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

293 Route 18, Suite 330
East Brunswick, NJ 08816

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

August 20, 2010

Local Government Energy Program
Energy Audit Final Report

City of Elizabeth

Peterstown Community Center
408 Palmer Street
Elizabeth, NJ 07202

Project Number: LGEA57

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The City of Elizabeth Peterstown Community Center is a single-story building comprising a total conditioned floor area of 25,168 square feet. The original structure was constructed in 1993 and has not gone through any major addition/renovation project since. It houses offices, a studio, classrooms, a nutrition station, and common sitting areas. 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	270,508	13,250	64,953	90.0	2,248
Proposed	244,693	8,185	53,304	66.4	1,563
Savings	25,815	5,065	11,649	23.6	595
% Savings	10	38	18	26	26

*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	Electricity Generated, (kWh/year)	Demand Reduction (kW)	SRECs earned (SRECs/year)	Total Revenue ($/year)
92,000	18,400	21,861	18.4	21	14,365

*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 City of Elizabeth Peterstown Community Center to reduce annual utility costs, which are $6,965 higher, when compared to the average estimated NJ commercial utility rates.

SWA has also entered energy information about the Peterstown Community Center in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This Peterstown Community Center is comprised of non-eligible ("Other") space type and as a result of being a "other" 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 public assembly building that uses 102.0 kBtu/sqft-yr, the Peterstown Community Center uses 90.0 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 Table 1. The measures are categorized by payback period in Table 2 below:

Table 3: Energy Conservation Measure Recommendations

ECMs	First Year Savings ($)	Simple Payback Period (years)	Initial Investment, $	CO2 Savings, lbs/yr
0-5 Year	658	0.8	500	6,696
5-10 Year	5,113	6.9	35,237	46,600
>10 year	5,877	16.4	96,315	48,757
Solar PV	14,365	6.4	92,000	39,142
Total	25,646	5.9	274,002	124,569

SWA estimates that implementing the recommended ECMs is equivalent to removing approximately 10 cars from the roads each year or avoiding the need of 303 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 City of Elizabeth. Based on the requirements of the LGEA program, City of Elizabeth must commit to implementing some of these measures, and must submit paperwork to the Local Government Energy Audit program within one year of this report's approval to demonstrate that they have spent, net of other NJCEP incentives, at least 25% of the cost of the audit (per building). The minimum amount to be spent, net of other NJCEP incentives, is $1,302.50.

Financial Incentives and Other Program Opportunities

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

SWA recommends that the City of Elizabeth implement all recommended Energy Conservation Measures at the Peterstown Community Center. The building should first move forward with the building light upgrades. Lighting typically gives off an amount of heat that will have an effect on the heating and cooling operations of the building. Once lighting upgrades are in place, SWA recommends that the building replace the programmable thermostats for the entrance's baseboard. This should be followed by the installation of the high efficiency modulating furnaces, hot water outdoor air reset control, heating system and controls re-commissioning, and lastly the high efficiency split system condensing unit installation. SWA also recommends that the City install a 18.4 kW roof mounted solar photovoltaic system, so that they can take advantage of New Jersey's Solar Renewable Energy Certificates. The building would be eligible for the NJ Office of Clean Energy's SmartStart, and Direct Install programs. SWA recommends that the building apply to receive incentives from the Direct Install and SmartStart programs.

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.

For this project, PMK Group, Inc., a business unit of Birdsall Services Group (BSG-PMK), worked as a sub-contractor in conjunction with Steven Winter Associates, Inc. (SWA).

SWA and PMK Group, Inc. performed an energy audit and assessment for the Peterstown Community Center at 408 Palmer Street, Elizabeth, NJ. The process of the audit included facility visits on 3/17 and 3/18, 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 City of Elizabeth to make decisions regarding the implementation of the most appropriate and most cost-effective energy conservation measures for the Peterstown Community Center.

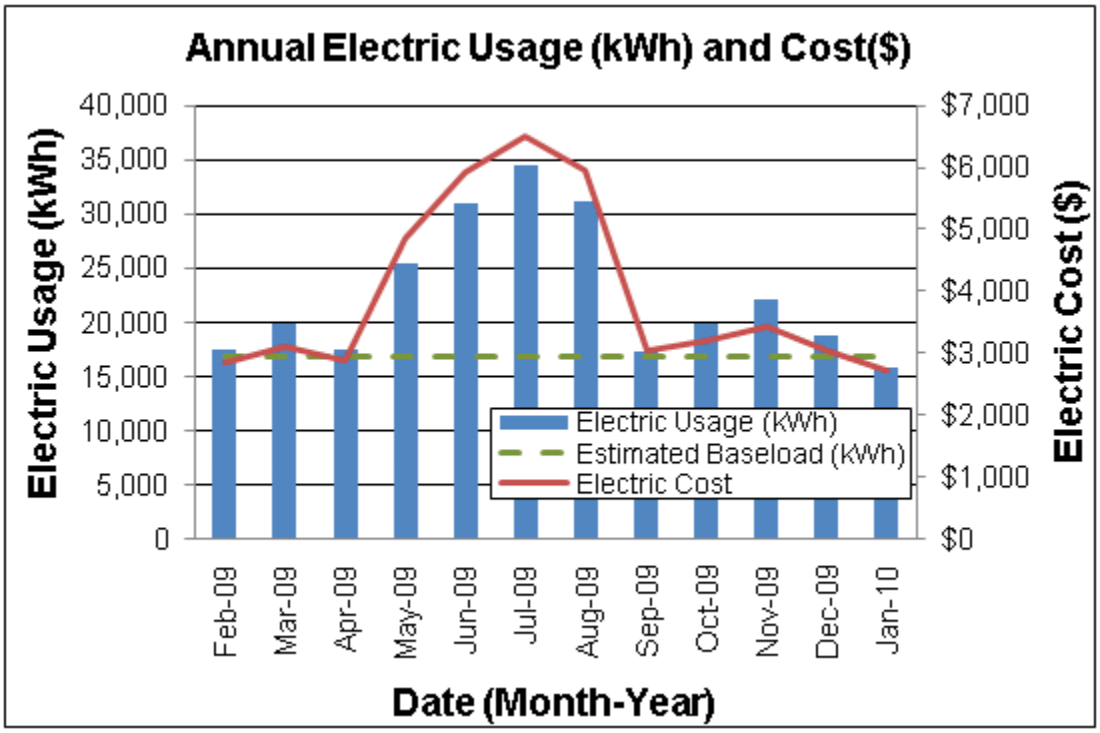
HISTORICAL ENERGY CONSUMPTION

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 Peterstown Community Center 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.

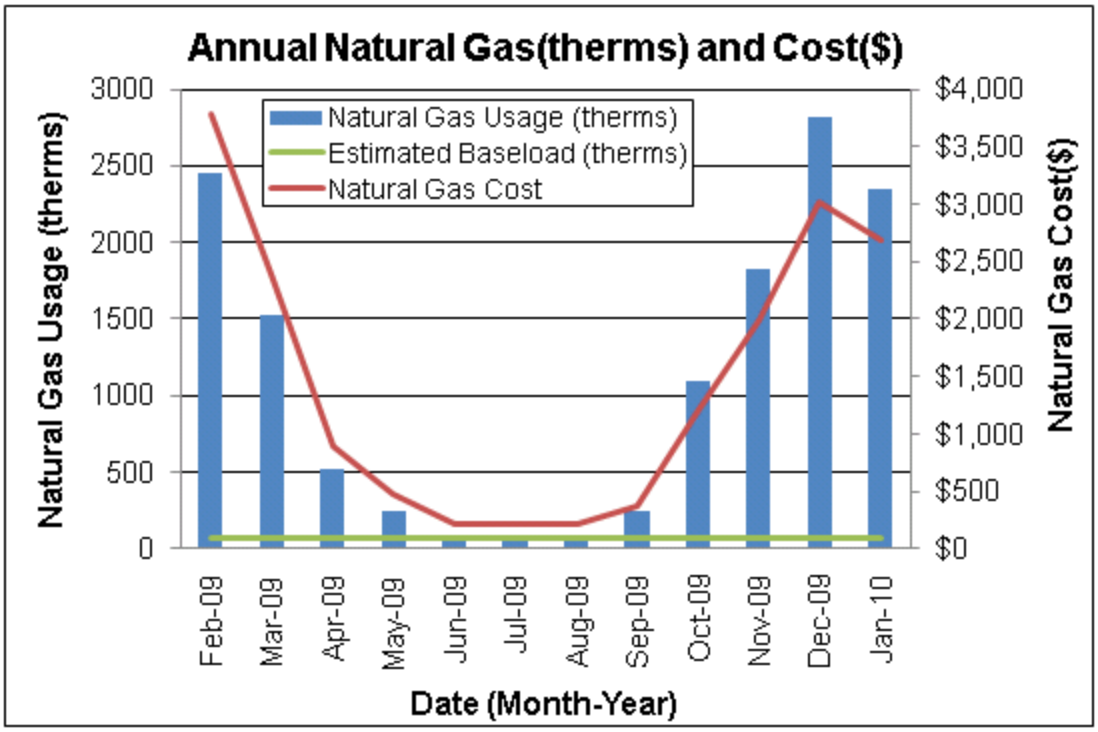
Electricity - The Peterstown Community Center is currently served by two electric meters. The Peterstown Community Center currently buys electricity from PSE&G at **an average aggregated rate of $0.176/kWh**. The Peterstown Community Center purchased **approximately 270,508 kWh, or $47,541 worth of electricity,** in the previous year. The average monthly demand was 65.1 kW and the annual peak demand was 81.0 kW.

