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November 18, 2010

Local Government Energy Program
Final Energy Audit Report

For

Lakewood Township
Inspection Building
212 Fourth St
Lakewood, NJ 08701

Project Number: LGEA80

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INTRODUCTION

On August 23rd, 2010 Steven Winter Associates, Inc. (SWA) and Birdsall Services Group (BSG) performed an energy audit and assessment of the Lakewood Inspection Building in Lakewood Township, 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 Township of Lakewood Inspection Building, at 212 Fourth Street, is a one-story, slab on grade building with a floor area comprised of 6,350 square feet. The building was built in 1978, and there have been no major renovations or additions since then. The Lakewood Inspection Building houses township administrative offices.

The Lakewood Inspection Building is occupied consistently by approximately 20 employees for 50 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 BSG 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 Lakewood Inspection Building in Lakewood Township, NJ 08901.

Based on the field visit performed by Steven Winter Associates (SWA) and BSG staff on August 23rd, 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, August, 2009 through July, 2010, the Inspection Building consumed a total of 87,800 kWh of electricity for a total cost of $10,882. In the most recent full year of natural gas data collected, August, 2009 through July, 2010, 3,627 therms of gas were consumed for a total cost of $4,774. With electricity and natural gas combined, the building consumed 662 MMBtus of energy at a total cost of $15,656.

SWA/BSG has entered energy information about the Lakewood Inspection Building in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. The building was classified as building type Office allowing it to receive a performance rating of 11 out of 100.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 107 kBtu/ft^{2}yr compared to the national average of a similar building consuming 66 kBtu/ft^{2}yr. Implementing the recommendations included in this report will reduce the building energy consumption by approximately 70.3 kBtu/ft^{2}yr.

Based on the assessment of the Lakewood Inspection Building, SWA/BSG has separated the recommendations into three categories (See Section 4 for more details). These are summarized as follows:

Category I Recommendations: Capital Improvements:

Based on the findings of SWA/BSG's survey, capital improvement measures are not recommended, due to the age and condition of the building.

Category II: Operations & Maintenance:

- Seal gaps in exterior wall penetrations and exterior wall joints
- Replace weather-stripping on exterior doors

Category III: Energy Conservation Measures:

At this time, SWA/BSG highly recommends a total of **9** Energy Conservation Measures (ECMs) for the Inspection Building that are summarized in the following table. The total investment cost for these ECMs, with incentives, is **$283,910** (based on a projected eligibility for New Jersey's Office of Clean Energy current incentive and rebate programs). SWA/BSG estimates a first year savings of **$29,345** with an

aggregated simple payback of **9.7 years**. SWA/BSG estimates that implementing the highly recommended ECMs will reduce the carbon footprint of the facility by **118,991 lbs of CO_2**.

There are various incentives that the Township of Lakewood could apply for that could also help lower the cost of installing the ECMs. SWA/BSG recommends that Lakewood apply for the NJ SmartStart program through the New Jersey Office of Clean Energy. This incentive can help provide technical assistance for the building in the implementation phase of any energy conservation project.

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	$0.12 $/kWh
Energy price escalation rate:	0% per DOE FEMP guidelines	Gas rate	$1.32 $/therm

Avg. Annual Demand: 0.00461 Area of Building (SF): 6,350

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, Yr	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yr	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO_2 Reduced, lbs/yr
1	Programm-able Thermostats	Similar Projects	$1,050	$0	$1,050	6,213	2.39	910	17.67	$0	$1,947	10	$16,440	0.54	1466%	147%	185%	$15,558	19,161
2	Vending Miser	Similar Projects	$250	$0	$250	1,610	0.62	0	0.87	$0	$193	10	$1,631	1.29	553%	55%	77%	$1,398	2,206
3	Domestic Hot Water Time Optimization	Similar Projects	$1,000	$0	$1,000	1,876	0.72	0	1.01	$0	$225	10	$1,901	4.44	90%	9%	18%	$921	2,571
4	Replace Surge Protectors with Smart Strips	Similar Projects	$1,575	$0	$1,575	7,221	2.78	0	3.88	$0	$867	10	$7,317	1.82	365%	36%	54%	$5,817	9,893
5	Demand-Controlled Ventilation	Similar Projects	$2,700	$0	$2,700	2,681	1.03	726	12.87	$0	$1,279	10	$10,803	2.11	300%	30%	46%	$8,214	12,161
TOTAL			$6,575	$0	$6,575	19,601	7.53	1,636	36.29	$0.00	$4,511	-	$38,092	1.46	-	-	-	$31,907	45,991

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, $	CO_2 Reduced, lbs/yr
6	35-kW Roof-Mounted PV System	Similar Projects	$246,330	$35,190	$211,140	37,420	14.38	0	20.11	$0	$22,700	30	$433,644	9.30	105%	4%	10%	$233,790	51,265
7	Lighting Upgrades	Empirical Data	$3,337	$70	$3,267	3,207	1.23	0	1.72	$0	$385	15	$4,529	8.49	39%	3%	8%	$1,328	4,394
	Occupancy Sensors		$720	$90	$630	501	0.19	0	0.27	$0	$60	10	$508	10.47	-19%	-2%	-1%	-$117	687
TOTAL			$250,387	$35,350	$215,037	41,129	15.81	0	22.10	$0.00	$23,145	-	$438,681	9.29	-	-	-	$235,001	56,346

Table 3 - Recommended End-of-Life Cycle 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, $	CO_2 Reduced, lbs/yr
8	Thermal-Pane Windows	Similar Projects	$14,322	$0	$14,322	119	0.05	246.62	3.95	$0	$340	35	$7,094	42.14	-50%	-1%	-1%	-$7,019	3,049
9	Replace Packaged Rooftop DX Units	Similar Projects	$50,000	$2,024	$47,976	5,396	2.07	530.90	11.26	$0	$1,348	15	$15,866	35.58	-67%	-4%	0%	-$31,879	13,605
TOTAL			$64,322	$2,024	$62,298	5,516	2.12	778	15.21	$0.00	$1,688	-	$22,961	36.90	-	-	-	-$38,898	16,654

