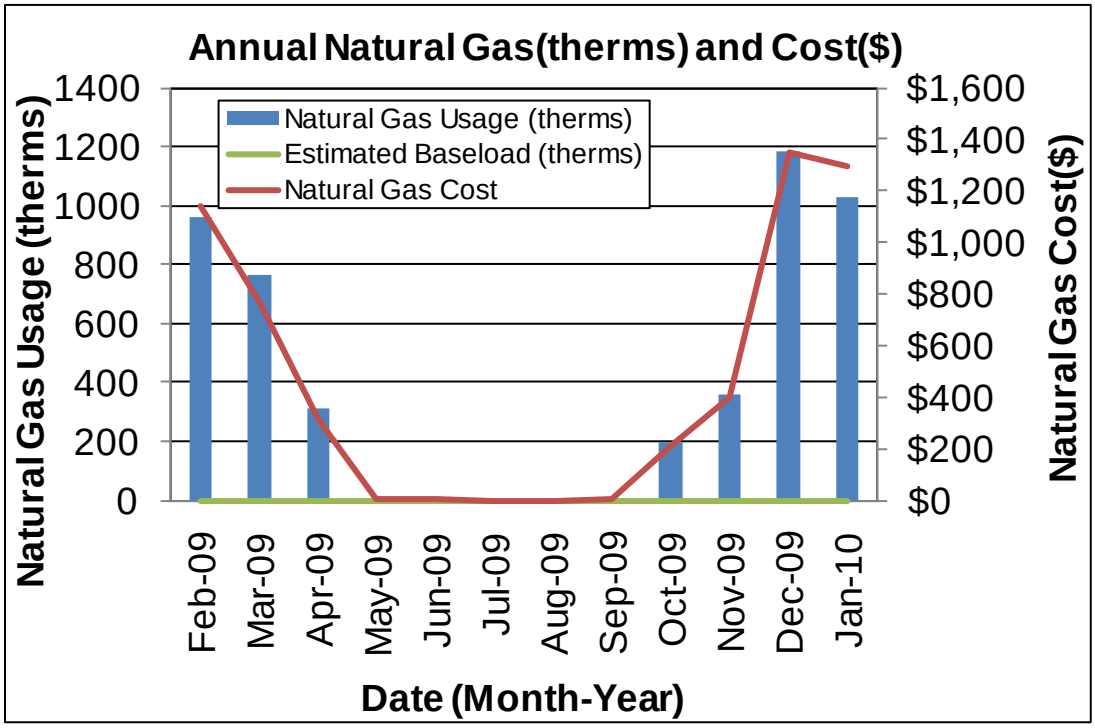
Electricity - The Bauer Community Center building is currently served by one electric meter. The Township currently buys electricity for the Bauer Community Center building from JCP&L at **an average aggregated rate of $0.193/kWh**. The Township purchased **approximately 57,360 kWh, or $11,073 worth of electricity,** for the Bauer Community Center building in the previous year. The average monthly demand was 47.0 kW and the annual peak demand was 52.2 kW.

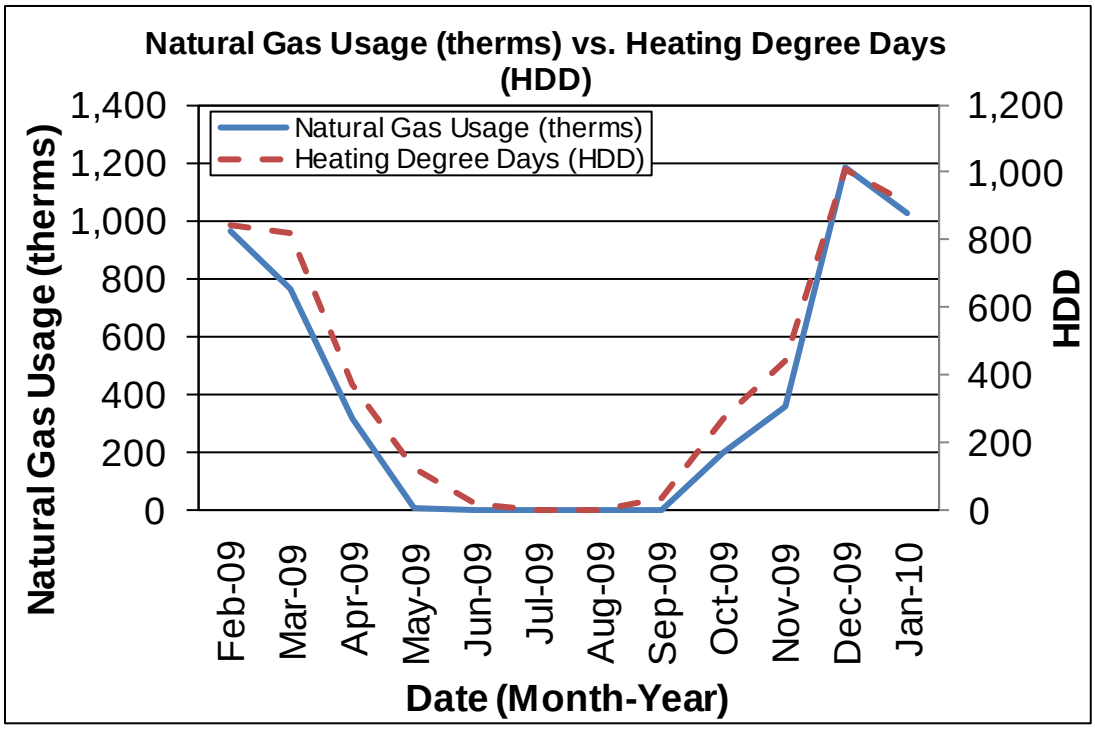
The chart below shows the monthly electric usage and costs. The dashed green line represents the approximate baseload or minimum electric usage required to operate the Bauer Community Center building.



Natural gas - The Bauer Community Center building is currently served by one meter for natural gas. The Township currently buys natural gas from PSE&G for the Bauer Community Center building at **an average aggregated rate of $1.138/therm**. The Township purchased **approximately 4,817 therms, or $5,483 worth of natural gas,** in the previous year for the Bauer Community Center building.

The chart below shows the monthly natural gas usage and costs. The green line represents the approximate baseload or minimum natural gas usage required to operate the Bauer Community Center building.



