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August 20, 2010

Local Government Energy Program
Energy Audit Report-FINAL

Township of Millburn

Millburn Gero Park Recreation building
335 White Oak Ridge Rd
Short Hills, NJ 07078

Project Number: LGEA58

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EXECUTIVE SUMMARY

The Gero Park Recreation building is a one-story, 2,336 square feet building constructed in 1961 with upgrades/renovations in 1988 and 1997 and a roof replacement in 2000. 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	13,816	1,920	5,132	99.0	239
Proposed	3,985	1,686	3,172	80.1	182
Savings	9,831	234	1,960	18.9	57
% Savings	71	12	38	19	24

*The Solar Photovoltaic system recommendation is excluded from this table

**Total Annual Cost savings are equal to energy cost savings plus incurred operations and maintenance savings

Table 2: Proposed Photovoltaic System

Initial Investment, $	Total Recommended System Capacity (kW)	Electricity Generated, (kWh/year)	Demand Reduction (kW)	SRECs earned (SRECs/year)	Total Revenue ($/year)
30,000	5.0	5,902	1.6	5	4,186

*Revenue generated from producing electricity and collecting Solar Renewable Energy Credits (SRECs) has been factored into the total revenue

There may be energy procurement opportunities for the Gero Park Recreation building to reduce annual utility costs. The Township of Millburn electric costs are $705 higher, when compared to the average estimated NJ commercial utility rates.

SWA has also entered energy information about the Gero Park Recreation building in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This recreation center is comprised of non-eligible ("Other - Recreation") space type and as a result of being a "non-eligible" space type; a performance score could not be generated. Although a performance score could not be generated, the software was able to generate site energy use intensity. Compared to a typical Recreation-related building that uses 104.0 kBtu/sqft-yr, the Township of Millburn Gero Recreation building used 99.0 kBtu/sqft-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 Tables 1 and 2. The measures are categorized by payback period in Table 3 below:

Table 3: Energy Conservation Measure Recommendations

ECMs	First Year Savings ($)	Simple Payback Period (years)	Initial Investment, $	CO2 Savings, lbs/yr
0-5 Year	1,471	1.2	1,800	10,242
5-10 Year	-	-	-	-
>10 year	489	16.4	8,031	3,252
Solar PV	4,186	7.2	30,000	10,568
Total	6,198	6.4	39,831	24,518

SWA estimates that implementing the recommended ECMs is equivalent to removing approximately 2 cars from the roads each year or avoiding the need of 59 trees to absorb the annual CO_2 generated.

The recommended ECMs and the list above are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for 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 $652.00.

Financial Incentives and Other Program Opportunities

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

SWA recommends that the Township of Millburn implement all recommended Energy Conservation Measures (ECMs). Due to the size of the building, it may be beneficial to implement all measures at the same time since there will be limited labor involved and there may be cost-sharing opportunities between different measures. SWA recommends that the project apply for the Direct Install and SmartStart programs through the NJ Office of Clean Energy. The Direct Install program will yield the greater financial incentives; therefore SWA recommends that the Township of Millburn first apply to the Direct Install program. After receiving a scope of work from the Direct Install contractor, SWA recommends that Township of Millburn apply to the SmartStart program for additional incentives that maybe help offset the cost of measures that are not covered by the Direct Install program.

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 Gero Park Recreation building at 335 White Oak Ridge Rd, Short Hills, NJ 07078. The process of the audit included 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 most cost-effective energy conservation measures for the Gero Park Recreation.

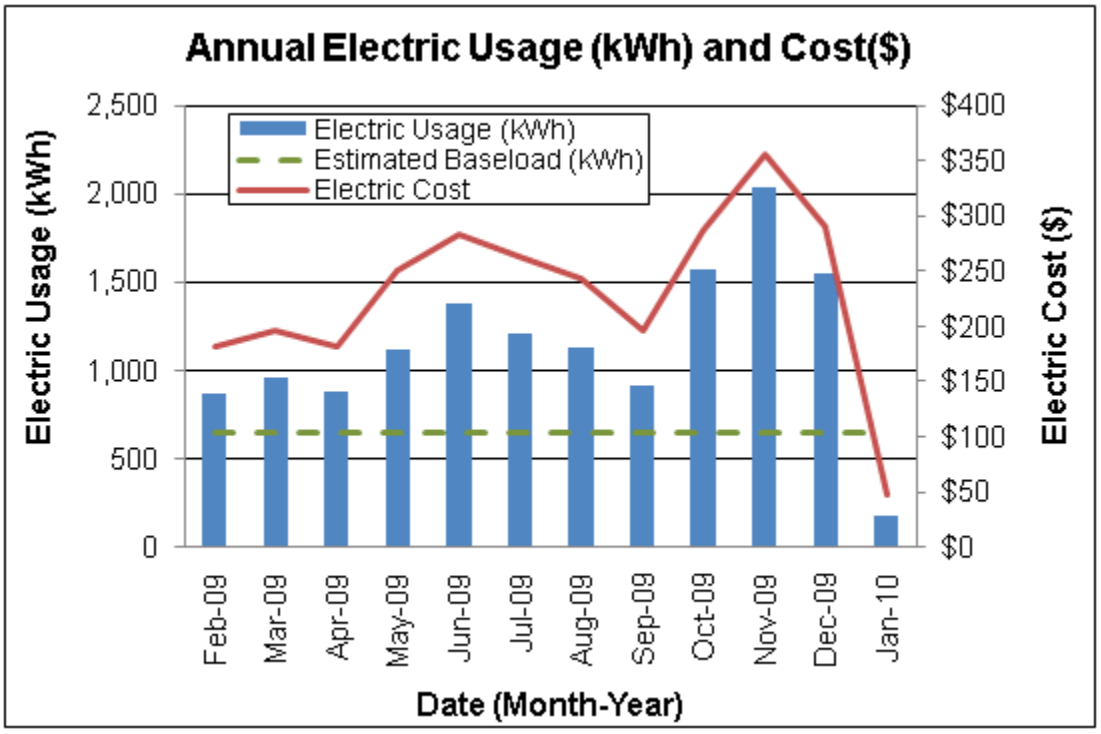
HISTORICAL ENERGY CONSUMPTION

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 Gero Park Recreation 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.