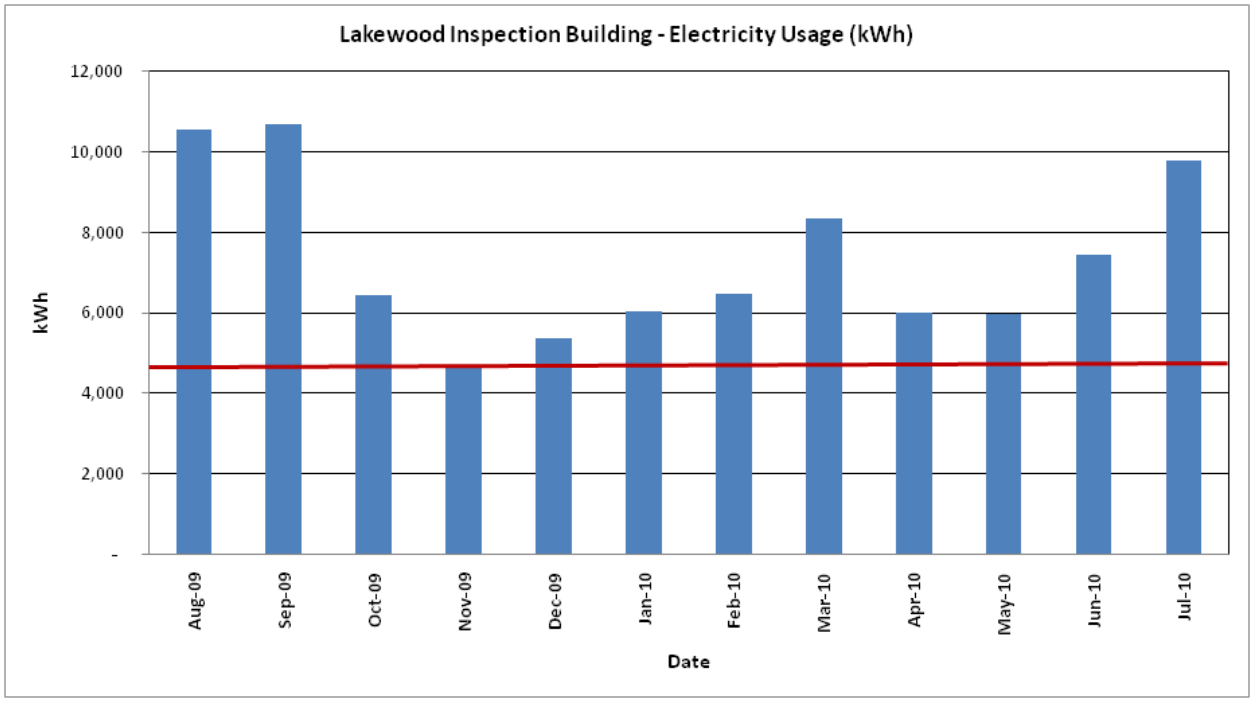
1. HISTORIC ENERGY CONSUMPTION

1.1. Energy Usage and Cost Analysis

SWA/BSG analyzed utility bills that were received from the utility company supplying the Inspection Building with electric and natural gas from August, 2009 through July, 2010.

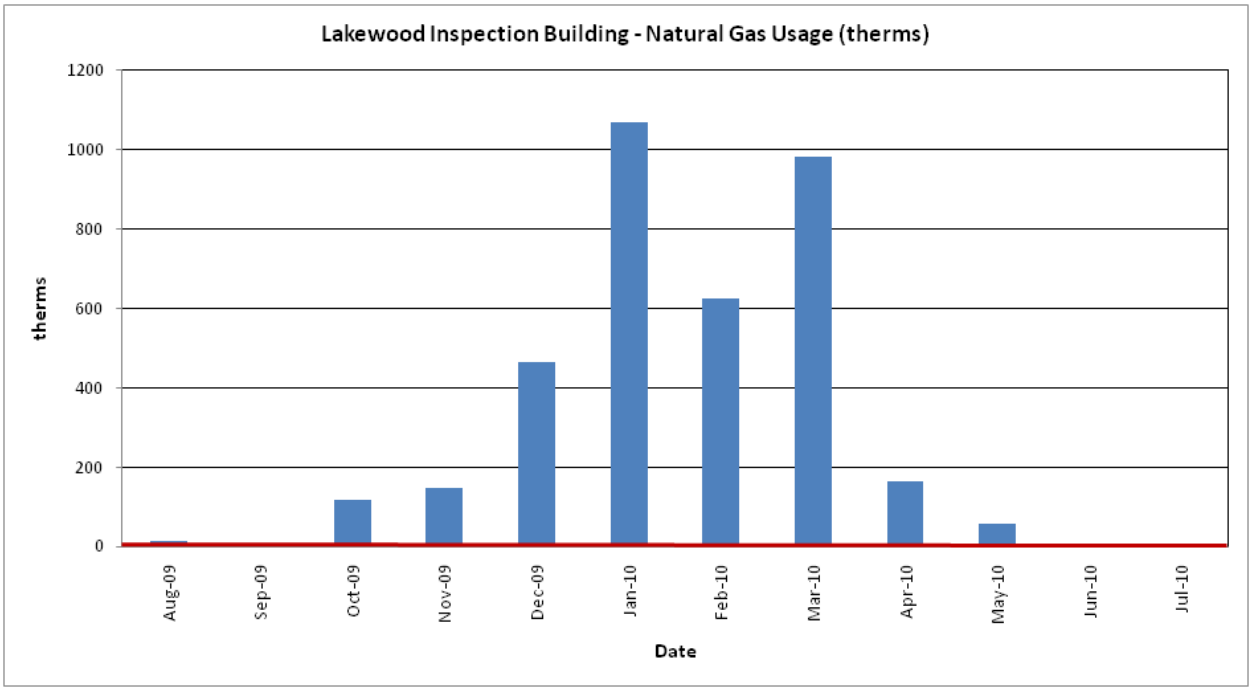
Electricity – The Inspection Building is currently served by one electric meter. The facility currently receives electricity from Jersey Central Power & Light at **an average rate of $0.12/kWh** based on 12 months of utility bills from August, 2009 through July, 2010. The facility consumed **approximately 87,800 kWh or $10,881.78 worth of electricity** in the previous year with an average monthly demand of 33.8 kW.