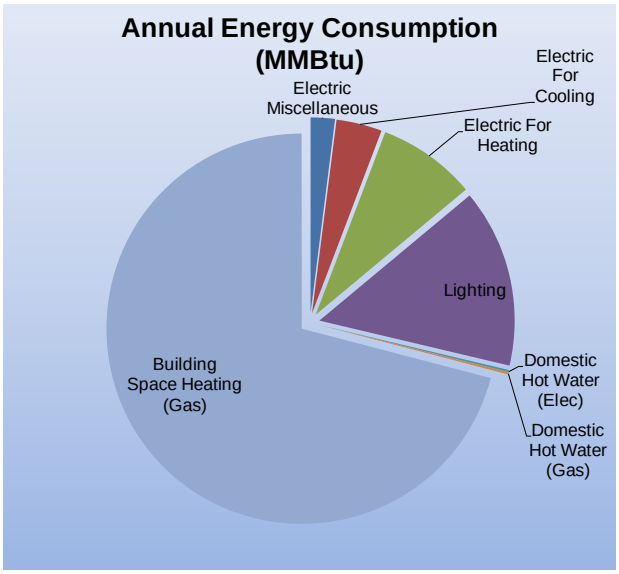


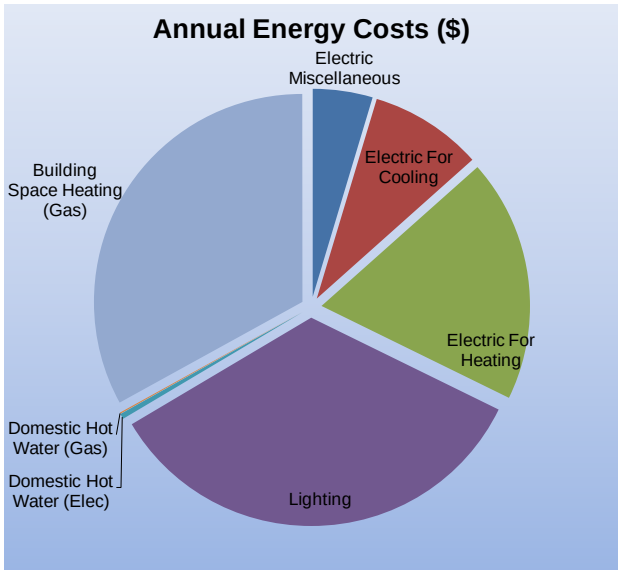
The chart above shows the monthly natural gas usage along with the heating degree days or HDD. Heating degree days is the difference of the average daily temperature and a base

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.

The following graphs, pie charts, and table show energy use for the Bauer Community Center building based on utility bills for the 12 month period. Note: electrical cost at $57/MMBtu of energy is 5.1 times as expensive as natural gas at $11/MMBtu

Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	$	% $	$/MMBtu
Electric Miscellaneous	14	2%	$769	5%	57
Electric For Cooling	26	4%	$1,452	9%	57
Electric For Heating	55	8%	$3,120	19%	57
Lighting	100	15%	$5,664	34%	57
Domestic Hot Water (Elec)	1	0%	$69	0%	57
Domestic Hot Water (Gas)	1	0%	$14	0%	11
Building Space Heating	480	71%	$5,468	33%	11
Totals	677	100%	$16,556	100%	
Total Electric Usage	196	29%	$11,073	67%	57
Total Gas Usage	482	71%	$5,483	33%	11
Totals	677	100%	$16,556	100%	



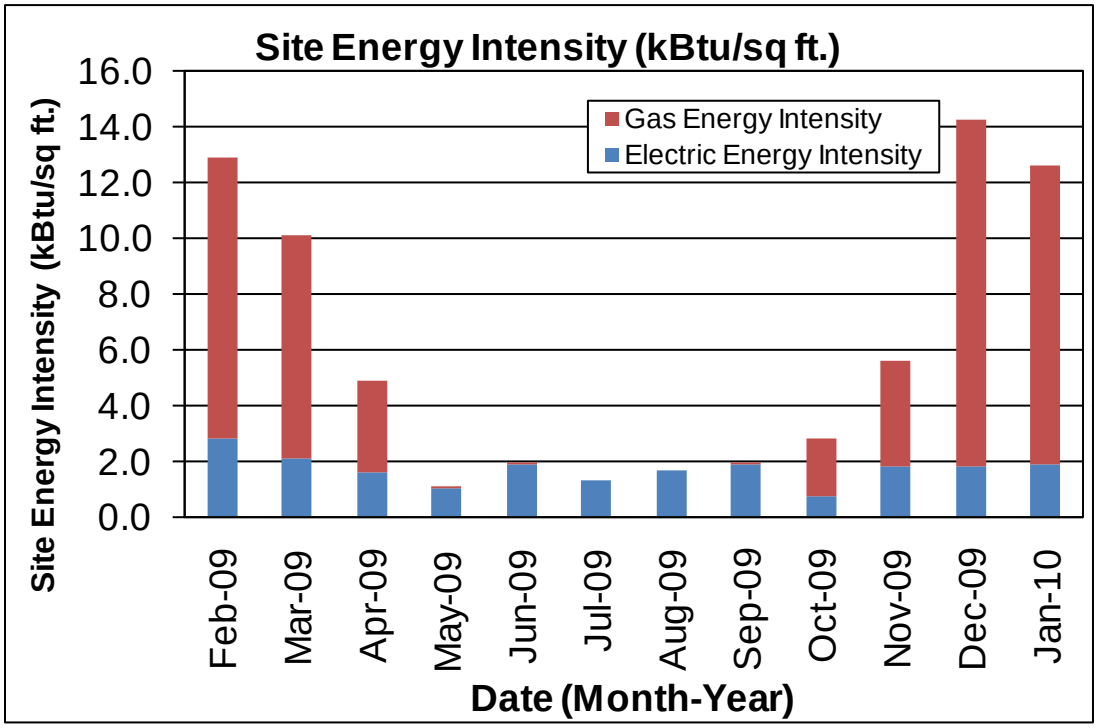


Energy benchmarking

SWA has entered energy information about the Bauer Community Center 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 it's categorization as "Other - Recreation" 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 69.0 kBtu/ft^2-yr compared to the national average of an "Other - Recreation" building consuming 65.0 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 Bauer Community Center 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")

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.

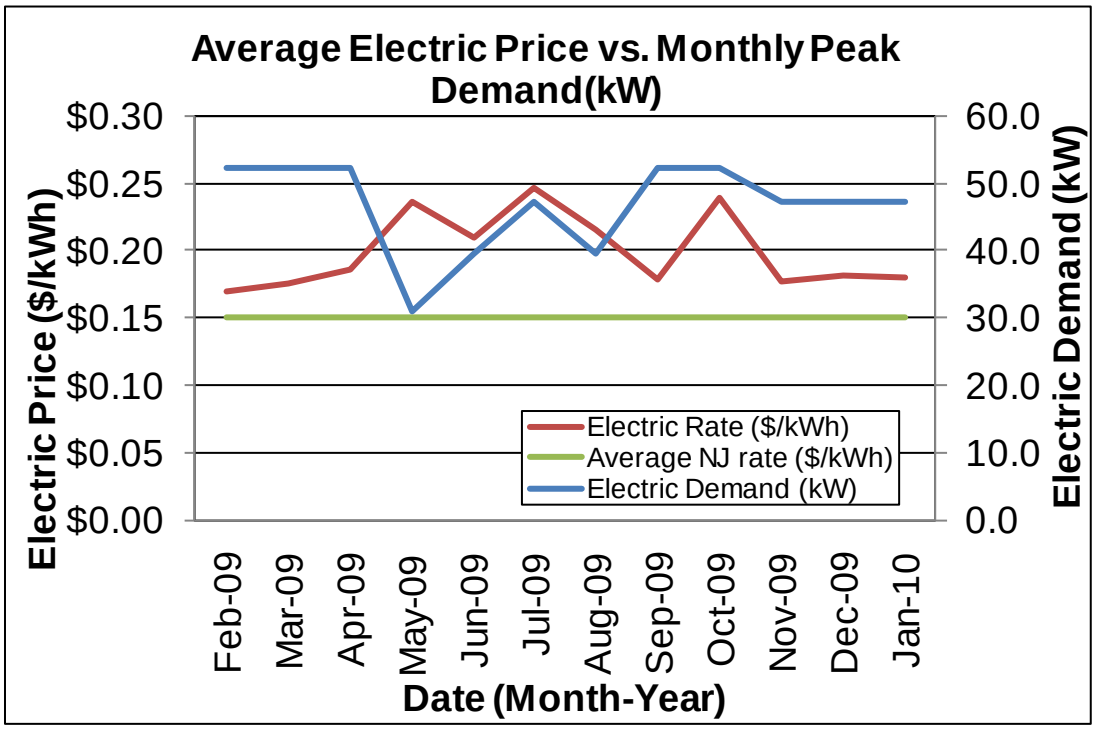
Tariff analysis is performed to determine if the rate that a municipality is contracted to pay with each utility provider is the best rate possible resulting in the lowest costs for electric and gas provision. Typically, the natural gas prices increase during the heating months when natural gas is used by the gas fired packaged rooftop 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 and air handlers.

