Steven Winter Associates, Inc.
Architects and Engineers

293 Route 18 South, Suite 330
East Brunswick, NJ 08816
www.swinter.com

Telephone: (866) 676-1972
E-mail:swinter@swinter.com

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Local Government Energy Program
Energy Audit Report

For

City of New Brunswick
New Brunswick Senior Citizen Resource Center

81 Huntington St
New Brunswick, NJ 08901

Project Number: LGEA63

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INTRODUCTION

On April 30th, Steven Winter Associates, Inc. (SWA) and PMK Group, a business unit of Birdsall Services Group (BSG-PMK), performed an energy audit and assessment of the New Brunswick Senior Citizen Resource Center in The City of New Brunswick, NJ. Current conditions and energy-related information were collected in order to analyze and facilitate the implementation of energy conservation measures for the building.

The New Brunswick Senior Citizen Resource Center is a single story (slab on grade) building totaling 14,700 square feet. The New Brunswick Senior Citizen Resource Center contains; administration offices and various common areas.

The New Brunswick Senior Citizen Resource Center is occupied consistently by approximately 20 people for 40 hours a week.

Energy data and building information collected in the field were analyzed to determine the baseline energy performance of the building. Using spreadsheet-based calculation methods, SWA and PMK estimated the energy and cost savings associated with the installation of each of the recommended energy conservation measures. The findings for the building are summarized in this report.

The goal of this energy audit is to provide sufficient information to make decisions regarding the implementation of the most appropriate and most cost effective energy conservation measures for the building.

Launched in 2008, the 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 75% of the cost of the audit. If the net cost of the installed measures recommended by the audit, after applying eligible NJ SmartStart Buildings incentives, exceeds the remaining cost of the audit, then that additional 25% will also be paid by the program. The Board of Public Utilities (BPU's) Office of Clean Energy has assigned TRC Energy Services to administer the Program.

EXECUTIVE SUMMARY

This document contains the energy audit report for the New Brunswick Senior Citizen Resource Center in The City of New Brunswick, NJ 08901.

Based on the field visit performed by Steven Winter Associates (SWA) and PMK staff on April 30th, 2010 and the results of a comprehensive energy analysis, this report describes the site's current conditions and recommendations for improvements. Suggestions for measures related to energy conservation and improved comfort are provided in the scope of work. Energy and resource savings are estimated for each measure that results in a reduction of heating, cooling, and electric usage.

Current conditions

In the most recent full year of data collected, February, 2009 through January, 2010, the New Brunswick Senior Citizen Resource Center consumed a total of 237,195 kWh of electricity for a total cost of $39,952. In the most recent full year of natural gas data collected, February, 2009 through January, 2010, 2,172 therms of gas were consumed for a total cost of $2,635. With electricity and natural gas combined, the building consumed 1062 MMBtus of energy at a total cost of $42,587.

SWA/BSG-PMK has entered energy information about the New Brunswick Senior Citizen Resource Center in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. The building was classified as a Library building preventing it from receiving a performance rating. Buildings achieving an Energy Star rating of 75 are eligible to apply for the Energy Star award and receive the Energy Star plaque to convey superior performance. These ratings also greatly help when applying for Leadership in Energy and Environmental Design (LEED) building certification through the United States Green Building Council (USGBC).

The Site Energy Use Intensity is 70 kBtu/ft^{2}yr compared to the national average of a similar building consuming 52 kBtu/ft^{2}yr. Implementing the recommendations included in this report will reduce the building energy consumption by approximately 21 kBtu/ft^{2}yr. There may be energy procurement opportunities for City of New Brunswick to reduce annual utility costs, which are $4,373 /year higher, when compared to the average estimated NJ commercial utility rates.

Based on the assessment of the New Brunswick Senior Citizen Resource Center, SWA/BSG-PMK has separated the recommendations into three categories (See Section 4 for more details). These are summarized as follows:

Category I Recommendations: Capital Improvements:

At this time there are no capital improvements recommended by SWA/BSG-PMK.

Category II: Operations & Maintenance:

- Refinish sun damaged exterior wall finishes
- Repair damaged exterior wood trim
- Unclog gutters and downspouts
- Monitor and mitigate moisture build up in wall cavities
- Repair roof leaks
- Re weather-strip exterior doors

Category III: Energy Conservation Measures:

At this time, SWA/BSG-PMK highly recommends a total of **4** Energy Conservation Measures (ECMs) for the New Brunswick Senior Citizen Resource Center that are summarized in the following table. The total investment cost for these ECMs, with incentives, is **$304,538** (based on a projected eligibility for New Jersey's Office of Clean Energy current incentive and rebate programs). SWA/BSG-PMK estimates a first year savings of **$36,519** with an aggregated simple payback of approximately **8 years**. SWA/BSG-PMK estimates that implementing the highly recommended ECMs will reduce the carbon footprint of the facility by **148,950 lbs of CO_2**.

The recommended ECMs and the list below are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for the City of New Brunswick. Based on the requirements of the LGEA program, the City of New Brunswick 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 $939.25.

SWA recommends that the City of New Brunswick enroll in the following incentive programs through the NJ Office of Clean Energy in order to reduce the installation costs of most measures:

- Direct Install
- SmartStart

The building would not qualify for the Pay-for-Performance program since the energy audit did not show that source energy consumption could not be reduced by 15+%.

Please refer to Appendix C for further details.

The following table summarizes the proposed Energy Conservation Measures (ECM) and their economic relevance:

ROI: Return on Investment (%)

Assumptions:

Discount rate:	3.2%	per DOE FEMP guidelines	Electricity rate	$0.17	$/kWh
Energy price escalation rate:	0%	per DOE FEMP guidelines	Gas rate	$1.21	$/therm
Avg. Annual Demand:	0.00543		Area of Building (SF)	14,700	

Table 1 - Highly Recommended 0-5 Year Payback ECMs

ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, $	Total 1st Yr Savings $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO2 Reduced, lbs/yr
1	Lighting Upgrades	Empirical Data	$6,758	$1,695	$5,063	10,720	4.85	0	2.49	$0	$1,822	15	$21,444	2.78	324%	22%	36%	$16,692	14,686
	Occupancy Sensors		$920	$355	$565	487	0.22	0	0.11	$0	$83	10	$700	6.82	24%	2%	8%	$142	668
TOTAL			$7,678	$2,050	$5,628	11,207	5.08	0	2.60	$0.00	$1,905	-	$22,143	2.95	-	-	-	$16,834	15,354

Table 2 - Recommended 5-10 Year Payback ECMs

ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, $	Total 1st Yr Savings $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO2 Reduced, lbs/yr
2	Water Heater Upgrade	Similar Projects	$8,350	$100	$8,250	12,776	5.79	-642	-1.40	$0	$1,395	13	$14,651	5.91	78%	6%	14%	$6,589	9,993
3	High-Efficiency Condensing Units & Modulating Furnaces	Contractor	$95,000	$8,140	$86,860	54,482	24.67	-113	11.88	$0	$9,125	18	$123,403	9.52	42%	2%	1%	-$9,023	73,315
4	34-kW Roof-Mounted PV System	Similar Projects	$238,000	$34,200	$203,800	36,707	16.62	0	8.52	$0	$24,094	30	$460,274	8.46	126%	4%	11%	$268,453	50,289
TOTAL			$341,350	$42,440	$298,910	103,965	47.08	-755	18.99	$0.00	$34,614	-	$598,327	8.64	-	-	-	$266,018	133,597

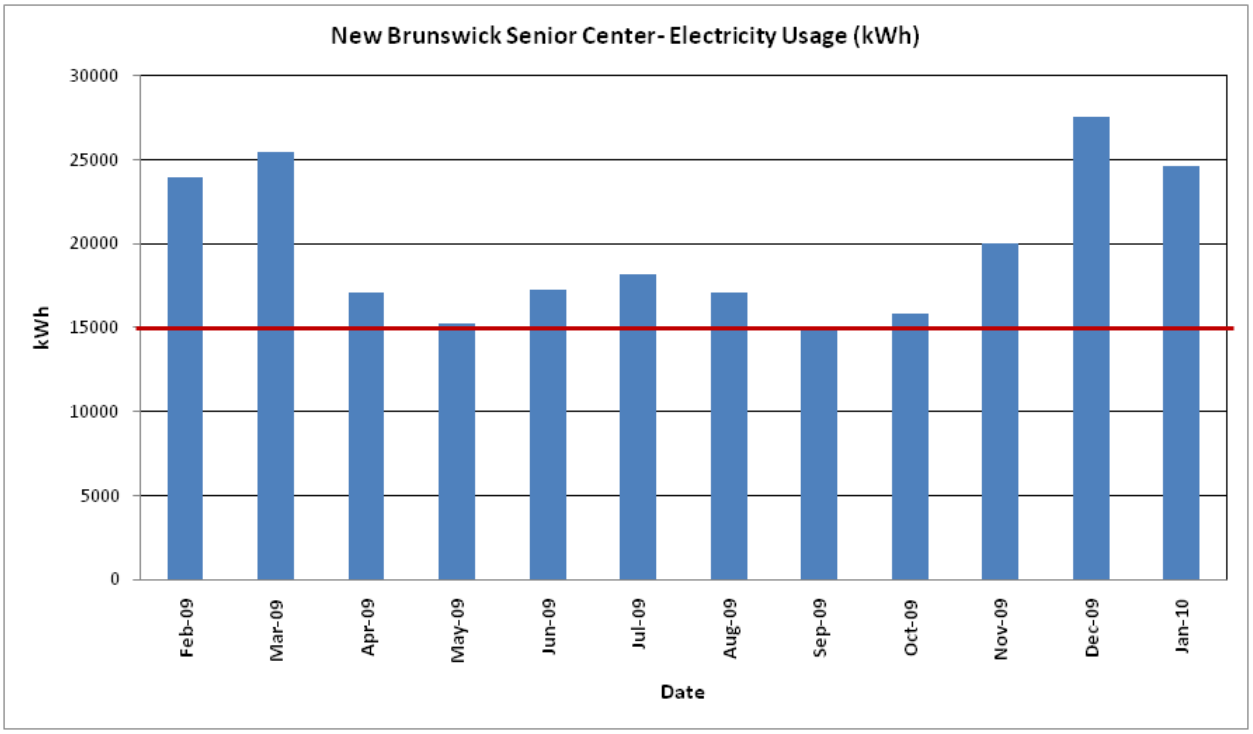
1. HISTORIC ENERGY CONSUMPTION

1.1. Energy Usage and Cost Analysis

SWA/BSG-PMK analyzed utility bills that were received from the utility company supplying the New Brunswick Senior Center building with electric and natural gas from February, 2009 through January, 2010.