The following charts show electricity usage for the Inspection Building based on utility bills for the billing analysis period. The red line indicates the estimated base-load in kWh.



Natural Gas – The Inspection Building is currently served by one meter for natural gas. The facility currently receives natural gas from New Jersey Natural Gas at **an average aggregated rate of $1.32/therm** based on 12 months of utility bills for August, 2009 through July, 2010. The facility consumed **approximately 3,642.384 therms or $4,773.86 worth of natural gas** in the previous year.

The following charts show the natural gas usage for the Inspection Building based on utility bills for the analysis period of August, 2009 through July, 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 domestic hot water. The natural gas usage above the red line shows the amount of natural gas used for heating.

1.2. Utility Rate

The Inspection Building currently receives electricity from Jersey Central Power & Light at a general service market rate for electricity use (kWh) with (kW) demand charge. The facility currently pays an average rate of approximately $0.12/kWh based on the most recent 12 months of utility bills.

The Inspection Building currently receives natural gas supply from New Jersey Natural 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 $1.32/therm based on the most recent 12 months of utility bills.

1.3. Energy Benchmarking

SWA/BSG has entered energy information about the Inspection Building in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. The username is *lakewoodtwp* and the password is *lakewood*. The building type was classified as Office because the building is used as administrative offices. A classification of Office does allow it to receive a performance rating which could be used to achieve an Energy Star building certification. The performance rating is 11 out of 100.

The Site Energy Use Intensity is 107 kBtu/sq.ft/yr compared to the national average of buildings classified as Office consuming 66 kBtu/sq.ft./yr. Implementing this report's recommended Energy Conservations Measures (ECMs) will reduce use by approximately 70.3 kBtu/sq.ft./yr.

SWA/BSG has created the Portfolio Manager site information for Inspection Building. This information can be accessed at: https://www.energystar.gov/istar/pmpam/, with the following:

Username: *lakewoodtwp*
Password: *lakewood*

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Lakewood Inspection Building

Building ID: 2427906
For 12-month Period Ending: June 30, 2010[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: August 30, 2010

Facility	**Facility Owner**	**Primary Contact for this Facility**
Lakewood Inspection Building 212 4th St Lakewood, NJ 08701	Township of Lakewood 231 Third St Lakewood, NJ 08701	Tony Arecchi 1 America Ave Lakewood, NJ 08701

Year Built: 1978
Gross Floor Area (ft²): 6,350

Energy Performance Rating[2] (1-100) 11

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	293,026
Natural Gas (kBtu)[4]	386,473
Total Energy (kBtu)	679,499

Energy Intensity[5]	
Site (kBtu/ft²/yr)	107
Source (kBtu/ft²/yr)	218

Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	65

Electric Distribution Utility
FirstEnergy - Jersey Central Power & Lt Co

National Average Comparison	
National Average Site EUI	66
National Average Source EUI	134
% Difference from National Average Source EUI	63%
Building Type	Office

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 and PMK staff on August 23rd, 2010 the following data was collected and analyzed.

2.1. Building Characteristics

The one-story, slab on grade, 6,350 square feet Inspection Building was originally constructed in 1978 as new construction. The slab on grade is uniform through the building, flush with entrance at 3rd Street with several steps at the rear of the building, exiting onto the parking lot grade level. The building is classified as Business Use Group.

2.2. Building occupancy profiles

Its occupancy is approximately 20 occupants on a daily basis, 50 hours per week, Monday through Friday, according to staff personnel.

2.3. Building Envelope

North Facade - Front Elevation

West Facade – Side Elevation

South Facade - Rear Elevation

Roof

East Facade – Side Elevation (South End) **East Facade – Side Elevation (North End)**

Due to unfavorable weather conditions, 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 construction is comprised of multiple assemblies.

In one front section (north elevation) wall assembly is comprised of brick veneer and concrete masonry unit back up with metal furring and gypsum board on the interior side of the back up acting as the interior finish surface.

In a another front section (north elevation) wall assembly is comprised of an exposed aggregate finish applied to concrete masonry unit back up with metal furring and gypsum board on the interior side of the backup acting as the interior finish surface.

In the front section (north elevation), at the top of the storefront system of each type of wall construction to the top of the parapet, is a metal siding system applied to a metal frame that is supported by each wall assembly. The soffit between the exterior wall and the metal siding system was constructed with a plaster finish system.

The sides and rear section (east/south/west) wall assembly is comprised of a single wythe, 8-inch concrete masonry unit backup wall with a 2" thick insulation and stucco type finish system adhered to it (Exterior Insulation Finish System, EIFS).

Note: Wall insulation levels could not be verified in the field.

Exterior and interior wall surfaces were inspected during the field audit. They were found to be in overall poor 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:

Damaged EIFS System

Damaged EIFS System

Gaps in sealant at panel joints

Gaps in sealant at penetrations

Gaps in sealant at penetrations

Gaps in sealant at penetrations

Missing weather-stripping

Rust stains indicating condensation due to single glazed skylight

Deteriorated sill and window

2.3.2.Roof

The building is comprised of one type of roof assembly.