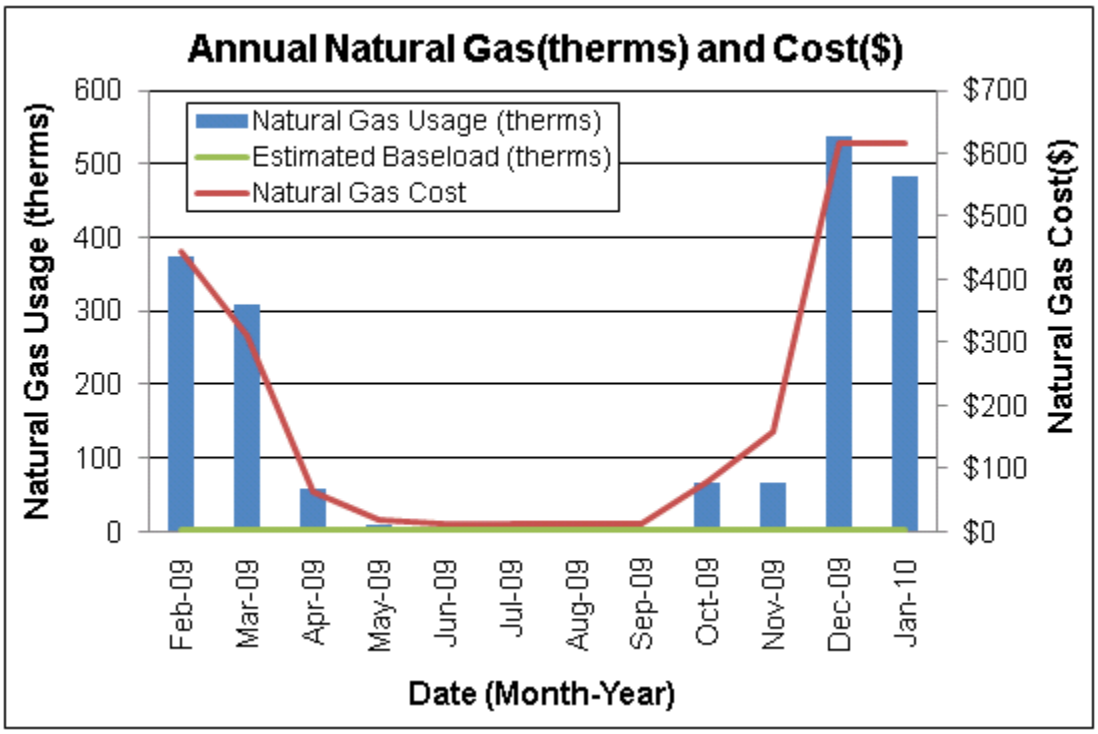
Electricity - The Gero Park Recreation building is currently served by one electric meter. The Township currently buys electricity for the Gero Park Recreation building from JCP&L at **an average aggregated rate of $0.201/kWh**. The Township purchased **approximately 13,816 kWh, or $2,771 worth of electricity,** for the Gero Park Recreation building in the previous year. The average monthly demand was 12.1 kW and the annual peak demand was 12.6 kW.

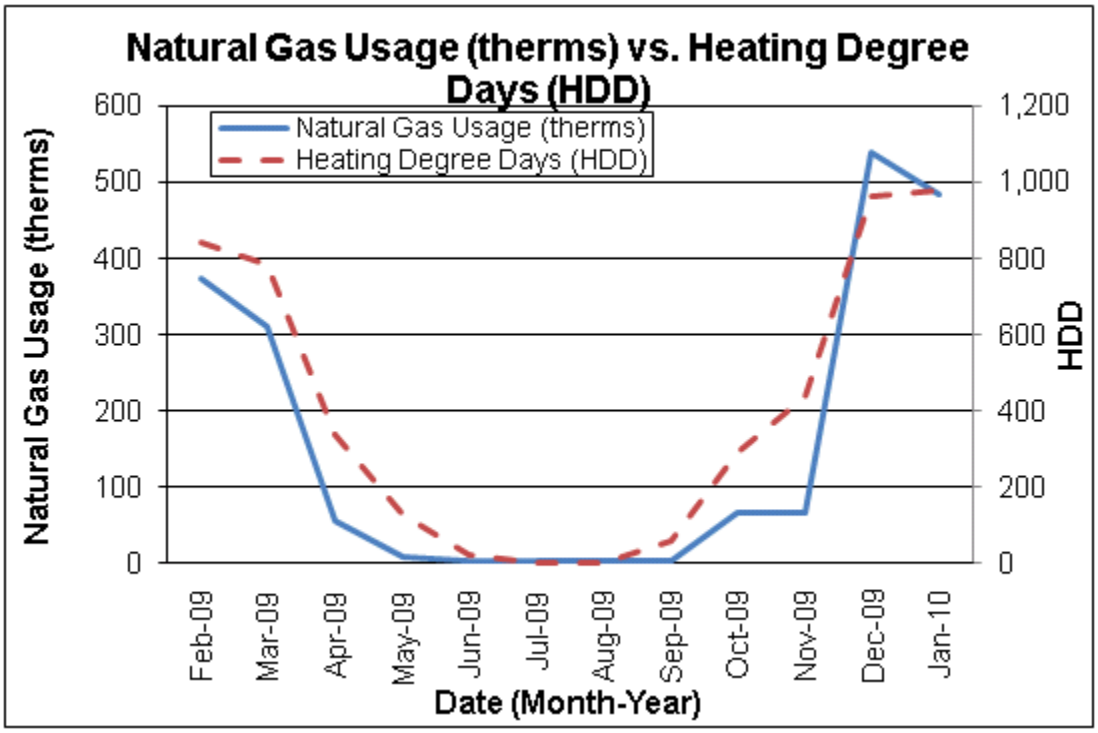
The chart below shows the monthly electric usage and costs. The dashed green line represents the approximate baseload or minimum electric usage required to operate the Gero Park Recreation building.



Natural gas - The Gero Park Recreation building is currently served by one meter for natural gas. The Township currently buys natural gas from PSE&G for the Gero Park Recreation building at **an average aggregated rate of $1.230/therm**. The Township purchased **approximately 1,920 therms, or $2,361 worth of natural gas,** in the previous year for the Gero Park Recreation 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 Gero Park Recreation building.

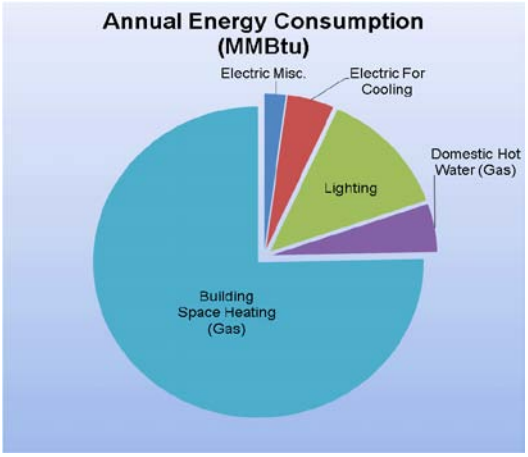


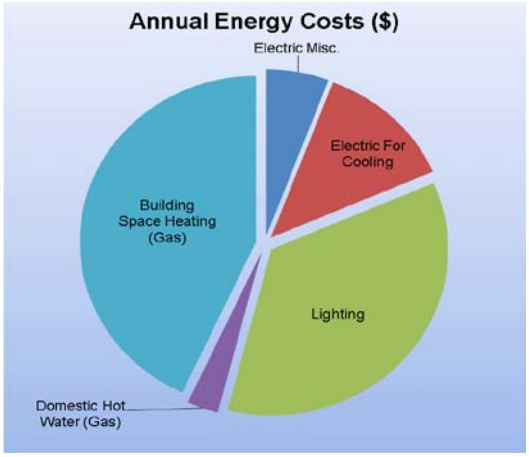


The chart above shows the monthly natural gas usage along with the heating degree days or HDD. Heating degree days is the difference of the average daily temperature and a base temperature, on a particular day. The heating degree days are zero for the days when the average temperature exceeds the base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