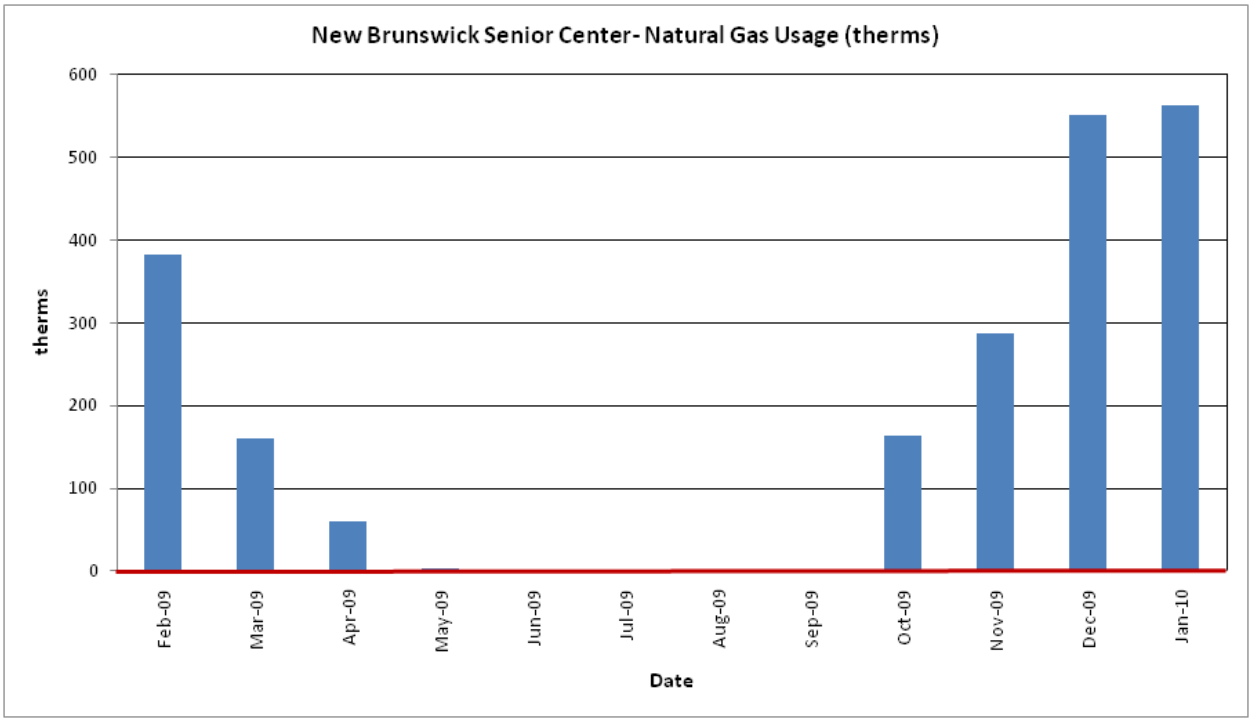
Electricity – The New Brunswick Senior Center building is currently served by one electric meter. The facility currently receives electricity from Public Service Electric & Gas at **an average rate of $0.17/kWh** based on 12 months of utility bills from February, 2009 through January, 2010. The facility consumed **approximately 237,195 kWh or $39,952 worth of electricity** in the previous year with an average monthly demand of 103.2 kW.

The following charts show electricity usage for the New Brunswick Senior Center building based on utility bills for the billing analysis period. The red line indicates the estimated base-load in kWh.



Natural Gas – The New Brunswick Senior Center building is currently served by one meter for natural gas. The facility currently receives natural gas from Public Service Electric & Gas at **an average aggregated rate of $1.21/therm** based on 12 months of utility bills for February, 2009 through January, 2010. The facility consumed **approximately 2,172 therms or $2,635 worth of natural gas** in the previous year.

The following charts show the natural gas usage for the New Brunswick Senior Center building based on utility bills for the analysis period of February, 2009 through January, 2010



The natural gas usage mimics seasonal needs for heating the buildings showing that natural gas is primarily used for heating. The red line indicates the base-load level for the heating, domestic hot water, and/or cooking needs. The natural gas usage above the red line shows the amount of natural gas used for heating.

1.2. Utility Rate

The New Brunswick Senior Center building currently receives electricity from Public Service Electric & Gas at a general service market rate for electricity use (kWh) with (kW) demand charge. The facility currently pays an average rate of approximately $0.17/kWh based on the most recent 12 months of utility bills.

The New Brunswick Senior Center building currently receives natural gas supply from Public Service Electric & Gas at a general service market rate for natural gas in therms. There is one gas meter that provides natural gas service to the facility. The average aggregated rate (supply and transport) for the meter is approximately $1.21/therm based on the most recent 12 months of utility bills.

1.3. Energy Benchmarking

SWA/BSG-PMK has entered energy information about the New Brunswick Senior Center building in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. The username is *cityofnewbrunswick* and the password is *newbrunswick*. The building was classified as a Public Assembly-Social/Meeting space preventing it from earning a performance rating which can be used to achieve an Energy Star building certification.

The Site Energy Use Intensity is 70 kBtu/sq.ft/yr compared to the national average of buildings classified as Public Assembly-Social/Meeting space consuming 52 kBtu/sq.ft./yr. Implementing this report's recommended Energy Conservations Measures (ECMs) will reduce use by approximately 21 kBtu/sq.ft./yr.

SWA/BSG-PMK has created the Portfolio Manager site information for New Brunswick City Hall. This information can be accessed at: https://www.energystar.gov/istar/pmpam/, with the following:

Username: *cityofnewbrunswick*
Password: *newbrunswick*

STATEMENT OF ENERGY PERFORMANCE
New Brunswick Senior Center

Building ID: 2367933
For 12-month Period Ending: March 31, 2010[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: June 25, 2010

Facility	Facility Owner	Primary Contact for this Facility
New Brunswick Senior Center 81 Huntington St New Brunswick, NJ 08901	City of New Brunswick 76 Bayard St New Brunswick, NJ 08901	Chris Butler 76 Bayard St New Brunswick, NJ 08901

Year Built: 1980
Gross Floor Area (ft²): 14,700

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	809,309
Natural Gas (kBtu)[4]	217,222
Total Energy (kBtu)	1,026,531
Energy Intensity[5]	
Site (kBtu/ft²/yr)	70
Source (kBtu/ft²/yr)	199
Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	135
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	96%
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

2. 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 Friday, May 07, 2010, the following data was collected and analyzed.

2.1. Building Characteristics

The single-story, (slab on grade), 14,700 square feet Senior Center building was constructed in the 1990s with no additions or major alterations to date. It houses administration offices and various common areas.


Partial Front Façade (typ.)


Partial Right Side Façade (typ.)


Partial Rear Façade (typ.)


Partial Left Side Façade (typ.)

2.2. Building occupancy profiles

Its occupancy is approximately 20 at any given time during the week. It is open Monday through Friday from 8:30am until 4:30pm.

2.3. Building Envelope

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

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

2.3.1. Exterior Walls

The exterior wall envelope is mostly constructed of brick veneer and some vertical wood siding accents, over 3-1/2" wood stud framing with 3 inches of fiberglass batt cavity insulation. The interior is mostly painted gypsum wallboard or exposed brick finish.

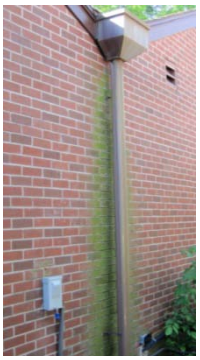
Note: Wall insulation levels could not be verified in the field and are based on available construction plans.

Exterior and interior wall surfaces were inspected during the field audit. They were found to bein overall acceptable condition with some signs of uncontrolled moisture, air-leakage and other energy-compromising issues.

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

Sun damaged exterior wall finishes

Damaged exterior wood trim caused by different types of insects, according to building maintenance personal.



Uncontrolled roof water run-off due to defective or clogged gutters and downspouts

Efflorescence on interior brick walls indicate moisture presence within the wall cavity.

2.3.2. Roof

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

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

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

The following specific roof problem spots were identified:



Signs of mold/water damage on interior finishes

2.3.3. 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 and are based on available construction plans.

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

2.3.4. Windows

The building contains basically one type of window.

- Casement type windows with a wood frame, clear double glazing and no interior or exterior shading devices. The windows are located throughout the building and are 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 or no major signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues.

2.3.5. Exterior Doors

The building contains only one type of exterior door.

- Metal type exterior doors. They are located throughout the building and are original.

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 only a few signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues.

The following specific door problem spots were identified:

Missing/worn weather-stripping was detected on all exterior doors

2.3.6. Building Air Tightness

Overall the field auditors found the building to be reasonably air-tight with only a few areas of suggested improvements, as described in more detail earlier in this chapter.

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

2.4. HVAC systems

2.4.1.Heating

Heating is provided by ten (10) natural gas, forced-air furnaces, which are equipped with cooling coils. The community room is partially heated by a 115 MBH, 92.6%-efficient Goodman furnace; all other furnaces are 80% efficient. The hallway is heated by a 90 MBH Carrier furnace; the community room and the kitchen are heated by a 115 MBH Goodman furnace; the billiard room, game room, and community room are heated by a 90 MBH Carrier furnace; the restrooms are heated by a 90 MBH Goodman furnace; the art room is heated by a 90 MBH Carrier furnace; the exercise room is heated by a 130 MBH York furnace; the offices are heated by a 100 MBH Lennox furnace; and the administration/lobby area and its restroom are heated by a 130 MBH York furnace. A furnace in the kitchen ceiling, which heats the kitchen, was not accessible. The janitor's room is heated by a small Emerson electric unit heater.

Figure 1: Carrier forced-air furnace

Category III Recommendations – ECM #3: Replace all furnaces with high-efficiency modulating units, and replace all condensing units, along with their cooling coils, with units with a high Seasonal Energy Efficiency Ratio (SEER).

