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**Local Government Energy Program
Energy Audit Report**

For

***City of New Brunswick
Dept. of Public Works – Front Building
400 Jersey Ave
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 Dept. of Public Works - Front Building 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 Dept. of Public Works - Front Building is a single story building totaling 9,200 square feet. The building contains; truck bays, storage, and working areas as well as an office, a bathroom and a common area.

The Dept. of Public Works - Front Building is occupied consistently by approximately 3 employees 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 Dept. of Public Works - Front Building 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 Dept. of Public Works - Front Building consumed a total of 194,400 kWh of electricity for a total cost of \$36,695. In the most recent full year of natural gas data collected, February, 2009 through January, 2010, 13,652 therms of gas were consumed for a total cost of \$14,903. . In the most recent full year of No. 2 Heating Oil data collected, April, 2009 through March, 2010, 1,205 gallons of heating oil were consumed for a total cost of \$2,982. With electricity, natural gas and heating oil combined, the building consumed 2,197 MMBtus of energy at a total cost of \$54,580.

SWA/BSG-PMK has entered energy information about the Dept. of Public Works - Front Building in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. The building was classified as a Service (Vehicle Repair) 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 273 kBtu/ft²yr compared to the national average of a similar building consuming 77 kBtu/ft²yr. Implementing the recommendations included in this report will reduce the building energy consumption by approximately 24 kBtu/ft²yr. There may be energy procurement opportunities for City of New Brunswick to reduce annual utility costs, which are \$7,536/year higher, when compared to the average estimated NJ commercial utility rates.

Based on the assessment of the Dept. of Public Works - Front Building, 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:

The roofing material on the shed style roof has reached the end of its useful life and is becoming brittle and wearing through; replacement of the roof should be considered in the coming years

Category II: Operations & Maintenance:

- Repair cracked brick and mortar joints
- Remove vegetation from exterior surfaces
- Caulk and Seal exterior wall penetrations
- Repair rain gutters
- Weatherstrip exterior doors

Category III: Energy Conservation Measures:

At this time, SWA/BSG-PMK highly recommends a total of **6** Energy Conservation Measures (ECMs) for the Dept. of Public Works - Front Building that are summarized in the following table. The total investment cost for these ECMs, with incentives, is **\$209,692** (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 **\$27,882** with an aggregated simple payback of approximately **7.5 years**. SWA/BSG-PMK estimates that implementing the highly recommended ECMs will reduce the carbon footprint of the facility by **69,500 lbs of CO₂**.

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 \$1,084.75.

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 \$0.19 \$/kWh
 Energy price escalation rate: 0% per DOE FEMP guidelines Gas rate \$1.07 \$/therm
 Heating oil rate \$2.49 \$/gal equiv. to \$1.78 \$/therm

Avg. Annual Demand: 0.00604 Area of Building (SF): 9,200

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	\$3,222	\$720	\$2,502	3,866	1.95	0	1.43	\$0	\$735	15	\$8,643	3.41	245%	16%	29%	\$6,267	5,296
	Occupancy Sensors		\$720	\$230	\$490	749	0.38	0	0.28	\$0	\$142	10	\$1,201	3.44	145%	15%	26%	\$724	1,026
2	Replace Through-the-Wall Air-Conditioners	Vendor Website	\$1,850	\$0	\$1,850	3,170	1.60	0	1.18	\$0.00	\$602	10	\$5,086	3.07	175%	17%	30%	\$3,288	4,343
3	Vending Miser	Similar Projects	\$250	\$0	\$250	1,610	0.81	0	0.60	\$0	\$306	10	\$2,583	0.82	933%	93%	122%	\$2,359	2,206
4	Convert Boiler to Gas & Install OAR	Vendor Website, Similar Projects	\$4,000	\$0	\$4,000	0	0.00	143.70	1.56	\$0	\$1,426	10	\$12,045	2.80	201%	20%	34%	\$8,168	1,681
TOTAL			\$10,042	\$950	\$9,092	9,395	4.73	144	5.05	\$0.00	\$3,212	-	\$29,559	2.83	-	-	-	\$20,806	14,552

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
5	Heating Override Control	Similar Projects	\$5,000	\$0	\$5,000	0	0.00	519.13	5.64	\$0	\$555	10	\$4,690	9.00	-6%	-1%	2%	-\$262	6,074
6	32.6-kW Roof-Mounted PV System	Similar Projects	\$228,200	\$32,600	\$195,600	35,674	17.96	0.00	13.23	\$0	\$24,115	30	\$460,676	8.11	136%	5%	12%	\$277,065	48,873
TOTAL			\$233,200	\$32,600	\$200,600	35,674	17.96	519	18.87	\$0.00	\$24,670	-	\$465,366	8.13	-	-	-	\$276,803	54,947

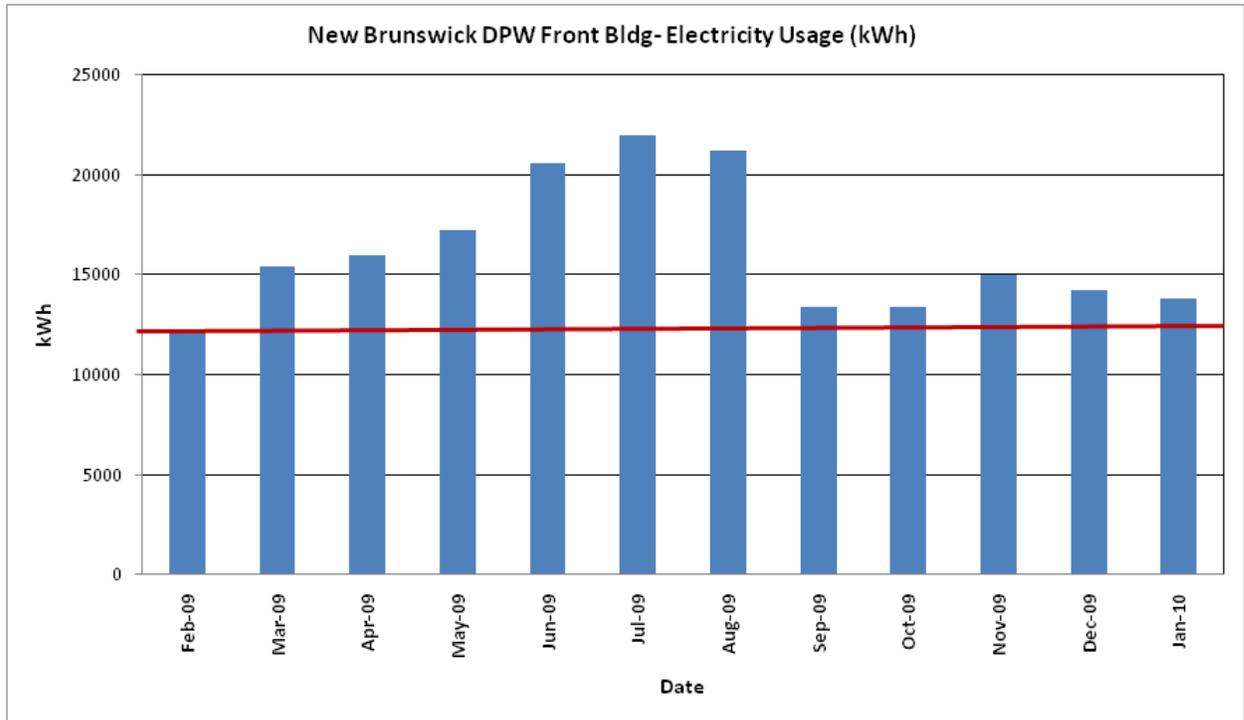
1. HISTORIC ENERGY CONSUMPTION

1.1. Energy Usage and Cost Analysis

SWA/BSG-PMK analyzed utility bills that were received from the utility company supplying the Dept. of Public Works Front building with electric, natural gas and no. 2 heating oil from February, 2009 through January, 2010 (heating oil bills are from April, 2009 through March, 2010).

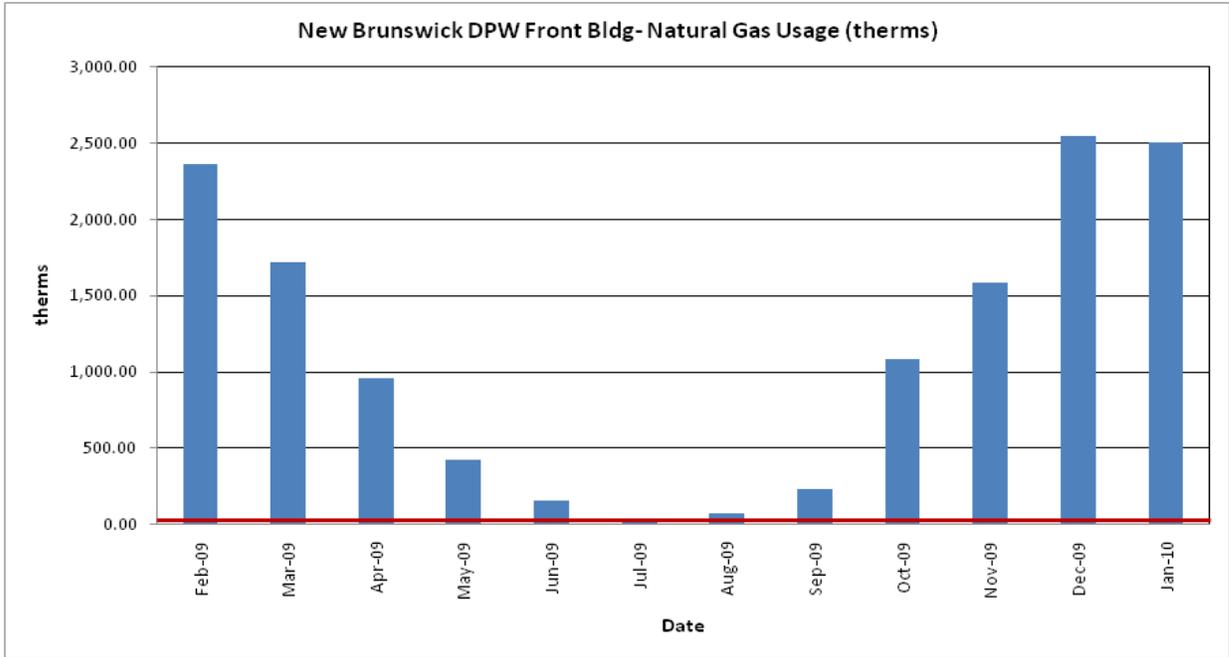
Electricity – The Dept. of Public Works Front building is currently served by one electric meter. The facility currently receives electricity from Public Service Electric & Gas at **an average rate of \$0.19/kWh** based on 12 months of utility bills from February, 2009 through January, 2010. The facility consumed **approximately 194,400 kWh or \$36,695 worth of electricity** in the previous year with an average monthly demand of 97 kW.