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 charges are 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. 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.

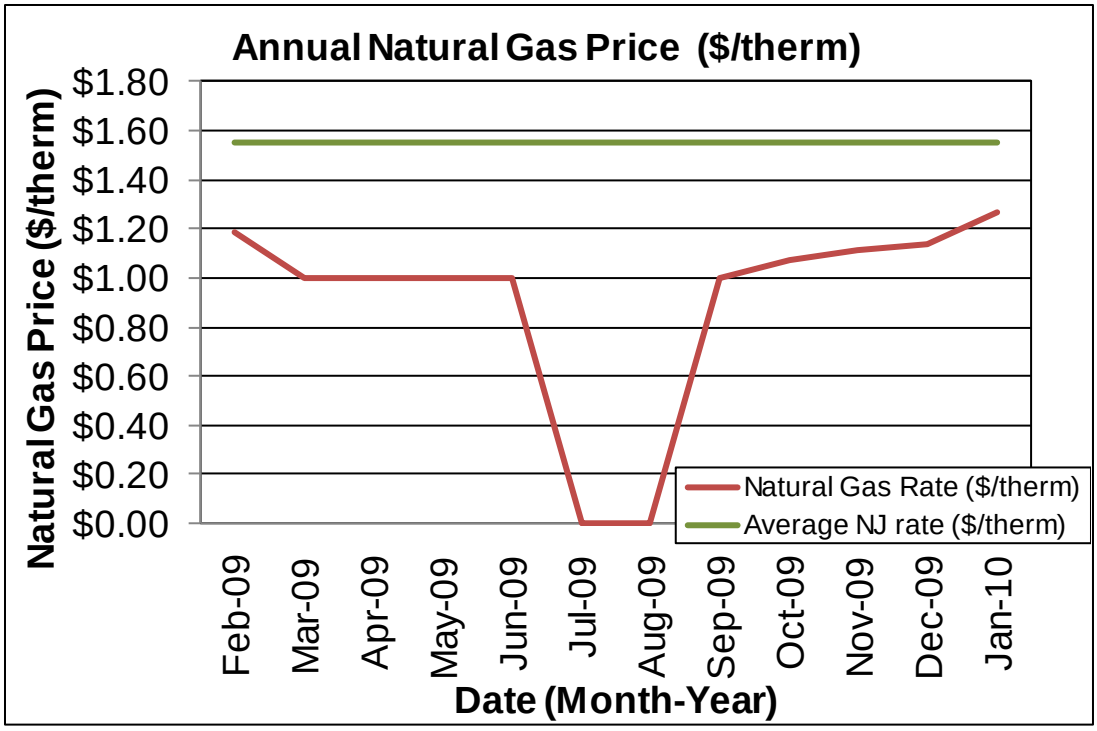
Energy Procurement strategies

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 Township pays a rate of $0.193/kWh for the Bauer Community Center building. The Bauer Community Center building annual electric utility costs are $2,469 higher, when compared to the average estimated NJ commercial utility rates. Electric bill analysis shows fluctuations up to 31% 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 competitive rate of $1.138/therm for the Bauer Community Center building. Natural gas bill analysis shows fluctuations up to 23% 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.

SWA recommends that the Township further explore opportunities of purchasing both natural gas and electricity from third-party suppliers in order to reduce rate fluctuation and ultimately reduce the annual cost of energy for the Bauer Community Center 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 visits from SWA on March 23, 2010, the following data was collected and analyzed.

Building Characteristics

The two-story, (slab on grade) 9,532 square feet Bauer Community Center Building was originally constructed in 1953 with additions/alterations completed in the 1970s after a fire destroyed much of the building. It houses multi-purpose function rooms, related administration offices, and storage rooms.

Front Façade

Rear Façade

Left Side Façade

Right Side Façade

Building occupancy profiles

The building occupancy is approximately 2 employees daily from 8:30AM until 4:30PM and approximately 200 visitors daily. Rooms are available for public use during evening hours but must be reserved in advance.

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 natural stone veneer and aggregate panels, over concrete block with an unconfirmed level of XPS (extruded polystyrene, blue or pink) insulation. The interior is mostly painted gypsum wallboard and wood type wall panels.

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 energy-compromising issues. Signs of insect infestation were found located mostly at the front of the building.

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

Insect nesting in exterior wall cracks and cavities

Insect nesting in exterior wall cracks and cavities

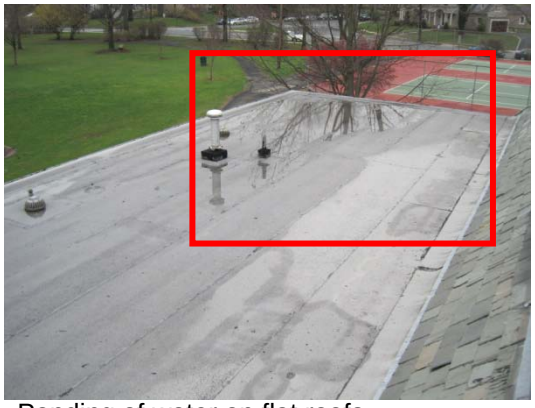
Roof

The building's roof is predominantly a flat and attached mansard parapet type over a wood frame, with a rolled asphalt finish. Other parts of the building are also covered by a medium-pitch gable type over a wood structure with a slate shingle finish. Insulation levels could not be confirmed in the field or without detailed drawings to confirm type or amount.

Roofs, related flashing, gutters and downspouts were inspected during the field audit. They were reported to be in overall poor condition, with signs of uncontrolled moisture, air-

leakage and other energy-compromising issues detected on all roof areas. Water is not directed properly to drains and tends to pool in certain areas. There area no gutters in the rear of the building, so that rain runoff in the rear flows of roofs and pools around doors which in serious rains then floods building. The gutters in the front of the building are damaged and there are a number of loose shingles. According to reports from building management this damage is created by snow.

The following specific roof problem spots were identified:



Ponding of water on flat roofs

Loose slate shingles

Damaged gutters in the front of the building

Base

The building's base is composed of a slab-on-grade floor with a perimeter foundation 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 acceptable condition. There are some signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues. The grade of the ground in the rear of the building is

sloped towards the building and there are no roof gutters in the rear of the building. Therefore rain water tends to pool at the base of the rear of the building, especially around the rear doors and on the left side of the building. The water floods into the building through these doors (see more details in doors section). There is no evidence that the water is infiltrating the building through the base, however the grade should be sloped away from the building to direct rain runoff away as much as possible.