The following graphs, pie charts, and table show energy use for the Gero Park Recreation building based on utility bills for the 12 month period. Note: electrical cost at $59/MMBtu of energy is almost 5 times as expensive as natural gas at $12/MMBtu

Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	$	% $	$/MMBtu
Electric Miscellaneous	5	2%	$294	6%	59
Electric For Cooling	11	5%	$655	13%	59
Lighting	31	13%	$1,822	36%	59
Domestic Hot Water (Gas)	12	5%	$148	3%	12
Building Space Heating	180	75%	$2,213	43%	12
Totals	239	100%	$5,132	100%	
Total Electric Usage	47	20%	$2,771	54%	59
Total Gas Usage	192	80%	$2,361	46%	12
Totals	239	100%	$5,132	100%	



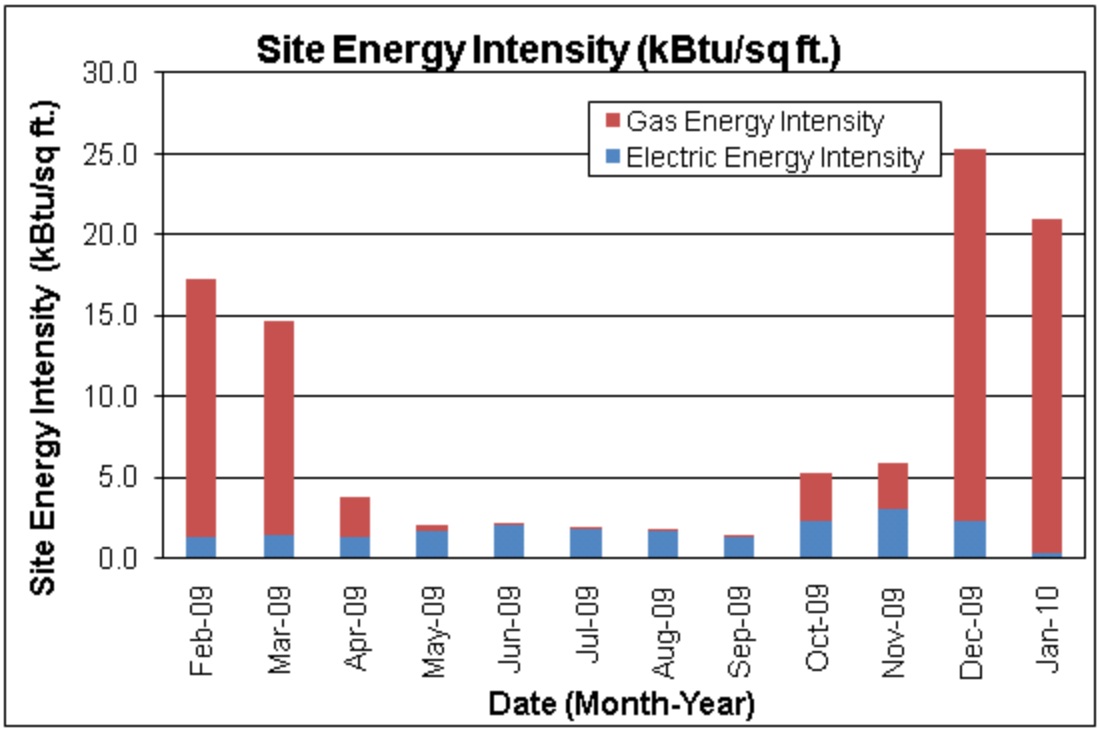


1.2. Energy benchmarking

SWA has entered energy information about the Gero Park Recreation 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" 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 99.0 kBtu/ft^2-yr compared to the national average of a "Other-Recreation" building consuming 104.0 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 Gero Park Recreation 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.

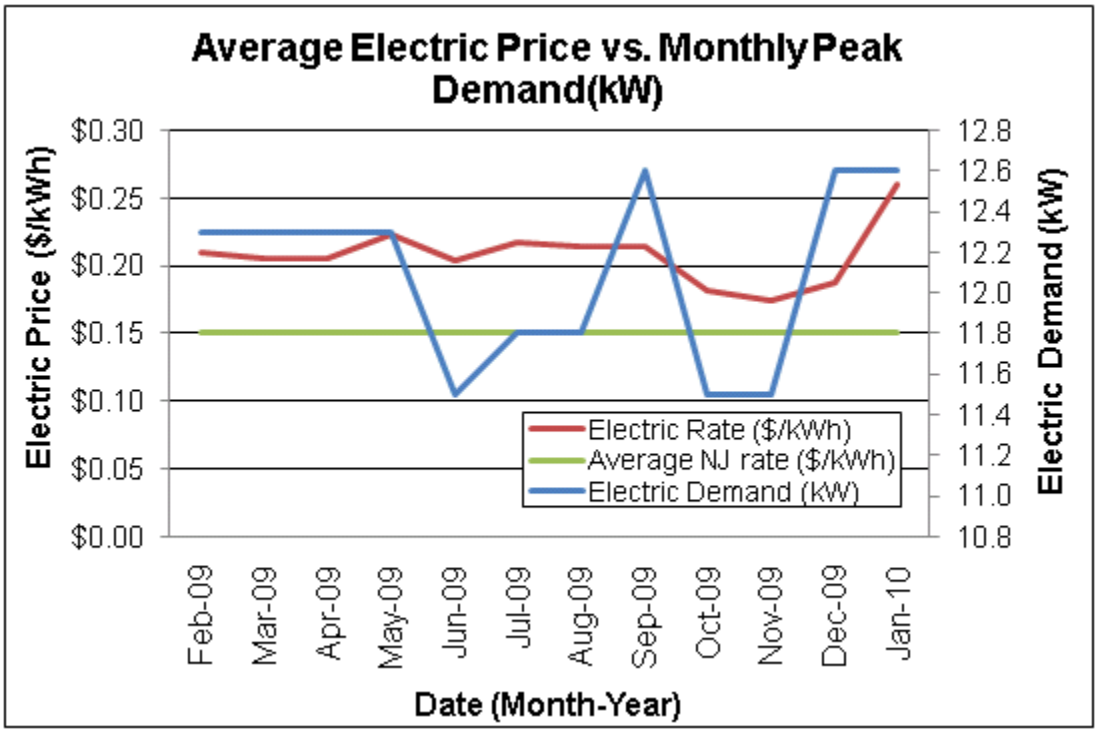
The supplier charges a market-rate price based on use, and the billing does not break down demand costs for all periods because usage and demand are included in the rate. Currently, the Township is paying a general service rate for natural gas. Demand pricing is not broken out in the bill. Thus the building 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. 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.