The following charts show electricity usage for the Dept. of Public Works Front building based on utility bills for the billing analysis period. The red line indicates the estimated base-load in kWh.



Natural Gas – The Dept. of Public Works Front 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 \$1.09/therm** based on 12 months of utility bills for February, 2009 through January, 2010. The facility consumed **approximately 13,652 therms or \$14,903 worth of natural gas** in the previous year.

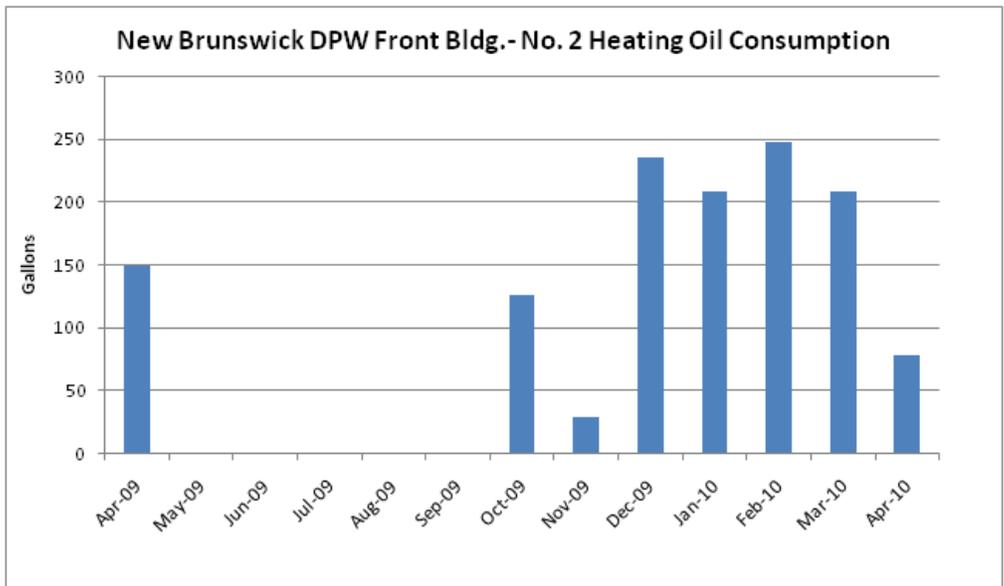
The following charts show the natural gas usage for the Dept. of Public Works Front building based on utility bills for the analysis period of February, 2009 through January, 2010



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.

No.2 Heating Oil – The Dept. of Public Works Front building is currently services one tank with No.2 heating oil. The facility currently receives heating oil from Allied Oil Co. at **an average rate of \$2.47/gal** based on 12 months of utility bills from April, 2009 through March, 2010. The facility consumed **approximately 1,205 gallons or \$2,982 worth of heating oil** in the previous year.

The following charts show heating oil usage for the Dept. of Public Works Front building based on utility bills for the billing analysis period.



1.2. Utility Rate

The Dept. of Public Works Front 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 \$0.19/kWh based on the most recent 12 months of utility bills.

The Dept. of Public Works Front 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 \$1.09/therm based on the most recent 12 months of utility bills.

The Dept. of Public Works Front building currently receives heating oil supply from Allied Oil Co. at a general service rate for no.2 heating oil in gallons. There is one oil storage tank that provides heating oil for the facility. The average rate (supply and transport) for the storage tank is approximately \$2.73/gal based on the most recent 12 months of utility bills.

1.3. Energy Benchmarking

SWA/BSG-PMK has entered energy information about the Dept. of Public Works Front 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 Service (Vehicle Repair/Service) preventing it from earning a performance rating which can be used to achieve an Energy Star building certification.

The Site Energy Use Intensity is 273 kBtu/sq.ft./yr compared to the national average of buildings classified as Service (Vehicle Repair/Service) consuming 77 kBtu/sq.ft./yr. Implementing this report's recommended Energy Conservations Measures (ECMs) will reduce use by approximately 24 kBtu/sq.ft./yr.

SWA/BSG-PMK has created the Portfolio Manager site information for New Brunswick. 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 DPW Front

Building ID: 2350265
For 12-month Period Ending: March 31, 2010¹
Date SEP becomes ineligible: N/A

Date SEP Generated: June 15, 2010

Facility
New Brunswick DPW Front
400 Jersey Ave
New Brunswick, NJ 08901

Facility Owner
City of New Brunswick
76 Bayard St
New Brunswick, NJ 08901

Primary Contact for this Facility
Chris Butler
76 Bayard St
New Brunswick, NJ 08901

Year Built: 1935
Gross Floor Area (ft²): 9,200

Energy Performance Rating² (1-100) N/A

Site Energy Use Summary³

Electricity - Grid Purchase(kBtu)	664,421
Fuel Oil (No. 2) (kBtu)	167,122
Natural Gas (kBtu) ⁴	1,348,424
Total Energy (kBtu)	2,179,967

Energy Intensity⁵

Site (kBtu/ft ² /yr)	237
Source (kBtu/ft ² /yr)	413

Emissions (based on site energy use)
Greenhouse Gas Emissions (MTCO₂e/year) 185

Electric Distribution Utility
Public Service Elec & Gas Co

National Average Comparison

National Average Site EUI	77
National Average Source EUI	150
% Difference from National Average Source EUI	175%
Building Type	Service (Vehicle Repair/Service, Postal Service)

Meets Industry Standards⁶ for Indoor Environmental Conditions:

Ventilation for Acceptable Indoor Air Quality	N/A
Acceptable Thermal Environmental Conditions	N/A
Adequate Illumination	N/A

Notes:

- 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.
- 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.
- Values represent energy consumption, annualized to a 12-month period.
- 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.
- Values represent energy intensity, annualized to a 12-month period.
- 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.

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

The government estimates the average time needed to fill out this form is 6 hours (includes the time for entering energy data, PE facility inspection, and notarizing the SEP) and welcomes suggestions for reducing this level of effort. Send comments (referencing OMB control number) to the Director, Collection Strategies Division, U.S., EPA (2622T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460.

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), 9,200 square feet DPW (front) building was originally constructed in 1935 with an additions completed in 1987. It houses truck bays, and office, a bathroom and a common area,



Areal View



Front Façade



Partial Front Façade (typ.)

2.2. Building occupancy profiles

Its occupancy is approximately 3 employees at any given time from Monday through Friday 7:00 am to 4:00 pm.

2.3. Building Envelope

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

General Note: All findings and recommendations on the exterior envelope (base, walls, roofs, doors and windows) are based on the energy auditors' experience and expertise, on construction

document reviews (if available) and on detailed visual analysis, as far as accessibility and weather conditions allowed at the time of the field audit.

2.3.1. Exterior Walls

The exterior wall envelope is mostly constructed of brick veneer over painted concrete block and brick with 0 inches of detectable insulation. The interior is mostly painted CMU (Concrete Masonry Unit) or brick and wood paneling in the office area.

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

Exterior and interior wall surfaces were inspected during the field audit. They were found to be in overall good, age-appropriate condition with only a few signs of uncontrolled moisture, air-leakage or other energy-compromising issues detected on all facades.

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



Cracked bricks and mortar joints



Overgrown ground vegetation touching exterior wall surfaces



Un-caulked/un-sealed exterior wall penetrations

2.3.2. Roof

The building's roof is predominantly a flat and parapet type over steel decking, with a built-up asphalt finish. It was replaced 1988. Zero inches of detectable ceiling insulation were recorded. Other parts of the building are also covered by a low-pitch shed type over a assumed wood structure with an asphalt shingle finish. Three inches of fiberglass batt ceiling insulation were recorded. This roof was replaced 1987. Interior finishes vary from exposed unfinished to suspended acoustic ceiling tile type.

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 good, age-appropriate condition, with only a few signs of uncontrolled moisture, air-leakage or other energy-compromising issues.

The following specific roof problem spots were identified:



The roofing material has reached the end of its useful lifespan. Leaks were reported.



Ineffective downspout deflector.



Defective gutters

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 or on construction plans, and are based upon similar wall types and time of construction.