2.4.2.Cooling

Cooling is provided by ten (10) condensing units, which feed cooling coils in the furnaces. The restrooms are cooled by a 4 ton Goodman unit, with a Seasonal Energy Efficiency Ratio (SEER) of 13, and the community room is partially cooled by a 5 ton, 14 SEER Goodman unit; all other units have SEER values of 10. The hallway is cooled by a 5 ton Carrier unit; the community room and kitchen are cooled by a 5 ton Goodman unit; the billiard room, game room, and community room are cooled by a 5 ton Carrier unit; the art room is cooled by a 2.5 ton Carrier unit; the exercise room is cooled by a 5-ton York unit; the offices are cooled by a 3.5 ton Lennox unit; the administration/lobby area and its restroom are cooled by a 5 ton York unit; and the kitchen is cooled by a 5 ton York unit.

Figure 2: Carrier condensing unit

Category III Recommendations – ECM #3: Replace all furnaces with high-efficiency modulating units, and replace all condensing units, along with their cooling coils, with units with a high Seasonal Energy Efficiency Ratio (SEER).

2.4.3.Ventilation

Kitchen exhaust is vented by a Penn Ventilator exhaust fan. Additional ventilation is provided by doors and windows.

2.4.4.Domestic Hot Water

Domestic hot water is provided by three (3) electric domestic water heaters. A sink in the exercise room is serviced by a 6 gallon, 2 kW Energy Miser unit. Two 85 gallon Ruud units provide the rest of the building's domestic hot water; a 27 kW unit services the kitchen, and a 18 kW unit services sinks throughout the rest of the building.

Category III Recommendation – ECM #3: Replace the two 85-gallon electric water heaters with natural gas water heaters. Natural gas is much cheaper than electricity, on a per-therm basis. Additionally, replace the 6-gallon point-of-use electric water heater in the exercise room with a tankless unit, which would only consume energy when the sink is in use.

Figure 3: Ruud domestic water heater

2.5. Electrical systems

2.5.1. 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 facility consists primarily of T12 Fluorescent fixtures with magnetic ballasts.

Category III Recommendation - ECM 1: Recommend upgrading all T-12 lighting fixtures with magnetic ballasts to T-8 fixtures with electronic ballasts. This and various other lighting upgrades are outlined in Appendix A.

2.5.2. Appliances and Process

Appliances, such as refrigerators, that are over 10 years of age should be replaced with newer efficient models with the Energy Star label. For example, Energy Star refrigerators use as little as 315 kWh / yr. 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, and copy machines, etc.

More information can be found in the "Products" section of the Energy Star website at: http://www.energystar.gov.

In this facility, there are (2) refrigerators, a microwave, a toaster, (8) computers, (3) TVs, a fax/copy machine, a water cooler, an ice maker, (2) convection ovens, an electric stove, an electric griddle, and a Bohn walk-in freezer with an outdoor condensing unit. In this facility, many of the appliances found and noted in the attached equipment list were older than the 10 year threshold and should be considered for the Energy Star program.

2.5.3. Elevators

There are no elevators at this facility.

3. Building Systems Equipment List

New Brunswick Senior Center							
Building System	Description	Locations	Model #	Fuel	Space Served	Year Installed	Estimated. Remaining Useful Life %
Heating/ Cooling	Furnace w/ 5-ton cooling coil (suitable for R-22); 90 MBH heating, 80% efficient	Closet across from rest room	Carrier; M# 40YR060300, S# 0591H01885 (cooling coil); M# 40YA900310 (furnace)	Electricity/ Natural gas	Hallway	1991	0%
	Condensing unit, 5 tons, 10 SEER	Outside	Carrier, M# 38YH060500DL, S# 3090E43372	Electricity		1990	0%
Heating/ Cooling	Furnace w/ cooling coil (suitable for R-22 or Puron); 115 MBH heating, 80% efficient	Closet in community room	Goodman, M# GDH81155CXAB, S# 0707748026	Electricity/ Natural gas	Community room, kitchen	2004	70%
	Condensing unit, 5 tons, 10 SEER	Outside	Goodman, M# CKL60-3L, S# 0409683982	Electricity		2004	60%
Heating/ Cooling	Furnace w/ 5-ton cooling coil (suitable for R-22); 90 MBH heating, 80% efficient	Closet, community room	Carrier; M# 40YR060300, S# 4990H01884 (cooling coil); M# 40YA900310 (furnace)	Electricity/ Natural gas	Billiard room, game room, community room	1990	0%
	Condensing unit, 5 tons, 10 SEER	Outside	Carrier, M# 38YH060500DL, S# 4089E01628	Electricity		1989	0%
Heating/ Cooling	Furnace w/ cooling coil (suitable for R-22 or Puron); 90 MBH heating, 80% efficient	Janitor's room	Goodman; M# CHPF4860D6CA, S# 0901581743 (cooling coil); M# GMS80905CHBD, S# 0806253557	Electricity/ Natural gas	Restrooms	2004	67%

	Condensing unit, 4 tons, 13 SEER	Outside	Goodman, M# GSC130483AF, S# 0812053775	Electricity		2008	87%
Heating/ Cooling	Furnace w/ cooling coil; 115 MBH heating, 92.6% efficient	Closet, community room	Goodman; M# CACF061D2A, S# 0412476720 (cooling coil); M# GMS91155DXA, S# 0502162136 (furnace)	Electricity/ Natural gas	Community room	2005	72%
	Condensing unit, 5 tons, 14 SEER	Outside	Goodman, M# SSX140601AD, S# 0706633170	Electricity		2007	80%
Heating/ Cooling	Furnace w/ cooling coil (suitable for R-22); 90 MBH heating, 80% efficient	Above ceiling, art room	Carrier; M# 40YR060300, S# 4990H01883 (cooling coil); M# 40YA900310 (furnace)	Electricity/ Natural gas	Art room	1990	0%
	Condensing unit, 2.5 tons, 10 SEER	Outside	Carrier, M# 38YH030510DL, S# 3990E23491	Electricity		1990	0%
Heating/ Cooling	Furnace w/ cooling coil (suitable for R-22); 130 MBH heating, 80% efficient	Closet, gym	York, M# P4DND20N10401A, S# EMJM536485	Electricity/ Natural gas	Exercise room	2000	44%
	5-ton condensing unit, 10 SEER	Outside	York, M# H2DB060S25A, S# EEHM574734	Electricity		1999	27%
Heating/ Cooling	Furnace w/ cooling coil (suitable for R-22); 100 MBH heating, 80% efficient	Closet, office	Lennox; M# C26-41FC-1, S# 6099G41611 (cooling coil); M# G23Q4/5-100-5, S# 5899H 28206	Electricity/ Natural gas	Offices	1999	39%
	Condensing unit, 3.5 tons, 10 SEER	Outside	Lennox, M# HS29-042-1P, S# 5899H 16382	Electricity		1999	27%

Heating/ Cooling	Furnace w/ cooling coil (suitable for R-22); 130 MBH heating, 80% efficient	Closet, office	York, M# P3DND20N10401D, S# EFHM650817	Electricity/ Natural gas	Admin/lobby, restroom	1999	39%
	Condensing unit, 5 tons, 10 SEER	Outside	York, M# H2DB060S25A, S# EFHM650220	Electricity		1999	27%
Heating/ Cooling	Kitchen make-up air unit, 40 kW electric heat, cooling coil	Kitchen ceiling	Not accessible	Electricity	Kitchen	Unknown	40%
	Condensing unit, 5 tons, 10 SEER	Outside	York, M# E1RA060S25A, S# WEMM019571			2003	53%
Heating	Electric unit heater	Entrance wall	No nameplate	Electricity	Entrance	1980	10%
Heating	Small electric unit heater	Janitor's room	Emerson Space Mod	Electricity	Janitor's room	Approx. 2000	23%
Domestic hot water	Water heater, 85 gallons, 27 kW	Closet, community room	Ruud, M# EGL85-27-G, S# N011091RU 0988500016	Electricity	Kitchen	1991	0%
Domestic hot water	85-gallon water heater, 18 kW	Maintenance room	Ruud, M# EGLS-85-18G, S# 0293E000084 N041593	Electricity	Sinks	1993	0%
Domestic hot water	Electric water heater, 6 gallons, 2 kW	Closet, exercise room	Energy Miser, M# 61H-6S, S# R0 0380705212	Electricity	Sink in exercise room	Approx. 2000	33%
Ventilation	Exhaust fan	Roof	Penn Ventilator	Electricity	Kitchen	1980	10%
Ventilation	Exhaust fan	Roof	Penn Ventilator	Electricity	Restrooms	1980	10%
Appliances	Ice maker	Kitchen	Scotsman, M# CME506AS-1F, S# 05091320016196	Electricity	Kitchen	Approx. 2000	47%
Appliances	(2) convection ovens	Kitchen	Vulcan, M# VC4ED DEV N0 9, S# 54-1020933	Electricity	Kitchen	Approx. 2000	50%
Appliances	Stove, 21.6 kW	Kitchen	Toastmaster, M# RH3-6D4, S# 254010505	Electricity	Kitchen	Approx. 2000	50%
Appliances	Griddle, 16.2 kW	Kitchen	Vulcan, M# HEG36D, S# 658120643	Electricity	Kitchen	Approx. 2000	50%

Appliances	Refrigerator	Kitchen	Turbo Air, M# TSR-49SD, S# DR49902126	Electricity	Kitchen	Approx. 2000	47%
Appliances	Refrigerator	Kitchen	Turbo Air, M# TSR-49SD, S# DR49909018	Electricity	Kitchen	Approx. 2000	47%
Appliances	Microwave	Kitchen	Amana, M# RCS 100A	Electricity	Kitchen	Approx. 1990	0%
Appliances	Walk-in freezer	Kitchen	Bohn	Electricity	Kitchen	Approx. 2000	47%
	Condensing unit	Outside	Bohn, M# BST015L6C, S# T09K03099		Walk-in freezer		

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.

4. ENERGY CONSERVATION MEASURES

Based on the assessment of this building, SWA and BSG-PMK have separated the investment opportunities into three categories of recommendations:

1. Capital Improvements – Upgrades not directly associated with energy savings
2. Operations and Maintenance – Low Cost/No Cost Measures
3. Energy Conservation Measures – Higher cost upgrades with associated energy savings

Category I Recommendations: Capital Improvements:

At this time there are no capital improvements recommended by SWA/BSG-PMK.