Windows

The building contains several different types of windows:

1. Casement type windows with a metal clad wood frame, clear double glazing and interior roller blinds.

2. Unit (fixed and awning) type windows with a metal clad wood frame, clear double glazing and interior roller blinds.

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 condition with signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues. Some windows were found to have missing panes of glass, interior moisture damage and warping of frames causing some windows not to function properly. Caulking around some windows was found to warn and cracked.

The following specific window problem spots were identified:

Attic window with missing pane of glass and interior water damage causing window not to operate properly

Cracked caulk around frame on the exterior

Exterior doors

The building contains both wood type and metal type exterior 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 poor condition with numerous signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues. Weather stripping around doors is worn. Some of the

wood doors are warped from moisture issues and do not function properly. The grade of the ground in the rear of the building is sloped towards the building and rain water pools around the rear doors and the doors on the left side of the building. The thresholds of these doors are not elevated above grade so that water tends to flood into the building despite the door saddle.

The following specific door problem spots were identified:

Signs of water pooling around doors and flooding into building

Image showing area of water pooling near exterior door

Warped and aged door and frame

Missing and worn weather-stripping around doors

Building air tightness

Overall the field auditors found the building to be not adequately air-tight with 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.

Mechanical Systems

Heating Ventilation Air Conditioning

The building is conditioned by four (4) gas-fired packaged rooftop HVAC units. There were no complaints or comfort issues reported. The building occupancy is highly variable and tends to increase during evening hours for social gatherings. There are four main zones served by each of the roof top units: Meeting room, Assembly room, Office/Lobby, and Game room.

Equipment

The Bauer Community Center building is heated/cooled by four (4) gas fired DX cooled rooftop packaged units. A comprehensive Equipment List can be found in Appendix A.

The rooftop units contain a natural gas burner for heating and a direct expansion (DX) system for cooling, made up of an evaporator, condenser and refrigerant loop. The units were manufactured by York and installed circa 1999. The units still have 27% remaining life and appear to be in good condition.

Gas fired DX cooled rooftop packaged units

There is a Kitchen adjacent to the Assembly room. It was previously equipped with commercial kitchen equipment but has since been removed due to compliance issues. The kitchen is equipped with a sink, two 3kW electric heaters, and a kitchen ventilation hood. Currently, it is not used for heavy cooking, but may be used to warm up pre-prepared food during parties and social gatherings. The ventilation hood and its associated exhaust fan were installed in 1999; although the fan is past its service life, it is not used, therefore could be left there. There is a small wall-mounted ventilation fan manually operated by a wall-mounted switch. This fan is past its service life and is used occasionally.

The kitchen also contains two ceiling mounted 3kW electric heaters for maintaining a minimum temperature during winter. The heaters are manually adjusted by the building operators when the outside air temperature is expected to fall below 40 deg F. SWA considered replacing these heaters with gas fired furnace or hot water heating. The payback was found to be in excess of 15 years. SWA proposes to install a gas fired furnace in the storage room to serve the kitchen as part of capital improvement.

Kitchen electric heater – manual knob control

Controls

The roof top package units are controlled by Honeywell Cycolotherm III programmable thermostats. Each zone has one thermostat with a temperature set point schedule programmed for occupied and unoccupied mode respectively. The occupancy pattern is not predictable and hence programming the existing thermostats to exact requirements is difficult. In this light, SWA recommends occupancy sensor based temperature settings to cut down energy usage. SWA recommends the Township install new thermostats with a controller due to the inconsistent occupancy pattern. Current and proposed temperature settings without the occupancy override are as follows:

	Summer		Winter		Shoulder	
	Occupied	**Unoccupied**	**Occupied**	**Unoccupied**	**Occupied**	**Unoccupied**
Current settings	72F	78F	68F	62F	Off	Off
Proposed settings	78F	Off	62F	62F	Off	Off

Please refer to ECM#6 for economics and savings.

Domestic Hot Water

The domestic hot water (DHW) for the Bauer Community Center restrooms is provided by a gas fired Rheem 22V5051 with 50 gal storage tank. Domestic hot water for the kitchen is provided by a gas fired State Industries Inc., GS640YBRT heater. Both heaters were found to be in good condition with approximately 85% of service life remaining.

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 Millburn Bauer Community Center building currently consists of mostly older inefficient T12 bulbs with magnetic ballasts. SWA recommends upgrading to high performance T8 fluorescent fixtures with electronic ballasts. T8 fixtures reduce wattage with the same lumen output. There were also fixtures found to contain screw-in incandescent and halogen (PAR) type bulbs (as seen in the image below). SWA recommends replacing the incandescent and halogen bulbs with screw-in compact fluorescent bulbs (CFLs). Please note; building management has already replaced some incandescent and PAR bulbs with CFLs in individual locations.

In addition, SWA recommends installing occupancy sensors in restrooms and the different function rooms (like the conference room, meeting room, game room, youth room) which are intermittently used during the day and where payback on savings is justified. Typically, occupancy sensors have an adjustable time delay that shuts down the lights automatically if no motion or sound is detected within a set time period.

Based on measurements of day light and artificial lighting levels for each space, there are not any vastly over-illuminated areas. See attached lighting schedule in Appendix A for a complete inventory of lighting throughout the building and estimated power consumption.

Example of typical fixture with inefficient 4'T12 bulbs and magnetic ballast

Examples of incandescent and halogen PAR type bulbs used in various rooms

Exit Lights - Exit signs were found to be incandescent bulb type fixtures. Energy and maintenance savings are available. SWA recommends replacing the incandescent exit signs with LED type exit signs to reduce wattage with the same lumen output. An LED retrofit kit may be used or the entire exit sign may be replaced economically.

Exterior Lighting - The exterior lighting surveyed during the building audit was found to be a mix of screw-in incandescent and halogen (PAR) bulb type fixtures. Some fixtures were found to be in disrepair. SWA recommends replacing these bulbs with screw-in compact fluorescent bulbs (CFLs). The exterior lighting is controlled by an automatic timer. SWA does not recommend any changes to the controls at this time.

Exterior light fixture with inefficient incandescent bulb and damaged lens

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 Bauer Community Center building does not have an elevator.

Other electrical systems

There are not currently any other significant energy-impacting electrical systems installed at the Bauer Community Center 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 Bauer Community Center building is a good candidate for a 5.2 kW Solar Panel installation. See ECM#8 for details.

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 Bauer Community Center building is not a good candidate for geothermal installation as it would require replacement of the entire existing HVAC system, of which major components still have between 25% and 30% remaining useful life.

Combined Heat and Power

The Bauer Community Center building is not a good candidate for CHP installation. 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.

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	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	life of measure, yrs	est. lifetime cost savings, $	simple payback, yrs	annual return on investment, %	CO_2 reduced, lbs/yr
1	48 New CFL fixtures to be installed	1,541	5,224	4.3	0	1.9	8	10,482	1.2	92	9,354
2	13 New LED exit sign fixtures to be installed with incentives	752	2,790	2.3	0	1	15	8,602	1.3	74	4,995
3	9 New occupancy sensors to be installed with incentives	1,800	2,362	1.9	0	0.8	15	6,838	3.9	19	4,229
4	93 New T8 fixtures to be installed with incentives	12,276	3,872	3.2	0	1.4	15	14,989	12.3	4	6,933
5	1 New 20.6 cu ft ENERGY STAR refrigerator	750	532	0.4	0	0.2	12	2,468	3.6	33	953
6	Install (4) new thermostats along with controller	3,600	4,200	3.4	200	3.6	12	12,458	3.5	21	9,725
7	Provide demand controlled ventilation for Assembly room	5,500	1,100	0.9	588	6.6	12	10,577	6.2	8	8,451

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.