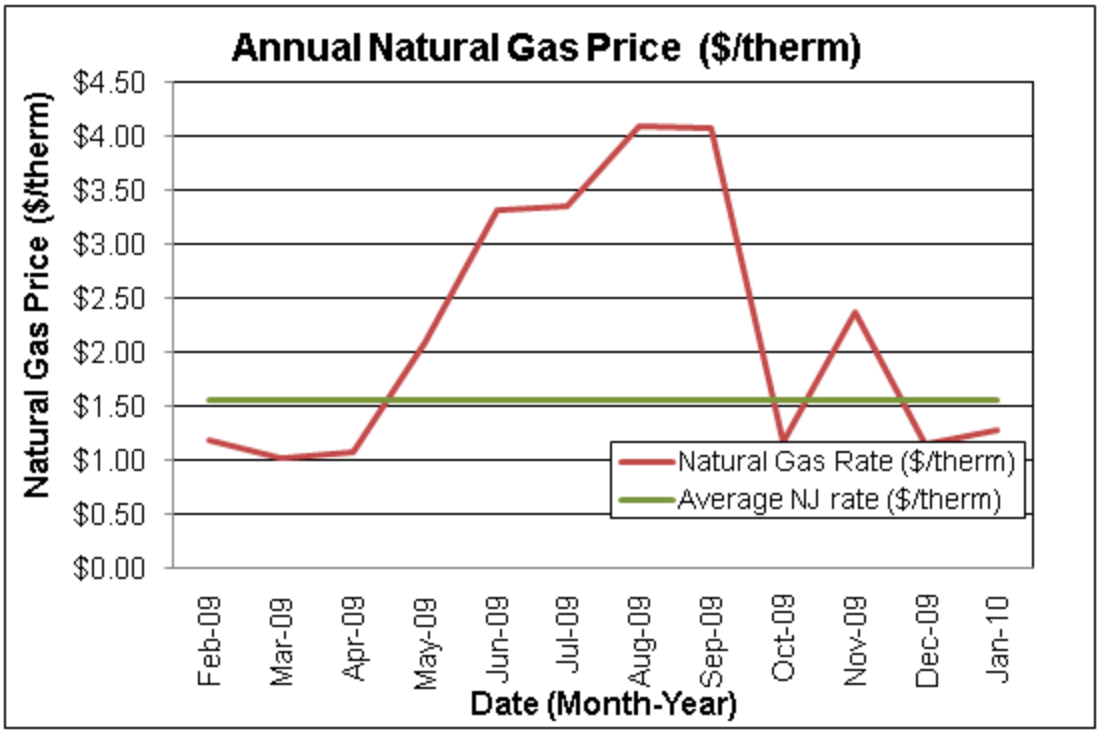
1.2.2. Energy Procurement strategies

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 $0.201/kWh for the Gero Park Recreation building. The Gero Park Recreation building annual electric utility costs are $705 higher, when compared to the average estimated NJ commercial utility rates. Electric bill analysis shows fluctuations up to 33% over the most recent 12 month period.



The average estimated NJ commercial utility rates for gas are $1.550/therm, while the Township pays a rate of $1.230/therm for the Gero Park Recreation building. The Gero Park Recreation building annual natural gas utility costs are $614 lower, when compared to the average estimated NJ commercial utility rates. Natural gas bill analysis shows fluctuations up to 75% 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 natural gas rates in summer are due to fixed meter charges coupled with low gas usage.

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 Gero Park Recreation 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, 2,336 square feet Millburn Gero Park building was originally constructed in 1961 with renovations/additions completed in 1997/1998. The building houses offices and a meeting room for public usage as well as a snack bar for summer sports events.


Front Façade


Rear Façade


Left Side Façade

2.2. Building occupancy profiles

There is one employee maintaining the building, approximately 17 hours per week. The building is used for summer camps and by reservation for events and parties. Half of the building is rented by the Millburn Little League.

Note: The entirety of the building was inaccessible at the time of the audit due to the Township not having access to tenant spaces (as half of the building is utilized by Millburn Little League).

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.

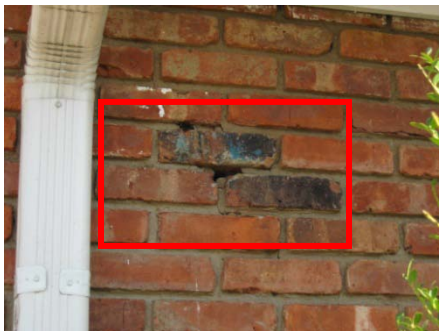
2.3.1. Exterior Walls

The exterior wall envelope is constructed of brick veneer, over concrete block with an unconfirmed level of detectable insulation. The interior is mostly painted gypsum wallboard or 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 no major signs of uncontrolled moisture, air-leakage or other energy-compromising issues.

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



Exterior wall penetrations in brick facade

Damaged brick on exterior wall

2.3.2. Roof

The building's roof is predominantly a medium-pitch gable type over a wood structure, with an asphalt shingle finish. The asphalt roof section is in good condition with no reported areas of concern or roof leaks. The core of the building has a flat EPDM membrane roof in age appropriate condition. Building maintenance personnel reported the asphalt roof was replaced in 2000. All insulation levels could not be detected at the time of the audit due to the attic scuttle location in tenant spaces. Building management could not verify insulation type or levels.

Roofs, related flashing, gutters and downspouts were inspected during the field audit. They were reported to be in overall acceptable condition. Roof drains and gutters clogged with leaves should be cleared on a regular basis.

The following specific roof problem spots were identified:

EPDM roof membrane in good condition

Wood rot due to proximity of water runoff from roof

Asphalt shingle roof in good condition

Water damaged ceiling tile

2.3.3. Base

The building's base is composed of a below-grade basement with a 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 condition with no signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues.

2.3.4. Windows

The building contains double-hung type windows with a vinyl frame, clear double glazing and interior shading. Building maintenance personnel stated the windows were replaced during the 1997/1998 renovations. Overall, the windows were found to be in good condition. There are wood framed, single pane, fixed sidelite windows on either side of the front door. These windows areoriginal to the building.

Windows, shading devices, sills, related flashing and caulking were inspected as far as accessibility allowed for signs of moisture, air-leakage and other energy compromising issues.

Typical window

Double pane vinyl framed window

2.3.5. Exterior doors

The building contains both an un-insulated wood front door and aluminum side 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 acceptable/ age appropriate condition with some signs of uncontrolled air-leakage issues. Doors are not air tight when closed and should be weather-stripped.