Category II: Operations & Maintenance:

- Refinish sun damaged exterior wall finishes
- Repair damaged exterior wood trim
- Unclog gutters and downspouts
- Monitor and mitigate moisture build up in wall cavities
- Repair roof leaks
- Re weather-strip exterior doors

Category III Recommendations: Energy Conservation Measures:

Summary Table

ECM #	Description
1	Lighting Upgrades & Occupancy Sensors
2	Water Heater Upgrade
3	High-Efficiency Condensing Units & Modulating Furnaces
4	34-kW Roof-Mounted PV System

ECM #1: Lighting Upgrades & Occupancy Sensors

Description:

Lighting at the Senior Center primarily consists of standard-efficiency fixtures with T12 lamps and magnetic ballasts. There are many incandescent fixtures and also a number of high-efficiency Compact Fluorescent fixtures. SWA/BSG-PMK recommends retrofitting the T12 fixtures with T8 lamps and electronic ballasts and replacing 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.

Recommended lighting upgrades are detailed in Appendix A.

Installation cost:

	Lighting (Only)	Sensors (Only)	Complete Lighting Upgrade
Cost	$6,758.00	$920.00	$7,678.00
Rebate	$1,695.00	$355.00	$2,050.00
Net Cost	$5,063.00	$565.00	$5,628.00
Savings (kWh)	10,720	487	11,075
Savings ($)	$1,822.34	$82.85	$1,882.83
Payback	2.8	6.8	3.0

Source of cost estimate: Empirical Data

Economics:

ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, $	Total 1st Yr Savings $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO2 Reduced, lbs/yr
1	Lighting Upgrades	Empirical Data	$6,758	$1,695	$5,063	10,720	4.85	0	2.49	$0	$1,822	15	$21,444	2.78	324%	22%	36%	$16,692	14,686
	Occupancy Sensors		$920	$355	$565	487	0.22	0	0.11	$0	$83	10	$700	6.82	24%	2%	8%	$142	668

Assumptions:

The electric cost used in this ECM was $0.17/kWh, which was the facilities' average rate for the 12-month period from May, 2009 through April, 2010. 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 A.

Rebates/financial incentives:

The New Jersey SmartStart offers rebates for upgrading lighting fixtures and installing lighting controls. The total rebate this ECM qualifies for is $2,050.

ECM #2: Water Heater Upgrade

Description:

Domestic hot water is provided to most of the building by two 85-gallon electric water heaters. A natural gas fired water heater would be much more cost-efficient. Currently, the Senior Center pays $0.17 per kWh for electricity, which is equivalent to $4.98 per them; by comparison, the Senior Center pays $1.21 per therm for electricity. The water heaters are located near gas-fired furnaces, and the estimated cost accounts for the projected costs for gas piping.

Additionally, a 6-gallon electric point-of-use water heater provides hot water to a single sink, located in the exercise room. This unit uses energy to keep the water heated at all times, even when the sink goes long periods of time without use. It is recommended that this unit be replaced with a small, 2.75-gallon tankless point-of-use water heater, which would only consume energy when the sink is in use.

Installation cost:

Estimated installed cost: Installation: $4,000 each for the two larger units, $350 for the tankless unit, $8,350 total
Source of cost estimate: Similar projects

Economics:

ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, $	Total 1st Yr Savings $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO_2 Reduced, lbs/yr
2	Water Heater Upgrade	Similar Projects	$8,350	$100	$8,250	12,776	5.79	-642	-1.40	$0.00	$1,395	13	$14,651	5.91	78%	6%	14%	$6,589	9,993

Assumptions:

To calculate the savings from switching from electricity to gas, a spreadsheet created by Rheem was used. The temperature rise of the heated water was set at 77°F on the spreadsheet, and the energy factor (a unit that specifies the efficiency of water heaters) is specified as 0.94 for electric units and 0.62 for gas units. Weight of water was set at 8.33 pounds/gallon. Using this data, the BTUs of output heat used for heating the water were calculated by the following equation:

$$BTUs_{output} = Vol. \times Wt._{Water} \times \Delta Temp.$$

This value would be the same for the current and proposed units. The actual BTUs purchased by each unit are calculated using this value and the energy factors:

$$BTUs_{input} = \frac{BTUs_{output}}{Energy\ Factor}$$

The annual costs for water heating by the two 85-gallon units and their replacements can now be calculated using this data:

The water heater in the exercise room has a volume of 6 gallons, and its recommended replacement is a 2.75 gallon tankless unit. It was estimated that the exercise room is in use no more than 1/3 of the week, and therefore, the "BTUs Required to Heat Water" for the tankless unit was multiplied by 1/3. The energy consumptions for the 6-gallon unit and its replacement are as follows:

(2) 85-Gallon Electric Water Heaters

Volume of Water Heated (gal)	Water Weight (lbs/gal)	Temperature Rise (°F)	BTUs Required to Heat Water	Energy Factor	BTUs Purchased to Heat Water	$/kWh	Daily Cost to Heat Water	Annual Cost to Heat Water
170	8.33	77	109,040	0.94	116,000	$0.17	$5.78	$2,108.93

(2) 85-Gallon Natural Gas Water Heaters

Volume of Water Heated (gal)	Water Weight (lbs/gal)	Temperature Rise (°F)	BTUs Required to Heat Water	Energy Factor	BTUs Purchased to Heat Water	$/therm	Daily Cost to Heat Water	Annual Cost to Heat Water
170	8.33	77	109,040	0.62	175,870	$1.21	$2.13	$776.73

6-Gallon Electric Water Heater

Volume of Water Heated (gal)	Water Weight (lbs/gal)	Temperature Rise (°F)	BTUs Required to Heat Water	Energy Factor	BTUs Purchased to Heat Water	$/kWh	Daily Cost to Heat Water	Annual Cost to Heat Water
6	8.33	77	3,848	0.94	4,094	$0.17	$0.20	$74.43

Tankless Point-of-Use Water Heater

Volume of Water Heated (gal)	Water Weight (lbs/gal)	Temperature Rise (°F)	BTUs Required to Heat Water	Energy Factor	BTUs Purchased to Heat Water	$/kWh	Daily Cost to Heat Water	Annual Cost to Heat Water
2.75	8.33	77	588	0.94	625	$0.17	$0.03	$11.37

Rebates/financial incentives:

This ECM is calculated based on a projected eligibility for New Jersey's SmartStart Rebate, worth $50 for each gas-fired water heater, for a total rebate of $100.

ECM #3: High-Efficiency Condensing Units & Modulating Furnaces

Description:

The Senior Center is heated by nine gas-fired duct furnaces and one electric duct furnace. Most of the units are at or near the end of their 18-year useful life, and should be replaced; units in the facility that have been installed more recently can also be upgraded for better efficiency. High-efficiency modulating furnaces are now available; Luxaire, for example, manufactures a model that is up to 98% efficient. The existing gas units, which have a cumulative heating capacity of 950 MBH, were approximately 80% efficient at the time of their purchase, but due to their age and condition, their efficiency was estimated to decrease by 5%, to 75%. The electric furnace, rated at 40 kW, is recommended to be replaced by a gas-fired unit. The Senior Center pays $0.17 per kWh for electricity, equivalent to $4.98 per therm; by comparison, the Senior Center pays $1.20 per therm for gas. Electric furnaces are nearly 100% efficient.

Ten condensing units feed cooling coils attached to each furnace. As with the furnaces, most units are at or near the end of their useful life, and should be replaced; newer units can also be upgraded for better efficiency. Condensing units are now available that use Puron refrigerant, a more efficient fluid than the existing R-22 refrigerant, yielding Seasonal Energy Efficiency Ratios (SEERs) up to 21 BTUs of cooling per watt-hour of electricity consumed; the SEERs of the existing units are approximately 10.

Installation cost:

Estimated installed cost: $95,000
Source of cost estimate: Contractor

Economics:

ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, $	Total 1st Yr Savings $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO_2 Reduced, lbs/yr
3	High-Efficiency Condensing Units & Modulating Furnaces	Contractor	$95,000	$8,140	$86,860	54,482	24.67	-113	11.88	$0	$9,125	18	$123,403	9.52	42%	2%	1%	-$9,023	73,315

Assumptions:

The cost per therm of natural gas that was used, taken from twelve months of the Senior Center's energy bills, was $1.21. Also taken from the energy bills were the gas consumption for the nine gas-fired furnaces, the only gas-consuming units in the building, 2,172 therms.

The gas savings by the furnaces can now be calculated:

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

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

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

The tenth furnace is electric. It has a capacity of 40 kW, which is equivalent to 136.6 MBH. Per ASHRAE, the outdoor drybulb temperature is above 10°F 99.6% percent of a year, and the number of heating degree days for one year is 5,065. The desired indoor temperature was estimated to be 68°F. The savings were calculated using the following equations:

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

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

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

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

The ten condensing units are also recommended for replacement. Using 12 months of the facility's electricity bills, it was determined that the cost of electricity is currently $0.17/kWh. 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:

This ECM is calculated based on a projected eligibility for New Jersey's SmartStart Rebate, up to $400 for each gas furnace and up to $92 per ton for unitary air-conditioning systems, for a total rebate of $8,140.

ECM #4: 34-kW Roof-Mounted PV System

Description:

Currently, the Senior 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 34-kW PV system to offset electrical demand for the building and reduce the annual net electric consumption for the building. A system of 170 commercial multi-crystalline 230 watt panels would generate 36,707 kWh of electricity per year, or 15.5% of the Senior Center's annual electric consumption.

Installation cost:

Estimated installed cost: $238,000; SREC revenue included in "Total 1st Year Savings"
Source of cost estimate: Similar projects

Economics:

ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, $	Total 1st Yr Savings $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO2 Reduced, lbs/yr
4	34-kW Roof-Mounted PV System	Similar Projects	$238,000	$34,200	$203,800	36,707	16.62	0.00	8.52	$0	$24,094	$30	$460,274	8.46	126%	4%	11%	$268,453	50,289

Assumptions:
Cost of installation was estimated, using data from similar projects, at approximately $7,000 per kW. Annual energy savings were calculated via "PV Watts", an online tool on the website of the National Renewable Energy Laboratory.

Rebates/financial incentives:

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.

5. ENERGY CONSERVATION MEASURE FUNDING ALTERNATIVES

BSG-PMK/SWA has reviewed several funding options for the purposes of subsidizing the costs for installing the energy conservation measures noted within this report.

Although funding options are constantly changing and updating this project may benefit from enrolling in a number of alternative programs such as the; The NJ SmartStart program with Technical Assistance, alternate funding by applying for financing and competitive grants through the United States Department of Energy as well as local utility incentive programs in an effort to offset a portion of the cost of ECM implementation.