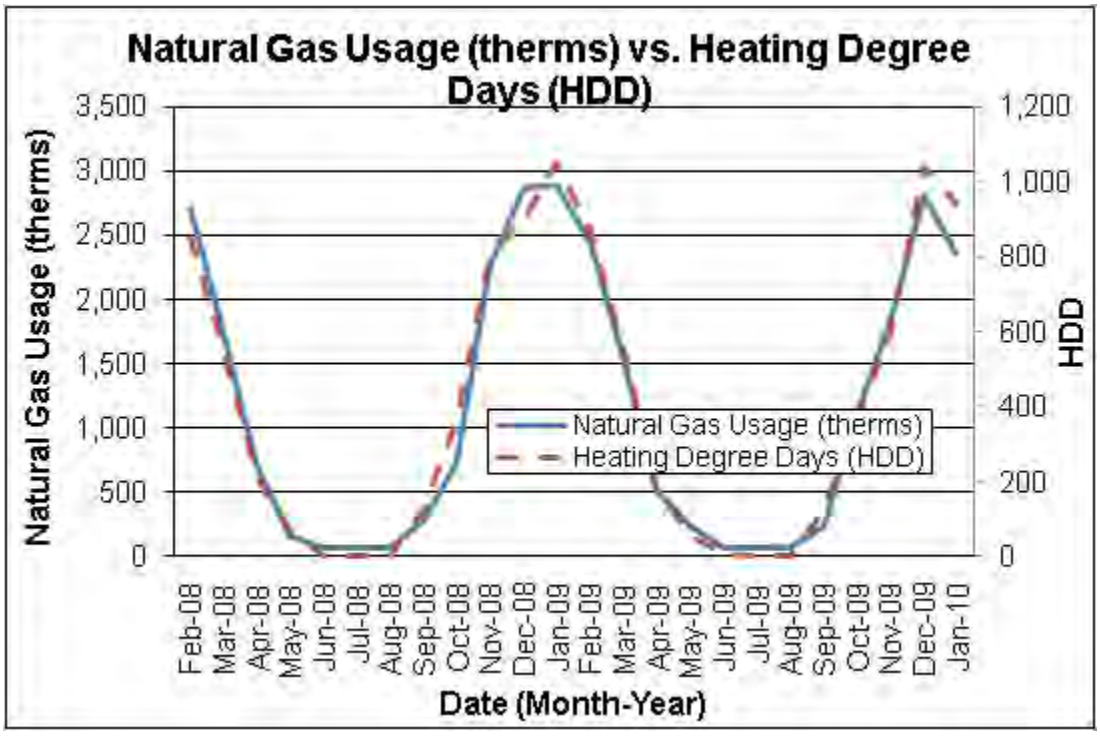
The chart below shows the monthly electric usage and costs. The dashed green line represents the approximate baseload or minimum electric usage required to operate the Peterstown Community Center.



Natural gas - The Peterstown Community Center is currently served by one meter for natural gas. The Peterstown Community Center currently buys natural gas from Elizabethtown Gas at **an average aggregated rate of $1.314/therm**. The Peterstown Community Center purchased **approximately 13,250 therms, or $17,412 worth of natural gas,** in the previous year.

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 Peterstown Community Center.

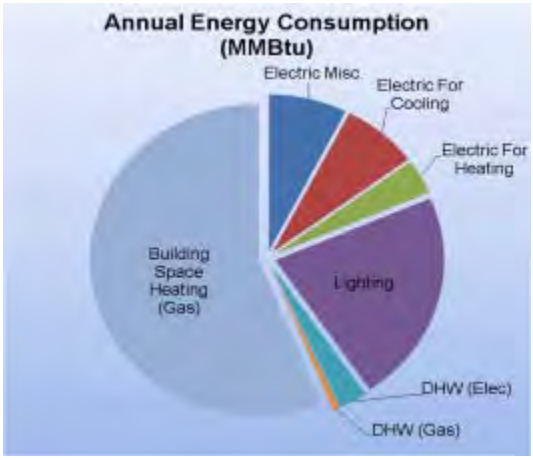


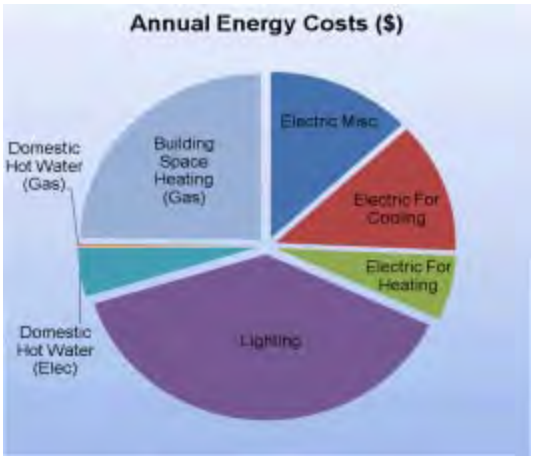


The chart above shows the monthly natural gas usage along with the heating degree days or HDD. Heating degree days is the difference of the average daily temperature and a base temperature, on a particular day. The heating degree days are zero for the days when the average temperature exceeds the base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

The following graphs, pie charts, and table show energy use for the Peterstown Community Center based on utility bills for the 12 month period. Note: electrical cost at $52/MMBtu of energy is almost 4 times as expensive as natural gas at $13/MMBtu

Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	$	% $	$/MMBtu
Electric Miscellaneous	160	8%	$8,237	13%	52
Electric For Cooling	157	7%	$8,079	13%	52
Electric For Heating	77	4%	$3,985	6%	52
Lighting	470	22%	$24,229	38%	52
Domestic Hot Water (Elec)	58	3%	$3,010	5%	52
Domestic Hot Water (Gas)	13	1%	$169	0%	13
Building Space Heating	1,196	56%	$15,721	25%	13
Totals	2,132	100%	$63,431	100%	
Total Electric Usage	923	41%	$47,541	73%	52
Total Gas Usage	1,325	59%	$17,412	27%	13
Totals	2,248	100%	$64,953	100%	



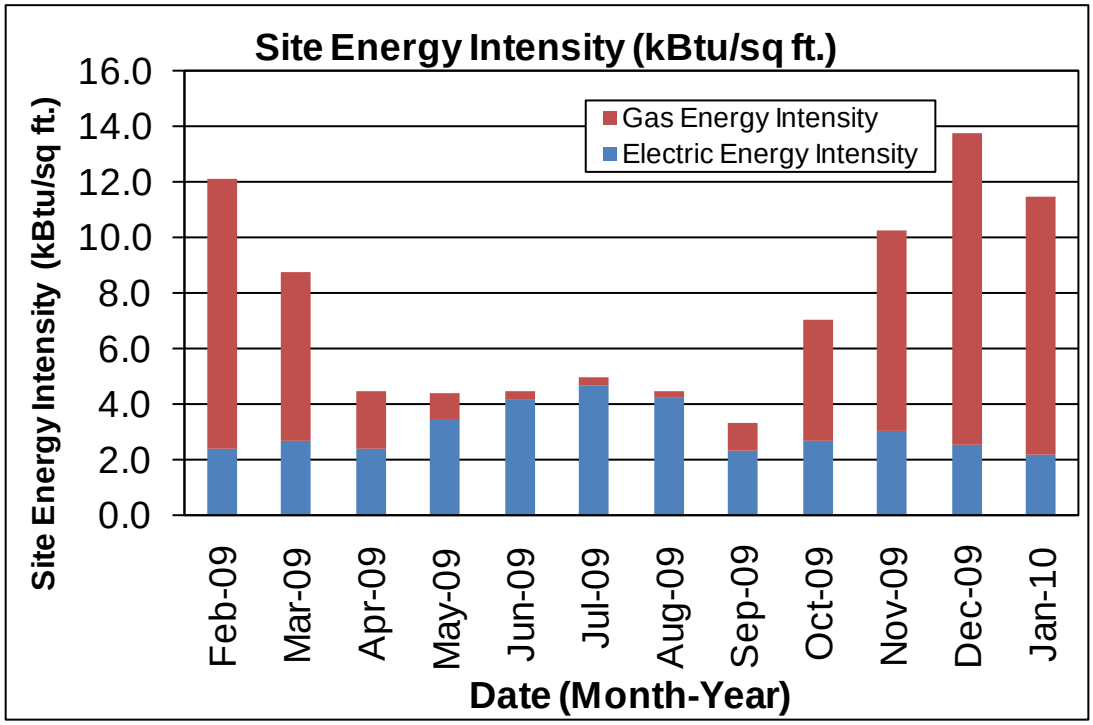


Energy benchmarking

SWA has also entered energy information about the Peterstown Community Center in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This Peterstown Community Center is comprised of non-eligible ("Other") space type and as a result of being a "other" 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 public assembly building that uses 102.0 kBtu/sqft-yr, the Peterstown Community Center uses 90.0 kBtu/sqft-yr. See ECM section for guidance on how to improve the building's rating.

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



Per the LGEA program requirements, SWA has assisted the City of Elizabeth to create an *ENERGY STAR® Portfolio Manager* account and share the Peterstown Community Center 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 City of Elizabeth (user name of "CityofElizabeth" with a password of *"CITYOFELIZABETH")* 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 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 rooftop unit with DX cooling.

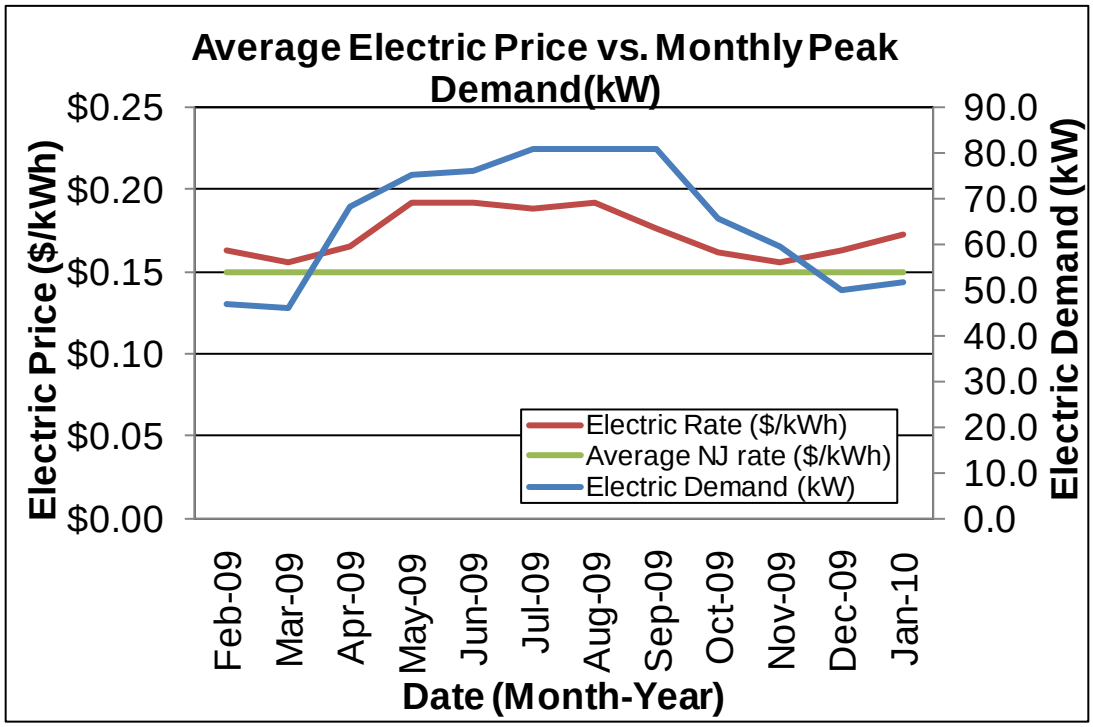
The supplier charges a market-rate price based on use, and the billing does not break down demand costs for all periods because usage and demand are included in the rate. Currently, the City of Elizabeth is paying a general service rate for natural gas. Demand is not broken out in the bill. Thus the 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. The general service rate for electric charges is market-rate based on usage and demand. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year.