The roofing assembly is comprised of wood truss joists spanning between masonry bearing walls. Roofing insulation is applied to topside of wood roof sheathing. Rigid insulation is mechanically attached to the decking. Roof structure is pitched from west to east to provide positive drainage to the through wall scupper locations. The insulation is covered with a fully-adhered EPDM roofing sheet membrane. The roofing membrane projects up and onto the low parapet that is covered with a metal coping. There are four (4) roof skylight penetrations, approximately 5 feet square each. Skylights are single-glazed with white acrylic plastic. Skylight curbs do not appear to be insulated since interior metal trim at curbs is rusting due to condensation forming on curb frame. A shade system has been introduced by staff within some skylights to deter sunlight from entering the building.

Roof

2.3.3. Base

The building's base is comprised of a slab-on-grade floor with no detectable slab edge/ perimeter insulation installed.

Slab/perimeter insulation levels could not be verified in the field and are based upon similar wall types and time of construction.

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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 observed to be wet due to two factors, one being that EIFS termination detail sloped back towards foundation wall, without a drip edge, causing wall surface water to run towards exposed foundation wall; the other being that roof leaders and drainage hubs at grade are in need of repair. Overall the base was reported to be in poor condition with some signs of uncontrolled moisture, air-leakage, and/or other energy-compromising issues.

2.3.4. Windows

The building contains two window types including: single double hung windows and paired double hung windows.

- Windows are wood construction with double glazed, un-insulated units consisting of clear exterior pane, air space, clear interior pane. The windows are original and have never been replaced. Interior wall mounted shading devices include venetian blinds.

Windows, shading devices, sills, related flashings and sealants were inspected where accessible for signs of moisture, air-leakage, and other compromising issues. Overall, the windows were found to be in poor condition with numerous signs of uncontrolled moisture, air-leakage and/or other energy-comprising issues.

The following specific window problem spots were identified:

Deteriorated sill and window. Frame components need sealant Frame to EIFS joints
Air leakage is occurring at sill. need to be sealed
Hermetic seal broken at lower sash.

2.3.5. Exterior Doors

The north facade of the building contains aluminum storefronts, aluminum entry doors and frames. The south façade of the building contains a steel door and frames.

1. Aluminum entry doors in storefront are narrow stile (2 ¼-inch nominal width) un-insulated doors, single glazed with ¼-inch tempered glass. Integral weather-stripping on doors is worn with no weather-stripping at door bottoms.

2. Aluminum storefront is comprised of non-thermally broken construction. Vision panels are glazed with sealed clear insulating units consisting of 1/4-inch tempered clear exterior pane, air space, 1/4-inch tempered clear interior pane. Metal insulated panels with exposed aggregate finish facing the exterior are also installed into storefront system at bottom and top sections. Vertical blinds are installed on the interior side of the storefront where vision panels are installed.

The south facade of the building contains a steel door and steel frame.

1. The solid steel door is unglazed. Steel frame is not insulated. Weather-stripping installed at the bottom of the door is partially missing and worn. There is no weather-stripping at head or jambs at the door.

All exterior doors, thresholds, related flashings, sealants and weather-stripping were inspected where accessible for signs of moisture, air-leakage, and other energy-compromising issues. Overall, the doors were found to be in poor condition with some signs of uncontrolled moisture, air-leakage and/or other energy-comprising issues.

The following specific door problem spots were identified:

Missing weather-stripping

Missing weather-stripping at door bottom, integral door weather-stripping is worn

Missing weather-stripping at door bottom, integral door weather-stripping is worn

2.3.6. Building Air Tightness

Overall, the field auditors found the building not to be adequately air-tight with numerous 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 minimize potentially costly long-term maintenance, repair and replacement expenses.

2.4. HVAC systems

2.4.1.Heating

The facility is heated by three (3) Carrier packaged rooftop DX units with gas heating, all of which are well beyond their useful life. The back offices are heated by a 152 MBH unit, and the front office space is heated by a 115 MBH and a 180 MBH unit. All units are 79% efficient and are controlled by non-programmable thermostats.

Category III Recommendations – ECM #9: Replace the three packaged rooftop DX units, which have all reached the end of their useful life, with three high-efficiency units.

Category III Recommendations – ECM #1: Replace the three operational non-programmable thermostats with programmable thermostats, which will automatically lower the heating and cooling levels when the building is not occupied.

Carrier packaged rooftop DX unit

2.4.2.Cooling

The three (3) Carrier DX units that provide heating also provide cooling. The unit that services the back offices provides 7.5 tons of cooling and has an Energy Efficiency Ratio (EER) of 7.75. The unit

that provides 115 MBH of gas heating to the front office space also provides 6 tons of cooling and has an EER of 8.6, and the unit that provides 180 MBH of heating to the space provides 8.5 tons of cooling and has an EER of 7.75.

Category III Recommendations – ECM #9: Replace the three packaged rooftop DX units, which have all reached the end of their useful life, with three high-efficiency units.

Category III Recommendations – ECM #1: Replace the three operational non-programmable thermostats with programmable thermostats, which will automatically lower the heating and cooling levels when the building is not occupied.

2.4.3. Ventilation

Restroom exhaust is vented by two (2) rooftop exhaust fans. Additional ventilation is provided by the rooftop units, doors, and windows.

Category III Recommendations – ECM #5: It is recommended that demand-controlled ventilation (DCV) be installed in the building. With DCV, a carbon dioxide (CO_2) sensor will be placed in each zone of the building, which will limit the fresh air intake to what is needed to maintain CO_2 levels mandated by building codes. When fresh air enters the building, heating and cooling systems need to work longer in order to maintain a desired temperature, and DCV will ensure that excess fresh air will not enter the building.