ECM#1, 2, 3, & 4: *Building Lighting Upgrades*

On the days of the site visits, SWA completed a lighting inventory of the Bauer Community Center building (see Appendix B). The existing lighting consists of mostly T12 fluorescent fixtures with magnetic ballasts. SWA recommends installing occupancy sensors in bathrooms, closets, offices and areas where payback on savings is justified. Typically, occupancy sensors have an adjustable time delay that shuts down the lights automatically if no motion is detected within a set time period. Advance micro-phonic lighting sensors include sound detection as a means to control lighting operation. SWA recommends replacing incandescent and halogen lamps with CFL lamps. 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: $16,369 (includes $9,800 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

ECM #	ECM description	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	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
1	48 New CFL fixtures to be installed	1,541	0	1,541	5,224	4.3	0	1.9	302	1,310	8	10,482	1.2	737	92	84	7,579	9,354
2	13 New LED exit sign fixtures to be installed with incentives	1,012	260	752	2,790	2.3	0	1	35	573	15	8,602	1.3	1,114	74	76	5,996	4,995
3	9 New occupancy sensors to be installed with incentives	1,980	180	1,800	2,362	1.9	0	0.8	0	456	15	6,838	3.9	280	19	23	3,564	4,229
4	93 New T8 fixtures to be installed with incentives	15,066	2,790	12,276	3,872	3.2	0	1.4	252	999	15	14,989	12.3	53	4	0	-517	6,933
	TOTAL	19,599	3,230	16,369	14,248	11.7	0	5.1	589	3,339		40,911	4.9					25,511

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

Rebates/financial incentives:

- *NJ Clean Energy – Occupancy and motion sensors ($20 per control) - Maximum incentive amount is $180.*
- *NJ Clean Energy – LED exit sign fixtures ($20 per fixture) - Maximum incentive amount is $260.*
- *NJ Clean Energy - T8 lamps with electronic ballast in existing facilities ($10-30 per fixture, depending on quantity and lamps) Maximum incentive amount is $2,790.*
  There are no incentives for CFL installation.

Please see Appendix F for more information on Incentive Programs.

ECM#5: *Replace Old Refrigerator with* ENERGY STAR® *Model*

Description:

On the days of the site visit, SWA observed an older refrigerator which is not ENERGY STAR® rated (using as much as 847 kWh/yr). Appliances, such as refrigerators, that are over 10-12 years of age should be replaced with newer efficient models with the ENERGY STAR® label. SWA recommends the replacement of the existing refrigerator which is operating at the end of its useful lives with a more modern, ENERGY STAR®, energy efficient appliance. Besides saving energy, the replacement will also keep the kitchen area cooler. In addition, the existing systems utilize R-12 refrigerant, which is not an ozone-friendly refrigerant. Newer systems should be specified with R-134A or R-404A refrigerant. When compared to the average electrical consumption of older equipment, ENERGY STAR® equipment results in large savings. Look for the ENERGY STAR®, label when replacing appliances and equipment, including: window air conditioners, refrigerators, printers, computers, copy machines, etc. More information can be found in the "Products" section of the ENERGY STAR® website at: http://www.energystar.gov.

Installation cost:

Estimated installed cost: $750
Source of cost estimate: ENERGY STAR® *purchasing and procurement site, similar projects, Manufacturer and Store established costs*

Economics:

ECM #	ECM description	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	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
5	1 New 20.6 cu ft ENERGY STAR refrigerator	750	0	750	532	0	0	0	103	206	12	2,468	3.6	394	33	26	1,273	953

Assumptions: SWA calculated the savings for this measure using measurements taken the day of the field visit and using the billing analysis. SWA assumed one annual call to a refrigeration contractor to perform minor repairs on old refrigerators.

Rebates/financial incentives:

NJ Clean Energy - There are not any incentives at this time offered by the state of NJ for this energy conservation measure.

ECM#6: Install (4) New Thermostats along with Controller

There are four gas fired DX roof top package units serving the following four zones: Meeting room, Assembly room, Office/Lobby, and Game room. The zones are open to public for most of the days; however, the occupancy levels are inconsistent. There are extended hours without occupancy, and a few hours of high occupancy during the evening hours. Further, the occupancy pattern is unpredictable. SWA proposes occupancy sensor based temperature settings to cut down energy usage.

Current and proposed temperature settings without the occupancy override are as follows:

	Summer		Winter		Shoulder	
	Occupied	**Unoccupied**	**Occupied**	**Unoccupied**	**Occupied**	**Unoccupied**
Current settings	72F	78F	68F	62F	Off	Off
Proposed settings	78F	Off	62F	62F	Off	Off

In the proposed settings, most equipment would operate at minimum settings in the new modes, remaining off during unoccupied hours in summer and shoulder seasons. These settings would revert to current settings on receiving an occupancy signal, and remain in the setting when the occupants are detected.

This schedule cannot be achieved with the existing thermostats as they have limited programming capability and would require intervention before the onset of a new season. Hence, SWA recommends that the Township install new thermostats, a new central controller that can be programmed infinitely from a computer, new occupancy sensors, an outside air stat, and new control wiring.

Installation cost:

Estimated installed cost: $3,600 (includes $1,800 of labor)
Source of cost estimate: Manufacturer's data and similar projects

Economics:

ECM #	ECM description	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	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
6	Install (4) new thermostats along with controller	3,680	80	3,600	4,200	3.4	200	3.6	0	1,038	12	12,458	3.5	246	21	27	6,612	9,725

Assumptions: SWA calculated the savings for this measure using nameplate data taken and using the billing analysis. SWA estimated 5% savings in equipment hours of operation resulting in heating and cooling electric and gas savings conservatively. Also, SWA assumed a diversity of 25% for equipment conservatively for calculations.

Rebates/financial incentives:

- *NJ Clean Energy – Occupancy and motion sensors ($20 per control) - Maximum incentive amount is $80.*

ECM#7: Provide Demand Controlled Ventilation for Assembly room

Description:

The roof top package unit serving the assembly room provides a fixed amount of outside air during operational hours. Conditioning outside air is a significant portion of the heating or cooling load. Demand control ventilation involves providing carbon dioxide (CO2) sensors in the occupied space or return ducts which can partially or totally shut down the outside air intake dampers in the air handling unit when the space is underutilized or unoccupied. The assembly room is used infrequently and may remain vacant for long periods during the day. By keeping the CO2 level less than 1000ppm within the conditioned space, the outside air is reduced to the minimum allowable in compliance with ASHRAE requirements. This control method can greatly reduce the heating or cooling load seen by the air handling unit and therefore save energy. Along with the sensors, necessary motorized air intake dampers will also have to be installed.