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

2.3.4. Windows

The building contains basically two types of windows.

- Double-hung type windows with a vinyl frame, clear double glazing and no interior or exterior shading devices. The windows are original and have never been replaced
- Single-hung type windows with a non-insulated aluminum frame, clear single glazing and no interior or exterior shading devices. The windows 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 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 spot was identified:



Missing/worn weather-stripping was found

2.3.6. Building Air Tightness

Overall the field auditors found the building to be reasonably air-tight, considering the building's use and occupancy, 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 an oil-fired Burnham hot water boiler, installed in 2000. It is rated at 196 MBH and is 87% efficient. Four 1/12 HP Bell & Gossett hot water circulation pumps serve the building's four zones of baseboard heat. The main garage is heated by five (5) Panelbloc low-intensity infrared radiant heaters, each with a capacity of 125 MBH. Although the Panelbloc units are old, they appear to be in good operating condition.

Category III Recommendation – ECM #4: Convert the boiler to natural gas by installing a new burner and extending the gas line to the burner, and install hot water outdoor air reset control (OAR). These 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. Outdoor air reset generally decreases heating costs by 8-15%.

Figure 1: Panelbloc low-intensity infrared radiant heater



Category III Recommendation – ECM #5: Install (2) roll up door sensors (one for each garage door) that will automatically shut off the Panelbloc low-intensity infrared radiant heaters when one of the garage doors is open.

2.4.2. Cooling

The building's only cooling is provided by three (3) through-the-wall air-conditioners. A Sharp unit cools the lounge, a 2-ton Hampton Bay unit cools the main office, and a 14,000 BTUH Fedders unit cools the entrance area.

Category III Recommendation – ECM #2: Replace all through-the-wall air-conditioners, which have reached the end of their useful life, with more efficient units.

2.4.3. Ventilation

There is one 30" -3hp wall mounted exhaust fan that is manually operated. Natural ventilation is provided by doors and windows.

2.4.4. Domestic Hot Water

Domestic hot water is provided by a 50 gallon AO Smith natural gas water heater, rated at 40 MBH. The unit was installed in 2007 and was found to be in good working order.

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>. The building is not currently equipped with energy vending miser devices for conserving energy usage by drinks and snacks vending machines. When equipped with the



Figure 2: AO Smith water heater

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 (2) refrigerators, (3) microwaves, (2) toaster ovens, (1) vending machine, a clothes washer, and a clothes dryer. 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.

Category III Recommendation – ECM #3: Install vending machine occupancy sensors on all vending machines, which will shut the power off when the vending machines are not being used.

2.5.3.Elevators

There are no elevators at this facility.

3. Building Systems Equipment List

New Brunswick Dept. of Public Works - Building #2 (Large Vehicle Storage)							
Building System	Description	Locations	Model #	Fuel	Space Served	Year Installed	Estimtaed. Remaining Useful Life %
Heating	Hot water boiler; 196/170 MBH input/output, 87% efficient	Boiler room	Burnham, M# PV85ET-TBWF, S# 64249176	#2 heating oil	Entire building, (4) zones	2000	71%
Heating	(5) low-intensity infrared radiant heaters, 125 MBH	Garage	Panelbloc, M# CL-125CI-4, S# 1V 151637	Natural gas	Garage	1968	25%
Heating	Hot water circulation pump, 1 phase, 1/12 HP, 1,725 RPM	Boiler room, pipe-mounted	Bell & Gossett Series 100, M# M09181 106189	Electricity	Zone 1: Offices/ baseboards	2006	60%
Heating	Hot water circulation pump, 1 phase, 1/12 HP, 1,725 RPM	Boiler room, pipe-mounted	Bell & Gossett Series 100, M# M09181 106189	Electricity	Zone 2: South end - Laundry	2001	10%
Heating	Hot water circulation pump, 1 phase, 1/12 HP, 1,725 RPM	Boiler room, pipe-mounted	Bell & Gossett Series 100, M# M09181 106189	Electricity	Zone 3: North end	2000	0%
Heating	Hot water circulation pump, 1 phase, 1/12 HP, 1,725 RPM	Boiler room, pipe-mounted	Bell & Gossett Series 100, M# M09181 106189	Electricity	Zone 4: East end	2004	40%
Heating	Oil burner, , 1/7 HP, 3,450 RPM	Boiler room	Beckett, M# 707 502, Part # 21805R	Electricity	Boiler	2000	52%
Cooling	Through-the-wall air-conditioner, 14 MBH, 2010 W, 7 EER	Entrance	Fedders, M# ACT14F7HKB, S# KU287552 2993	Electricity	Entrance	1993	0%
Cooling	Through-the-wall air-conditioner	Lounge	Sharp (nameplate not accessible)	Electricity	Lounge	Approx. 1990	0%
Cooling	Through-the-wall air-conditioner, 2 tons, 8.3 EER	Main office	Hampton Bay, M# HBD240, S# EH238497 1236	Electricity	Main office	1997	0%

Domestic Hot Water	Water heater, 50 gallons, 40 MBH, 40.94 gal/hr recovery	Boiler room	AO Smith, M# GCV 50 100, S# F07A024221	Natural gas	Sinks	2007	77%
Ventilation	30", 6-blade ventilation fan, 3 HP motor 1735 Rpm	Garage wall	Dayton (motor) Model 5K675M	Electricity	Main garage	Approx. 1987	20%
Appliances	Refrigerator	Break area	Hotpoint (no nameplate)	Electricity	Break area	Approx. 1990	20%
Appliances	Microwave	Break area	Magic Chef, M# DM84KG, S# 11936813QU	Electricity	Break area	1996	30%
Appliances	Refrigerator (currently not in use)	Supervisor's office	Welbilt (no nameplate)	Electricity	Supervisor's office	Approx. 1995	25%
Appliances	Microwave	Supervisor's office	GE, M# J E87 002, S# GV967704S	Electricity	Supervisor's office	1987	0%
Appliances	Vending machine (Pepsi)	Entrance	Dixie-Narco, M# DN 501E MC/S11-9, S# 2436 6551BX	Electricity	Entrance	Approx. 2000	60%
Appliances	Microwave	Lounge	Sunbeam, M# SM0701A7E, S# UHW7020001	Electricity	Lounge	2008	90%
Appliances	Clothes washer	Laundry room	Kenmore, M# 110.92060110, S# CA3741254	Electricity	Laundry room	Approx. 1990	20%
Appliances	Clothes dryer, 22 MBH	Laundry room	Kenmore, M# 110.9282100, S# 72821	Natural gas	Laundry room	Approx. 1990	20%
Appliances	Refrigerator	Main office	Sanyo, M# SR-1288X, S# 910411823	Electricity	Main office	Approx. 1991	0%

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:

The roofing material on the shed style roof has reached the end of its useful life and is becoming brittle and wearing through; replacement of the roof should be considered in the coming years

Category II: Operations & Maintenance:

- Repair cracked brick and mortar joints
- Remove vegetation from exterior surfaces
- Caulk and Seal exterior wall penetrations
- Repair rain gutters
- Weatherstrip exterior doors

Category III Recommendations: Energy Conservation Measures:

Summary Table

ECM #	Description
1	Lighting Upgrades & Occupancy Sensors
2	Replace Through-the-Wall Air-Conditioners
3	Vending Miser
4	Convert Boiler to Gas & Install OAR
5	Heating Override Control
6	32.6-kW Roof-Mounted PV System

ECM #1: Lighting Upgrades & Occupancy Sensors

Description:

Lighting at the DPW (Front) primarily consists of standard-efficiency fixtures with T12 lamps and magnetic ballasts. There are also several incandescent fixtures. SWA/BSG-PMK recommends retrofitting the T12 fixtures with T8 lamps and electronic ballasts and replacing the incandescent fixtures with compact fluorescents. Lighting replacements typically yield a short payback.

Recommended lighting upgrades are detailed in Appendix A.

Installation cost:

	Lighting (Only)	Sensors (Only)	Complete Lighting Upgrade
Cost	\$3,222.00	\$720.00	\$3,942.00
Rebate	\$720.00	\$230.00	\$950.00
Net Cost	\$2,502.00	\$490.00	\$2,992.00
Savings (kWh)	3,866	749	4,381
Savings (\$)	\$734.53	\$142.27	\$832.34
Payback	3.4	3.4	3.6

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	\$3,222	\$720	\$2,502	3,866	1.95	0	1.43	\$0	\$735	15	\$8,643	3.41	245%	16%	29%	\$6,267	5,296
	Occupancy Sensors		\$720	\$230	\$490	749	0.38	0	0.28	\$0	\$142	10	\$1,201	3.44	145%	15%	26%	\$724	1,026

Assumptions:

The electric cost used in this ECM was \$0.19/kWh, which was the facilities' average rate for the 12-month period from February, 2009 through January, 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 \$950.

ECM #2: Replace Through-the-Wall Air-Conditioners

Description:

The only cooling in the building is supplied by three through-the-wall air-conditioning units, all of which have reached the end of their useful life. The main office is cooled by a 2-ton Hampton Bay unit, with an Energy Efficiency Ratio (EER) of 8.3. A 14,000 BTUH, 7 EER Fedders unit cools the front entrance. A Sharp unit, which cools the lounge, does not have a nameplate, but was approximately the same size as the Fedders unit, and therefore was estimated to also have a capacity of 14,000 BTUH; this unit was also estimated, due to the time period in which it was manufactured, to have an EER of 8. Newer air-conditioning units use Puron refrigerant, a more efficient fluid than the current R-22 refrigerant. This yields a higher EER. Due to the age and condition of the units, their EERs have been estimated to decrease by 1.0.