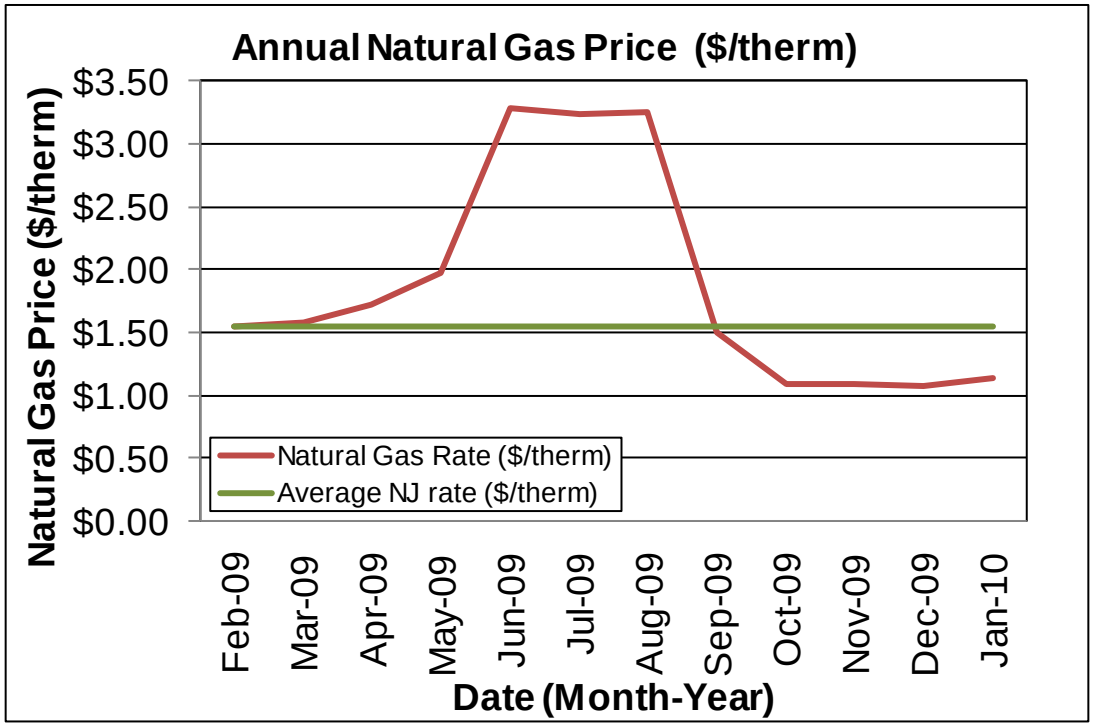
Energy Procurement strategies

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 Peterstown Community Center pays a rate of $0.176/kWh. The Peterstown Community Center annual electric utility costs are $6,964.94 higher, when compared to the average estimated NJ commercial utility rates. Electric bill analysis shows fluctuations up to 19% over the most recent 12 month period.



The average estimated NJ commercial utility rates for gas are $1.550/therm, while the Peterstown Community Center pays a rate of $1.314/therm. Natural gas bill analysis shows fluctuations up to 67% 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 Peterstown Community Center 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 Peterstown Community Center. Appendix C contains a complete list of third-party energy suppliers for the City of Elizabeth service area.

EXISTING FACILITY AND SYSTEMS DESCRIPTION

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

Based on visits from SWA on Tuesday, March 16, 2010 and Wednesday, March 17, 2010 the following data was collected and analyzed.

Building Characteristics

The single-story, (slab on grade), 25,168 square feet Peterstown Community Center Building was constructed in 1993 and has not gone through any major addition/renovation project since. It houses offices, a studio, classrooms, a nutrition station, and common sitting areas.


Front Façade


Rear Façade


Left Side Façade


Typical Court Yard View

Building Occupancy Profiles

The building is occupied by 30-70 people, Monday through Friday from 6:30 am until 10 pm.

Building Envelope

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

General Note: All findings and recommendations on the exterior envelope (base, walls, roofs, doors and windows) are based on the energy auditors' experience and expertise, on construction document reviews (if available) and on detailed visual analysis, as far as accessibility and weather conditions allowed at the time of the field audit.

Exterior Walls

The exterior wall envelope is mostly constructed of brick veneer with a concrete or split block base and some smooth-faced brick veneer accents, over a steel frame with 3-1/2 inches of fiberglass batt cavity insulation. The interior is mostly painted gypsum wallboard.

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 acceptable condition but with numerous signs of uncontrolled moisture, air-leakage and other energy-compromising issues mostly due to faulty original construction detailing.

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

Signs (mostly efflorescence) of uncontrolled roof water runoff on walls due to missing/defective roof flashing

Deteriorating interior and exterior wall finishes due to water/moisture presence inside the wall cavity

Roof

The building's roof is predominantly a combination type over a steel structure, with a mostly asphalt shingle and EPDM finish. It has never been replaced but patched and fixed in different areas. Six inches of fiberglass batt attic/ceiling insulation in some areas, and zero inches of detectable roof insulation were recorded.

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

Roofs, related flashing, gutters and downspouts were inspected during the field audit. They were reported to be in overall acceptable condition except in two areas where leaking was reported especially after heavy downpours.

The following specific roof problem spots were identified:

Signs of water damage on ceiling tiles due to significant roof leaks in two areas of the building.

Uneven, ineffective and inconsistent attic and roof insulation found

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

Windows

The building contains basically one type of window:

1. Fixed type windows with an insulated aluminum frame, clear double glazing and some interior and exterior shading devices. The windows are and are all original and have never been replaced.

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

Exterior doors

The building contains only one type of exterior door:

1. Glass with aluminum frame type exterior doors. They are located throughout the building and are original and have never been replaced.

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

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.

Mechanical Systems

Heating

Heating for the Peterstown Community Center is provided primarily by three (3) hot water boilers and four (4) forced-air furnaces, all of which are gas-fired. The three boilers, located in mechanical rooms 1, 3 and 4 are not original equipment and were replaced in early 2010. All are 110 MBH, 95.8% efficient Peerless units. Each boiler feeds perimeter and corridor baseboard sections via two (2) Taco hot water circulation pumps. The perimeter baseboard supply water temperature is controlled based on outdoor temperature reset control. At the time of the audit, Boiler HB-2 was not equipped with hot water outdoor air reset. The boilers and perimeter piping were found to be in good condition with no indications of leaks or malfunctions.

There are four Reznor duct furnaces located in mechanical lofts 1 through 4 that provide overhead heat and make up air to the building. Each of the four mechanical rooms provide heating to the East Corridor, South East Wing, South Wing (including the multi-purpose room), and West Wing, respectively. All are 250 MBH, 80% efficient Reznor units, three of which were installed in 1993 and the other installed in 2010. Each of the 4 zones is controlled by individual programmable thermostats. Individual room temperatures are controlled by adjustable space temperature sensors and above ceiling mounted bypass boxes. The furnaces were found to be in good working order with exception of unit #3 that was running full capacity and overheating the spaces that it serves.

Existing Peerless Boiler

The main entrance is heated by four (4) 7.5 kw, 3-foot electric baseboard sections each rated 0.25 kW/ft. Each section of baseboard has a manual dial that controls the space temperature. The baseboard operates 24 hours per day at the manually set temperature settings.

Five (5) Mitsubishi Mr. Slim split-system heat pumps serve the library and multi-purpose room with electric heat; however, the duct furnaces are the primary source of heat for the library and the Mr Slim electric heat is supplemental. Due to the fact that gas heat is less expensive than electric heat, the furnaces should be used as primary heat to the areas.

Cooling

Cooling is provided by four (4) air-cooled indoor self-contained air-conditioners and five (5) split-system heat pumps. The self-contained air-conditioners are located in mechanical lofts 1 through 4, along with the above noted Reznor furnaces, and provide cooling to the East Corridor, South East Wing, South Wing (including the multi-purpose room), and West Wing, respectively. These air-conditioners are Carrier units, all of which provide 12 tons of cooling and have Energy Efficiency Ratios (EERs) of 8.5. All units were installed in 2003 and are in good condition. Access to the condenser coil sections is limited for cleaning. The condenser sections need to be kept clean for optimum system efficiency. Each coil is located internally to the system in the loft space and condenser air is drawn through the units via an intake and exhaust duct system. At the time of our audit the coils were found to be reasonable clean, however, installation of a remote or roof top condenser would alleviate time consuming maintenance on the coils as well as improve operating performance.

Additionally there are five 3-ton, 10 SEER Mr. Slims, installed in 2001. Two of the units serve the multi-purpose room, and the other three units serve the library areas.

Typical Mr. Slim Heat Pump

Ventilation

Outside air is provided through the four (4) Carrier mezzanine units along with natural ventilation through the operable doors. Each mezzanine mechanical room has one exhaust fan that serves the men's and ladies restrooms located immediately below. There are two (2) Penn kitchen exhaust hoods used to capture food and cooking odor from the kitchen area. The hood is mounted directly over the gas ranges and hot trays. The hood is set up with one roof top exhaust fan and one make up air fan in an effort to keep the kitchen slightly negative. All ventilation systems were found to be manually operated and in good operating condition.