Category III Recommendations – ECM #8: Replace all windows, which are single-pane and in poor condition, with thermal-pane windows.

2.4.4. Domestic Hot Water

Water is heated by a 40 gallon, 4.5 kW electric water heater, installed in 2010.

Category III Recommendations – ECM #3: Install a timer on the water heater to shut off the power at times when the building is not occupied.

AO Smith electric 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 T8 fluorescent fixtures with electronic ballasts.

Category III Recommendation - ECM #7: Recommend replacing all 32 Watt T8 lamps with 28 Watt energy saving lamps. 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 twenty-one (21) computers, a refrigerator, a soda vending machine, a coffee maker, and a microwave. In this facility, one of the appliances (the coffee maker) found and noted in the attached equipment list was older than the 10 year threshold and should be considered for the Energy Star program.

Category III Recommendation – ECM #2: Install a vending machine occupancy sensor on the vending machine, which will shut the power off when the vending machine is not being used.

Category III Recommendation – ECM #4: Even when idle, the average desktop computer system requires 56 W of electricity. Replace the surge protectors at all twenty-five (25) computers with SmartStrips, which will shut off the power to the computer system when the system is idle.

2.5.3.Elevators

There are no elevators in the building.

3. Building Systems Equipment List

Lakewood Inspection Building							
Building System	Description	Locations	Model #	Fuel	Space Served	Year Installed	Estimated. Remaining Useful Life %
Heating/ Cooling	Packaged rooftop DX unit; 7.5 tons cooling, 7.75 EER; 152 MBH gas heating, 79% efficiency	Roof - Back	Carrier, M# 48HDF008500	Gas/Elec.	Back offices	Approx. 1985	0%
Heating/ Cooling	Packaged rooftop DX unit; 6 tons cooling, 8.6 EER; 115 MBH gas heating, 79% efficiency	Roof - Middle	Carrier, M# 48DJE007500	Gas/Elec.	Front office space	Approx. 1985	0%
Heating/ Cooling	Packaged rooftop DX unit; 8.5 tons cooling, 7.75 EER; about 180 MBH, 79% efficiency	Roof - Front	Carrier, M# 48HD009540	Gas/Elec.	Front office space	Approx. 1985	0%
Domestic Hot Water	40 gallon, 4.5 kW water heater	Utility room	American Water Heater, M# E62-40H-045DV, S# 1021T429026	Electric	Sinks	2010	100%
Appliances	Pepsi vending machine	Employee kitchen	Dixie-Narco, M# DN 276E HV/SII-6, S# 69280328 DB	Electric	Employee kitchen	Approx. 2005	72%
Appliances	Refrigerator	Employee kitchen	Whirlpool, M# ET8MHKXMQ03, S#	Electric	Employee kitchen	2005	72%

			ES0731940				
Appliances	Coffee maker, 1.8 kW	Employee kitchen	Automatic Marketing Industries, M# OM-2L, S# 38763	Electric	Employee kitchen	Approx. 1995	10%
Appliances	Microwave, 1.65 kW input, 1.2 kW output	Employee kitchen	Sharp, M# R-410EW, S# 133866	Electric	Employee kitchen	2001	40%
Ventilation	(2) exhaust fans	Roof	No nameplate	Electric	Restroom exhaust	Approx. 1995	20%
Controls	(3) non-programmable thermostats; (2) analog, (1) digital	Office space	Honeywell	Electric	Entire building	Approx. 1995	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 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:

Based on the findings of SWA/BSG's survey, capital improvement measures are not recommended, due to the age and condition of the building.

Category II: Operations & Maintenance:

- Seal gaps in exterior wall penetrations and exterior wall joints
- Replace weather-stripping on exterior doors

Category III Recommendations: Energy Conservation Measures:

Summary Table

ECM #	Description
1	Programmable Thermostats
2	Vending Miser
3	Domestic Hot Water Time Optimization
4	Replace Surge Protectors with Smart Strips
5	Demand-Controlled Ventilation
6	35-kW Roof-Mounted PV System
7	Lighting Upgrades
8	Thermal-Pane Windows
9	Replace Packaged Rooftop DX Units

ECM #1: Programmable Thermostats

Description:

Heating and cooling at the Inspection Building is controlled by three (3) non-setback thermostats. Non-setback thermostats must be adjusted manually, so the heating and cooling would not be lowered automatically when the building is not in use. It is recommended that the existing thermostats be replaced by three (3) setback thermostats, which adjust the temperature automatically when the facility is not in use, and save energy by not causing excess heating and cooling to be used when the building is unoccupied.

Installation cost:

Estimated installed cost: $350 each, $1,050 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
1	Programm-able Thermostats	Similar Projects	$1,050	$0	$1,050	6,213	2.39	910	17.67	$0.00	$1,947	10	$16,440	0.54	1466%	147%	185%	$15,558	19,161

Assumptions:

The fuel costs for the Inspection Building are $0.12/kWh for electricity and $1.32/therm for natural gas. For the heating season, the occupied and unoccupied temperatures were assumed to be 68°F and 60°F, respectively. For the cooling season, these temperatures were assumed to be 74°F and 85°F, respectively. 3,628 therms of natural gas were consumed by the building between August, 2009 and July, 2010. The electric consumption due to cooling was calculated using the degree-day method for cooling. Electrical consumption due to cooling was calculated using the degree-day method for cooling systems. Per the American Society of Heating, Refrigeration & Air-Conditioning Engineers (ASHRAE), the outdoor dry bulb temperature is above 93°F for 0.4% percent of a year, and the number of cooling degree-days for one year is 968. The building operates 50 hours per week. The desired indoor temperature during the cooling season was assumed to be 74°F. All central cooling systems in the building total 16 tons, and the SEER (Seasonal Energy Efficiency Ratio) of the existing cooling units was estimated to be 7.0.