Installation cost: \$550 each for the 14,000 BTUH units, \$750 for the 2-ton unit, \$1,850 total

Source of cost estimate: Vendor website

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	Replace Through-the-Wall Air-Conditioners	Vendor Website	\$1,850	\$0	\$1,850	3,170	1.60	0	1.18	\$0.00	\$602	10	\$5,086	3.07	175%	17%	30%	\$3,288	4,343

Assumptions:

Using 12 months of the facility's electricity, it was determined that the cost of electricity is currently \$0.19/kWh. Per the American Society of Heating, Refrigeration & Air-Conditioning Engineers (ASHRAE), the outdoor dry bulb temperature is above 93°F 0.4% percent of a year, and the number of cooling degree-days for one year is 1,024. 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:

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

Rebates/financial incentives:

No rebates or incentives for through-the-wall air-conditioners could be found.

ECM #3: Vending Miser

Description:

The average vending machine consumes 4,025 kWh of energy per year, most of which can be attributed to lighting and cooling, which run 24 hours-per-day. Installing occupancy sensors on the DPW Large Vehicle Storage building’s one (1) vending machine would activate the power to the unit when in use, and deactivate the power if the unit has not been used for more than 15 minutes. Vending machine lighting would remain off until the adjacent area is occupied again. The refrigeration unit will be shut down for a maximum two hours, in order to maintain a desirable temperature for the product.

Installation cost: \$250

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
3	Vending Miser	Similar Projects	\$250	\$0	\$250	1,610	0.81	0	0.60	\$0	\$306	10	\$2,583	0.82	933%	93%	122%	\$2,359	2,206

Assumptions:

The electric cost used in this ECM was \$0.19/kWh, which was the DPW Large Vehicle Storage building’s average rate for the period ranging from March, 2009 through January, 2010. The average vending machine consumes 4,025 kWh per year. Energy savings for a vending machine in low-traffic (less than 68 hours per week) areas is approximately 40%.

Rebates/financial incentives:

NJ Clean Energy – Direct Install program (60% of installed cost)

ECM #4: Convert Boiler to Natural Gas & Install Outdoor Air Reset Control

Description:

Four zones – the offices, the south end, the north end, and the east end – are heated by a 196 MBH Burnham oil-fired, hot water boiler. The unit was installed in 2000 and has 25 years of its useful life remaining, and is in good condition. It is 87% efficient, better than the standard 80%. This unit can be made more energy- and cost-efficient by switching the heating fuel to natural gas and installing hot water outdoor air reset control (OAR). The DPW pays for heating oil at a rate of \$2.49 per gallon, equivalent to \$1.78 per therm; by comparison, the rate the DPW pays for natural gas, which is used to fuel the water heater that sits only a few feet from the boiler, is \$1.07 per therm. Converting to natural gas requires replacing the oil burner with a gas burner and extending the gas line to the burner. Hot water boilers can be made more energy-efficient by installing OAR. These 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. Outdoor air reset generally decreases heating costs by 8-15%.

Installation cost:

Estimated installed cost: \$2,000 for the conversion to gas, \$2,000 for OAR, \$4,000 total

Source of cost estimate: Similar projects, burner vendor website

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	Convert Boiler to Gas & Install OAR	Vendor Website, Similar Projects	\$4,000	\$0	\$4,000	0	0.00	143.70	1.56	\$0	\$1,426	10	\$12,045	2.80	201%	20%	34%	\$8,168	1,681

Assumptions:

The fuel costs at the DPW Large Vehicle Storage building, taken from 12 months of energy bills, are \$1.07 per therm for natural gas and \$2.49 per gallon for #2 heating oil, equivalent to \$1.78 per therm. During this time, the boiler consumed 1,283 gallons of oil, equivalent to 1,796 therms. An equal amount of therms would theoretically be consumed after the conversion to gas; the savings would come as a result of the difference in fuel prices. OAR would result in a savings of 8% of the total amount of therms. Cost savings for OAR were calculated using the cost of gas, rather than oil.

Rebates/financial incentives:

No rebates or incentives for converting to gas or installing OAR could be found.

ECM #5: Heating Override Control

Description:

The garage is heated by five (5) 125 MBH gas-fired low-intensity infrared heaters. These units operate at all times when the areas are occupied, including when the garage doors are open. The operation of the units while the doors are open allowing infiltration and resulting in a lower temperature within the space which causes wasted energy use in an attempt to heat the open space. It is recommended that two (2) end switches or photo eyes be installed that will automatically shut off the units when one of the two garage doors are in the fully-open position.

Installation cost:

Estimated installed cost: \$2,500 for each end switch or photo eye (two total), \$5,000 total

Source of cost estimate: Vendor website

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
5	Heating Override Control	Similar Projects	\$5,000	\$0	\$5,000	0	0.00	519.13	5.64	\$0	\$555	10	\$4,690	9.00	-6%	-1%	2%	-\$262	6,074

Assumptions:

The cost per therm of natural gas that was used, taken from twelve months of the building's energy bills, was \$1.07. Per the American Society of Heating, Refrigeration & Air-Conditioning Engineers (ASHRAE), the outdoor dry bulb temperature is above 10°F 99.6% percent of a year, and the number of heating degree-days for one year is 5,034. The desired indoor temperature was estimated to be 65°F. Due to the fact that the garages are not occupied at all hours of the day, it was assumed that the units only operate approximately 55 out of a possible 168 hours every week, and therefore only $\frac{55}{168}$ of the heating degree days were used for the calculations of the current energy consumptions; for the proposed energy consumptions, it was assumed that the end switch or photo eye would reduce the weekly operating hours by 15%. The existing heating units are 80% efficient, but due to their age and condition, their efficiency was assumed to decrease by 10%, to 70%. The savings were calculated using the following equation:

$$\frac{\text{Capacity} \times \text{Degree-Days} \times 24}{\text{Efficiency}_{\text{current}} \times (\text{Temp}_{\text{indoor}} - \text{Temp}_{99.6\%})} \times \frac{1 \text{ therm}}{100,000.4 \text{ BTU}} \times \frac{(\text{Weekly Operating Hours})}{24 \times 7} \times 15\% = \text{Current Gas Input (therms)}$$

Rebates/financial incentives:

No rebates or incentives for unit heaters were found.

ECM #6: 32.6-kW Roof-Mounted PV System

Description:

Currently, the DPW Large Vehicle Storage building does not use any renewable energy systems. Renewable energy systems, such as photovoltaic panels, can be mounted on the roof of the facility and can offset a significant portion of the purchased electricity for the building. Power stations generally have two separate electrical charges: usage and demand. Usage is the amount of electricity in kilowatt-hours that a building uses from month to month. Demand is the amount of electrical power that a building uses at any given instance in a month period. During the summer periods, when electric demand at a power station is high due to the amount of air conditioners, lights, equipment, etc. being used within the region, demand charges go up to offset the utility's cost to provide enough electricity at that given time. Photovoltaic systems not only offset the amount of electricity use by a building, but also reduce the building's electrical demand, resulting in a higher cost savings as well. SWA/BSG-PMK presents below the economics of installing a 32.6-kW PV system to offset electrical demand for the building and reduce the annual net electric consumption for the building. A system of 163 commercial multi-crystalline 200 watt panels would generate 35,674 kWh of electricity per year, or 18.4% of the DPW Large Vehicle Storage building's annual electric consumption.

Installation cost:

Estimated installed cost: \$228,200; 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, \$	CO ₂ Reduced, lbs/yr
6	32.6-kW Roof-Mounted PV System	Similar Projects	\$228,200	\$32,600	\$195,600	35,674	17.96	0.00	13.23	\$0	\$24,115	30	\$460,676	8.11	136%	5%	12%	\$277,065	48,873

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 pay 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 Dept. of Public Works Front 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 32.6 kW was selected. The total annual generating capacity of the system is 35,674 kWh as estimated using PV WATTS calculator provided by the Department of Energy (DOE), National Renewable Energy Laboratory (NREL).



AC Energy
&
Cost Savings



Station Identification	
City:	Newark
State:	New_Jersey
Latitude:	40.70° N
Longitude:	74.17° W
Elevation:	9 m
PV System Specifications	
DC Rating:	32.6 kW
DC to AC Derate Factor:	0.770
AC Rating:	25.1 kW
Array Type:	Fixed Tilt
Array Tilt:	20.0°
Array Azimuth:	130.0°
Energy Specifications	
Cost of Electricity:	19.0 ¢/kWh

Results			
Month	Solar Radiation (kWh/m ² /day)	AC Energy (kWh)	Energy Value (\$)
1	2.43	1886	358.34
2	3.24	2308	438.52
3	4.10	3158	600.02
4	4.80	3459	657.21
5	5.60	4061	771.59
6	5.85	3987	757.53
7	5.62	3898	740.62
8	5.32	3676	698.44
9	4.65	3205	608.95
10	3.68	2684	509.96
11	2.46	1792	340.48
12	2.08	1560	296.40
Year	4.16	35674	6778.06

This proposed PV system would include 163 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 18 percent of the electric power consumed annually by the Dept. of Public Works Front 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 18 percent. The estimated cost of construction, without incentives, would be approximately \$228,200 for this system. The approximate annual savings would be \$24,115 which would make the approximate payback, without incentives, 9.5 years

PV System – Dept. of Public Works Front Bldg

	Savings	Cost
Estimated Cost Of Construction		\$228,200
REIP Incentive		-\$32,600
Township Investment		\$195,600
First Year Electric Energy Savings	\$6,778	
Estimated Annual SREC Revenue	\$17,837	
Annual Maintenance		\$500
First Year Savings	\$24,115	

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

A passive or active solar hot water system could be installed on the roof in place of some of the PV panels. Based on the size of the current domestic hot water system, a solar hot water system would require approximately 500 sq. ft., which equates to 6 or 7 panels. This system would offset the energy consumed for domestic hot water production. System installations costs vary and would not eliminate the need for a conventionally powered domestic hot water system, instead it would be in addition to a smaller conventionally powered domestic hot water system. For this reason it cannot be recommended as an Energy Conservation Measure, but it is recommended as a step toward sustainability.