Domestic Hot Water

There are fourteen (14) water heaters in the building, thirteen (13) of which are electric. Hot water for the kitchen area is provided by a 74 gallon, 75 MBH AO Smith domestic water heater. All restroom sinks and individual hand sinks outside of the kitchen area are equipped with individual tankless, point-of-use electric water heaters (10 qty). There is one additional electric water heater located in each of (3) mechanical rooms. Mechanical room 1 houses a 6 gallon AO Smith electric water heater, Mechanical room 3, a 6 gallon American Water Heater electric unit, and a 10 gallon Rheem electric unit in Mechanical room 4. These three units are in series with the tankless, point-of-use units and are understood to be for back up use.

Electrical systems

Lighting

A complete inventory of all interior, exterior, and exit sign light fixtures were examined and documented in Appendix A of this report including an estimated total lighting power consumption. The lighting consists primarily of T12 fluorescent fixtures which should be retrofit with T8 lamps and electronic ballast. The most common fixture is a 2x2 recessed

fixture with a parabolic lens, T12 u-tube lamps and magnetic ballast. There were also many compact fluorescent fixtures. For this building, there are certain areas where lights typically remain lit when unoccupied for long periods of time with no occupancy control. A detailed list of the recommended upgrades is provided in Appendix A.

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. When compared to the average electrical consumption of older equipment, Energy Star equipment results in a large savings. Building management should select Energy Star label appliances and equipment when replacing: 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. The building is currently equipped with energy vending miser devices for conserving energy usage by Drinks and Snacks vending machines. When equipped with the vending miser devices, vending machines use less energy and are comparable in daily energy performance to new ENERGY STAR qualified machines.

In this facility, there are ten (10) computers, two (2) copy/fax machines, four (4) refrigerators, a freezer, a microwave, a dishwasher, and a gas stove. With the exception of the professional kitchen equipment, all were found to be replaced recently and with acceptable EER ratings. One Quasar unit is indicated in the equipment list as needing to be replaced.

Elevators

The Peterstown Community Center does not have an installed elevator.

Other electrical systems

There are not currently any other significant energy-impacting electrical systems installed at the Peterstown Community Center.

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

As a result of our study, the roof of the Peterstown Community Center building has been identified as conducive for the application of a Photovoltaic (PV) system.

Based on the goal of generating as much of the building's electric load as possible utilizing renewable energy while meeting the limitations of usable space available, a PV system with a design capacity of 18.4 kW was selected. The total annual generating capacity of the system is 21,861 kWh as estimated using PV WATTS calculator provided by the Department of Energy (DOE), National Renewable Energy Laboratory (NREL).

This proposed PV system would include 80 flat, crystalline PV modules installed on the roof. The system is based on commonly used 230 Watt PV modules, and one (1) inverter for conversion to AC power.

The proposed system would generate approximately 8 percent of the electric power consumed annually by the Community Center building. It is noted this system would supplement the utility power supply since PV electricity production is based on weather and the system size is limited to 8 percent. The estimated cost of construction would be approximately $110,400 for this system. There would be an applicable upfront incentive through the Renewable Energy Incentive Program; this rebate could be up to $18,400. The approximate annual savings would be $14,365, which would make the approximate payback 6.5 years

If the Client is interested in moving forward, a structural analysis of the roofs must be performed to confirm they will support the addition of PV modules.

Solar Thermal Collectors

Solar thermal collectors are not recommended due to the low amount of domestic hot water use throughout the building.

Wind

Wind power production is not appropriate for this location because required land is not available for the wind turbine. Also, the available wind energy resource is very low.

Geothermal

Geothermal is not applicable to this project because it would require modifications to the existing heat distribution system, which would not be cost effective.

Combined Heat and Power

Combined Heat Power is not applicable to this project because of the HVAC system type and limited domestic hot water usage.

PROPOSED ENERGY CONSERVATION MEASURES

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

Recommendations: Energy Conservation Measures

ECM#	Description of Highly Recommended 0-5 Year Payback ECMs
1	Programmable thermostat for Entrance's baseboards
	Description of Recommended 5-10 Year Payback ECMs
2	Lighting Upgrades
3	18.4 kW Roof-mounted PV system
4	Re-commissioning of heating system and controls
5	Hot Water Outdoor Air Reset Control
	Description of Recommended >10 Year Payback ECMs
6	Lighting Occupancy Sensors
7	High-efficiency modulating furnaces
8	High-efficiency Split-System Condensing units and AHUs

ECM#1: *Programmable thermostat for Entrance's baseboards*

The four (4) electric baseboard sections in the main entry are each rated at 0.75 kW. The heating level is controlled manually by individual dials on each baseboard, and the heating is not shut off or reduced when the building is not in use. It is recommended that a setback thermostat be installed by an electrician, which would shut off the baseboards automatically when the facility is not in use, and save energy by not causing excess heating to be used when the building is unoccupied.

Installation cost:

Estimated installed cost: $500 (Includes $100 in labor costs)
Source of cost estimate: Similar projects

ECM	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	500	3,740	0.9	0	0.5	0	658	10	6,582	0.8	1216%	122%	132%	5,058	6,696

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. In the heating season, October through April, there are 4,871 hours when the outside air temperature is 65°F; due to the fact that the baseboards are never shut off, this was assumed to be the number of hours per year the system currently operates. The facility is occupied 82 hours per week; with the programmable thermostat, the baseboards can be shut off for the remaining 86 hours of the week, decreasing the time the units operate by 51%. It was estimated that the four baseboards, which each have a heating capacity of 0.75 kW, are only operating at 50% of their maximum capacity.

Rebates/financial incentives:

- *None*

Please see Appendix F for more information on Incentive Programs.

ECM#2: *Lighting Upgrades*

Lighting at the Peterstown Community Center primarily consists of standard-efficiency fixtures with T12 lamps and magnetic ballasts. There are also many compact fluorescent fixtures and a few incandescent. SWA/BSG-PMK recommends retrofitting the T12 fixtures with T8 lamps and electronic ballasts and the incandescent fixtures with compact fluorescent lamps. Lighting replacements typically yield a short payback and should because of the low cost to upgrade combined favorable energy savings.

Installation cost:

Estimated installed cost: $500 (Includes $100 in labor costs)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM	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	13,237	12,599	3.0	0	1.7	30	2,247	15	33,711	5.9	155%	10%	15%	13,209	22,559

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

Please see Appendix F for more information on Incentive Programs.

ECM#3: *18.4 kW Roof-mounted PV system*

Currently, Peterstown Community Center 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/BSG-PMK presents below the economics of installing a 18.4-kW PV system to offset electrical demand for the building and reduce the annual net electric consumption for the building. A system of 80 commercial multi-crystalline 230 watt panels would generate 21,861 kWh of electricity per year, or 8% of Peterstown Community Center's annual electric consumption.

Installation cost:

Estimated installed cost: $110,400; (Includes $27,600 in labor)
Source of cost estimate: Similar Projects

ECM	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	92,000	21,861	5.3	0	3.0	0	14,365	25	359,113	6.4	290%	12%	14%	97,283	39,142

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 – Renewable Energy Incentive Program (REIP) ($1/Watt installed)*

This ECM is eligible for New Jersey's Solar Renewable Energy Certificates (SREC). SRECs are marketable certificates issued to the owner of a PV system for each 1,000 kWh (1MWh) of electricity generated. SRECs are sold or traded separately from the power generated; the income from the sale

of the SREC can be used to offset the cost of the system by applying the revenue to a loan payment or debt service. The value of the SREC is market driven, and is controlled by the amount of the Solar Alternative Compliance Payment (SACP) which is set by the NJBPU. The SREC market is derived from New Jersey's Renewable Portfolio Standard (RPS), which requires that all licensed energy suppliers in the state invest in energy generated from renewable sources, with specific requirements for solar power. If a supplier does not invest by purchasing SRECs, the supplier must pay the SACP for a percentage of the total annual power produced. Since SRECs typically trade just below the SACP, there is an incentive for the supplier to buy SRECs. The SREC Program provides a market for SRECs to be created and verified on the owner's behalf. The New Jersey Clean Energy program facilitates the sale of SRECs to New Jersey electric suppliers. PV system owners in New Jersey with a grid-connected PV system are eligible to participate in New Jersey's SREC Program.

The NJBPU has stated its intention to continue to operate a program of rebates and SRECs, On September 12, 2007, the NJBPU approved an SREC only pilot incentive program. The program set the SACP at an initial value of $711, decreasing annually for an eight (8) year period. SRECs would be generated for fifteen (15) years (referred to as the Qualification Life), and have a two (2) year trading life. The NJBPU believes that to achieve an internal rate of return of twelve (12) percent, the target SREC price would be $611, reducing by three (3) percent per year for the same eight (8) year period that the SACP is set.

Please see Appendix F for more information on Incentive Programs.

ECM#4: *Re-commissioning of heating system and controls*

Peterstown Community Center is heated by four 250-MBH gas-fired duct furnaces, located in four mechanical lofts, and three gas-fired hot water boilers, located in three mechanical rooms. Re-commissioning the heating system, which includes the furnaces, boilers, ductwork, bypass boxes, baseboards, pumps, and controls, would decrease the amount of excess heat consumed by correcting any temperature imbalances in the system and ensure that the controls are setting the temperature back properly, therefore saving approximately 15% in energy costs.

Installation cost:

Estimated installed cost: $20,000 (Includes $8,140 in labor costs)
Source of cost estimate: Similar Projects

ECM	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	20,000	0	0.0	1,988	7.9	0	2,612	10	26,122	7.7	31%	3%	5%	2,057	21,914

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. Also, taken from the energy bills was the number of heating degree-days for one year, 5,065. Due to the fact that the building only operates 82 out of a possible 168 hours every week, only $\frac{82}{168}$ of the heating degree days were used for these calculations. Per ASHREA the outdoor drybulb temperature is above 10°F 99.6% percent of a year. The desired indoor temperature was estimated to be 68°F. The current furnaces are 80% efficient. The heating consumption by the furnaces was calculated using the following equation:

$$\frac{\text{Capacity}\times\text{Degree-Days}\times 24}{\text{Efficiency}_{current}\times(\text{Temp.}_{indoor}-\text{Temp.}_{99.6\%})}\times\frac{1\text{ therm}}{100{,}000.4\text{ BTU}}\times\frac{(\text{Weekly Operating Hours})}{24\times 7}=\text{Current Gas Input (therms)}$$

Re-commissioning the system would reduce the energy consumption of the furnaces by approximately 15%.