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

The weekly hours of setback were estimated to be 12 hours every night, 2 hours every day on weekdays, and 12 hours every day on weekends. The savings were calculated using Honeywell's Commercial Programmable Thermostat Energy Savings Calculator, an Excel spreadsheet, which assumes 3% savings per degree of setback for the heating season, and 6% for the cooling season.

Rebates/financial incentives:

No rebates or incentives available for this measure at this time

ECM #2: 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 an occupancy sensor on the Inspection Building's one (1) vending machines would activate the power to the vending machine 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, $	CO_2 Reduced, lbs/yr
2	Vending Miser	Similar Projects	$250	$0	$250	1,610	0.62	0	0.87	$0	$193	10	$1,631	1.29	553%	55%	77%	$1,398	2,206

Assumptions:

The electric cost used in this ECM was $0.12/kWh, which was the Inspection Building's average rate for the 12-month period ranging from August, 2009 through July, 2010. The average vending machine consumes 4,025 kWh per year. Energy savings for a vending machine in low-occupancy (less than 68 hours per week) areas is approximately 40%.

Rebates/financial incentives:

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

ECM #3: Domestic Hot Water Time Optimization

Description:

Domestic hot water is provided by a 40-gallon electric water heater, which is in good condition. A tankless water heater would be more energy-efficient; with a tankless unit, water would only be heated as-needed, whereas the current unit consumes more energy than needed in order to maintain a desired temperature 24 hours-per-day. However, it would also be wasteful to replace the existing water heater as it is too new. Instead, it is recommended that a timer be installed on the existing water heater, which will shut off the power to the unit during hours when the building is not occupied. The building is occupied 60 hours per week, meaning the timer would allow the water heater to operate 108 fewer hours per week.

Installation cost:

Estimated installed cost: $1,000
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	Domestic Hot Water Time Optimization	Similar Projects	$1,000	$0	$1,000	1,876	0.72	0.00	1.01	$0	$225	10	$1,901	4.44	90%	9%	18%	$921	2,571

Assumptions:

Using 12 months of the facility's electricity bills, it was determined that the cost of electricity is currently $0.12/kWh.

To calculate the savings from installing the timer, 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. Weight of water was set at 8.33 pounds/gal. Using this data, the BTUs of output heat used for heating the water were calculated by the following equation:

The actual BTUs purchased by each unit are calculated using these values and the energy factors:

Due to the fact that the timer would shut down the water heater during the 108 hours of the week that the building would not be occupied, the energy consumption by the unit after the installation of the timer would be — of what the unit currently uses.

Rebates/financial incentives:

No rebates or incentives available for this measure at this time

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ECM #4: Replace Surge Protectors with SmartStrips

Description:

The computers at the Inspection Building only operate, on average, for about 50 hours per week. Devices such as monitors, printers, and scanners, however, cause the average desktop computer system to have an idle wattage of 56 W. It is recommended that SmartStrips be purchased to replace each computer's surge protector, which would shut off the power supply when the computer system is idle.

Installation cost:

Estimated installed cost: $75 each, $1,575 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
4	Replace Surge Protectors with Smart Strips	Similar Projects	$1,575	$0	$1,575	7,221	2.78	0.00	3.88	$0	$867	10	$7,317	1.82	365%	36%	54%	$5,817	9,893

Assumptions:

The cost of electricity, taken from 12 months of the Inspection Building's electricity bills, is $0.12 per kWh. 21 surge protectors are recommended to be replaced with SmartStrips; at an average of 56.04 W of idle wattage per computer system for 118 idle hours per week, 7,221 kWh of electricity are saved per year.

Rebates/financial incentives:

No rebates or incentives available for this measure at this time

ECM #5: Demand-Controlled Ventilation

Description:

A minimum amount of fresh outside air is designed into heating ventilating, and Air conditioning systems per ASHREA Standard 62 requirements based on proposed occupancy designs in order to maintain acceptable carbon dioxide (CO_2) and odor levels. Demand Control Ventilation provides an opportunity to tailor the amount of outside air introduced to the building zones based on CO_2 levels. This reduces excessive outside air conditioning. When this happens, excess cold air enters the building in the winter, and excess warm air enters the building in the summer, forcing the heating and cooling systems to work harder to maintain a desired temperature and humidity. It is recommended that each of the twenty (20) zones in the building be retrofitted with CO_2 sensors, which will ensure that only enough fresh air will enter the building, and decrease the amount of energy required to maintain indoor design temperature conditions. Demand Ventilation Control can save between 10 to 30% of heating and cooling costs depending on size and occupancy characteristics of a building. For this ECM we have made our savings calculations based on the minimum savings of 10% for heating and cooling cost.

Installation cost:

Estimated installed cost: $2,700 at $900 per zone
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
5	Demand-Controlled Ventilation	Similar Projects	$2,700	$0	$2,700	2,681	1.03	726	12.87	$0	$1,279	10	$10,803	2.11	300%	30%	46%	$8,214	12,161

Assumptions:

Natural gas and electricity costs are $1.32 per therm and $0.12 per kWh, respectively. From August, 2009 through July, 2010, the building consumed 3,628 therms of natural gas, all of which were consumed by the rooftop units.