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.

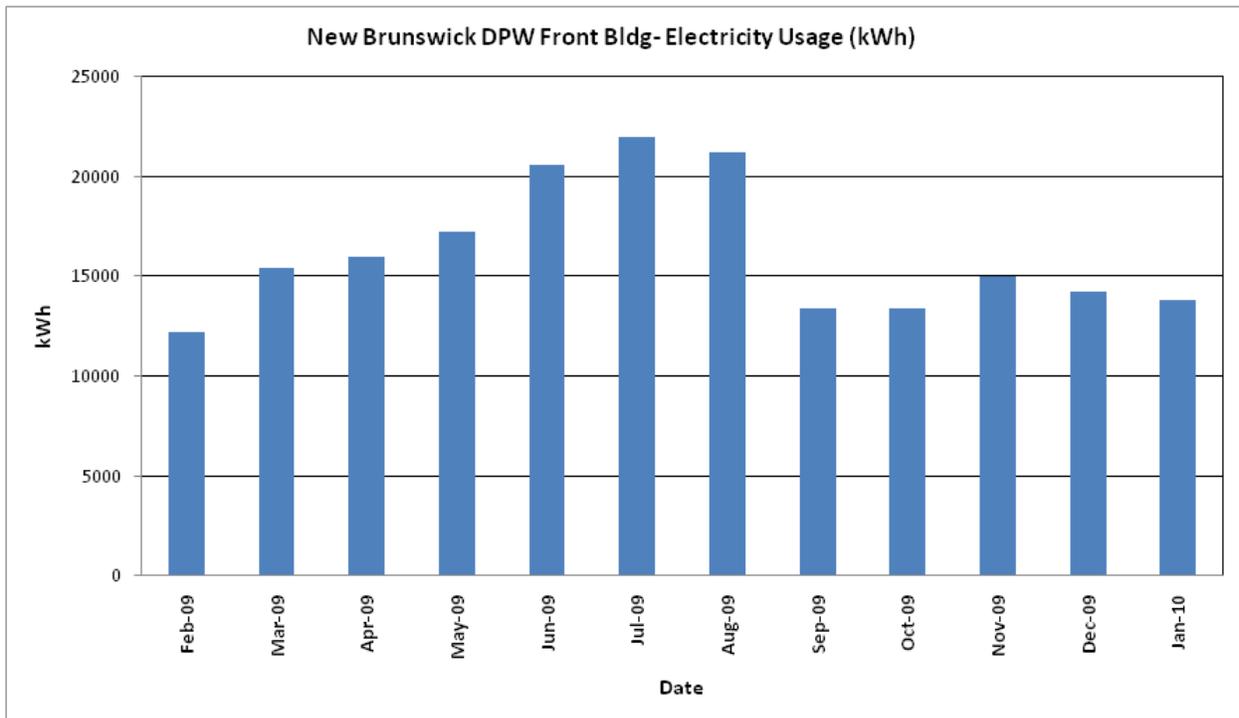
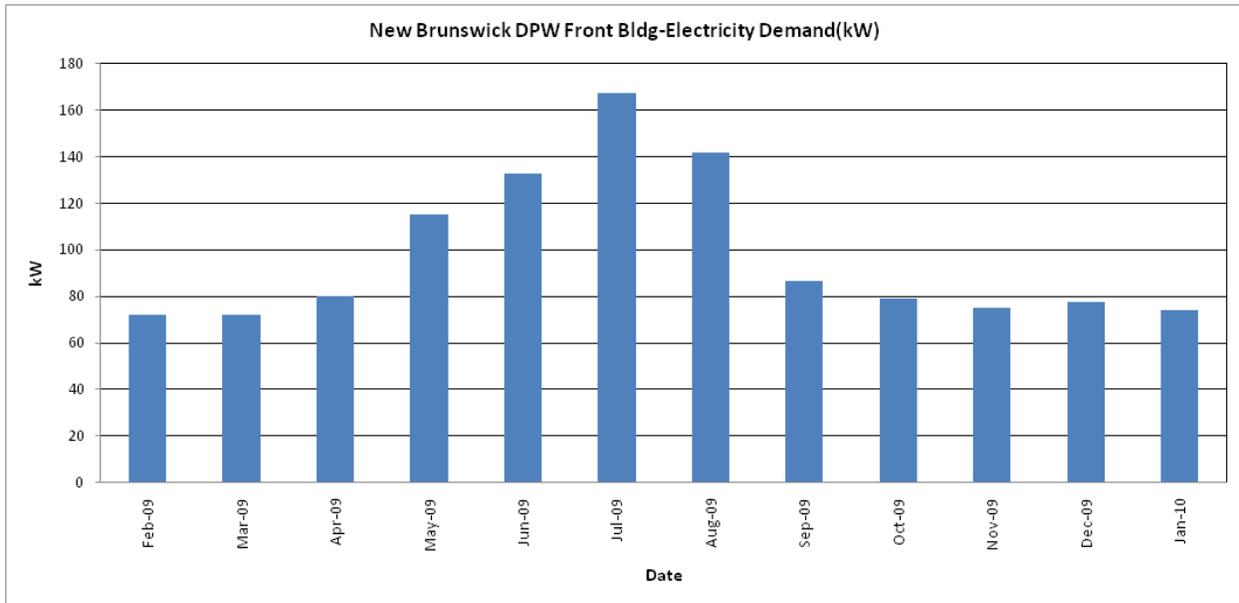
6.6. Wind

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.

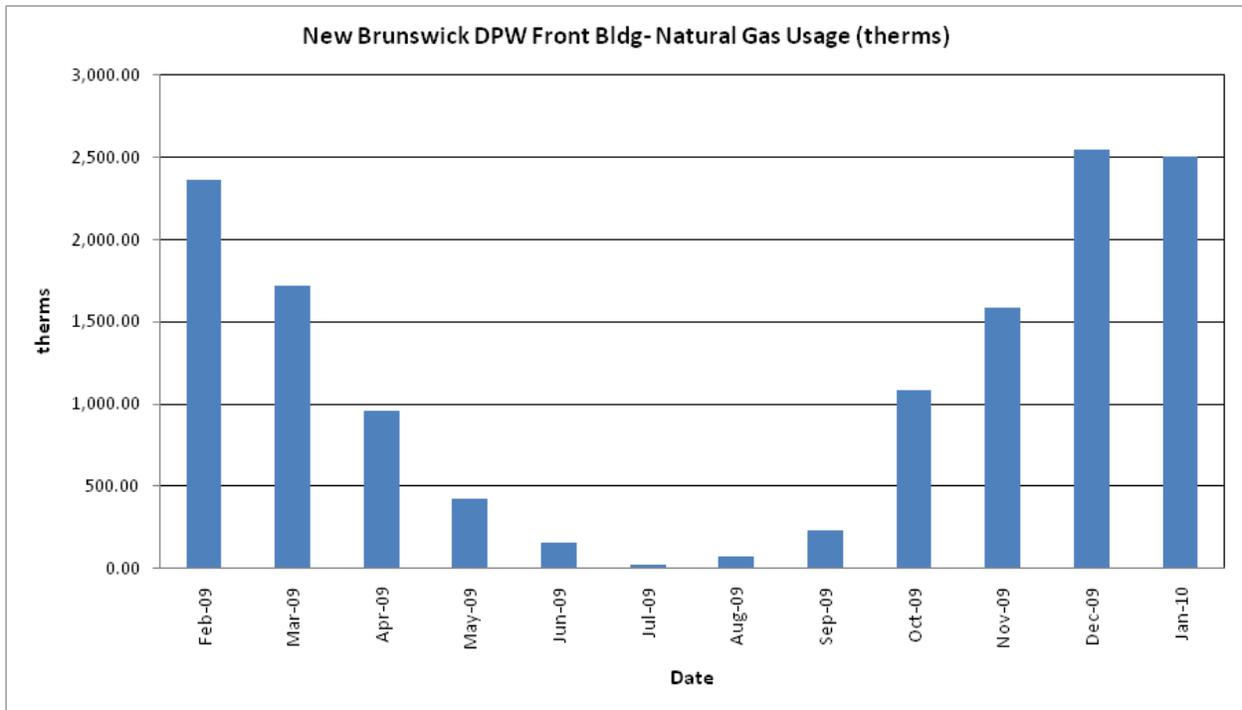
7. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