Rebates/financial incentives:

- *None*

Please see Appendix F for more information on Incentive Programs.

ECM#5: *Hot Water Outdoor Air Reset Control*

Heating is provided to the perimeter and hallway baseboard fin tube of the Peterstown Community Center by three gas-fired hot water boilers, located in three mechanical rooms. Two boilers, HB-1 and HB-3, are equipped with hot water outdoor air reset control (OAR), and the third boiler, HB-2, was not equipped with an OAR controller at the time of the audit. Without OAR the boiler will provide hot water to the baseboard at a constant temperature of approximately 180°F. This can cause the boiler to overwork and to provide and excessively high temperature to the space it was designed to heat wasting energy and increasing gas bills. Outdoor air reset controllers reduce the maximum boiler water temperature depending on the outside air temperature; for instance, if the outside air temperature is 0°F, the boiler temperature will be 180°F, but if the outside air temperature is 40°F, the boiler temperature will only need to be 130°F.

Installation cost:

Estimated installed cost: $2,000 (Includes $660 in labor costs)
Source of cost estimate: Similar Projects

ECM	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	2,000	0	0.0	193	0.8	0	254	10	2,536	7.9	27%	3%	5%	141	2,127

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. Also, taken from the energy bills was the number of heating degree-days for one year, 5,065. Per ASHREA the outdoor dry bulb temperature is above 10°F 99.6% percent of a year. The desired indoor temperature was estimated to be 68°F. The heating consumption by the boiler was calculated using the following equation:

$$\frac{\text{Capacity}\times\text{Degree-Days}\times 24}{\text{Efficiency}_{current}\times(\text{Temp.}_{indoor}-\text{Temp.}_{99.6\%})}\times\frac{1\text{ therm}}{100{,}000.4\text{ BTU}}=\text{Current Gas Input (therms)}$$

Outside air reset controllers typically save between 8% and 15% of the annual heating consumption; to be conservative, the lower end of this range, 8%, was be used.

Rebates/financial incentives:

- *None*

Please see Appendix F for more information on Incentive Programs.

ECM#6: *Lighting Occupancy Sensors*

Lighting at the Peterstown Community Center primarily consists of standard-efficiency fixtures with T12 lamps and magnetic ballasts. There were 3 private office areas identified that contain lighting that is left on for long periods of time with no occupancy. SWA/BSG-PMK recommends that occupancy sensors are installed in these areas in order to limit the time that lights are left on unnecessarily.

Installation cost:

Estimated installed cost: $720 (Includes $90 in labor costs)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM	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	720	387	0.1	0	0.1	0	68	10	681	10.6	-5%	-1%	-1%	-145	693

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 – Wall-mounted occupancy sensors ($20 per sensor)*

Please see Appendix F for more information on Incentive Programs.

ECM#7: *High-efficiency modulating furnaces*

The East Corridor, South East Wing, South Wing (including the multi-purpose room), and West Wing are heated by four 250-MBH, gas-fired duct furnaces, located in four mechanical lofts. The furnace in mechanical loft #3, which heats the South Wing, has recently been replaced; the other three units are near the end of their 18-year useful life, and should be replaced. Higher-efficiency modulating furnaces are now available, which are up to 95% efficient. The current units were 80% efficient at the time of their purchase, but due to their age and condition, their efficiency was estimated to decrease by 10%, to 70%.

Installation cost:

Estimated installed cost: $55,800 (Includes $15,960 in labor costs)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM	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	55,800	0	0.0	2,884	11.5	270	4,060	15	60,894	13.7	9%	1%	1%	-8,031	31,790

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. Also, taken from the energy bills was the number of heating degree-days for one year, 5,065. Due to the fact that the Peterstown Community Center only operates 82 out of a possible 168 hours every week, only $\frac{82}{168}$ of the heating degree days were used for these calculations. Per ASHREA the outdoor dry bulb temperature is above 10°F 99.6% percent of a year, and the desired indoor temperature was estimated to be 68°F. The savings were calculated using the following equations:

$$\frac{\text{Capacity}\times\text{Degree-Days}\times 24}{\text{Efficiency}_{current}\times(\text{Temp.}_{indoor}-\text{Temp.}_{99.6\%})}\times\frac{1\text{ therm}}{100{,}000.4\text{ BTU}}\times\frac{(\text{Weekly Operating Hours})}{24\times 7}=\text{Current Gas Input (therms)}$$

$$\text{Gas Output (therms)}=\text{Current Gas Input}\times\text{Efficiency}_{current}$$

$$\text{Proposed Gas Input (therms)}=\frac{\text{Gas Output}}{\text{Efficiency}_{proposed}}$$

$$\text{Savings (therms)}=\text{Current Gas Input}-\text{Proposed Gas Input}$$

Rebates/financial incentives:

- *NJ Clean Energy – SmartStart – Gas-fired furnaces ($300-$400 per unit)*

Please see Appendix F for more information on Incentive Programs.

ECM#8: *High-efficiency Split-System Condensing units and AHUs*

The multi-purpose room and the library are cooled by five (5) 3-ton Mitsubishi Mr. Slim split-system heat pumps, which serve five (5) wall-mounted evaporators. The units are nearing the end of its useful life, and more energy-efficient models are now available. These units, along with their corresponding evaporators, should be replaced with more energy-efficient split-system air-conditioners, rather than heat pumps. The current units each provide 38 MBH of electric heat, which is not needed, as the furnaces already provide ample heating. Additionally, the heat provided by the furnaces, which is fueled by natural gas, is more cost-effective than the electric heat provided by the Mr. Slims. Newer Mr. Slim models now use Puron refrigerant, a more efficient fluid than the current R-22 refrigerant. This yields a higher Seasonal Energy Efficiency Ratio (SEER). The newer Mr. Slims have a SEER of 15.1; the SEER of the current units were 10 at the time of its purchase, but based on its age and condition, it can be estimated that the SEER has decreased by 5%, to 9.5.

Installation cost:

Estimated installed cost: $39,795 (Includes $11,700 in labor costs)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM	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	39,795	9,089	2.2	0	1.2	150	1,750	15	26,245	22.7	-34%	-2%	-5%	-19,207	16,274

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SEER values, as stated above, are 9.5 for the existing units and 15.1 for the proposed ones. A number of 1,024 cooling degree-days and a 0.4% dry-bulb temperature of 93°F were used for calculations; this data was provided by the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE). The desired indoor temperature during the cooling season was assumed to be 74°F.

The following equation, the degree-day equation for cooling systems, was used to calculate the electric consumptions of the current and proposed air-conditioners:

$$\frac{\text{Capacity}\times\text{Degree-Days}\times 24\ \frac{\text{hours}}{\text{day}}}{1{,}000\times\text{SEER}\times\left(\text{Temp.}_{0.4\%}-\text{Temp.}_{\text{indoor}}\right)}=\text{Electric Consumption (in kWh)}$$

Rebates/financial incentives:

- *NJ Clean Energy – SmartStart – Unitary and Split AC systems ($90 per unit)*

Please see Appendix F for more information on Incentive Program

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 Peterstown Community Center:

- Roof Insulation – Replace all uneven and ineffective insulation with new (R-30) minimum insulation.

- Repair Wall Finishes – Repair deteriorating interior and exterior wall finishes due to water/moisture presence inside the wall cavity. Properly seal to prevent future occurrence of efflorescence.

- Purchase Energy Star appliances – Appliances at the Peterstown Community Center were surveyed and observed to not be Energy Star rated appliances. All of the appliances were observed to be in good condition and would not be cost-effective to replace at this time. SWA recommends that the building considers purchasing the most energy-efficient equipment when existing equipment fails, 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.

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.

- Maintain roofs - SWA recommends regular maintenance to verify water is draining correctly. Coordinate location of roof leaks with instances of ceiling tile damage.

- Maintain downspouts and cap flashing - Repair/install missing downspouts and cap flashing as needed to prevent water/moisture infiltration and insulation damage.

- 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.

- Category II Recommendation-Repair and Maintenance: The four (4) Carrier condenser sections need to be kept clean for optimum system efficiency. Each coil is located internally to the system in the loft space and condenser air is drawn through the units via an intake and exhaust duct system. At the time of our audit the coils were found to be reasonable clean however

installation of a remote or roof top condenser would alleviate time consuming maintenance on the coils as well as improve operating performance.

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

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

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

Note: The recommended ECMs and the list above are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for the City of Elizabeth. Based on the requirements of the LGEA program, the City of Elizabeth must commit to implementing some of these measures, and must submit paperwork to the Local Government Energy Audit program within one year of this report's approval to demonstrate that they have spent, net of other NJCEP incentives, at least 25% of the cost of the audit (per building). The minimum amount to be spent, net of other NJCEP incentives, is $1,302.50.

APPENDIX A: EQUIPMENT LIST

Peterstown Community Center Equipment List							
Building System	Description	Locations	Model #	Fuel	Space Served	Year Installed	Estimated. Remaining Useful Life %
Heating	HB-1: Boiler w/ outdoor air reset, 110 MBH, 95.8% efficient	Mechanical room #1	Peerless, M# PF-110-N-REV 1, S# 00145625-200906	Natural gas	East Area Hallway baseboard	2010	100%
	Hot water circulation pump, 1/2 HP, 1,750 RPM 18 gpm		Taco, M# 12-92 133A3N2 5.65	Electricity			
	Hot water circulation pump, 1/2 HP, 1,750 RPM 18 gpm		Taco, M# 12-92 133A3N2 5.65	Electricity			
Heating	HB-2: Boiler w/o outdoor air reset, 110 MBH, 95.8% efficient	Mechanical room #3	Peerless, M# PF-110-N-REV 1, S# 00145631-200906	Natural gas	South Area Hallway baseboard	2010	100%
	Hot water circulation pump, 1/2 HP, 1,750 RPM 18 gpm		Taco, M# 12-92 133A3N2 5.65	Electricity			
	Hot water circulation pump, 1/2 HP, 1,750 RPM 18 gpm		Taco, M# 12-92 133A3N2 5.65	Electricity			
Heating	HB-3: Boiler w/ outdoor air reset, 110 MBH, 95.6% efficient	Mechanical room #2	Peerless, M# PF-110-N-REV 1; S# 00145824-200906	Natural gas	West Perimeter H.W. Baseboard	2010	100%
	Hot water circulation pump 18 gpm		Taco, M# 12-92 133A3N2 5.65	Electricity			
	Hot water circulation pump 18 gpm		Taco, M# 12-92 133A3N2 5.65				
Heating	(4) 3' electric baseboards, 0.75 kW	Front entrance	Marley Electric Heating, M# C2503WB	Electricity	Front entrance	1993	20%