The following specific door problem spots were identified:

Missing and worn weather-stripping around and between doors allows air to infiltrate into building

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

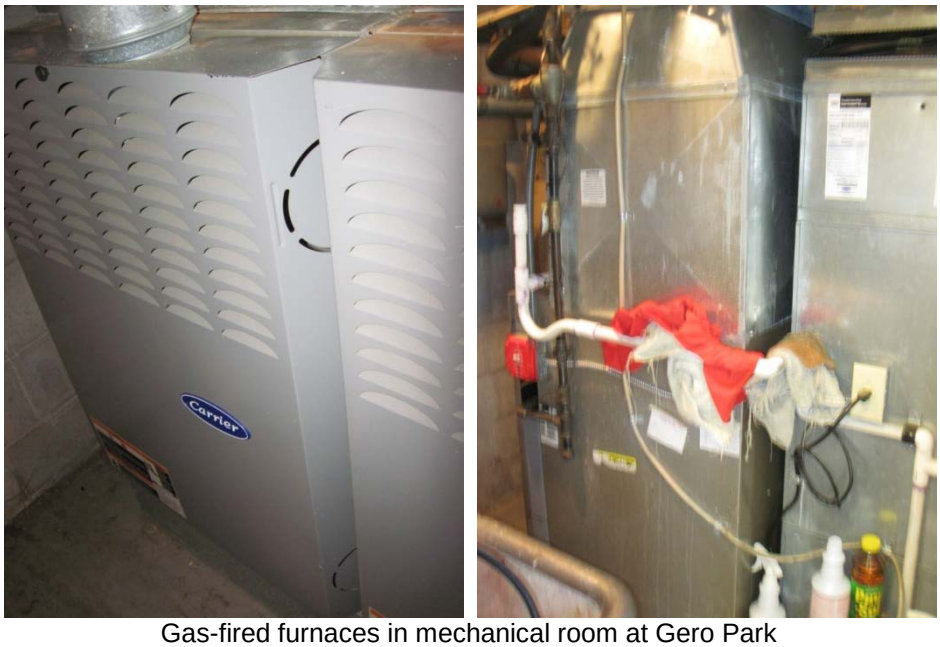
Heating Ventilation Air Conditioning

Equipment

The Gero Park Recreation building is heated and cooled by three commercial sized power-vented, gas-fired furnaces with three condensers (located on the flat roof section). Two of the furnaces are located in the public area of the building; however the third furnace is located in a portion of the building that is tenant-owned. All furnaces were in reasonably good condition. A comprehensive Equipment List can be found in Appendix A.

The furnaces 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 refrigerant and condensate lines are connected through a building cavity to the roof, where the condensers are located.

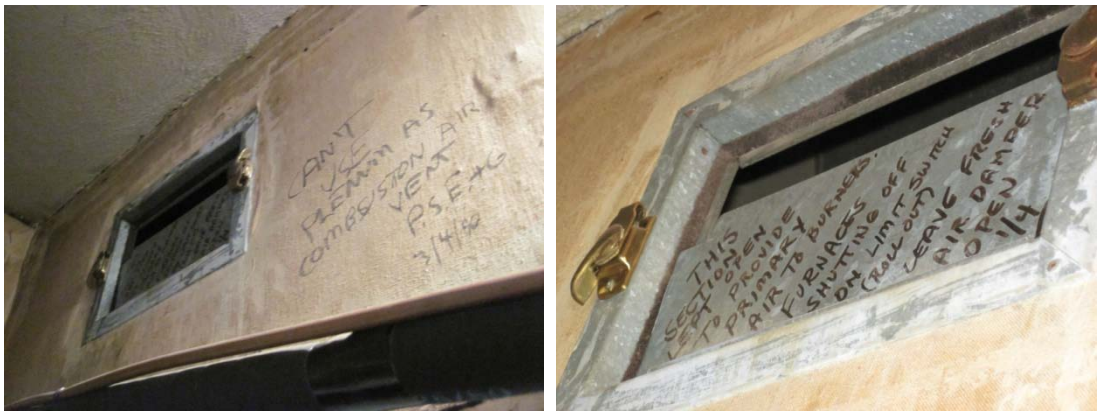
The burner provides heat to the passing air through the combustion of natural gas. Air also passes across the evaporator coil, which cools incoming air and is distributed by the blower via ductwork to the spaces within the building. The cooling coil within the furnace ductwork is cooled using R-22 refrigerant that is circulated between the evaporator coil and the condensing unit located on the roof.



Gas-fired furnaces in mechanical room at Gero Park

The furnaces receive their necessary make-up air, or needed combustion air via a cut out in the sheet metal in the return plenum (as shown in the images below).

Both units were installed in 2002 and appear to be in good condition with no signs of rust or deterioration.



Sheet metal cut off of return plenum to allow needed fresh air for combustion


Three condensers on flat roof section

Two condensers (located on the flat roof section) were manufactured in 1995 while the third condenser was manufactured in 1999. The life of a compressor is generally 15-20 years old. At the time of the audit, SWA was informed the Township has plans to replace the two older units in the near future. SWA recommends a full load calculation design to correctly size the equipment. Load calculations help to ensure that equipment is correctly sized to match the building heating and cooling loads.

There are two exhaust fans located on the roof, which serve the bathrooms and kitchen hood. In general, the building exhaust fans have an estimated 20% useful operating life left.

Distribution Systems

The two gas-fired furnaces located in the mechanical room draw air from the building into their return plenums as well as outside air, combining to mix and provide the furnace with makeup air. A blower, located in the air handler cabinet, supplies conditioned air to the building and also creates a negative pressure in the return ductwork to help bringing air into the furnace. Heated or cooled air passes through ductwork to its final destination in rooms throughout the building.

The ductwork for all systems is located in the attic. The attic was inaccessible during the time of the SWA audit, due to the entry location in tenant spaces. Supply and return air registers are located in the ceiling throughout the building.

Controls

The heating and cooling equipment is controlled by manual thermostats. There is a locked box covering the AC control for the building. The two thermostats located in the hallway nearest the kitchen/storage room (shown in images below) operate the entire building.

Controls for heating and cooling in Gero Park building

Domestic Hot Water

The domestic hot water (DHW) for the Gero Park Recreation building is provided by a gas-fired Rheemglas 22-30-1 heater with a 30-gallon storage capacity. Combustion air passes through the heating chamber located in the center of the tank via natural draft. The draft hood appeared to be in satisfactory condition, although the flue pipe should be evaluated for sufficient pitch.

DHW tank in mechanical room

This heater has 0% estimated useful operating life remaining and should be considered for replacement.

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 at the Millburn Gero Park Recreation building consists of a mix of lighting fixtures with fluorescent T12, T8 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).

In addition, SWA recommends installing occupancy sensors in spaces which are intermittently used throughout 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.

Exterior Lighting - The exterior lighting surveyed during the building audit was found contain metal halide bulb type fixtures. SWA recommends replacing the metal halides with pulse start metal halides. Also, there appeared to be duct tape covering the photocell sensors. SWA auditors were uncertain of the reasoning behind the tape. SWA suggests the building maintenance personnel and Gero Park Recreation staff discusses needs for exterior lighting and discuss best energy efficient practice.

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. The tenant space contained a two door commercial refrigerator, and two vending machines.

Elevators

The Gero Park Recreation building does not have an installed elevator.

Other electrical systems

There are not currently any other significant energy-impacting electrical systems installed at the Gero Park Recreation 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.

3.1 Existing systems

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

3.2 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 Gero Park Recreation building is a good candidate for a 5 kW Solar Panel installation. See ECM#6 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 Gero Park Recreation 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 68% remaining useful life.