7.1. Energy Purchasing

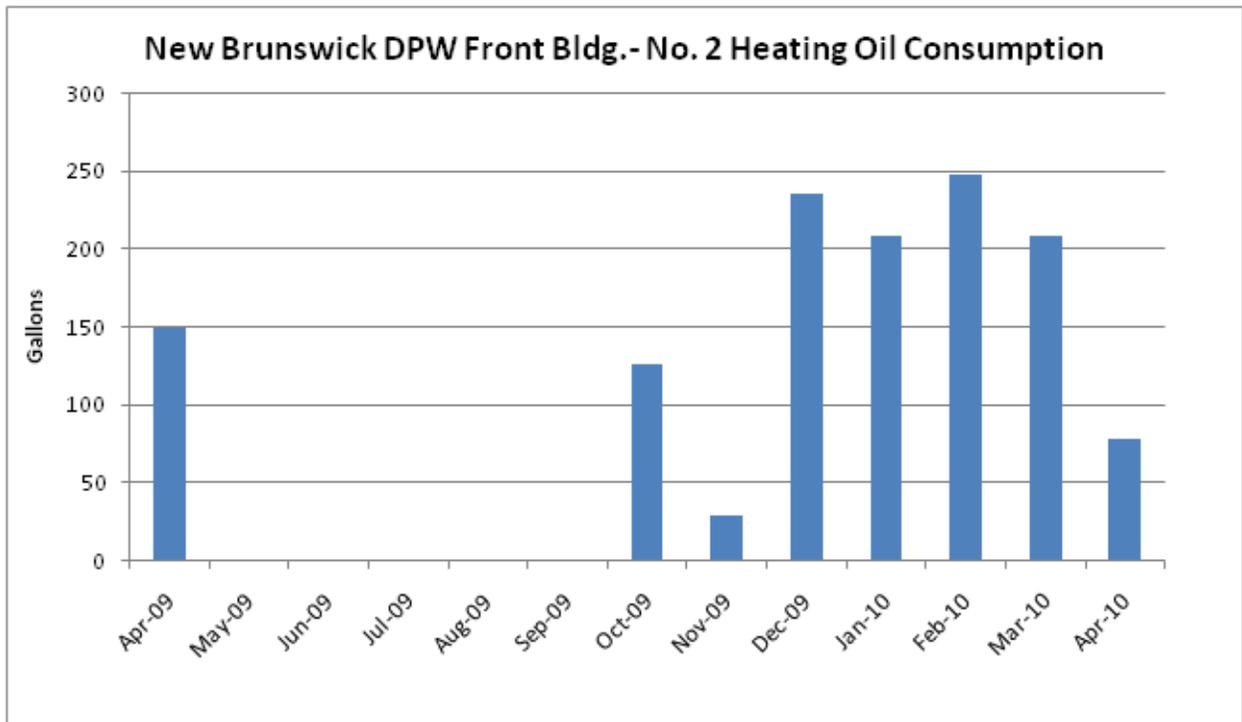
The average electrical peak demand for the previous year was 97.8 kW and the maximum peak demand was 167 kW. The electric and gas load profiles for this project are presented in the following charts. The first chart shows electric demand (in kW) for the previous 12 months and the next three charts show electric, gas, and oil usage (in kWh, therms, gal), 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.

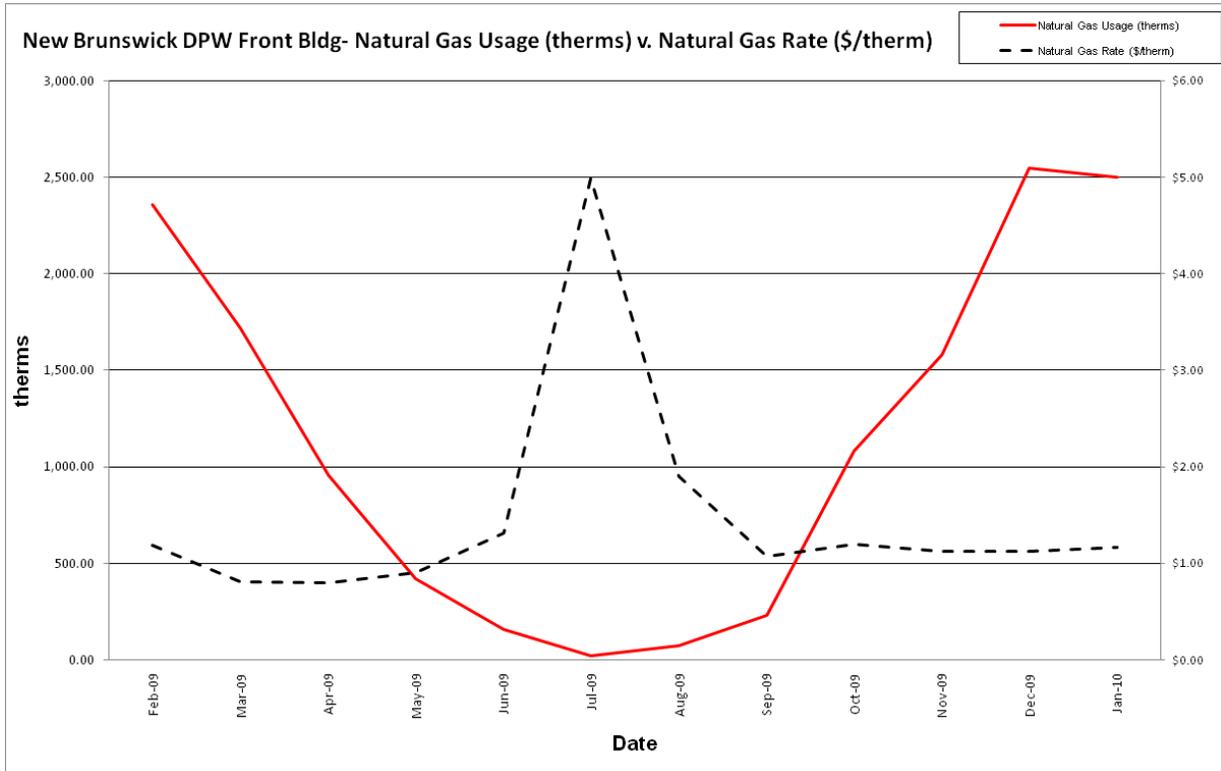


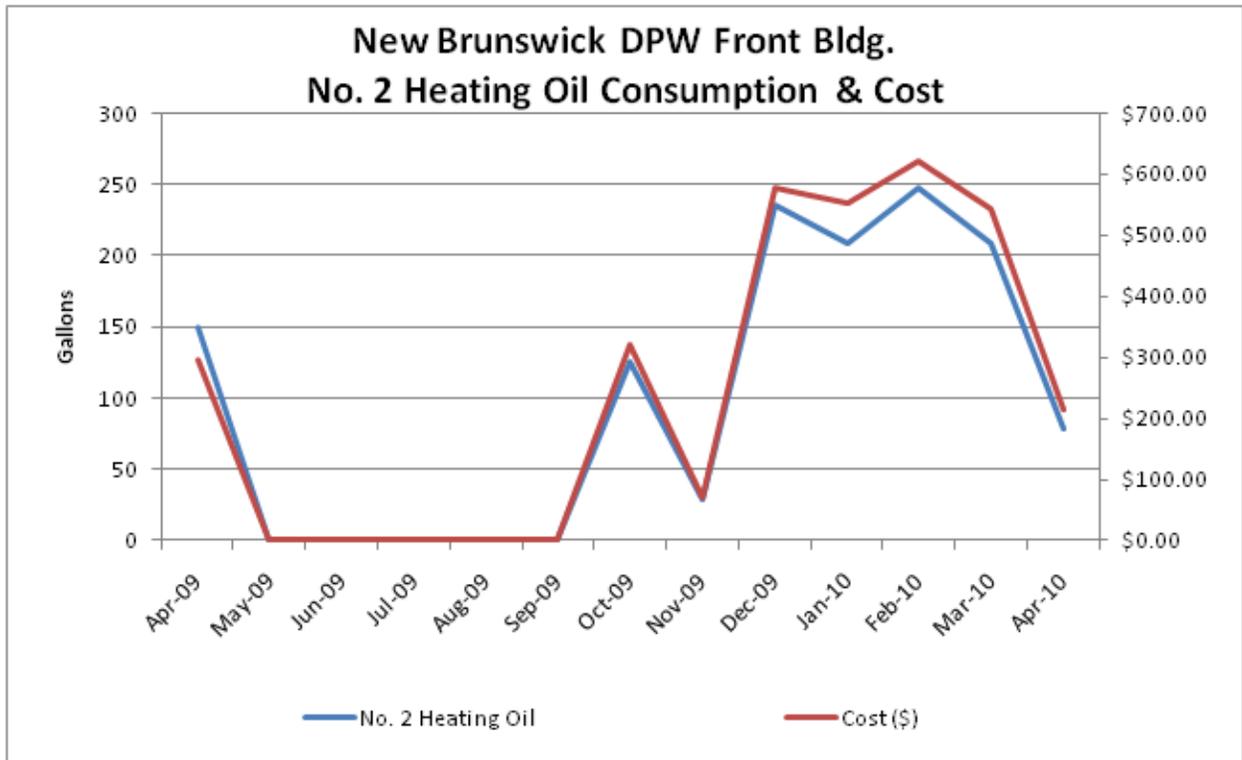
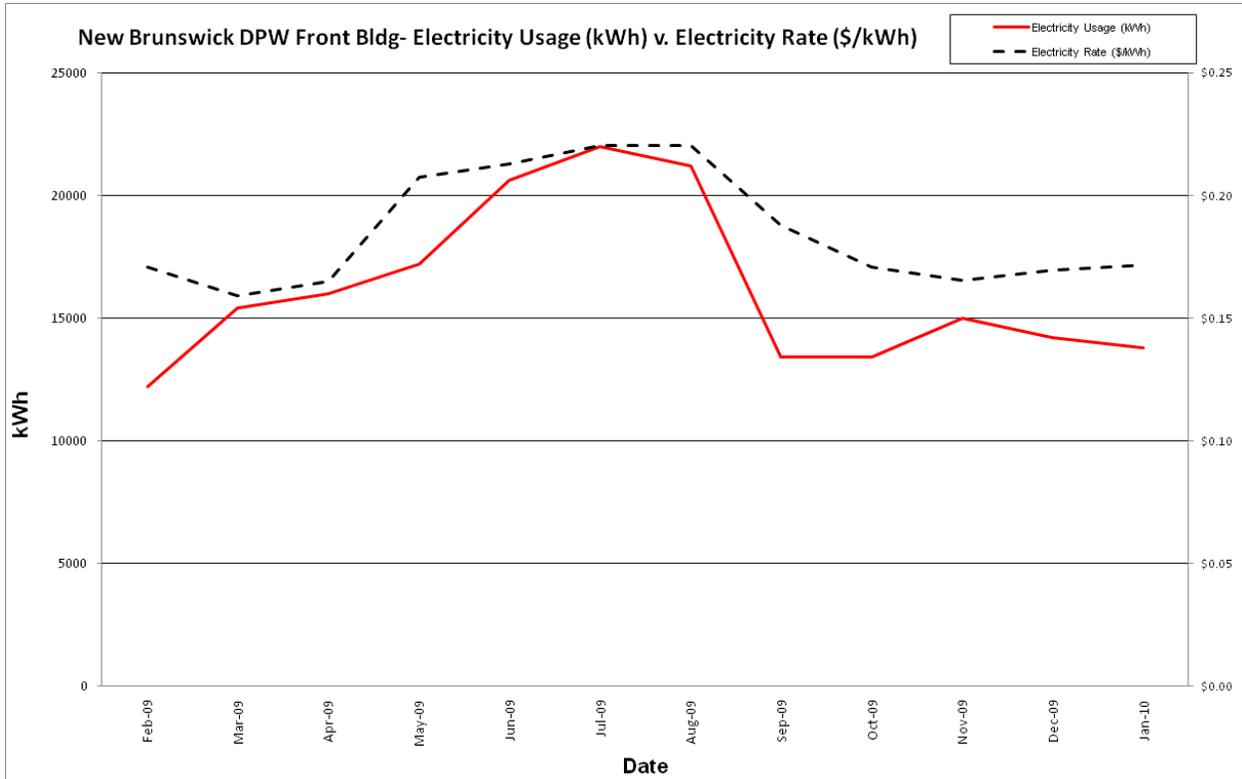
7.2. Tariff analysis