Heating	250 MBH duct furnace, 80% efficient	Mechanical loft #1	Reznor, M# EEDU250-6, S# BAI66Q2N20402	Natural gas	East Corridor	2001	50%
Cooling	Air-cooled indoor self-contained air conditioner, 12 tons, 8.5 EER	Mechanical loft #1	Carrier, M# 50BYN01452, S# 1003B67495	Electricity		2003	53%
Heating	250 MBH duct furnace, 80% efficient	Mechanical loft #4	Reznor, M# EEDU250-6, S# BAA66Q2N01825	Natural gas	West Wing	2001	50%
Cooling	Air-cooled indoor self-contained air conditioner, 12 tons, 8.5 EER	Mechanical loft #4	Carrier, M# 50BYN01452, S# 0403B65840	Electricity		2003	53%
Heating	250 MBH duct furnace, 80% efficient	Mechanical loft #3	Reznor, M# EEDU250-6, S# BJA94Q2N00324	Natural gas	South Wing including all purpose rm	2010	100%
Cooling	Air-cooled indoor self-contained air conditioner, 12 tons, 8.5 EER	Mechanical loft #3	Carrier, M# 50BYN01452, S# 1503B68835	Electricity		2003	53%
Heating	250 MBH duct furnace, 80% efficient	Mechanical loft #2	Reznor, M# EEDU250-3, S# ASC66J7N10998	Natural gas	South East wing	1993	6%
Cooling	Air-cooled indoor self-contained air conditioner, 12 tons, 8.5 EER	Mechanical loft #2	Carrier, M# 50BYN01452, S# 1503B68834	Electricity		2003	53%
Cooling	Split-system heat pump, 3 tons cooling, 10 SEER; 38 MBH electric heating, COP of 1	Roof	Mitsubishi, M# PUH36EK, S# 11E00106B	Electricity	Library Reading Rm.	2001	40%
	Split-system air-handler	Wall-mounted	Mitsubishi, M# PKH36FL	Electricity			
Cooling	Split-system heat pump, 3 tons cooling, 10 SEER; 38 MBH electric heating, COP of 1	Roof	Mitsubishi, M# PUH36EK / S #11E00008B	Electricity	Library office	2001	40%
	Split-system air-handler	Wall-mounted	Mitsubishi, M# PKH36FL	Electricity			

Cooling	Split-system heat pump, 3 tons cooling, 10 SEER; 38 MBH electric heating, COP of 1	Roof	Mitsubishi, M# PUH36EK / S #11E00005B	Electricity	Library (north)	2001	40%
	Split-system air-handler	Wall-mounted	Mitsubishi, M# PKH36FL	Electricity			
Cooling	Split-system heat pump, 3 tons cooling, 10 SEER; 38 MBH electric heating, COP of 1	Roof	Mitsubishi, M# PUH36EK, S# 11E00112B	Electricity	Multi-purpose room	2001	40%
	Split-system air-handler	Wall-mounted	Mitsubishi, M# PKH36FL	Electricity			
Cooling	Split-system heat pump, 3 tons cooling, 10 SEER; 38 MBH electric heating, COP of 1	Roof	Mitsubishi, M# PUH36EK, S# 11E00111B	Electricity	Multi-purpose room	2001	40%
	Split-system air-handler	Wall-mounted	Mitsubishi, M# PKH36FL	Electricity			
Ventilation	EF-1-4: Exhaust fan 250 cfm	Mechanical loft #1-4	Penn # Z-101	Electricity	Men's/ Women's rooms	1993	25%
Ventilation	Kitchen Hood SF-1-300 cfm	Roof	Penn QX-12	Electricity	Gas Range / Hot trays	1993	25%
Ventilation	Kitchen Hood KH-2- 2800 cfm	Roof	Penn QX-16			1993	25%
Ventilation	EF-3: Exhaust fan	Mechanical loft #3	No nameplate	Electricity	Men's/ Women's rooms	1993	25%
DHW	Electric water heater, 6 gallons, 1.65 kW	Mechanical room #1	AO Smith, M# EJC 6 200, S# L07J200196	Electricity	Restroom sinks	2007	77%
DHW	Water heater, 74 gallons, 75.1 MBH, 72.82 gal/hr recovery	Mechanical room #4	AO Smith, M# FCG 75 270, S# A06A123786	Natural gas	Kitchen, dishwasher	2006	69%
DHW	Water heater, 6 gallons, 1.5 kW	Mechanical room #3	American Water Heater, M# E61-6U-015SV, S# 0706514990	Electricity	Restroom sinks	2007	77%

DHW	Water heater, 10 gallons, 2 kW	Mechanical room #2	Rheem, M# 81VP10S, S# RH 0603218616	Electricity	Restroom sinks	2003	46%
DHW	(10) tankless water heaters, 3.5 kW, 240°F rise at 1 GPM	Restrooms	Eemax, M# SP 3512	Electricity	10 sinks throughout the building	1993	50%
Appliances	Refrigerator	Health Department	Hot Point (no access)	Electricity	Health Department	-	75%
Appliances	Refrigerator	Health Department	Woods (no access)	Electricity	Health Department	-	75%
Appliances	Freezer	Kitchen	Frigidaire, M# FFU2065FW1, S# EB64146491	Electricity	Kitchen	2006	79%
Appliances	Refrigerator	Kitchen	Beverage-Air, M# 5UR48-12	Electricity	Kitchen	-	50%
Appliances	Microwave	Kitchen	Quasar, M# MQ6634XW, S# AW506500728	Electricity	Kitchen	1985	0%
Appliances	Refrigerator	Kitchen	Frigidaire, M# PLRU1778ES4, S# WA82401508	Electricity	Kitchen	2008	89%
Appliances	Dishwasher	Kitchen	Jackson, M# JP-24B, JP-24BF, S# 4596M	Electricity	Kitchen	1996	10%
Appliances	Stove, (6) burners, (2) ovens, (1) griddle	Kitchen	Vulcan, M# 260L, S# 481004325EP	Natural gas	Kitchen	1993	25%

Note: The remaining useful life of a system (in %) is the relationship between the system manufactured and/or installed date and the standard life expectancy of similar equipment based on ASHRAE (2003), ASHRAE Handbook: HVAC Applications, Chapter 36.

LIGHTING ANALYSIS

Elizabeth Township
Peterstown Community Center
408 Palmer Street

BIRDSALL SERVICES GROUP
ENGINEERS & CONSULTANTS

Upgrade Code	Upgrade Description	Existing Fixture	Existing Watts	Proposed Fixture	Proposed Watts	Lighting Total # of Upgrades	Lighting Cost per Upgrade ($)	Lighting SmartStart Rebate per Upgrade
1	400W Metal Halide Pole Mounted Fixture in Aluminum Casing w/ Clear Lense.	400W MH/BALLAST	445	No Upgrade	445	4	$0.00	$0.00
2	400W Metal Halide Wall Mounted Fixture in Aluminum Casing w/ Clear Lense.	400W MH/BALLAST	445	No Upgrade	445	4	$0.00	$0.00
3	Recessed Fixture with a 28W Compact Fluorescent Lamp	F28W/2D/835	28	No Upgrade	28	35	$0.00	$0.00
4	400W Metal Halide Wall Mounted Fixture	400W MH/BALLAST	445	No Upgrade	445	4	$0.00	$0.00
5	70W Metal Halide Wall Mounted Fixture	70W MH/BALLAST	95	No Upgrade	95	30	$0.00	$0.00
6	Fixture with a 60W Incandescent Lamp / Retrofit with a 15W Compact Fluorescent	60W INCANDESCENT	60	15W CF/SI	15	1	$6.00	$0.00
7	Recessed Fixture with (2)35W T12 Fluorescent U-Tube Lamps and a magnetic Ballast / Retrofit with T8 Lamps and Electronic Ballast	2L22"	62	2L22" LO	55	218	$50.00	$15.00
8	(2) 18W Compact Fluorescent Lamps in a 1' x 1' Recessed Fixture with a Parabolic Lens	18W/3G/4P	36	No Upgrade	36	67	$0.00	$0.00
9	Surface Mount Fixture with a 300W Incandescent Lamp / Retrofit with a 28W Compact Fluorescent	300W INCANDESCENT	300	28W CF/SI	28	8	$10.00	$0.00
10	Surface Mount Fixture with a 60W Incandescent Lamp / Retrofit with a 15W Compact Fluorescent	60W INCANDESCENT	60	15W CF/SI	15	1	$6.00	$0.00
11	4' Wall Mounted Fluorescent Fixture with 34W T12 lamps and a Magnetic Ballast / Retrofit with T8 Lamps and Electronic Ballast	2L4' EE/STD	80	2L4' T8/ELEC	61	8	$60.00	$15.00
12	4' SurfaceMounted Fluorescent Fixture with 34W T12 lamps and a Magnetic Ballast / Retrofit with T8 Lamps and Electronic Ballast	2L4' EE/STD	80	2L4' T8/ELEC	61	48	$60.00	$15.00
13	2' SurfaceMounted Fluorescent Fixture with 20W T12 lamps and a Magnetic Ballast / Retrofit with T8 Lamps and Electronic Ballast	(2) F20T12/HPFMAG	56	(2) F017T8/EEMAG	43	1	$40.00	$15.00
14	4' Recessed Fluorescent Fixture with 34W T12 lamps and a Magnetic Ballast / Retrofit with T8 Lamps and Electronic Ballast	2L4' EE/STD	80	2L4' T8/ELEC	61	64	$60.00	$15.00
15	Wall Mounted Decorative Dome Light Fixture with (3) 60W Lamps / Retrofit with (3) 15W Compact Fluorescents	3L 60W INCANDESCENT	180	3L 15W CFL	45	5	$18.00	$0.00
16	Surface Mounted Wrap-around Fluorescent Fixture with T8 Lamps and an Electronic Ballast	2L4' T8/ELEC	61	No Upgrade	61	2	$0.00	$0.00