Electrical consumption due to cooling was calculated using the degree-day method for cooling systems. Using 12 months of the facility's electric bills, it was determined that the cost of electricity is currently $0.12/kWh. Per the American Society of Heating, Refrigeration & Air-Conditioning Engineers (ASHRAE), the outdoor dry bulb temperature is above 93°F for 0.4% percent of a year, and the number of cooling degree-days for one

year is 968. The desired indoor temperature during the cooling season was assumed to be 74°F. All central cooling systems in the building total 86 tons, and the average SEER (Seasonal Energy Efficiency Ratio) is about 10

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

$$\frac{\quad}{\qquad\qquad\qquad\qquad\qquad\qquad}$$

Rebates/financial incentives:

No rebates or incentives available for this measure at this time

ECM #6: 35-kW Roof-Mounted PV System

Description:

Currently, the Inspection 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 presents below the economics of installing a 35-kW PV system to offset electrical demand for the building and reduce the annual net electric consumption for the building. A system of 153 commercial multi-crystalline 230 watt panels would generate 37,420 kWh of electricity per year, or 42.6% of the Inspection Building's annual electric consumption.

Installation cost:

Estimated installed cost: $246,330; 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	35-kW Roof-Mounted PV System	Similar Projects	$246,330	$35,190	$211,140	37,420	14.38	0	20.11	$0	$22,700	30	$433,644	9.30	105%	4%	$233,790.02	$0	51,265

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.

ECM #7: Lighting Upgrades

Description:

Lighting at the Inspection Building primarily consists of energy-efficient fixtures with T8 lamps and electronic ballasts. There are also a number of fixtures using incandescent lamps. SWA/BSG-PMK recommends replacing the incandescent lamps with high-efficiency compact fluorescents and replacing the 32 watt lamps in the T8 fixtures with 28 watt lamps.

Recommended lighting upgrades are detailed in Appendix A.

Installation cost:

	Lighting (Only)	Sensors (Only)	Complete Lighting Upgrade
Cost	$3,337.00	$720.00	$4,057.00
Rebate	$70.00	$90.00	$510.00
Net Cost	$3,267.00	$630.00	$3,547.00
Savings (kWh)	3,207	501	3,610
Savings ($)	$384.88	$60.15	$433.18
Payback	8.5	10.5	8.2

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
7	Lighting Upgrades	Empirical Data	$3,337	$70	$3,267	3,207	1.23	0	1.72	$0	$385	15	$4,529	8.49	39%	3%	8%	$1,328	4,394
	Occupancy Sensors		$720	$90	$630	501	0.19	0	0.27	$0	$60	10	$508	10.47	-19%	-2%	-1%	-$117	687

Assumptions:

The electric cost used in this ECM was $0.12/kWh, which was the facilities' average rate for the 12-month period from August, 2009 through July, 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 $160.

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ECM #8: Thermal-Pane Windows

Description:

The windows at the Inspection Building have passed their useful life of 35 years. They are single-pane, non-thermal windows that do not provide much thermal resistance. In addition, the current units allow excess infiltration. Replacing the windows with double-pane units with aluminum framing and thermal breaks will prevent heat from escaping in the winter and entering in the summer, therefore reducing the amount the heating and cooling systems need to work, saving energy and adding longevity to the lives of the systems.

Installation cost:

Estimated installed cost: $14,322 at $62 per square-foot
Source of cost estimate: Similar projects

Economics:

Assumptions:

The area of the windows that are recommended to be replaced is 231 square feet. The electric cost used, taken from 12 months of the Inspection Building's energy bills, is $0.12 per kWh. The cost of natural gas is $1.32/therm. The cost of installation, using several similar projects as a guideline, was determined assuming $62 per square-foot of windows. The current windows are single-pane, and have a thermal resistance (R-value) of 1.28, equivalent to an overall heat transfer coefficient (U-factor) of 0.78. The proposed windows have an R-value of 3.8 and a U-factor of 0.26. The efficiency of the current heating system is 80%. The mean EER (Energy Efficiency Ratio) for the current air conditioning units is approximately 10. The assumed indoor temperature in the cooling season is 74°F, and for the heating season, 68°F. The calculations were performed using a heat transfer analysis, with 5°F bin temperature data for Atlantic City, NJ. The first step in calculating the savings is to multiply the annual hourly occurrences for each 5°F bin by the difference between that temperature and the desired indoor temperature (bin temperatures above 72°F were considered to be the cooling season, and below were considered to be a heating season), and sum all of these values for heating and cooling. The unit for these two values will be °F, and shall be represented as (, with t representing time and ΔT representing the temperature difference. Current and proposed heat loss were calculated using the following equations:

The energy savings, in BTUs, were calculated using the difference between the current and proposed heat losses, for heating and cooling. Electric and natural gas savings were calculated using the following equations:

Rebates/financial incentives:

No rebates or incentives available for this measure at this time

ECM #9: Replace Packaged Rooftop DX Units

Description:

The Inspection Building is cooled and heated by three (3) packaged rooftop DX units, with totals of 447 MBH of gas heating and 24 tons of cooling. The units have reached the end of its useful life and should be replaced. Higher-efficiency rooftop units are now available, which have Energy Efficiency Ratios (EERs) of up to 12. Two units, one with a cooling capacity of 7.5 tons and the other with a capacity of 8.5 tons, had an EER of 7.8 and a heating efficiency of 79% at the time of their purchase, but due to their age and condition, their EER and efficiency were estimated to decrease to 7.0 and 70%, respectively. The third unit, a 6-ton unit, had an EER of 8.6 and a heating efficiency of 79% at the time of its purchase, and was estimated to currently have an EER of 7.7 and a heating efficiency of 70%. The heating efficiency of the proposed units is 82%.

Installation cost:

Estimated installed cost: $50,000
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
9	Replace Packaged Rooftop DX Units	Similar Projects	$50,000	$2,024	$47,976	5,396	2.07	530.90	11.26	$0	$1,348	15	$15,866	35.58	-67%	-4%	0%	-$31,879	13,605

Assumptions:

The cost per therm of natural gas that was used, taken from twelve months of the Inspection Building's energy bills, was $1.32. Between August, 2009 and July, 2010, the building consumed 3,628 therms of natural gas, all of which were consumed by the rooftop units. The savings were calculated using the following equation:

The cooling savings can now be calculated. Using 12 months of the facility's electricity bills, it was determined that the cost of electricity is currently $0.12/kWh. Per ASHRAE, the outdoor dry bulb temperature is above 93°F for 0.4% percent of a year, and there are 968 annual cooling degree days at this geographical area. The desired indoor temperature during the cooling season was assumed to be 74°F. The building is occupied 50 hours per week.