Combined Heat and Power

The Gero Park Recreation building is not a good candidate for CHP installation and would not be cost-effective due to the size and operations of the building. Typically, CHP is best suited for buildings with a high electrical 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 0-5 Year Payback ECMs
1	Install 73 new CFL lamps
2	Install 2 programmable thermostats
3	Replace old refrigerator with ENERGY STAR® model
	Description of 5-10 Year Payback ECMs
4	Install 44 new T8 fluorescent fixtures
5	Install 34 new Pulse Start Metal Halide fixtures
6	Install a roof-mounted 5 kW Solar PV system
	Description of >10 Year Payback ECMs
7	Replace domestic hot water heater with high efficiency unit
8	Replace 3 rooftop condensers with 15.0 SEER units

ECM#1: *Install 73 new CFL lamps*

Description:

The Gero Recreation building contains 69 light fixtures that contain a total of 73 incandescent lamps. Four of the 69 light fixtures contain 2 lamps each. CFL lamps are capable of producing the same light levels while reducing related electricity consumption by 2/3. SWA recommends that the Township of Millburn always use CFL lamps as opposed to incandescent bulbs.

Installation cost:

Estimated installed cost: $730 (includes $219 labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

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
Install 73 new CFL lamps	RS Means	730	0	730	3,643	5.3	0	5.3	323	1,055	5	5,276	0.7	6	1	1	4,075	6,523

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. The replacements for each lighting fixture, the costs to replace or retrofit each one, and the rebates and wattages for each fixture are located in Appendix B.

Rebates/financial incentives:

- *None*

Please see Appendix F for more information on Incentive Programs

ECM#2: *Install 2 programmable thermostats*

Description:

The Gero Recreation building contains a total of 3 gas-fired furnaces with corresponding condensers that provide heating and cooling to the building. The heating and cooling loads are determined based on four programmable thermostats; the main portion of the building is operated by one thermostat for heating and one separate thermostat for cooling. The tenant-owned portion of the building is also controlled by one thermostat for heating and one thermostat for cooling. SWA recommends installing two programmable thermostats; one for the main area of the building and one for the tenant-owned portion of the building. These programmable thermostats should be able to control both heating and cooling functions. Based on the limited use of the building, the programmable thermostats should be set to provide heating and cooling during the known operation schedule. When the building is occupied outside of the regular known operation schedule, a manual override adjustment can be made that will allow the occupants to control the heating and cooling for a period of 2 hours before it reverts back to unoccupied mode.

Installation cost:

Estimated installed cost: $260 (includes $60 labor)
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 2 programmable thermostats	RS Means	260	0	260	322	0.0	180	8.2	0	286	10	2,861	0.9	10	1	1	2,156	2,561

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA assumes energy savings based on the daily operation of 84 hours per week and a reduction of approximately 10% of excessive heating and cooling usage.

Rebates/financial incentives:

- *None*

Please see Appendix F for more information on Incentive Programs

ECM#3: *Replace old refrigerator with ENERGY STAR® model*

Description:

On the days of the site visit, SWA observed an older refrigerator in the Kitchen which is not ENERGY STAR®, rated (using as much as 869 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 life 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: $810 (includes $30 labor)
Source of cost estimate: Vendor

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	Replace old refrigerator with ENERGY STAR® Model	Vendor	810	0	810	902	0.3	0	1.3	0	181	12	2,176	4.5	2	0	0	973	1,615

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

- *None*

Please see Appendix F for more information on Incentive Programs

ECM#4: *Install roof-mounted 5 kW roof-mounted Solar PV system*

Currently, the Gero Recreation building does not use any renewable energy systems. Renewable energy systems, such as photovoltaic panels, can be mounted on the roof of the facility and can offset a significant 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 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. SWA presents below the economics of installing a 5-kW PV system to offset electrical demand for the building and reduce the annual net electric consumption for the building. A system of 22 commercial multi-crystalline 230 watt panels would generate 5,902 kWh of electricity per year, or 42.7% of Gero Recreation building's annual electric consumption.

Installation cost:

Estimated installed cost: $30,000; (Includes $15,000 in labor)
Source of cost estimate: Similar Projects

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 a roof-mounted 5 kW Solar PV system	Similar Projects	35,000	5,000	30,000	5,902	1.6	0	8.6	0	4,186	25	104,658	7.2	2	0	0	25,506	10,568

*SREC revenue included in "Total 1st Year Savings"

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. Cost of installation was estimated using data from similar projects, at approximately $7,000 per kW. Annual energy savings were calculated using PV WATTS, an online tool administered by the National Renewable Energy Laboratory (NREL).

Rebates/financial incentives:

- *NJ Clean Energy – Renewable Energy Incentive Program (REIP) - $1/Watt installed*
- *Solar Renewable Energy Credit (SREC) program – Each time a solar electric system generates 1,000 kWh (1 MWh) of electricity, a SREC is issued which can then be sold or traded separately from the power. The building must become net-metered in order to earn SRECs as well as sell power back to the electric grid. Annual SREC revenue of $3,000 has been factored into the annual savings for a period of 15 years. For every full MWh of generated per year (5,902 kWh per year will generate 5 SRECs), a market rate of $600/SREC has been calculated. SRECs are factored into the annual cost for a period of 15 years, which is the term limit of the SREC registration program. SRECs require proof of performance, application approval and negotiations with the utility.*

Please see Appendix F for more information on Incentive Programs.

ECM#5: *Replace domestic hot water heater with high efficiency unit*

The gas-fired domestic hot water heater at the Gero Recreation building is currently performing at a low efficiency based on the age of the equipment. The domestic hot water heater is currently operating beyond its expected useful lifetime. SWA recommends upgrading this unit to a sealed-combustion unit, with a thermal efficiency of at least 85%.

Installation cost:

Estimated installed cost: $1,058 (Estimated labor of $200)
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	Replace domestic hot water heater with high efficiency unit	RS Means	1,108	50	1,058	0	0.0	46	2.0	30	87	10	866	12.2	0	0	0	-327	507

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

Rebates/financial incentives:

- *NJ Clean Energy – SmartStart – Gas fired heaters <50 gallons ($50 per unit)*

Please see Appendix F for more information on Incentive Programs.

ECM#6: *Install 3 new Pulse Start Metal Halide fixtures*

Description:

The Gero Recreation building contains 3 Probe Start Metal Halide light fixtures used for exterior lighting that are operated by timers. SWA recommends replacing these probe start metal halide lights with pulse start metal halides to decrease the energy usage for the same amount of light and longer useful life.

Installation cost:

Estimated installed cost: $2,010 (includes $450 labor)
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
6	Install 3 new Pulse Start Metal Halide fixtures	RS Means	2,010	75	1,935	696	0.1	0	1.0	2	142	15	2,128	13.6	0	0	0	-265	1,246

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. The replacements for each lighting fixture, the costs to replace or retrofit each one, and the rebates and wattages for each fixture are located in Appendix B.

Rebates/financial incentives:

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

Please see Appendix F for more information on Incentive Programs

ECM#7: *Replace 3 rooftop condensers with 15.0 SEER units*

The Gero Recreation building currently contains 3 rooftop condensing units that provide cooling to the building via a split system in conjunction with 3 separate gas-fired furnaces. Two units serving the owner's side are estimated at 3 tons and 10.0 original SEER value, and were installed in 1995. SWA recommends replacing both these units, as they have reached the end of their useful lifetime. SWA recommends that each condenser is replaced with an equivalent-sized condenser with SEER values of 15.0 or higher.