Summary

	Lighting (Only)	Sensors (Only)	Complete Lighting Upgrade
Cost	$18,322.00	$780.00	$19,102.00
Rebate	$5,085.00	$420.00	$5,505.00
Net Cost	$13,237.00	$360.00	$13,597.00
Savings (kWh)	12,599	387	12,942
Savings ($)	$2,267.79	$69.64	$2,329.56
Payback	5.8	5.2	5.8

Variables:

$0.18	Avg. Electric Rate ($/kWh)
	Avg. Demand Rate ($/kW)
2080	Operating Hours/Year
8	Operating Hours/Work Day

Assumptions:

25%	Occupancy Sensor Savings (Avg)
40%	Occupancy Sensor Savings(> Avg)

Notes:

Seq. #	Upgrade Code	Room/Area	Hrs/ Work Day	Hrs/ Year	Existing Fixture	Existing Qty.	Existing Watts	Existing Foot Candles	Proposed Fixture	Proposed Qty.	Proposed Watts	kW Reduction	Lighting Energy Savings, kWh	Lighting Cost ($)	Lighting Savings ($)	Lighting Payback (yrs)	Controls Type	Controls Qty.	Occupancy Sensors (ONLY) Energy Savings, kWh	Occupancy Sensors (ONLY) Cost ($)	Occupancy Sensors (ONLY) Savings ($)	Occupancy Sensors (ONLY) Payback (yrs)	SmartStart Rebate Lighting	SmartStart Rebate Sensors	Lighting & Occupancy Sensors Energy Savings, kWh	Lighting & Occupancy Sensors Post-Rebate Cost ($)	Lighting & Occupancy Sensors Savings ($)	Lighting & Occupancy Sensors Payback (yrs)
		Totals:					38296				31536	6.76	12599	$18,322.00	$2,267.79	8.1			387	$780.00	$69.64	11.2	$5,085.00	$420.00	12942	$13,597.00	$2,329.56	5.8
1	1	Exterior (Parking)	7	1820	400W MH/BALLA	4	1780		No Upgrade	4	1780	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
2	2	Exterior (Perimeter)	7	1820	400W MH/BALLA	4	1780		No Upgrade	4	1780	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
3	3	Exterior (Walkway)	7	1820	F28W/2D/835	25	700		No Upgrade	25	700	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
4	4	Exterior (Driveway)	7	1820	400W MH/BALLA	4	1780		No Upgrade	4	1780	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
5	5	Exterior (Driveway)	7	1820	70W MH/BALLAS	4	380		No Upgrade	4	380	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
6	6	Electrical Room	1	260	60W INCANDESC	1	60		15W CF/SI	1	15	0.045	12	$6.00	$2.11	2.8			0	$0.00	$0.00		$0.00	$0.00	12	$6.00	$2.11	2.8
7	5	Electrical room	1	260	70W MH/BALLAS	10	950		No Upgrade	10	950	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
8	3	Exterior Entryway	12	3120	F28W/2D/835	2	56		No Upgrade	2	56	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
9	7	Boiler Room	1	260	2L22"	2	124		2L22" LO	2	110	0.014	4	$100.00	$0.66	152.6			0	$0.00	$0.00		$30.00	$0.00	4	$70.00	$0.66	106.8

					Existing				Proposed				Lighting				Controls		Occupancy Sensors (ONLY)				SmartStart Rebate		Lighting & Occupancy Sensors			
Seq. #	Upgrade Code	Room/Area	Hrs/ Work Day	Hrs/ Year	Fixture	Qty.	Watts	Foot Candles	Fixture	Qty.	Watts	kW Reduction	Energy Savings, kWh	Cost ($)	Savings ($)	Payback (yrs)	Type	Qty.	Energy Savings, kWh	Cost ($)	Savings ($)	Payback (yrs)	Lighting	Sensors	Energy Savings, kWh	Post-Rebate Cost ($)	Savings ($)	Payback (yrs)
10	9	Mechanical Room	1	260	300W INCANDES	2	600		26W CF/SI	2	56	0.544	141	$20.00	$25.46	0.8			0	$0.00	$0.00		$0.00	$0.00	141	$20.00	$25.46	0.8
11	10	Mechanical Room	1	260	60W INCANDESC	1	60		15W CF/SI	1	15	0.045	12	$5.00	$2.11	2.8			0	$0.00	$0.00		$0.00	$0.00	12	$6.00	$2.11	2.8
12	8	Entrance hall	12	3120	18W/30/4P	4	144		No Upgrade	4	144	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
13	7	Examination room	6	1560	2L22"	8	496		2L22" LO	8	440	0.056	87	$400.00	$15.72	25.4			0	$0.00	$0.00		$120.00	$0.00	87	$280.00	$15.72	17.8
14	7	Doctors Office	6	1560	2L22"	4	248		2L22" LO	4	220	0.028	44	$200.00	$7.86	25.4			0	$0.00	$0.00		$60.00	$0.00	44	$140.00	$7.86	17.8
15	7	Nurses Office	6	1560	2L22"	4	248		2L22" LO	4	220	0.028	44	$200.00	$7.86	25.4			0	$0.00	$0.00		$60.00	$0.00	44	$140.00	$7.86	17.8
16	7	Medical Waiting Area	8	2080	2L22"	16	992		2L22" LO	16	880	0.112	233	$800.00	$41.93	19.1			0	$0.00	$0.00		$240.00	$0.00	233	$560.00	$41.93	13.4
17	8	Hallway	12	3120	18W/30/4P	6	216		No Upgrade	6	216	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
18	3	Center Outdoor Quad	7	1820	F28W2D/835	4	112		No Upgrade	4	112	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
19	5		7	1820	70W MH/BALLAS	8	760		No Upgrade	8	760	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
20	11	Mens Room	8	2080	2L4' EE/STD	1	80		2L4' T8/ELEC	1	61	0.019	40	$60.00	$7.11	8.4			0	$0.00	$0.00		$15.00	$0.00	40	$45.00	$7.11	6.3
21	7	Storage	1	260	2L22"	32	1984		2L22" LO	32	1760	0.224	58	$1,600.00	$10.48	152.6			0	$0.00	$0.00		$480.00	$0.00	58	$1,120.00	$10.48	106.8
22	11	Womens Room	8	2080	2L4' EE/STD	1	80		2L4' T8/ELEC	1	61	0.019	40	$60.00	$7.11	8.4			0	$0.00	$0.00		$15.00	$0.00	40	$45.00	$7.11	6.3
23	8	Hallway	12	3120	18W/30/4P	12	432		No Upgrade	12	432	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
24	7	Office 1	8	2080	2L22"	4	248		2L22" LO	4	220	0.028	58	$200.00	$10.48	19.1	OSR	1	129	$260.00	$23.21	11.2	$60.00	$140.00	173	$260.00	$31.08	8.4
25	7	Office 2	8	2080	2L22"	4	248		2L22" LO	4	220	0.028	58	$200.00	$10.48	19.1	OSR	1	129	$260.00	$23.21	11.2	$60.00	$140.00	173	$260.00	$31.08	8.4
26	7	Storge	1	260	2L22"	4	248		2L22" LO	4	220	0.028	7	$200.00	$1.31	152.6			0	$0.00	$0.00		$60.00	$0.00	7	$140.00	$1.31	106.8
27	7	Office 3	8	2080	2L22"	4	248		2L22" LO	4	220	0.028	58	$200.00	$10.48	19.1	OSR	1	129	$260.00	$23.21	11.2	$60.00	$140.00	173	$260.00	$31.08	8.4
28	7	Kitchen	6	1560	2L22"	4	248		2L22" LO	4	220	0.028	44	$200.00	$7.86	25.4			0	$0.00	$0.00		$60.00	$0.00	44	$140.00	$7.86	17.8
29	7		6	1560	2L22"	8	496		2L22" LO	8	440	0.056	87	$400.00	$15.72	25.4			0	$0.00	$0.00		$120.00	$0.00	87	$280.00	$15.72	17.8
30	7		6	1560	2L22"	16	992		2L22" LO	16	880	0.112	175	$800.00	$31.45	25.4			0	$0.00	$0.00		$240.00	$0.00	175	$560.00	$31.45	17.8
31	8	Hallway	12	3120	18W/30/4P	26	936		No Upgrade	26	936	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
32	12	Gathering Area	12	3120	2L4' EE/STD	48	3840		2L4' T8/ELEC	48	2928	0.912	2845	$2,880.00	$512.18	5.6			0	$0.00	$0.00		$720.00	$0.00	2845	$2,160.00	$512.18	4.2
33	7	Lounge	12	3120	2L22"	32	1984		2L22" LO	32	1760	0.224	699	$1,600.00	$125.80	12.7			0	$0.00	$0.00		$480.00	$0.00	699	$1,120.00	$125.80	8.9
34	11	Mens Room	8	2080	2L4' EE/STD	1	80		2L4' T8/ELEC	1	61	0.019	40	$60.00	$7.11	8.4			0	$0.00	$0.00		$15.00	$0.00	40	$45.00	$7.11	6.3
35	11	Womens Room	8	2080	2L4' EE/STD	1	80		2L4' T8/ELEC	1	61	0.019	40	$60.00	$7.11	8.4			0	$0.00	$0.00		$15.00	$0.00	40	$45.00	$7.11	6.3
36	13	Closet	1	260	(2) F20T12/HPFM	1	56		(2) F017T8/EEMA(	1	43	0.013	3	$40.00	$0.61	65.7			0	$0.00	$0.00		$15.00	$0.00	3	$25.00	$0.61	41.1
37	7	Custodial Room 2	1	260	2L22"	2	124		2L22" LO	2	110	0.014	4	$100.00	$0.66	152.6			0	$0.00	$0.00		$30.00	$0.00	4	$70.00	$0.66	106.8
38	9	Mechanical Room	1	260	300W INCANDES	2	600		26W CF/SI	2	56	0.544	141	$20.00	$25.46	0.8			0	$0.00	$0.00		$0.00	$0.00	141	$20.00	$25.46	0.8
39	7	Lounge 1	12	3120	2L22"	32	1984		2L22" LO	32	1760	0.224	699	$1,600.00	$125.80	12.7			0	$0.00	$0.00		$480.00	$0.00	699	$1,120.00	$125.80	8.9
40	3	Outside Quad 2	7	1820	F28W2D/835	4	112		No Upgrade	4	112	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
41	5		7	1820	70W MH/BALLAS	8	760		No Upgrade	8	760	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
42	14	Library	12	3120	2L4' EE/STD	64	5120		2L4' T8/ELEC	64	3904	1.216	3794	$3,840.00	$682.91	5.6			0	$0.00	$0.00		$960.00	$0.00	3794	$2,880.00	$682.91	4.2
43	8		12	3120	18W/30/4P	9	324		No Upgrade	9	324	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
44	7	Office Area	8	2080	2L22"	8	496		2L22" LO	8	440	0.056	116	$400.00	$20.97	19.1			0	$0.00	$0.00		$120.00	$0.00	116	$280.00	$20.97	13.4
45	15	Center Entry/Exit	12	3120	3L 60W INCANDE	4	720		3L 15W CFL	4	180	0.54	1685	$72.00	$303.26	0.2			0	$0.00	$0.00		$0.00	$0.00	1685	$72.00	$303.26	0.2
46	8	Hallway	12	3120	18W/30/4P	6	216		No Upgrade	6	216	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
47	7	Classroom	8	2080	2L22"	32	1984		2L22" LO	32	1760	0.224	466	$1,600.00	$83.87	19.1			0	$0.00	$0.00		$480.00	$0.00	466	$1,120.00	$83.87	13.4
48	8	Hallway	12	3120	18W/30/4P	4	144		No Upgrade	4	144	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
49	11	Mens Room	8	2080	2L4' EE/STD	1	80		2L4' T8/ELEC	1	61	0.019	40	$60.00	$7.11	8.4			0	$0.00	$0.00		$15.00	$0.00	40	$45.00	$7.11	6.3
50	11	Womens Room	8	2080	2L4' EE/STD	1	80		2L4' T8/ELEC	1	61	0.019	40	$60.00	$7.11	8.4			0	$0.00	$0.00		$15.00	$0.00	40	$45.00	$7.11	6.3
51	7	Custodial Room	1	260	2L22"	2	124		2L22" LO	2	110	0.014	4	$100.00	$0.66	152.6			0	$0.00	$0.00		$30.00	$0.00	4	$70.00	$0.66	106.8
52	9	Mechanical Room	1	260	300W INCANDES	2	600		26W CF/SI	2	56	0.544	141	$20.00	$25.46	0.8			0	$0.00	$0.00		$0.00	$0.00	141	$20.00	$25.46	0.8
53	16	Custodial Room	1	260	2L4' T8/ELEC	2	122		No Upgrade	2	122	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
54	9	Mechanical Room	1	260	300W INCANDES	2	600		26W CF/SI	2	56	0.544	141	$20.00	$25.46	0.8			0	$0.00	$0.00		$0.00	$0.00	141	$20.00	$25.46	0.8
55	11	Mens Room	8	2080	2L4' EE/STD	1	80		2L4' T8/ELEC	1	61	0.019	40	$60.00	$7.11	8.4			0	$0.00	$0.00		$15.00	$0.00	40	$45.00	$7.11	6.3
56	11	Womens Room	8	2080	2L4' EE/STD	1	80		2L4' T8/ELEC	1	61	0.019	40	$60.00	$7.11	8.4			0	$0.00	$0.00		$15.00	$0.00	40	$45.00	$7.11	6.3
57	15	Exterior Outside Entry	12	3120	3L 60W INCANDE	1	180		3L 15W CFL	1	45	0.135	421	$18.00	$75.82	0.2			0	$0.00	$0.00		$0.00	$0.00	421	$18.00	$75.82	0.2