Installation cost:
Estimated installed cost: $5,500 (includes $1,800 of labor)
Source of cost estimate: Manufacturer's data and similar projects

Economics:

ECM #	ECM description	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	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
7	Provide demand controlled ventilation for Assembly room	5,500	0	5,500	1,100	0.9	588	6.6	0	881	12	10,577	6.2	92	8	12	3,170	8,451

Assumptions: SWA calculated the savings for this measure using nameplate data taken and using the billing analysis. SWA estimated that fresh air load will be reduced by 50% during occupied hours. Therms savings are assumed to result for 4 winter months resulting from preheating the outside air, and kWh savings for 4 summer months from precooling the outside air. There are no savings assumed for the shoulder season.

Rebates/financial incentives:

There are no rebates for this measure at this time.

ECM#8: *Install 5.2 kW PV System*

Description:

Currently, Bauer Community Center building does not use any renewable energy systems. Renewable energy systems such as photovoltaic panels, can be mounted on the building roofs, and can offset a portion of the purchased electricity for the building. Power stations generally have two separate electrical charges: usage and demand. Usage is the amount of electricity in kilowatt-hours that a building uses from month to month. Demand is the amount of electrical power that a building uses at any given instance in a month's period. During the summer periods, when electric demand at a power station is high due to the amount of air conditioners, lights, equipment, etc… being used within the region, demand charges go up to offset the utility's cost to provide enough electricity at that given time. Photovoltaic systems not only offset the amount of electricity use by a building, but also reduce the building's electrical demand, resulting in a higher cost savings as well. It is recommended at this time that the Bauer building further review installing a 5.2 kW PV system to offset electrical demand and reduce the annual net electric consumption for the building, and review guaranteed incentives from NJ rebates to justify the investment. The Township may consider applying for a grant and/or engage a PV generator/leaser who would install the PV system and then sell the power at a reduced rate. JCP&L provides the ability to buy SREC's at $600/MWh or best market offer.

The building has flat and sloping roof with limited locations for portions of a 5.2 kW PV installation on the building roof. A commercial crystalline 123 watt panel has 10.7 square feet of surface area (11.5 watts per square foot). A 5.2 kW system needs approximately 42 panels which would take up 500 square feet. The installation of a renewable Solar Photovoltaic power generating system could serve as a good educational tool and exhibit for the community.

Installation cost:

Estimated installed cost: $32,240 (including $12,480 total labor cost)
Source of cost estimate: Similar projects

Economics:

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
8	Install 5.2 kW Solar Photovoltaic system	Similar Projects	36,400	4,160	32,240	6,136	5	0	2.2	0	4,784	25	83,606	6.7	159	637	10.23	$30,291	10,987

Cash Flow Year 0	-$32,240										
Cash Flow Year 1	$4,784	Cash Flow Year 6	$4,784	Cash Flow Year 11	$4,784	Cash Flow Year 16	$1,184	Cash Flow Year 21	$1,184		
Cash Flow Year 2	$4,784	Cash Flow Year 7	$4,784	Cash Flow Year 12	$4,784	Cash Flow Year 17	$1,184	Cash Flow Year 22	$1,184		
Cash Flow Year 3	$4,784	Cash Flow Year 8	$4,784	Cash Flow Year 13	$4,784	Cash Flow Year 18	$1,184	Cash Flow Year 23	$1,184		
Cash Flow Year 4	$4,784	Cash Flow Year 9	$4,784	Cash Flow Year 14	$4,784	Cash Flow Year 19	$1,184	Cash Flow Year 24	$1,184		
Cash Flow Year 5	$4,784	Cash Flow Year 10	$4,784	Cash Flow Year 15	$4,784	Cash Flow Year 20	$1,184	Cash Flow Year 25	$1,184		

Assumptions: SWA estimated the cost and savings of the system based on past PV projects. SWA projected physical dimensions based on a typical Polycrystalline Solar Panel (123 Watts, model #ND-U230C1). PV systems are sized based on Watts and physical dimensions for an array will differ with the efficiency of a given solar panel (W/sq ft).

Rebates/financial incentives:

NJ Clean Energy - Renewable Energy Incentive Program, Incentive based on $0.80 / watt Solar PV application for systems 50 kW or less.

http://www.njcleanenergy.com/renewable-energy/programs/renewable-energy-incentive-program

NJ Clean Energy - Solar Renewable Energy Certificate Program. Each time a solar electric system generates 1,000kWh (1MWh) of electricity, a SREC is issued which can then be sold or traded separately from the power. The buildings must also become net-metered in order to earn SRECs as well as sell power back to the electric grid. A total annual SREC credit of $3,600 has been incorporated in the above costs however it requires proof of performance, application approval and negotiations with the utility.

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 Bauer Community Center building:

- Replace Kitchen exhaust fan - there is a small wall mounted ventilation fan manually operated by a wall mounted switch. This fan is past its service life and SWA recommends replacing it as part of capital improvement because energy savings alone would not justify the replacement. Estimated cost of replacement is $300

- Replace Kitchen electric heaters with a gas fired furnace – the kitchen contains two ceiling mounted 3kW electric heaters for maintaining a minimum temperature during winter. The heaters are manually cranked up by the building operators when the outside air temperature is expected to fall below 40 deg F. SWA recommends replacing these heaters with a gas fired furnace located in the storage room to serve the kitchen as part of capital improvement. Estimated cost of replacement is $10,000

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

- Slope roof surface to drain effectively at time of reroofing.

- Slope perimeter grade away from building to maximize site drainage.

- Replace un-insulated wood and metal doors with insulated and weather-stripped RFP door types

- Confirm roof/attic insulation levels and insulate to a minimum of R-30

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.

- Exterminate for insect nesting in exterior wall cracks and cavities. SWA found areas mentioned in the exterior wall section of this report, where insects have nested on the exterior wall/roof assembly. Maintenance personnel should provide regular care for these areas in order to prevent future damage to exterior wall integrity.

- 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 replace 2.2gpm faucet aerators with 0.5gpm 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.

- 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.

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

- Preventative exterior wall maintenance - SWA recommends as part of the maintenance program to install proper flashing, 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 stone and masonry cavities filled or re-pointed with mortar or appropriate caulk to minimize and prevent water and moisture infiltration into the envelope assemblies.

- Maintain downspouts and cap flashing - Slope perimeter grade away from building to maximize site drainage. Especially at door locations to prevent water from flooding into building. Install gutters, downspouts and downspout deflectors in the rear of the building to minimize uncontrolled roof water run-off to help direct water away from building doorways. 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.