Installation cost:

Estimated installed cost: $4,572 (Estimated labor of $360)
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
7	Replace 2 rooftop condensors with 15.0 SEER units	RS Means	5,400	552	4,848	823	0.3	0	1.2	90	255	25	6,386	19.0	0	0	0	-498	1,474

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

Rebates/financial incentives:

- *NJ Clean Energy – SmartStart – Split AC units ($92 per ton)*

Please see Appendix F for more information on Incentive Programs.

ECM#8: *Install 1 new T8 fluorescent fixtures*

Description:

On the days of the site visits, SWA completed a lighting inventory of the Gero Recreation building (see Appendix B). The Gero Recreation building contained 1 T8 fluorescent light in a storage closet. Replacing this lighting fixture would not be cost-effective; however, SWA recommends that the fixture is replaced as soon as it fails.

Installation cost:

Estimated installed cost: $190 (includes $30 labor)
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
8	Install 1 new T8 fluorescent fixture	RS Means	205	15	190	14	0.0	0	0.0	2	5	15	72	39.5	-1	0	0	-133	25

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. The replacements for each lighting fixture, the costs to replace or retrofit each one, and the rebates and wattages for each fixture are located in Appendix B.

Rebates/financial incentives:

- *NJ Clean Energy – SmartStart – T8 fluorescent fixtures ($15 per sensor)*

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 Gero Park Recreation building:

- 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. Add insulation if required. SWA recommends air sealing around all electrical, plumbing, and HVAC penetrations.

- Replace all original, single-glazed windows with a low-E, double-glazed type

- Replace original, un-insulated wood door with insulated door type

Operations and Maintenance

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

- Install occupancy sensors in interior spaces – SWA identified 20 separate areas within the Gero Recreation building that could benefit from the installation of occupancy sensors. Due to the limited use of the building, installing occupancy sensors would not be cost-effective; however, they are recommended to prevent lights from being left on for extended periods of time when the building is not occupied.

- Repair or replace exterior photocell sensors – SWA observed that all exterior lighting was operated by photocell sensors that were not operable due to someone putting tape over the sensors. SWA recommends removing the tape and repairing each photocell sensors in order to properly operate the exterior lights according to daylight. If the sensors are non-repairable then SWA recommends replacing them.

- Remove rotten wood trim near/on roof (as noted in building description section 2.3.2) and replace with flashing and proper sealant. Rotten wood invites pests, such as carpenter ants, and should be eliminated where possible.

- Overgrown ground vegetation should be trimmed to not touch or block exterior wall surfaces from access, ventilation and sunlight. For best practice, SWA recommends plants minimum installation distance to be no less than 24” from the building. This will help to maintain a better distance between root systems potentially causing damage to foundation walls.

- 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. Inspect and maintain all roof surfaces on a regular basis.

- Maintain weather-stripping around all exterior doors and roof hatches. Doors and vestibules should be observed annually for deficient weather-stripping and replaced as needed. It is important to check doors between the garage and conditioned spaces, in order to reduce occupant exposure to indoor pollutants originating from garage.

- Maintain sealants and caulks at all windows for airtight performance. 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.

- 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 entry into the building.

- 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.

- 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 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 or further damage.

- Maintain downspouts and cap flashing - Slope perimeter grade away from building to maximize site drainage. 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	Model #	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Heating / Cooling	power vented gas-fired	Carrier 585TA155-20	Natural Gas/ Electric	Mechanical Room	Gero Park Recreation	2002	68%
Heating / Cooling	power vented gas-fired	Carrier 585TA155-20	Natural Gas/ Electric	Mechanical Room	Gero Park Recreation	2002	68%
Heating / Cooling	power vented gas-fired	Carrier, 58MCA100-16	Natural Gas/ Electric	Mechanical Room	Gero Park Recreation	1999	60%
Cooling	Condenser	561AJ036-E, serial 0295E08472	Electric	Rooftop	Gero Park Recreation	1995	0%
Cooling	Condenser	561CJ036-C, serial 2295E06270	Electric	Rooftop	Gero Park Recreation	1995	0%
Cooling	Condenser	38CKC048300, serial 3299E17945	Electric	Rooftop	Gero Park Recreation	1999	10%
Ventilation	exhaust fan for kitchen	Greenheck G-85-DGEX-QD	Electric	Rooftop	Gero Park Recreation	2002	20%
Ventilation	exhaust fan for bathrooms	Nutone	Electric	Rooftop	Gero Park Recreation	2002	20%
Domestic Hot Water	75 gal storage, 75MBH input, 70% est. eff.	Bradford White MIITW75T6CN10	Natural Gas	Tenant Mechanical Room	Gero Park Recreation	2000	15%
Domestic Hot Water	30 gal storage, 40kBtu input, 70% est. eff.	Rheemglas 22-30-1	Natural Gas	Mechanical Room	Gero Park Recreation	1995	0%
Lighting	See details - Appendix B	-	Electric	See details - Appendix B	Gero Park Recreation	-	-