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 Dept. of Public Works Front building 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 Dept. of Public Works Front building 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 Dept. of Public Works Front building 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, electricity, and oil over a previous 12 month period.



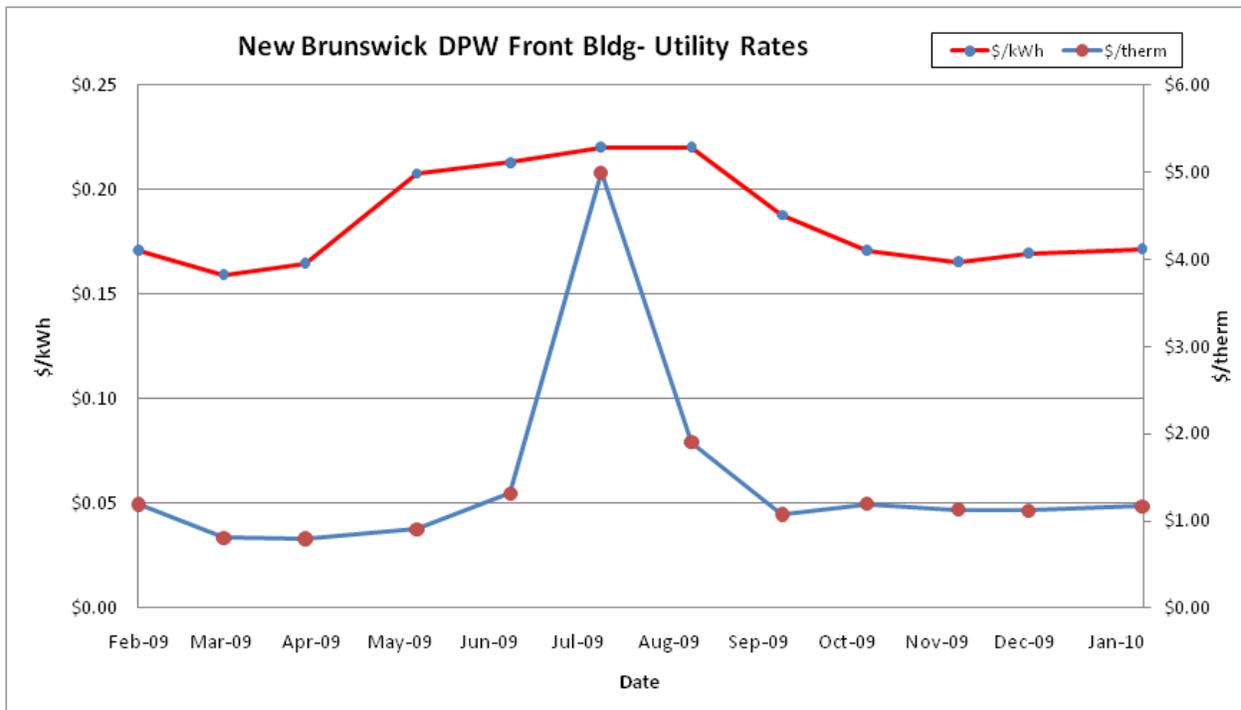


7.3. Energy Procurement strategies

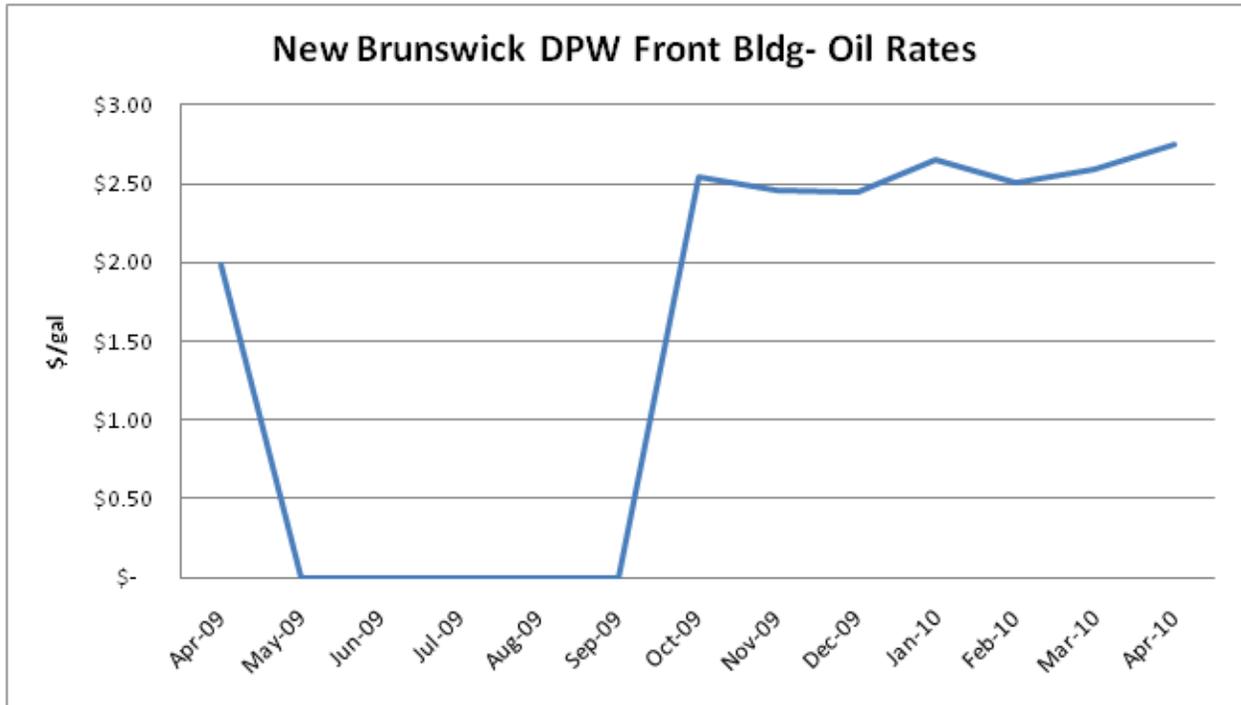
Billing analysis shows large price fluctuations of over the course of the year for the Dept. of Public Works Front building natural gas account. Changing third party suppliers could reduce the cost associated with energy procurement. Customers that have a large variation in monthly billing rates can 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.

The analysis of the heating oil bills shows that the average price per gallon of heating oil was \$2.47. Switching heating oil suppliers may deliver a lower price per gallon for heating oil. Converting the system to natural gas would also potentially return savings.

SWA/BSG-PMK 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 \$ 0.04/kWh, which would have equated to approximately \$7,536 for the past 12 months. New Brunswick already purchases natural gas for lower rate than the average rate of \$1.45/therm.



The following chart displays the changes in heating oil rates over the previous 12 month term. During the late spring and early summer months no heating oil was delivered, or consumed. This is the cause of the big dip in the following chart.