The Smart Start program offers reimbursement incentives for various equipment purchases, and lighting incentives. The benefits and requirements of this program can be found at:

http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings

The Pay-for-Performance program offers incentives for working with an approved contractor to create a scope of work that will reduce source energy consumption by 15+%. Incentives are achieved during various phases of reporting and implementation. The benefits and requirements of this program can be found at:

http://www.njcleanenergy.com/commercial-industrial/programs/pay-performance

Financial assistance is also available through the United States Department of Energy in the form of; Grants, Cooperative Research and development agreements, small business innovation research, and Loan Guarantee Programs. Further information for these programs is available at:

http://www1.eere.energy.gov/financing/types_assistance.html

Local Utility incentives such as a Direct Install Program, offer incentives that can provide up to 80% subsidy of the cost to install particular ECM's. As each utility company has different guidelines and incentives it is important to contact your local utility authority for eligibility in these programs.

Additional funding may also be found through the following funding methods:

- Energy Savings Improvement Program (ESIP) – Public Law 2009, Chapter 4 authorizes government entities to make energy related improvements to their facilities and par for the costs using the value of energy savings that result from the improvements.

- Municipal Bonds – Municipal bonds are a bond issued by a city or other local government, or their agencies. Municipal bonds may be general obligations of the issuer or secured by specified revenues. Interest income received by holders of municipal bonds is often exempt from the federal income tax and from the income tax of the state in which they are issued, although municipal bonds issued for certain purposes may not be tax exempt.

- Power Purchase Agreement – Public Law 2008, Chapter 3 authorizes contractor of up to fifteen (15) years for contracts commonly known as "power purchase agreements."

These are programs where the contracting unit (Owner) procures a contract for, in most cases, a third party to install, maintain, and own a renewable energy system.

BSG-PMK/SWA recommends the Owner review the use of the above-listed funding options in addition to utilizing their standard method of financing for facilities upgrades in order to fund the proposed energy conservation measures.

6. RENEWABLE AND DISTRIBUTED ENERGY MEASURES

6.1. Existing systems

There are currently no existing renewable energy systems.

6.2. Solar Photovoltaic

As a result of our study, the roof of the New Brunswick Senior 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 34 kW was selected. The total annual generating capacity of the system is 36,707 as estimated using PV WATTS calculator provided by the Department of Energy (DOE), National Renewable Energy Laboratory (NREL).

PVWatts

AC Energy & Cost Savings

Cautions for Interpreting the Results

Station Identification	
City:	Newark
State:	New_Jersey
Latitude:	40.70° N
Longitude:	74.17° W
Elevation:	9 m
PV System Specifications	
DC Rating:	34.0 kW
DC to AC Derate Factor:	0.770
AC Rating:	26.2 kW
Array Type:	Fixed Tilt
Array Tilt:	20.0°
Array Azimuth:	233.0°
Energy Specifications	
Cost of Electricity:	17.0 ¢/kWh

Results			
Month	Solar Radiation ($kWh/m^2/day$)	AC Energy (kWh)	Energy Value ($)
1	2.47	2004	340.68
2	3.18	2351	399.67
3	4.04	3241	550.97
4	4.75	3575	607.75
5	5.58	4211	715.87
6	5.76	4086	694.62
7	5.67	4105	697.85
8	5.28	3800	646.00
9	4.61	3298	560.66
10	3.61	2725	463.25
11	2.31	1720	292.40
12	2.04	1591	270.47
Year	4.11	36707	6240.19

This proposed PV system would include 170 flat, crystalline PV modules installed on the roof. The system is based on commonly used 200 Watt PV modules, and one (1) inverter for conversion to AC power.

The proposed system would generate approximately 15 percent of the electric power consumed annually by the New Brunswick Senior 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 15 percent. The estimated cost of construction would be approximately $238,000 for this system. The approximate annual savings would be $24,094, which would make the approximate payback 10 years

PV System – New Brunswick Senior Citizen Resource Center		
	Savings	**Cost**
Estimated Cost Of Construction		$238,00
REIP Incentive		-$34,200
Township Investment		$204,000
First Year Electric Energy Savings	$6,240	
Estimated Annual SREC Revenue	$18,354	
Annual Maintenance		$500

First Year Savings	$24,094
Simple Payback Analysis	Approximately 10 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.

6.3. Solar Thermal Collectors

Solar thermal collectors are not recommended for this location based on the shading and amount of roof area available with unobstructed southern exposure.

6.4. 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.

6.5. Geothermal

Geothermal is not applicable to this project. A geothermal system would require the existing heating distribution system to be removed and replaced with a heat pump system. Large underground vertical or horizontal loop systems would need to be installed beneath the existing concrete pad and asphalt. These modifications to the existing heat distribution system would be extremely disruptive to the use of the building and the surrounding neighborhood in addition to the high cost of such an installation and retrofit.

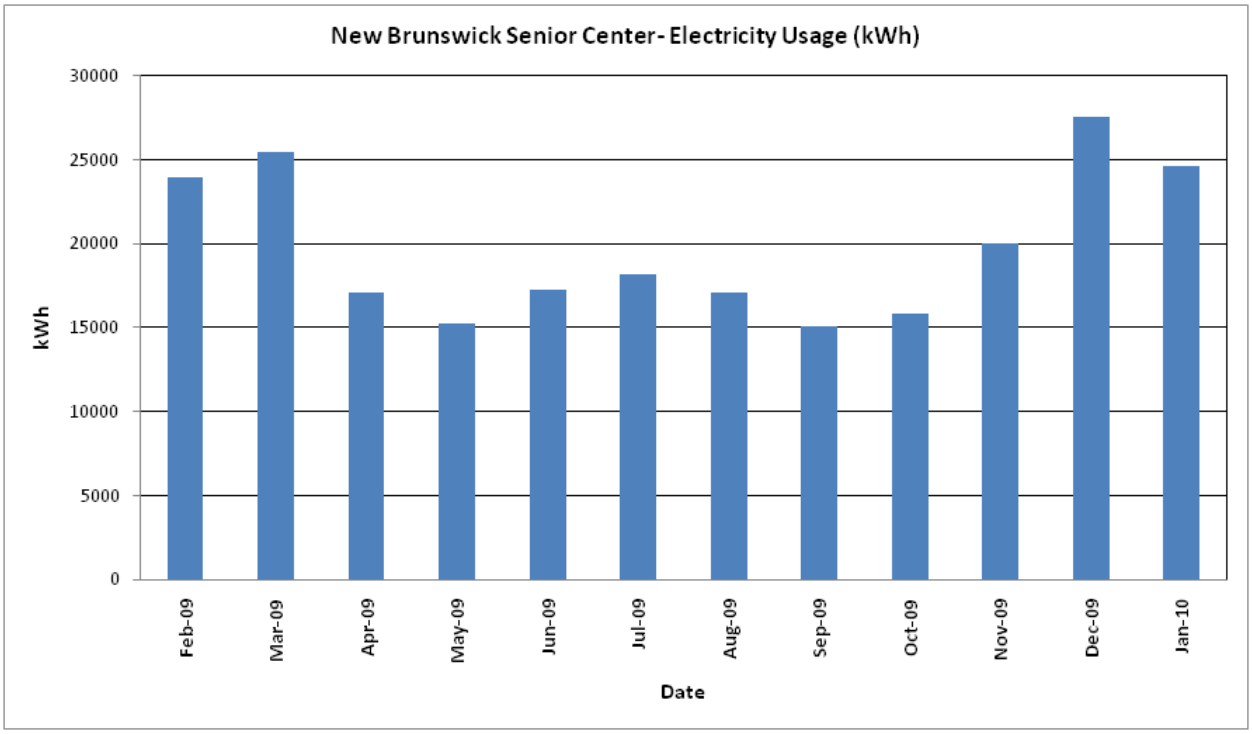
6.6. Wind

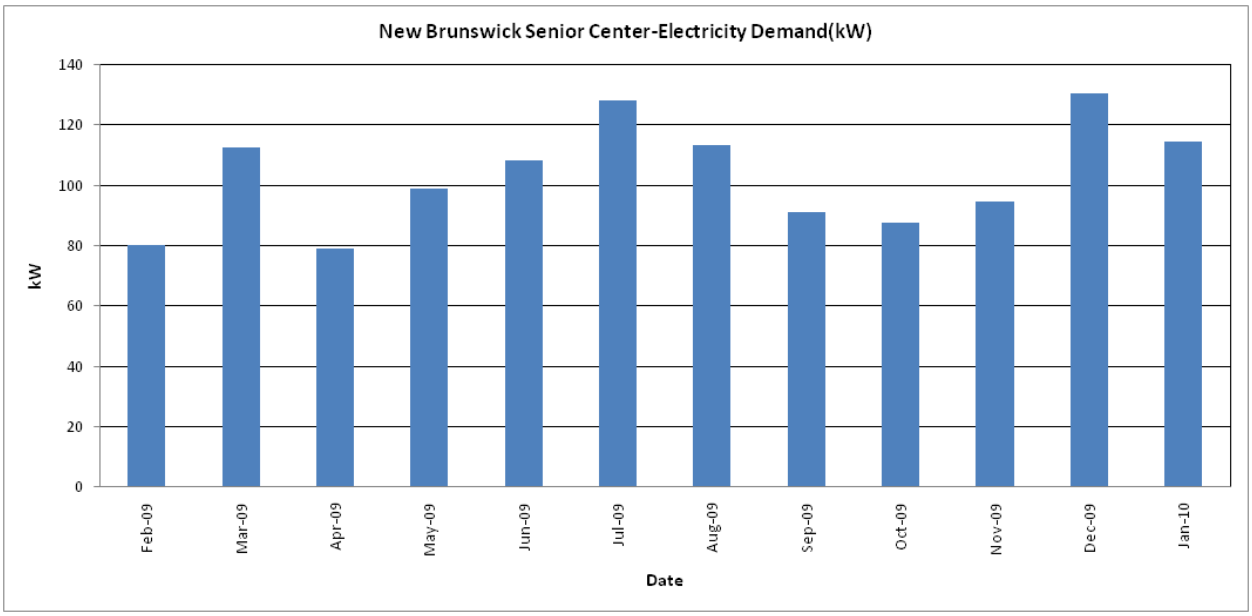
Wind power production is not appropriate for this location because required land is not available for the wind turbine. Also, the available wind energy resource is very low.

7. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

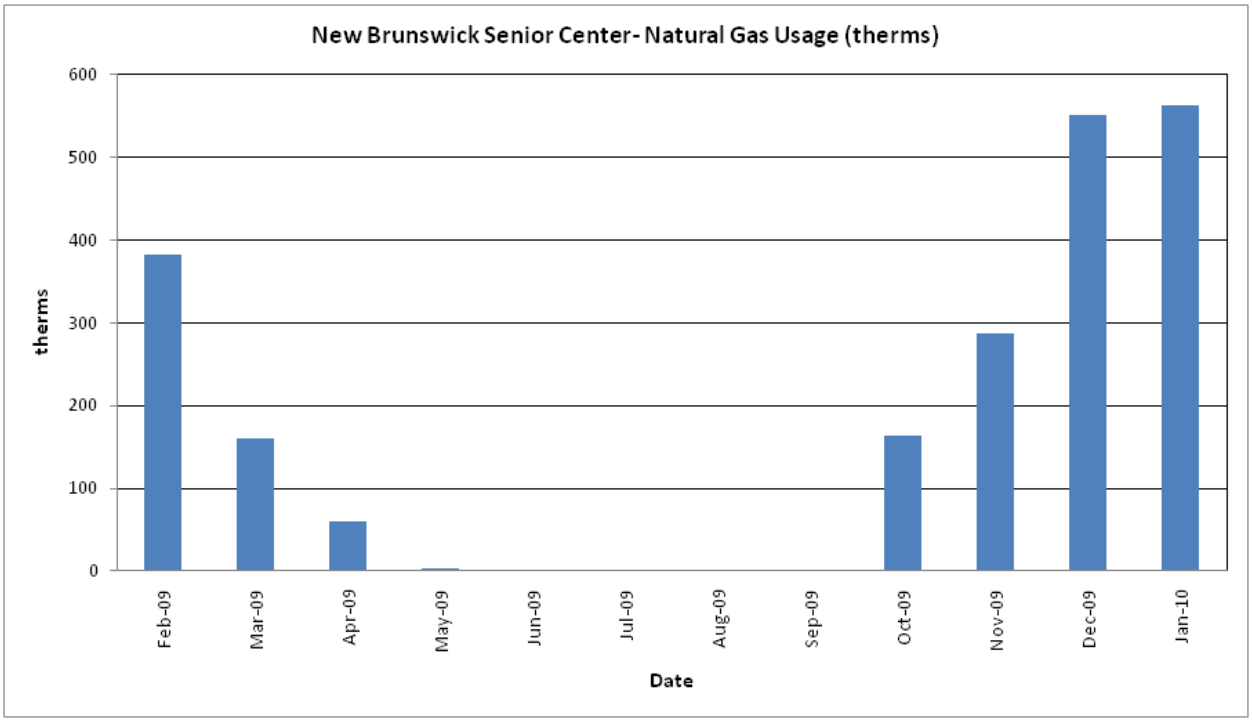
7.1. Energy Purchasing

The average electrical peak demand for the previous year was 103.2 kW and the maximum peak demand was 130.35 kW. The electric and gas load profiles for this project are presented in the following charts. The first chart shows electric demand (in kW) for the previous 12 months and the other two charts show electric and gas usage (in kWh), respectively.





The electrical demand peaks (except for a few fluctuations) reflect the electrical consumption peaks.



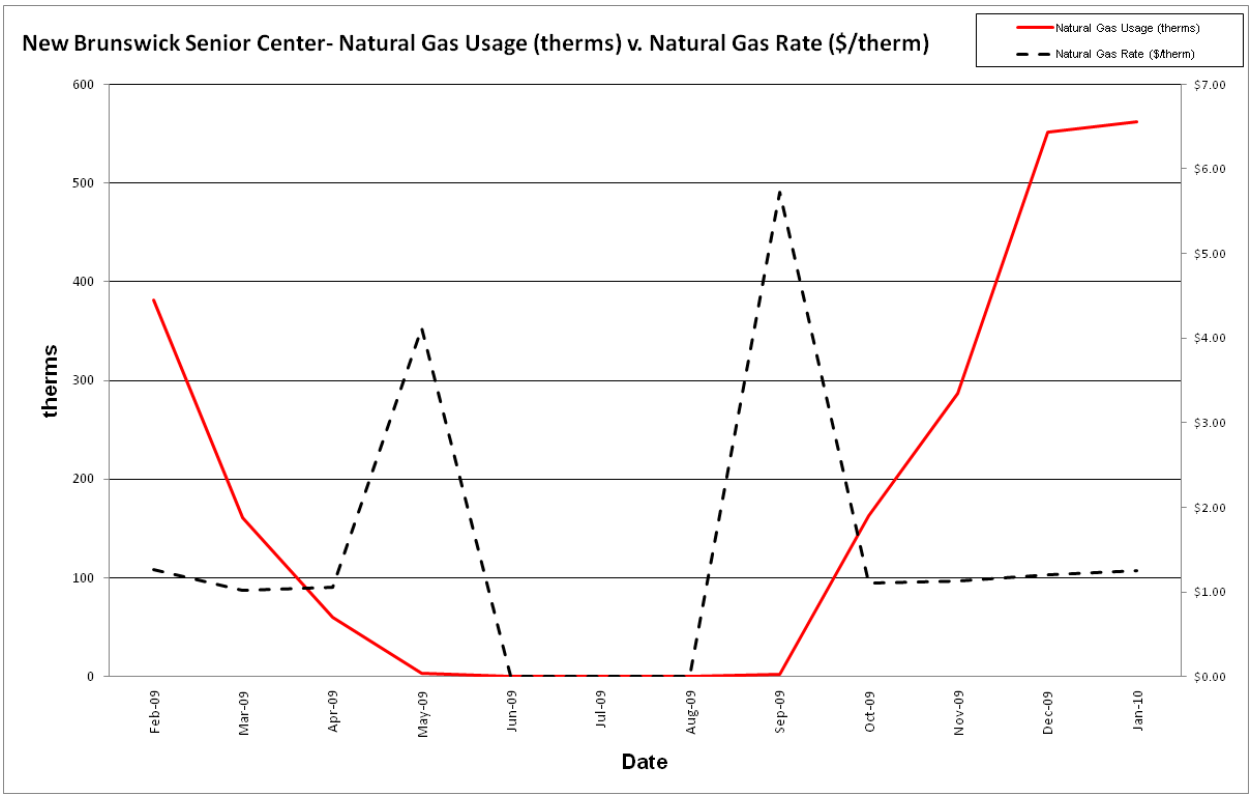
The natural gas usage shows that the most natural gas is consumed in the winter months, meaning the majority of natural gas use in this building is for heating.

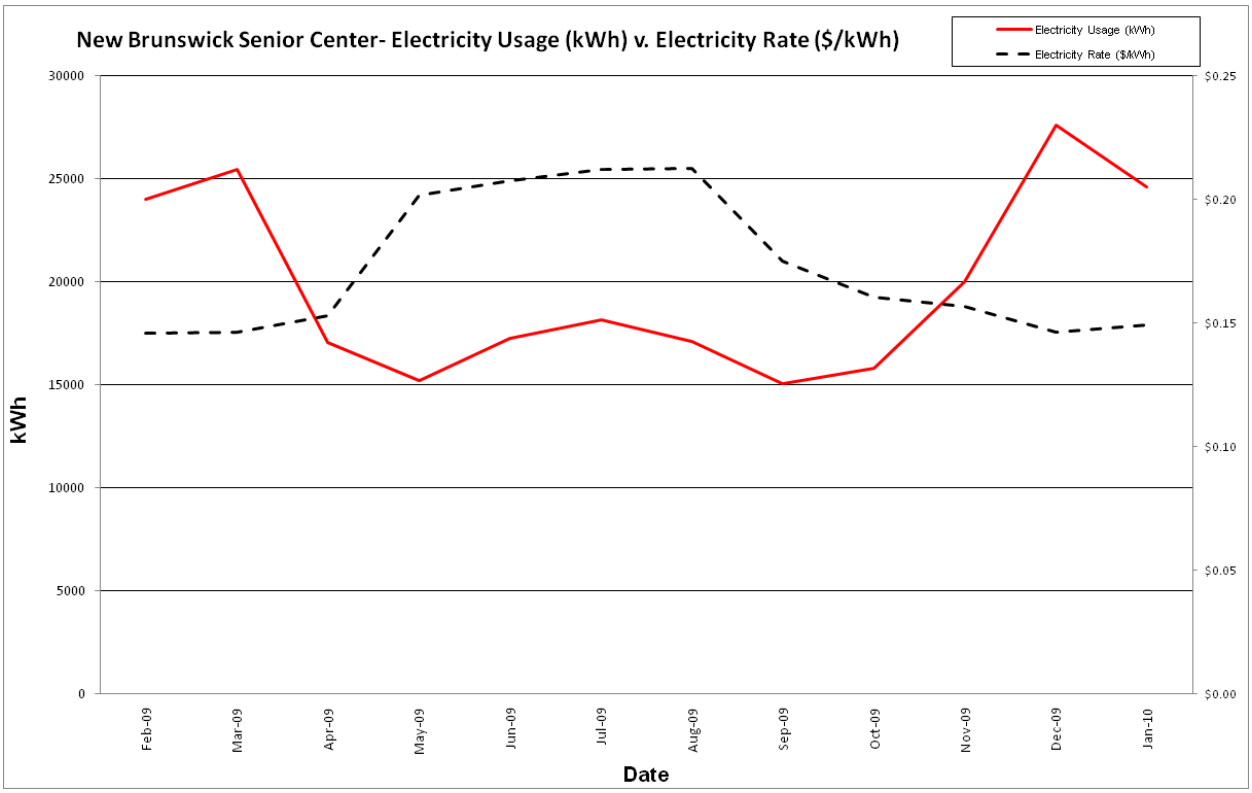
7.2. Tariff analysis

Currently, natural gas is provided via one gas meter with Public Service Electric & Gas serving as transmission and supply provider. The general service rate for natural gas charges a market-rate price based on use and the New Brunswick Senior Center billing data does not breakdown demand costs for all periods. Typically, the natural gas prices increase during the cooling months when natural gas is less of a demand.

The New Brunswick Senior Center is direct-metered (via one meter) and currently purchases electricity from Public Service Electric & Gas at a general service rate. The general service rate for electric charges are market-rate based on use and the New Brunswick Senior Center billing does show a breakdown of demand costs. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year. Typically, the electricity prices increase during the cooling months when electricity is used by the HVAC condensing units and air handlers.