APPENDIX C: THIRD PARTY ENERGY SUPPLIERS

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

Third Party Electric Suppliers for PSEG Service Territory	Telephone & Web Site
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com
American Powernet Management, LP 437 North Grove St. Berlin, NJ 08009	(877) 977-2636 www.americanpowernet.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
ConEdison Solutions 535 State Highway 38 Cherry Hill, NJ 08002	(888) 665-0955 www.conedsolutions.com
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(888) 635-0827 www.newenergy.com
Credit Suisse, (USA) Inc. 700 College Road East Princeton, NJ 08450	(212) 538-3124 www.creditsuisse.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
Metro Energy Group, LLC 14 Washington Place Hackensack, NJ 07601	(888) 536-3876 www.metroenergy.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
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	(800) 225-1560 www.spragueenergy.com
Strategic Energy, LLC 55 Madison Avenue, Suite 400 Morristown, NJ 07960	(888) 925-9115 www.sel.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 Elizabethtown Gas Co. 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
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
Glacial Energy of New Jersey, Inc. 207 LaRoche Avenue Harrington Park, NJ 07640	(877) 569-2841 www.glacialenergy.com
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com
Intelligent Energy 2050 Center Avenue, Suite 500 Fort Lee, NJ 07024	(800) 724-1880 www.intelligentenergy.org
Metromedia Energy, Inc. 6 Industrial Way Eatontown, NJ 07724	(877) 750-7046 www.metromediaenergy.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

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
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 is expresses the percentage return of the investment based on the lifetime cost savings of the ECM. This value can be included as an annual or lifetime value, or both.

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

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

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

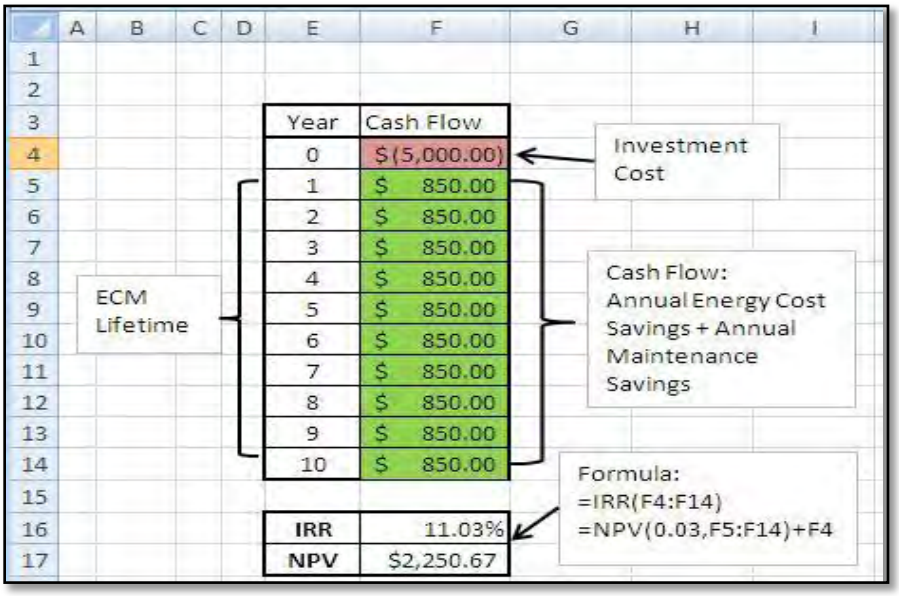
Calculation References

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

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

Excel NPV and IRR Calculation

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



Solar PV ECM Calculation

There are several components to the calculation:

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

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

ECM and Equipment Lifetimes

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

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

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

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

New Jersey Clean Energy Program Commercial & Industrial Lifetimes

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

APPENDIX E: STATEMENT OF ENERGY PERFORMANCE FROM ENERGY STAR®

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
City of Elizabeth - Peterstown Community Center

Building ID: 2250617
For 12-month Period Ending: January 31, 2010[1]
Date SEP becomes Ineligible: N/A

Date SEP Generated: May 27, 2010

Facility
City of Elizabeth - Peterstown Community Center
418-434 Palmer Street
Elizabeth, NJ 07202

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1992
Gross Floor Area (ft²): 25,168

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	907,172
Natural Gas (kBtu)[4]	1,347,565
Total Energy (kBtu)	2,254,737

Energy Intensity[5]	
Site (kBtu/ft²/yr)	90
Source (kBtu/ft²/yr)	176

Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	210

Electric Distribution Utility
Public Service Elec & Gas Co

National Average Comparison	
National Average Site EUI	52
National Average Source EUI	102
% Difference from National Average Source EUI	73%
Building Type	Social/Meeting

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. Theincentives 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.

Energy Efficiency and Conservation Block Grant Rebate Program

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

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

Other Federal and State Sponsored Programs

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

*Subject to availability. Incentive program timelines might not be sufficient to meet the 25% in 12 months spending requirement outlined in the LGEA program.

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	Programmable thermostat for Entrance's baseboards	Similar Projects	500	0	500	3,740	0.9	0	0.5	0	658	10	6,582	0.8	1216%	122%	132%	5,058	6,696
2	Lighting Upgrades	RS Means	18,322	5,085	13,237	12,599	3.0	0	1.7	30	2,247	15	33,711	5.9	155%	10%	15%	13,209	22,559
3	18.4 kW Roof-mounted PV system	Similar Projects	110,400	18,400	92,000	21,861	18.4	0	3.0	0	14,365	25	359,113	6.4	290%	12%	14%	97,283	39,142
4	Re-commissioning of heating system and controls	Similar Projects	20,000	0	20,000	0	0.0	1,988	7.9	0	2,612	10	26,122	7.7	31%	3%	5%	2,057	21,914
5	Hot Water Outdoor Air Reset Control	Similar Projects	2,000	0	2,000	0	0.0	193	0.8	0	254	10	2,536	7.9	27%	3%	5%	141	2,127
6	Lighting Occupancy Sensors	RS Means	780	60	720	387	0.1	0	0.1	0	68	10	681	10.6	-5%	-1%	-1%	-145	693
7	High-efficiency modulating furnaces	RS Means	57,000	1,200	55,800	0	0.0	2,884	11.5	270	4,060	15	60,894	13.7	9%	1%	1%	-8,031	31,790
8	High-efficiency Split-System Condensing units and AHUs	RS Means	41,175	1,380	39,795	9,089	2.2	0	1.2	150	1,750	15	26,245	22.7	-34%	-2%	-5%	-19,207	16,274
	TOTALS		**250,177**	**26,125**	**224,052**	**47,676**	**24.6**	**5,065**	**26.6**	**450**	**26,013**	-	**515,885**	**8.6**	-	-	-	**90,366**	**141,195**

APPENDIX H: METHOD OF ANALYSIS

Assumptions and tools

Energy modeling tool:	Established/standard industry assumptions, eQUEST
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 Peterstown Community Center 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 Peterstown Community Center(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.