- 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 their energy use. The US 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	Location	Model#	Fuel	Space served	Year Equip Installed	Remaining useful life %
HVAC	Roof top package unit, 208-230/3/60, R22, MCA 41.6, 204/161.5 MBH in/out, 2 hp supply fan motor	Roof	York, Model DDUC-T090N205A, S/N NHGM108110	Gas/Elec.	Meeting room	1999	27%
HVAC	Roof top package unit, 208-230/3/60, R22, MCA 115.1, 400 MBH in max, 7.5 hp supply fan motor	Roof	York, Model DBUC-T240N400CF, S/N NEGM131693	Gas/Elec.	Assembly/game room	1999	27%
HVAC	Roof top package unit, 208-230/3/60, R22, MCA 27.9, 125 MBH in, 1 hp supply fan motor	Roof	York, Model DHUC-T060N125A, S/N NHGM102606	Gas/Elec.	Office/entrance	1999	27%
HVAC	Roof top package unit, 208-230/3/60, R22, MCA 53.9, 245/194 MBH in/out, 3 hp supply fan motor	Roof	York, Model DDUC-T120N245A, S/N NKGM121543	Gas/Elec.	Game room/Youth center	1999	27%
Ventilation	Kitchen hood exhaust fan; not in use anymore	Outside, on wall	Nameplate N/A	Elec.	Kitchen	1999	27%
Ventilation	Kitchen ventilation exhaust fan, 1/6hp est.	Outside, on wall	Carnes, nameplate N/A	Elec.	Kitchen	1999 est.	0%
Heating	3kW electric heater, ceiling hung, 2 nos.	Kitchen	Nameplate N/A	Elec.	Kitchen	2000 est.	33%
DHW	50 Gallon domestic hot water heater; I/P 38,000 Btu/hr, est. 84% efficiency	Storage room	Rheem, Gaurdian, model 22V50F1, S/N RHLN0708522572	Gas	Kitchen	2008	85%
DHW	38 Gallon domestic hot water heater; I/P 40,000 Btu/hr, est. 82% efficiency	Janitor room	State Industries, Inc., Model GS640YBRT, S/N L04A105315	Gas	Restrooms	2008	85%
Ventilation	Toilet exhaust fan, celing mounted, est. 1/4hp motor	Toilet	Nameplate N/A	Elec.	Restrooms	2005 est.	50%

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	1	Conference room (101)	Recessed	M	4'T12	3	4	40	Sw	2	365	12	516	377	T8	Recessed	4'T8	E	OS	3	4	32	2	365	5	399	218	85	73	158
2	1	Meeting Rm (102)	Recessed	S	Hal	11	1	90	Sw	2	365	20	1,208	882	CFL	Recessed	CFL	S	Sw	11	1	30	2	365	0	330	241	641	0	641
3	1	Meeting Rm (102)	Chandelier	S	Inc	1	12	60	Sw	2	365	0	720	526	CFL	Chandelier	CFL	S	Sw	1	12	9	2	365	0	108	79	447	0	447
4	1	Meeting Rm (102)	Track	S	Inc	1	6	65	Sw	2	365	0	390	285	CFL	Track	CFL	S	Sw	1	6	20	2	365	0	120	88	197	0	197
5	1	Meeting Rm (102)	Exit Sign	S	Inc	1	2	15	N	24	365	0	30	263	LEDex	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	215	0	215
6	1	Main Hallway (103)	Recessed	M	4'T12	5	4	40	Sw	6	365	12	860	1,883	T8	Recessed	4'T8	E	Sw	5	4	32	6	365	5	665	1456	427	0	427
8	1	Main entrance lobby (104)	Recessed	M	2'T12	13	4	20	Sw	6	365	6	1,118	2,448	T8	Recessed	2'T8	E	Sw	13	4	17	6	365	2	910	1993	456	0	456
7	1	Main Hallway (103)	Exit Sign	S	Inc	3	2	15	N	24	365	0	90	788	LEDex	Exit Sign	LED	S	N	3	1	5	24	365	1	17	145	644	0	644
10	1	Office (105)	Recessed	M	4'T12	2	4	40	Sw	4	365	12	344	502	T8	Recessed	4'T8	E	OS	2	4	32	3	365	5	266	291	114	97	211
11	1	Coat room (106)	Recessed	M	4'T12	6	2	40	Sw	1	365	12	552	201	T8	Recessed	4'T8	E	Sw	6	2	32	1	365	5	414	151	50	0	50
9	1	Main entrance lobby (104)	Exit Sign	S	Inc	1	2	15	N	24	365	0	30	263	LEDex	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	215	0	215
12	1	Game room (107)	Exit Sign	S	Inc	2	2	15	N	24	365	0	60	526	LEDex	Exit Sign	LED	S	N	2	1	5	24	365	1	11	96	429	0	429
13	1	Game room (107)	Recessed	M	4'T12	8	4	40	Sw	2	365	12	1,376	1,004	T8	Recessed	4'T8	E	OS	8	4	32	2	365	5	1064	583	228	194	422
14	1	Game Rm office undercabinet (107)	Equipment / Fume Hood	M	4'T12	1	1	40	Sw	4	365	12	52	76	T8	ipment / Fume Hd	4'T8	E	Sw	1	1	32	4	365	5	37	54	22	0	22
15	1	Game room (107)	Recessed	M	4'T12	4	4	40	Sw	4	365	12	688	1,004	T8	Recessed	4'T8	E	OS	4	4	32	3	365	5	532	583	228	194	422
16	1	Game Room Storage Closet (108)	Ceiling Mounted	M	4'T12	1	1	40	Sw	1	365	12	52	19	T8	Ceiling Mounted	4'T8	E	Sw	1	1	32	1	365	5	37	14	5	0	5
17	1	Bathroom Women (109)	Recessed	M	4'T12	2	4	40	Sw	6	365	12	344	753	T8	Recessed	4'T8	E	OS	2	4	32	5	365	5	266	437	171	146	316
18	1	Bathroom Men (110)	Recessed	M	4'T12	2	4	40	Sw	6	365	12	344	753	T8	Recessed	4'T8	E	OS	2	4	32	5	365	5	266	437	171	146	316
19	1	Hallway to youth rm (111a)	Recessed	M	4'T12	1	2	40	Sw	6	365	12	92	201	T8	Recessed	4'T8	E	Sw	1	2	32	6	365	5	69	151	50	0	50
20	1	youth room (111)	Recessed	M	4'T12	6	4	40	Sw	2	365	12	1,032	753	T8	Recessed	4'T8	E	OS	6	4	32	2	365	5	798	437	171	146	316
21	1	youth room (111)	Exit Sign	S	Inc	2	2	15	N	24	365	0	60	526	LEDex	Exit Sign	LED	S	N	2	1	5	24	365	1	11	96	429	0	429
22	1	youth room storage (112)	Recessed	M	4'T12	1	2	40	Sw	1	365	12	92	34	T8	Recessed	4'T8	E	Sw	1	2	32	1	365	5	69	25	8	0	8
23	1	Assembly (113)	Recessed	M	4'T12	24	4	40	Sw	4	365	12	4,128	6,027	T8	Recessed	4'T8	E	OS	24	4	32	3	365	5	3192	3495	1367	1165	2532
24	1	Assembly (113)	Track	S	CFL	8	1	23	Sw	0.1	365	0	184	7	N/A	Track	CFL	S	Sw	8	1	23	0	365	0	184	7	0	0	0
25	1	Assembly (113)	Pendant	S	Inc	8	1	65	Sw	4	365	0	520	759	CFL	Pendant	CFL	S	Sw	8	1	20	4	365	0	160	234	526	0	526
26	1	Assembly (113)	Exit Sign	S	Inc	4	2	15	N	24	365	0	120	1,051	LEDex	Exit Sign	LED	S	N	4	1	5	24	365	1	22	193	858	0	858
27	1	Kitchen (114)	Ceiling Mounted	M	4'T12	8	2	40	Sw	4	365	12	736	1,075	T8	Ceiling Mounted	4'T8	E	OS	8	2	32	3	365	5	552	604	269	201	470
28	1	Utility Rm (115)	Recessed	M	4'T12	2	4	40	Sw	1	365	12	344	126	T8	Recessed	4'T8	E	Sw	2	4	32	1	365	5	266	97	28	0	28
29	2	Storage Rm (201)	Recessed	M	4'T12	2	1	40	Sw	1	365	12	104	38	T8	Recessed	4'T8	E	Sw	2	1	32	1	365	5	74	27	11	0	11
30	2	Storage Closet 1 (202)	Wall Mounted	S	Inc	1	1	75	Sw	1	365	0	75	27	CFL	Wall Mounted	CFL	S	Sw	1	1	25	1	365	0	25	9	18	0	18
31	2	Storage Rm (203)	Ceiling Mounted	E	4'T8	5	2	32	Sw	1	365	5	345	126	N/A	Ceiling Mounted	4'T8	E	Sw	5	2	32	1	365	5	345	126	0	0	0
32	2	Hallway (204)	Ceiling Mounted	E	4'T8	8	2	32	Sw	6	365	5	552	1,209	N/A	Ceiling Mounted	4'T8	E	Sw	8	2	32	6	365	5	552	1209	0	0	0
33	2	Storage Closet 2 (205)	Wall Mounted	S	Inc	1	1	75	Sw	1	365	0	75	27	CFL	Wall Mounted	CFL	S	Sw	1	1	25	1	365	0	25	9	18	0	18
34	2	Storage Closet 3 (206)	Wall Mounted	S	Inc	1	1	75	Sw	1	365	0	75	27	CFL	Wall Mounted	CFL	S	Sw	1	1	25	1	365	0	25	9	18	0	18
35	2	Storage Closet 4 (207)	Wall Mounted	S	Inc	1	1	75	Sw	1	365	0	75	27	CFL	Wall Mounted	CFL	S	Sw	1	1	25	1	365	0	25	9	18	0	18
36	2	Storage Closet 5 (208)	Wall Mounted	S	Inc	1	1	75	Sw	1	365	0	75	27	CFL	Wall Mounted	CFL	S	Sw	1	1	25	1	365	0	25	9	18	0	18
37	2	Storage Rm (209)	Recessed	M	4'T12	2	1	40	Sw	1	365	12	104	38	T8	Recessed	4'T8	E	Sw	2	1	32	1	365	5	74	27	11	0	11
38	Ext	Exterior	Wall Mounted	S	Hal	14	1	90	T	6	365	20	1,537	3,366	CFL	Wall Mounted	CFL	S	T	14	1	30	6	365	0	420	920	2447	0	2447
39	Ext	Exterior	Recessed	S	Inc	8	1	75	T	6	365	0	600	1,314	CFL	Recessed	CFL	S	T	8	1	25	6	365	0	200	438	876	0	876
Totals:						175	100	1,737				272	19,699	29,341						175	94	969			105	12,566	15,093	11,886	2,362	14,248