The following charts compare the utility consumption and utility rates for the natural gas and electricity over the previous 12 month period. Note that there were no therms of natural gas consumed for three months during which the New Brunswick Senior Center was charged $10.12 each month.

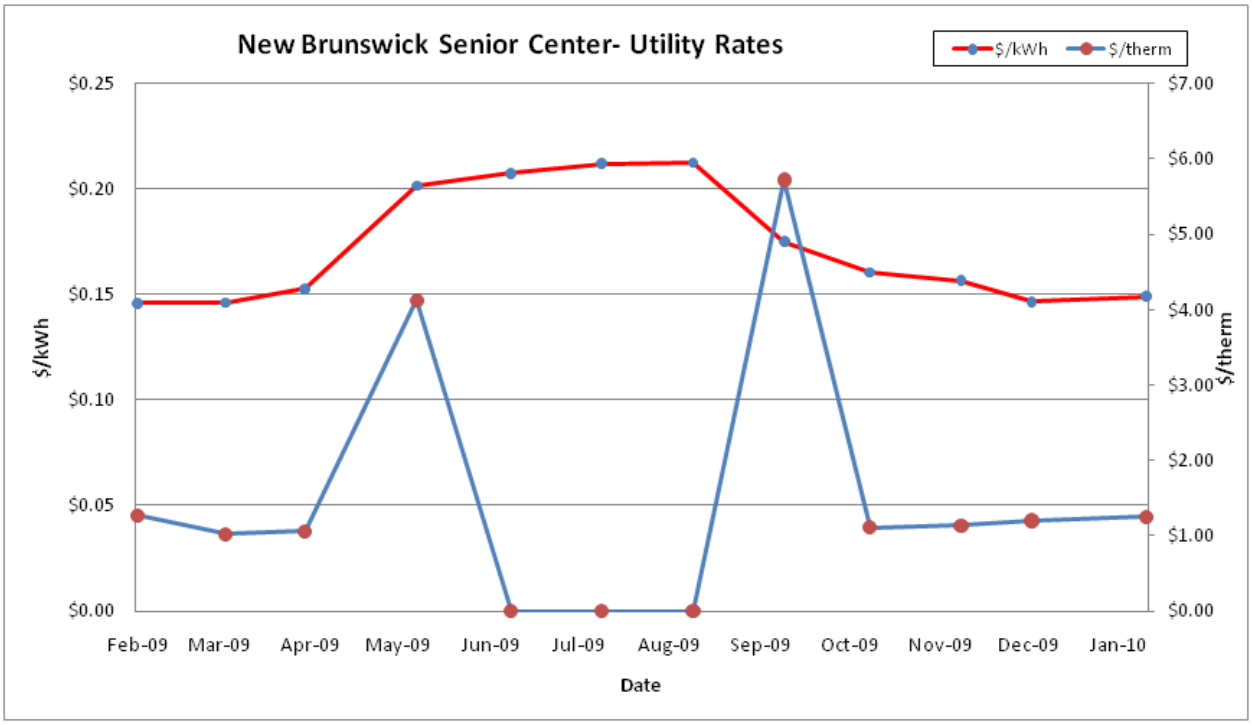

New Brunswick Senior Center- Natural Gas Usage (therms) v. Natural Gas Rate ($/therm)
Natural Gas Usage (therms)
Natural Gas Rate ($/therm)
therms
600
500
400
300
200
100
0
$7.00
$6.00
$5.00
$4.00
$3.00
$2.00
$1.00
$0.00
Feb-09
Mar-09
Apr-09
May-09
Jun-09
Jul-09
Aug-09
Sep-09
Oct-09
Nov-09
Dec-09
Jan-10
Date


New Brunswick Senior Center- Electricity Usage (kWh) v. Electricity Rate ($/kWh)
Electricity Usage (kWh)
Electricity Rate ($/kWh)
kWh
30000
25000
20000
15000
10000
5000
0
$0.25
$0.20
$0.15
$0.10
$0.05
$0.00
Feb-09
Mar-09
Apr-09
May-09
Jun-09
Jul-09
Aug-09
Sep-09
Oct-09
Nov-09
Dec-09
Jan-10
Date

7.3. Energy Procurement strategies

Billing analysis shows large price fluctuations of over the course of the year for the New Brunswick Senior Center natural gas account. Changing third party suppliers could reduce the cost associated with energy procurement. Customers that have a large variation in monthly billing rates can often reduce the costs associated with energy procurement by selecting a third party energy supplier. Contact the NJ Energy Choice Program for further information on Energy Services Companies (ESCOs) that can act as third party energy suppliers. Appendix B contains a complete list of third party energy suppliers.

SWA/BSG-PMK also recommends that New Brunswick contact third party energy suppliers in order to negotiate a lower electricity rate. Comparing the current electric rate to average utility rates of similar type buildings in New Jersey, which are approximately $0.15/kWh, it may be possible to save up to $ 0.02/kWh, which would have equated to approximately $4,373 for the past 12 months. New Brunswick already purchases natural gas for lower rate than the average rate of $1.45/therm.



8. METHOD OF ANALYSIS

8.1. Assumptions and methods

Energy modeling method:	Spreadsheet-based calculation methods
Cost estimates:	RS Means 2009 (Facilities Maintenance & Repair Cost Data) RS Means 2009 (Building Construction Cost Data) RS Means 2009 (Mechanical Cost Data) Note: Cost estimates also based on utility bill analysis and prior experience with similar projects.

8.2. Disclaimer

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

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

LIGHTING ANALYSIS

New Bruswick
Senior Center
81 Huntington 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	Retrofit the 4' wrap around fixture by replaceing the (2) T12 Lamps and Magnetic Ballast(s) with (2) T8 Lamps and an Electronic Ballast	2L4' EE/STD	80	2L4' T8/ELEC	61	15	$50.00	$15.00
2	Recessed Fixture with a 15W Compact Fluorescent Lamp / No Upgrade	15W CF/SI	15	No Upgrade	15	21	$0.00	$0.00
3	Retrofit the 2x2 fixture by replaceing the (2) T12 U-Tube Lamps and Magnetic Ballast(s) with (2) T8 U-Tube Lamps and an Electronic Ballast	2L22" STD/STD	94	2L22"	62	7	$50.00	$15.00
4	Replace the 60W Incandescent lamps with 13W Compact Fluorescents	60W INCANDESCENT	60	13W CF/SI	15	10	$6.00	$0.00
5	Retrofit the 4' recessed fixture by replaceing the (4) T12 Lamps and Magnetic Ballast(s) with (4) T8 Lamps and an Electronic Ballast	4L4' EE/STD	160	4L4' T8/ELEC	110	61	$80.00	$15.00
6	Retrofit the 4' fixture by replaceing the (4) T12 Lamps and Magnetic Ballast(s) with (4) T8 Lamps and an Electronic Ballast	4L4' EE/STD	160	4L4' T8/ELEC	110	0	$80.00	$15.00
7	Replace the 60W Incandescent lamps with 13W Compact Fluorescents	60W INCANDESCENT	60	13W CF/SI	15	17	$6.00	$0.00
8	250W Metal Halide Fixture / no Upgrade	250W MH/BALLAST	286	No Upgrade	286	9	$0.00	$0.00
9	Retrofit the 2x2 fixture by replaceing the (2) T12 U-Tube Lamps and Magnetic Ballast(s) with (2) T8 U-Tube Lamps and an Electronic Ballast	2L22" STD/STD	94	2L22"	62	7	$50.00	$15.00
10	Retrofit the 4' fixture by replaceing the T12 Lamp and Magnetic Ballast with a T8 Lamp and an Electronic Ballast	1L4' EE/STD	50	1L4' T8/ELEC	31	39	$40.00	$15.00
11	Retrofit the 4' wrap around fixture by replaceing the (4) T12 Lamps and Magnetic Ballast(s) with (4) T8 Lamps and an Electronic Ballast	4L4' EE/STD	160	4L4' T8/ELEC	110	6	$80.00	$15.00
12						0	$0.00	$0.00

Summary	Lighting (Only)	Sensors (Only)	Complete Lighting Upgrade
Cost	$6,758.00	$920.00	$7,678.00
Rebate	$1,695.00	$355.00	$2,050.00
Net Cost	$5,063.00	$565.00	**$5,628.00**
Savings (kWh)	10,720	487	**11,075**
Savings ($)	$1,822.34	$82.85	**$1,882.83**
Payback	2.8	6.8	**3.0**

Variables:

$0.17	Avg. Electric Rate ($/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)
							18508				12531	5.977	10720	$6,758.00	$1,822.34	3.7			487	$920.00	$82.85	11.1	$1,695.00	$355.00	11075	$5,628.00	$1,882.83	3.0
1	1	Maintance Room	10	2600	2L4' EE/STD	5	400		2L4' T8/ELEC	5	305	0.095	247	$250.00	$41.99	6.0	OSR	1	260	$260.00	$44.20	5.9	$75.00	$175.00	445	$260.00	$75.69	3.4
2	3	Hallway	11	2860	2L22" STD/STD	3	282		2L22"	3	186	0.096	275	$150.00	$46.68	3.2			0	$0.00	$0.00		$45.00	$0.00	275	$105.00	$46.68	2.2
3	3	Locker Room	8	2080	2L22" STD/STD	4	376		2L22"	4	248	0.128	266	$200.00	$45.26	4.4	OSR	1	196	$260.00	$33.24	7.8	$60.00	$140.00	395	$260.00	$67.18	3.9
4	4	Bathroom	8	2080	60W INCANDESC	1	60		13W CF/SI	1	15	0.045	94	$6.00	$15.91	0.4			0	$0.00	$0.00		$0.00	$0.00	94	$6.00	$15.91	0.4
5	4	Bathroom	8	2080	60W INCANDESC	1	60		13W CF/SI	1	15	0.045	94	$6.00	$15.91	0.4			0	$0.00	$0.00		$0.00	$0.00	94	$6.00	$15.91	0.4
6	5		8	2080	4L4' EE/STD	2	320		4L4' T8/ELEC	2	220	0.1	208	$160.00	$35.36	4.5			0	$0.00	$0.00		$30.00	$0.00	208	$130.00	$35.36	3.7
7	4	Game Room	7	1820	60W INCANDESC	3	180		13W CF/SI	3	45	0.135	246	$18.00	$41.77	0.4			0	$0.00	$0.00		$0.00	$0.00	246	$18.00	$41.77	0.4
8	6		7	1820	4L4' EE/STD	8			0																			
9	5	Pool Room	7	1820	4L4' EE/STD	4	1280		4L4' T8/ELEC	8	880	0.4	728	$640.00	$123.76	5.2			0	$0.00	$0.00		$120.00	$0.00	728	$520.00	$123.76	4.2
10	4		7	1820	60W INCANDESC	4	640		4L4' T8/ELEC	4	440	0.2	364	$320.00	$61.88	5.2			0	$0.00	$0.00		$60.00	$0.00	364	$260.00	$61.88	4.2
11	7	Closet	0.5	130	60W INCANDESC	1	240		13W CF/SI	4	60	0.18	328	$24.00	$55.69	0.4			0	$0.00	$0.00		$0.00	$0.00	328	$24.00	$55.69	0.4
12	4	Community Room	10	2600	60W INCANDESC	6	60		13W CF/SI	1	15	0.045	6	$6.00	$0.99	6.0			0	$0.00	$0.00		$0.00	$0.00	6	$6.00	$0.99	6.0
13	8		10	2600	250W MH/BALLA	8	360		13W CF/SI	6	90	0.27	702	$36.00	$119.34	0.3			0	$0.00	$0.00		$0.00	$0.00	702	$36.00	$119.34	0.3
14	5	Closet	0.5	130	4L4' EE/STD	1	2288		No Upgrade	8	2288	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
15	7	Back Hallway	8	2080	60W INCANDESC	30	160		4L4' T8/ELEC	1	110	0.05	7	$80.00	$1.11	72.4			0	$0.00	$0.00		$15.00	$0.00	7	$65.00	$1.11	58.8
16	5	Pottery Room	5	1300	4L4' EE/STD	8	1800		13W CF/SI	30	450	1.35	2808	$180.00	$477.36	0.4			0	$0.00	$0.00		$0.00	$0.00	2808	$180.00	$477.36	0.4
17	7		5	1300	60W INCANDESC	4	1280		4L4' T8/ELEC	8	880	0.4	520	$640.00	$88.40	7.2			0	$0.00	$0.00		$120.00	$0.00	520	$520.00	$88.40	5.9
18	5	Kitchen	6	1560	4L4' EE/STD	7	240		0	4	60	0.18	234	$24.00	$39.78	0.6			0	$0.00	$0.00		$0.00	$0.00	234	$24.00	$39.78	0.6
19	9		6	1560	2L22" STD/STD	4	1120		4L4' T8/ELEC	7	770	0.35	546	$560.00	$92.82	6.0			0	$0.00	$0.00		$105.00	$0.00	546	$455.00	$92.82	4.9
20	7		6	1560	60W INCANDESC	3	376		2L22"	4	248	0.128	200	$200.00	$33.95	5.9			0	$0.00	$0.00		$60.00	$0.00	200	$140.00	$33.95	4.1
21	8	Community Area	10	2600	250W MH/BALLA	6	180		13W CF/SI	3	45	0.135	211	$18.00	$35.80	0.5			0	$0.00	$0.00		$0.00	$0.00	211	$18.00	$35.80	0.5

					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)
22	1	Bathroom	8	2080	2L4' EE/STD	4	1716		No Upgrade	6	1716	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
23	1	Bathroom	8	2080	2L4' EE/STD	4	320		2L4' T8/ELEC	4	244	0.076	158	$200.00	$26.87	7.4			0	$0.00	$0.00		$60.00	$0.00	158	$140.00	$26.87	5.2
24	2	Hallway	11	2860	15W CF/SI	2	320		2L4' T8/ELEC	4	244	0.076	158	$200.00	$26.87	7.4			0	$0.00	$0.00		$60.00	$0.00	158	$140.00	$26.87	5.2
25	10	TV Room	8	2080	1L4' EE/STD	15	30		No Upgrade	2	30	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
26	10	Study	6	1560	1L4' EE/STD	14	750		1L4' T8/ELEC	15	465	0.285	593	$600.00	$100.78	6.0			0	$0.00	$0.00		$225.00	$0.00	593	$375.00	$100.78	3.7
27	10	Exercise Room	6	1560	1L4' EE/STD	14	700		1L4' T8/ELEC	14	434	0.266	415	$560.00	$70.54	7.9			0	$0.00	$0.00		$210.00	$0.00	415	$350.00	$70.54	5.0
28	2	Admin/Lobby	11	2860	15W CF/SI	8	700		1L4' T8/ELEC	14	434	0.266	415	$560.00	$70.54	7.9			0	$0.00	$0.00		$210.00	$0.00	415	$350.00	$70.54	5.0
29	10		11	2860	1L4' EE/STD	4	120		No Upgrade	8	120	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
30	11		11	2860	4L4' EE/STD	3	200		1L4' T8/ELEC	4	124	0.076	217	$160.00	$36.95	4.3			0	$0.00	$0.00		$60.00	$0.00	217	$100.00	$36.95	2.7
31	2	Foyer	11	2860	15W CF/SI	2	480		4L4' T8/ELEC	3	330	0.15	429	$240.00	$72.93	3.3			0	$0.00	$0.00		$45.00	$0.00	429	$195.00	$72.93	2.7
32	5	Office	0.5	130	4L4' EE/STD	5	30		No Upgrade	2	30	0	0	$0.00	$0.00		OSW	1	21	$200.00	$3.65	54.8	$0.00	$20.00	21	$180.00	$3.65	49.4
33	5	Closet	0.5	130	4L4' EE/STD	2	800		4L4' T8/ELEC	5	550	0.25	33	$400.00	$5.53	72.4			0	$0.00	$0.00		$75.00	$0.00	33	$325.00	$5.53	58.8
34	11	Office	8	2080	4L4' EE/STD	2	320		4L4' T8/ELEC	2	220	0.1	13	$160.00	$2.21	72.4	OSW	1	10	$200.00	$1.77	113.1	$30.00	$20.00	20	$310.00	$3.43	90.5
35	5	Coat Room	0.5	130	4L4' EE/STD	2	320		4L4' T8/ELEC	2	220	0.1	208	$160.00	$35.36	4.5			0	$0.00	$0.00		$30.00	$0.00	208	$130.00	$35.36	3.7

Appendix B: Third Party Energy Suppliers (ESCOs)

PSE&G SERVICE TERRITORY
Last Updated: 05/19/10

***CUSTOMER CLASS** - R – RESIDENTIAL C – COMMERCIAL I –INDUSTRIAL
****GREEN POWER MARKETER**

Supplier	Telephone & Web Site	*Customer Class
American Powernet Management, LP 437 North Grove St. Berlin, NJ 08009	(877) 977-2636 www.americanpowernet.com	C ACTIVE
Commerce Energy, Inc. 4400 Route 9 South, Suite 100 Freehold, NJ 07728	(800) 556-8457 www.commerceenergy.com	C ACTIVE
ConEdison Solutions Cherry Tree Corporate Center 535 State Highway 38 Cherry Hill, NJ 08002	(888) 665-0955 www.conedsolutions.com	C ACTIVE
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(888) 635-0827 www.newenergy.com	C/I ACTIVE
Credit Suisse, (USA) Inc. 700 College Road East Princeton, NJ 08450	(212) 538-3124 www.creditsuisse.com	C ACTIVE
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com	C/I ACTIVE
FirstEnergy Solutions 300 Madison Avenue Morristown, NJ 07962	(800) 977-0500 www.fes.com	C/I ACTIVE
Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, N.J. 08701	(800) 805-8586 www.gesc.com	R/C/I ACTIVE
Green Mountain Energy Company*** 3000 Atrium Way	(800) 810-7300	R/C/I

Mount Laurel, NJ 08054	www.greenmountain.com	**ACTIVE**
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com	**C/I** **ACTIVE**
Integrys Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830	(877) 763-9977 www.integrysenergy.com	**C/I** **ACTIVE**
Liberty Power Delaware, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(866) 769-3799 www.libertypowercorp.com	**C/I** **ACTIVE**
Liberty Power Holdings, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(866) 769-3799 www.libertypowercorp.com	**C/I** **ACTIVE**
Linde Energy Services 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 www.linde.com	**C/I** **ACTIVE**
Palmco Power NJ, LLC One Greentree Centre 10000 Lincoln Drive East, Suite 201 Marlton, NJ 08053	(877) 726-5862 www.PalmcoEnergy.com	**C/I** **ACTIVE**
Pepco Energy Services, Inc. 112 Main St. Lebanon, NJ 08833	(800) ENERGY-9 (363-7499) www.pepco-services.com	**C/I** **ACTIVE**
Sempra Energy Solutions The Mac-Cali Building 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 www.semprasolutions.com	**C/I** **ACTIVE**
South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 756-3749 www.south jerseyenergy.com	**C/I** **ACTIVE**

Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	(800) 225-1560 www.spragueenergy.com	**C/I** **ACTIVE**
Sterling Planet, Inc.*** 58 Otto Avenue Beverly, NJ 08010	(877) 457-2306 www.sterlingplanet.com	**R/C/I** **ACTIVE**
Strategic Energy, LLC 55 Madison Avenue, Suite 400 Morristown, NJ 07960	(888) 925-9115 www.sel.com	**C/I** **ACTIVE**
Suez Energy Resources NA, Inc. 333 Thornall Street, 6th Floor Edison, NJ 08837	(888) 644-1014 www.suezenergyresources.com	**C/I** **ACTIVE**
UGI Energy Services, Inc. 224 Strawbridge Drive Suite 107 Moorestown, NJ 08057	(856) 273-9995 www.ugienergyservices.com	**C/I** **ACTIVE**
Verde Energy USA, Inc. 50 East Palisades Avenue Englewood, NJ 07631	(800) 388-3862 www.lowcostpower.com	**R/C/I** **ACTIVE**
Viridian Energy 2001 Route 46, Waterview Plaza Suite 310 Parsippany, NJ 07054	(866) 663-2508 www.viridian.com	**R/C/I** **ACTIVE**

Back to the main supplier page

New Jersey Clean Energy Pay for Performance

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

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

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

Direct Install 2010 Program*

Direct Install is a division of the New Jersey Clean Energy Programs' Smart Start Buildings. It is a turn-key program for small to mid-sized facilities to aid in upgrading equipment to more efficient types. It is designed to cut overall energy costs by upgrading lighting, HVAC and other equipment with energy efficient alternatives. The program pays **up to 60%** of the retrofit costs, including equipment cost and installation costs.

Eligibility:

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

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

Smart Start

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

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

Equipment Replacement.

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

Renewable Energy Incentive Program*

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

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

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

Utility Sponsored Programs

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

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.