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 Brunswick
DPW (Front)
400 Jersey Avenue



Upgrade Code	Upgrade Description	Existing		Proposed		Lighting		
		Fixture	Watts	Fixture	Watts	Total # of Upgrades	Cost per Upgrade (\$)	SmartStart Rebate per Upgrade
1	Replace the 75W Halogen Lamps with 26W Compact Fluorescents	(2) 75W HALOGEN	150	26W CF/SI	28	1	\$10.00	\$0.00
2	Replace the 60W Incandescent lamps with 13W Compact Fluorescents	60W INCANDESCENT	60	13W CF/SI	15	2	\$6.00	\$0.00
3	Retrofit the 4' recessed fixture by replacing the (4) T12 Lamps and Magnetic Ballast(s) with (4) T8 Lamps and an Electronic Ballast	4L4' EE/STD	160	4L4' T8/ELEC	110	18	\$80.00	\$15.00
4	Retrofit the 4' wraparound fixture by replacing the (4) T12 Lamps and Magnetic Ballast(s) with (4) T8 Lamps and an Electronic Ballast	4L4' EE/STD	160	4L4' T8/ELEC	110	1	\$80.00	\$15.00
5	Retrofit the 8' fixture by replacing the (2) T12 Lamps and Magnetic Ballast(s) with (2) T8 Lamps and an Electronic Ballast	2L8' EE/STD	138	2L8' T8/ELEC	118	18	\$50.00	\$15.00
6	250W Metal Halide / No upgrade	250W MH/BALLAST	286	No Upgrade	286	12	\$0.00	\$0.00
7	Replace the (4) 75W Incandescent Lamps with (4) 26W Compact Fluorescents	(4) 75W INCANDESCENT	300	(4) 26W CF/SI	112	2	\$40.00	\$0.00
8	Retrofit the 4' fixture by replacing the (2) T12 Lamps and Magnetic Ballast(s) with (2) T8 Lamps and an Electronic Ballast	2L4' EE/STD	80	2L4' T8/ELEC	61	2	\$50.00	\$15.00
9	Retrofit the 8' fixture by replacing the (1) T12 Lamps and Magnetic Ballast(s) with (1) T8 Lamps and an Electronic Ballast	1L8' EE/STD	83	1L8' T8/ELEC	67	7	\$60.00	\$15.00
10	Retrofit the 4' fixture by replacing the (4) T12 Lamps and Magnetic Ballast(s) with (4) T8 Lamps and an Electronic Ballast	4L4' EE/STD	160	4L4' T8/ELEC	110	1	\$80.00	\$15.00
11	Retrofit the 8' fixture by replacing the (4) T12 Lamps and Magnetic Ballast(s) with (4) T8 Lamps and an Electronic Ballast	4L8' EE/STD	276	4L8' T8/ELEC	233	1	\$100.00	\$15.00
12						0	\$0.00	\$0.00

Summary

	Lighting (Only)	Sensors (Only)	Complete Lighting Upgrade
Cost	\$3,222.00	\$720.00	\$3,942.00
Rebate	\$720.00	\$230.00	\$950.00
Net Cost	\$2,502.00	\$490.00	\$2,992.00
Savings (kWh)	3,866	749	4,381
Savings (\$)	\$734.53	\$142.27	\$832.34
Payback	3.4	3.4	3.6

Variables:

\$0.19	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				Proposed			kW Reduction	Lighting				Occupancy Sensors (ONLY)				Lighting & Occupancy Sensors							
					Fixture	Qty.	Watts	Foot Candles	Fixture	Qty.	Watts		Energy Savings, kWh	Cost (\$)	Savings (\$)	Payback (yrs)	Energy Savings, kWh	Cost (\$)	Savings (\$)	Payback (yrs)	SmartStart Rebate	Energy Savings, kWh	Post-Rebate Cost (\$)	Savings (\$)	Payback (yrs)			
Totals:					11003		8862	2.141	3866	\$3,222.00	\$734.53	4.4	749	\$720.00	\$142.27	5.1	\$720.00	\$230.00	4381	\$2,992.00	\$832.34	3.6						
1	1	Exterior Lights	7	1820	(2) 75W HALOGEN	1	150		26W CF/SI	1	28	0.122	222	\$10.00	\$42.19	0.2			0	\$0.00	\$0.00		\$0.00	\$0.00	222	\$10.00	\$42.19	0.2
2	3		7	1820	4L4' EE/STD	4	640		4L4' T8/ELEC	4	440	0.2	364	\$320.00	\$69.16	4.6			0	\$0.00	\$0.00		\$60.00	\$0.00	364	\$260.00	\$69.16	3.8
3	3	Locker Room	8	2080	4L4' EE/STD	2	320		4L4' T8/ELEC	2	220	0.1	208	\$160.00	\$39.52	4.0	OSR	1	166	\$260.00	\$31.62	8.2	\$30.00	\$70.00	322	\$320.00	\$61.26	5.2
4	2	Bathroom	1	260	60W INCANDESCENT	1	60		13W CF/SI	1	15	0.045	12	\$6.00	\$2.22	2.7			0	\$0.00	\$0.00		\$0.00	\$0.00	12	\$6.00	\$2.22	2.7
5	4	Garage	8	2080	4L4' EE/STD	1	160		4L4' T8/ELEC	1	110	0.05	104	\$80.00	\$19.76	4.0			0	\$0.00	\$0.00		\$15.00	\$0.00	104	\$65.00	\$19.76	3.3
6	5		8	2080	2L8' EE/STD	18	2484		2L8' T8/ELEC	18	2124	0.36	749	\$900.00	\$142.27	6.3			0	\$0.00	\$0.00		\$270.00	\$0.00	749	\$630.00	\$142.27	4.4
7	6		8	2080	250W MH/BALLAST	12	3432		No Upgrade	12	3432	0	0	\$0.00	\$0.00				0	\$0.00	\$0.00		\$0.00	\$0.00	0	\$0.00	\$0.00	
8	7		8	2080	(4) 75W INCANDESCENT	2	600		(4) 26W CF/SI	2	224	0.376	782	\$80.00	\$148.60	0.5			0	\$0.00	\$0.00		\$0.00	\$0.00	782	\$80.00	\$148.60	0.5
9	8		8	2080	2L4' EE/STD	2	160		2L4' T8/ELEC	2	122	0.038	79	\$100.00	\$15.02	6.7			0	\$0.00	\$0.00		\$30.00	\$0.00	79	\$70.00	\$15.02	4.7
10	3	Super Intendant Office	8	2080	4L4' EE/STD	3	480		4L4' T8/ELEC	3	330	0.15	312	\$240.00	\$59.28	4.0	OSW	1	250	\$200.00	\$47.42	4.2	\$45.00	\$20.00	484	\$375.00	\$91.88	4.1
11	9	Rear Storage/Foyer	8	2080	1L8' EE/STD	6	498		1L8' T8/ELEC	6	402	0.096	200	\$360.00	\$37.94	9.5			0	\$0.00	\$0.00		\$90.00	\$0.00	200	\$270.00	\$37.94	7.1
12	2		8	2080	60W INCANDESCENT	1	60		13W CF/SI	1	15	0.045	94	\$6.00	\$17.78	0.3			0	\$0.00	\$0.00		\$0.00	\$0.00	94	\$6.00	\$17.78	0.3
13	9	Storage/Sally Port	4	1040	1L8' EE/STD	1	83		1L8' T8/ELEC	1	67	0.016	17	\$60.00	\$3.16	19.0			0	\$0.00	\$0.00		\$15.00	\$0.00	17	\$45.00	\$3.16	14.2
14	3	Locker Room Bathroom	4	1040	4L4' EE/STD	2	320		4L4' T8/ELEC	2	220	0.1	104	\$160.00	\$19.76	8.1			0	\$0.00	\$0.00		\$30.00	\$0.00	104	\$130.00	\$19.76	6.6
15	3	Locker Room Bathroom	4	1040	4L4' EE/STD	3	480		4L4' T8/ELEC	3	330	0.15	156	\$240.00	\$29.64	8.1			0	\$0.00	\$0.00		\$45.00	\$0.00	156	\$195.00	\$29.64	6.6
16	3	Rear Storage/Wash Dry Room	8	2080	4L4' EE/STD	4	640		4L4' T8/ELEC	4	440	0.2	416	\$320.00	\$79.04	4.0	OSR	1	333	\$260.00	\$63.23	4.1	\$60.00	\$140.00	645	\$380.00	\$122.51	3.1
17	10	Chemical Storage	2	520	4L4' EE/STD	1	160		4L4' T8/ELEC	1	110	0.05	26	\$80.00	\$4.94	16.2			0	\$0.00	\$0.00		\$15.00	\$0.00	26	\$65.00	\$4.94	13.2
18	11	Tire Storage	2	520	4L8' EE/STD	1	276		4L8' T8/ELEC	1	233	0.043	22	\$100.00	\$4.25	23.5			0	\$0.00	\$0.00		\$15.00	\$0.00	22	\$85.00	\$4.25	20.0

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
Integrus Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830	(877) 763-9977 www.integrusenergy.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.southjerseyenergy.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](#)

Appendix C: Incentive Programs

New Jersey Clean Energy Pay for Performance

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

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

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

Direct Install 2010 Program*

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

Eligibility:

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

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

Smart Start

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

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

Equipment Replacement.

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

Renewable Energy Incentive Program*

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

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

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

Utility Sponsored Programs

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

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.