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	Rear Porch	Ceiling Mounted	S	Inc	6	1	120	Sw	6	210	0	720	907	CFL	Ceiling Mounted	CFL	S	Sw	6	1	40	6	210	0	240	302	605	0	605
2	Ext	Side Porch	Ceiling Mounted	S	Inc	6	1	120	Sw	6	210	0	720	907	CFL	Ceiling Mounted	CFL	S	Sw	6	1	40	6	210	0	240	302	605	0	605
3	Ext	Exterior	Flood	S	Hal	4	2	120	MS	6	210	26	1,066	1,343	CFL	Flood	CFL	S	MS	4	2	40	6	210	0	320	403	939	0	939
4	Ext	Exterior	Flood	S	Hal	4	1	120	T	6	210	26	586	738	CFL	Flood	CFL	S	T	4	1	40	6	210	0	160	202	536	0	536
5	1	Hallway	Recessed Parabolic	S	CFL	3	2	42	Sw	4	210	0	252	212	N/A	Recessed Parabolic	CFL	S	Sw	3	2	42	4	210	0	252	212	0	0	0
6	1	Bathroom Men	Recessed Parabolic	S	CFL	4	2	42	Sw	4	210	0	336	282	N/A	Recessed Parabolic	CFL	S	Sw	4	2	42	4	210	0	336	282	0	0	0
7	1	Bathroom Women	Recessed Parabolic	S	CFL	4	2	42	Sw	4	210	0	336	282	N/A	Recessed Parabolic	CFL	S	Sw	4	2	42	4	210	0	336	282	0	0	0
8	1	Handicap Bathroom	Recessed Parabolic	S	CFL	2	2	42	Sw	2	210	0	168	71	N/A	Recessed Parabolic	CFL	S	Sw	2	2	42	2	210	0	168	71	0	0	0
9	1	Side Hallway	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Exit Sign	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
10	1	Rear Hallway	Recessed Parabolic	S	CFL	3	2	42	Sw	4	210	0	252	212	N/A	Recessed Parabolic	CFL	S	Sw	3	2	42	4	210	0	252	212	0	0	0
11	1	Rear Hallway	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Exit Sign	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
12	1	Boiler Rm	Ceiling Mounted	S	Inc	1	1	65	Sw	1	210	0	65	14	CFL	Ceiling Mounted	CFL	S	Sw	1	1	20	1	210	0	20	4	9	0	9
13	1	Front Hallway	Recessed	S	Inc	3	1	75	Sw	4	210	0	225	189	CFL	Recessed	CFL	S	Sw	3	1	25	4	210	0	75	63	126	0	126
14	1	Front Hallway	Flood	S	Inc	2	1	65	Sw	4	210	0	130	109	CFL	Flood	CFL	S	Sw	2	1	20	4	210	0	40	34	76	0	76
15	1	Storage Rm	Recessed Parabolic	M	4'T12	1	4	40	Sw	1	210	12	172	36	T8	Recessed Parabolic	4'T8	E	Sw	1	4	32	1	210	5	133	28	8	0	8
16	1	Storage Rm	Ceiling Mounted	S	Inc	2	1	60	Sw	1	210	0	120	25	CFL	Ceiling Mounted	CFL	S	Sw	2	1	20	1	210	0	40	8	17	0	17
17	1	Storage Rm	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
18	1	Meeting Rm Right	Flood	S	Inc	18	1	60	Sw	4	210	0	1,080	907	CFL	Flood	CFL	S	Sw	18	1	20	4	210	0	360	302	605	0	605
19	1	Meeting Rm Right	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Exit Sign	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
20	1	Meeting Rm Left	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Exit Sign	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
21	1	Meeting Rm Left	Flood	S	Inc	20	1	60	Sw	4	210	0	1,200	1,008	CFL	Flood	CFL	S	Sw	20	1	20	4	210	0	400	336	672	0	672
22	Ext	Front Door Exterior	Recessed	S	Inc	1	1	75	Sw	6	210	0	75	95	CFL	Recessed	CFL	S	Sw	1	1	25	6	210	0	25	32	63	0	63
23	Ext	Exterior	Spotlight	S	MH	1	1	150	T	6	210	42	192	242	PSMH	Spotlight	PSMH	S	T	1	1	100	6	210	20	120	151	91	0	91
24	Ext	Basketball Court	Spotlight	S	MH	2	2	150	T	9	210	42	684	1,293	PSMH	Spotlight	PSMH	S	T	2	2	100	9	210	20	440	832	461	0	461
25	Ext	Parking Lot	Pole Mounted	S	Inc	2	1	60	T	8	210	0	120	202	CFL	Pole Mounted	CFL	S	T	2	1	20	8	210	0	40	67	134	0	134
Totals:						98	35	1,575				151	8,548	9,506						98	35	797			48	4,047	4,559	4,947	0	4,947
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.

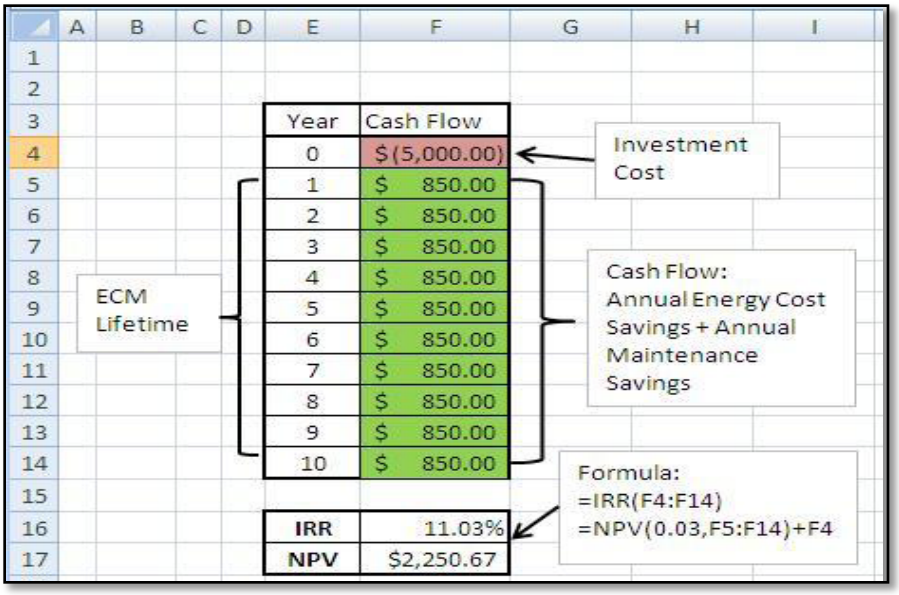
Calculation References

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 - Recreational Center

Building ID: 2244006
For 12-month Period Ending: January 31, 2010[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: June 14, 2010

Facility
Township of Millburn - Recreational Center
335 White Oak Ridge Road
Short Hills, NJ 07048

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1961
Gross Floor Area (ft²): 2,336

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

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	47,738
Natural Gas (kBtu)[4]	183,457
Total Energy (kBtu)	231,195

Energy Intensity[5]

Site (kBtu/ft²/yr)	99
Source (kBtu/ft²/yr)	150

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	N/A

Electric Distribution Utility
N/A

National Average Comparison

National Average Site EUI	104
National Average Source EUI	213
% Difference from National Average Source EUI	-29%
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 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

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 73 new CFL lamps	RS Means	730	0	730	3,643	5.3	0	5.3	323	1,055	5	5,276	0.7	6	1	1	4,075	6,523
2	Install 2 programmable thermostats	RS Means	260	0	260	322	0.0	180	8.2	0	286	10	2,861	0.9	10	1	1	2,156	2,561
3	Replace old refrigerator with ENERGY STAR® Model	Vendor	810	0	810	902	0.3	0	1.3	0	181	12	2,176	4.5	2	0	0	973	1,615
4	Install a roof-mounted 5 kW Solar PV system	Similar Projects	35,000	5,000	30,000	5,902	1.6	0	8.6	0	4,186	25	104,658	7.2	2	0	0	25,506	10,568
5	Replace domestic hot water heater with high efficiency unit	RS Means	1,108	50	1,058	0	0.0	46	2.0	30	87	10	866	12.2	0	0	0	-327	507
6	Install 3 new Pulse Start Metal Halide fixtures	RS Means	2,010	75	1,935	696	0.1	0	1.0	2	142	15	2,128	13.6	0	0	0	-265	1,246
7	Replace 2 rooftop condensors with 15.0 SEER units	RS Means	5,400	552	4,848	823	0.3	0	1.2	90	255	25	6,386	19.0	0	0	0	-498	1,474
8	Install 1 new T8 fluorescent fixture	RS Means	205	15	190	14	0.0	0	0.0	2	5	15	72	39.5	-1	0	0	-133	25
	TOTALS		**45,523**	**5,692**	**39,831**	**12,302**	**7.6**	**226**	**27.6**	**447**	**6,198**	-	**124,423**	**6.4**	-	-	-	**31,487**	**24,518**

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.