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.

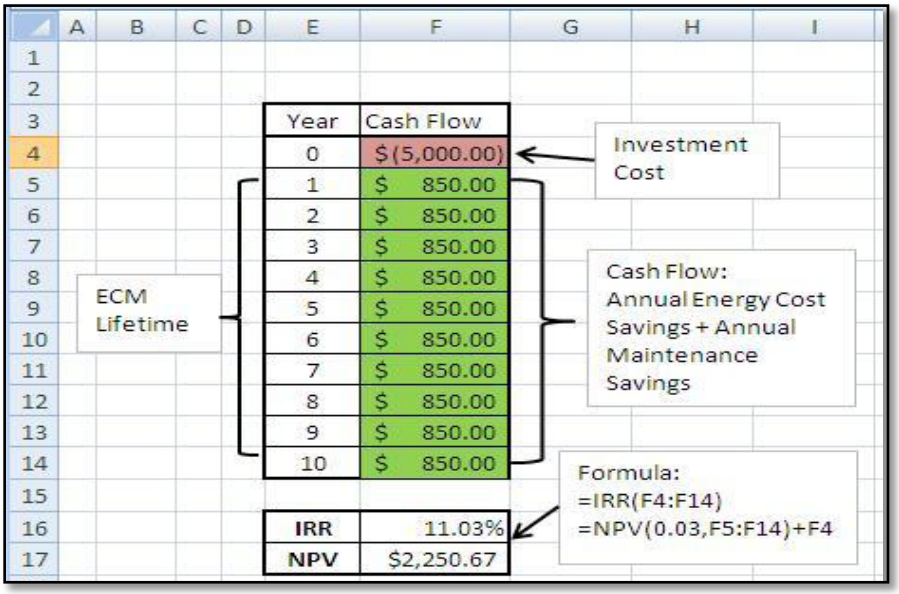
Calculation References

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 - Bauer Community Center

Building ID: 2243403
For 12-month Period Ending: January 31, 2010[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: April 15, 2010

Facility	Facility Owner	Primary Contact for this Facility
Township of Millburn - Bauer Community Center 100 Main Street Millburn, NJ 07041	N/A	N/A

Year Built: 1953
Gross Floor Area (ft²): 9,532

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	195,097
Natural Gas (kBtu)[4]	461,629
Total Energy (kBtu)	656,726

Energy Intensity[5]	
Site (kBtu/ft²/yr)	69
Source (kBtu/ft²/yr)	119

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	65
National Average Source EUI	136
% Difference from National Average Source EUI	-12%
Building Type	Recreation

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 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

ECM Counter		ECM description	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st year cost 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, $	CO2 reduced, lbs/yr
1	0 to 5 Year Payback ECM	48 New CFL fixtures to be installed	1,541	0	1,541	5,224	4.3	0	1.9	302	1,310	8	10,482	1.2	737	92	84	7,579	9,354
2		13 New LED exit sign fixtures to be installed with incentives	1,012	260	752	2,790	2.3	0	1.0	35	573	15	8,602	1.3	1,114	74	76	5,996	4,995
6		Install (4) new thermostats along with controller	3,600	0	3,600	4,200	3.4	200	3.6	0	1,038	12	12,458	3.5	246	21	27	6,612	9,725
5		1 New 20.6 cu ft ENERGY STAR refrigerator	750	0	750	532	0.4	0	0.2	103	206	12	2,468	3.6	394	33	26	1,273	953
3		9 New occupancy sensors to be installed with incentives	1,980	180	1,800	2,362	1.9	0	0.8	0	456	15	6,838	3.9	280	19	23	3,564	4,229
		TOTALS	**8,883**		**8,443**	**15,108**	**12.3**	**200**	**7.5**	**440**	**3,583**		**40,848**	**2.4**	**-**	**-**	**-**	**-**	**29,255**
7	5 to 10 Year Payback ECM	Provide demand controlled ventilation for Assembly room	5,500	0	5,500	1,100	0.9	588	6.6	0	881	12	10,577	6.2	92	8	12	3,170	8,451
		TOTALS	**5,500**	**0**	**5,500**	**1,100**	**0.9**	**588**	**6.6**	**0**	**881**		**10,577**	**6.2**	**-**	**-**	**-**	**-**	**8,451**
4	> 10 Year Paybakc (End of Life ECM)	93 New T8 fixtures to be installed with incentives	15,066	2,790	12,276	3,872	3.2	0	1.4	252	999	15	14,989	12.3	53	4	0	-517	6,933
		TOTALS	**15,066**		**12,276**	**3,872**	**3.2**	**0**	**1.4**	**252**	**999**		**14,989**	**12.3**	**-**	**-**	**-**	**-**	**6,933**

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.