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

Rebates/financial incentives:

This ECM is calculated based on a projected eligibility for New Jersey's SmartStart Rebate, which pays up to $92 per ton for rooftop units, or $2,024 for this measure.

BSG/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

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/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.

5. RENEWABLE AND DISTRIBUTED ENERGY MEASURES

5.1. Existing systems

There are currently no existing renewable energy systems.

5.2. Solar Photovoltaic

As a result of our study, the roof of the Inspection 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 35 kW was selected. The total annual generating capacity of the system is 37,420 kWh as estimated using PV WATTS calculator provided by the Department of Energy (DOE), National Renewable Energy Laboratory (NREL).

AC Energy & Cost Savings

(Type comments here to appear on printout; maximum 1 row of 80 characters.)

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	35.2 kW
DC to AC Derate Factor:	0.770
AC Rating:	27.1 kW
Array Type:	Fixed Tilt
Array Tilt:	0.0°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	11.2 ¢/kWh

Results			
Month	Solar Radiation (kWh/m²/day)	AC Energy (kWh)	Energy Value ($)
1	2.09	1659	185.81
2	2.87	2145	240.24
3	3.95	3262	365.34
4	4.95	3884	435.01
5	5.73	4565	511.28
6	6.09	4505	504.56
7	5.97	4511	505.23
8	5.32	4051	453.71
9	4.48	3335	373.52
10	3.28	2528	283.14
11	2.20	1628	182.34
12	1.80	1347	150.86
Year	4.07	37420	4191.04

This proposed PV system would include 153 flat, crystalline PV modules installed on the roof. The system is based on commonly used 230 Watt PV modules, and one (1) inverter for conversion to AC power.

The proposed system would generate approximately 42 percent of the electric power consumed annually by the Inspection 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 42 percent. The estimated cost of construction would be approximately $246,330 for this system. The system that is being recommended would meet the qualifications for a $35,190 upfront incentive through the New Jersey Clean Energy Program. The approximate annual savings would be $22,700, which would make the approximate payback 9 years

PV System – Inspection Building		
	Savings	**Cost**
Estimated Cost Of Construction		$246,330
REIP Incentive		$35,190
Township Investment		$211,140
First Year Electric Energy Savings	$4,490	
Estimated Annual SREC Revenue	$18,710	
Annual Maintenance		$500
First Year Savings	$22,700	
Simple Payback Analysis	Approximately 9.3 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.

5.3. Solar Thermal Collectors

Solar thermal collectors are feasible for this location based on the shading and amount of roof area available with unobstructed southern exposure. Installation of a solar thermal hot water heat system would reduce the space available for photovoltaic modules and would be redundant to the current domestic hot water system.

5.4. Combined Heat and Power

Combined Heat Power is not applicable to this project because of the lack of available resources and the demand for heat and hot water is being met by the high efficiency boilers currently in place

5.5. 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.

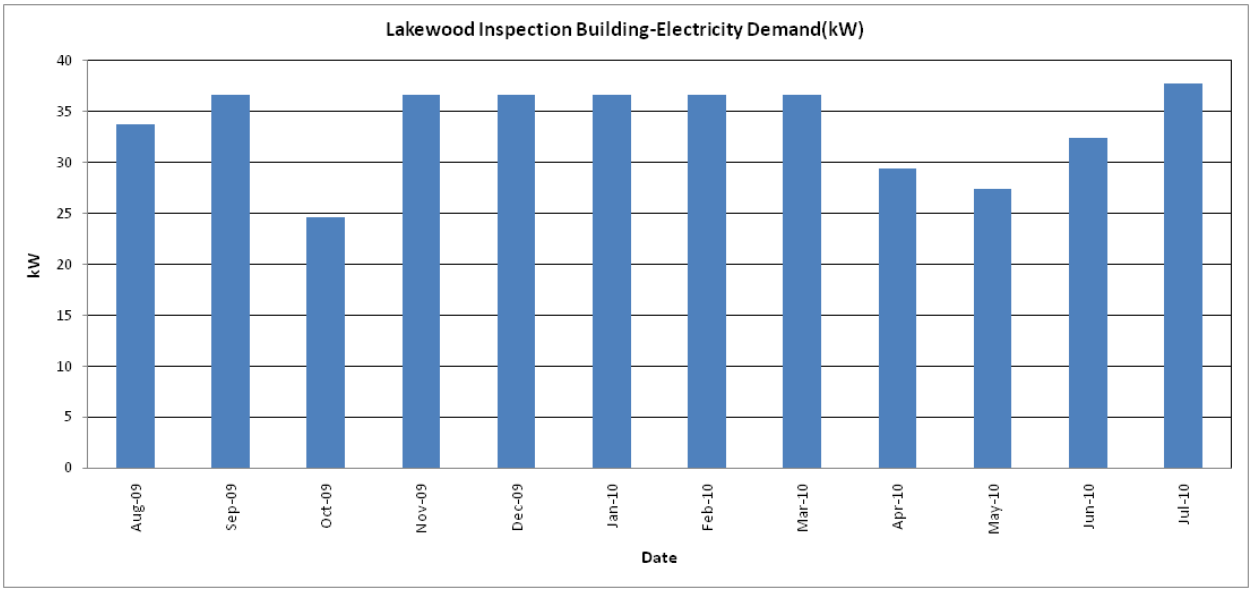
5.6. Wind

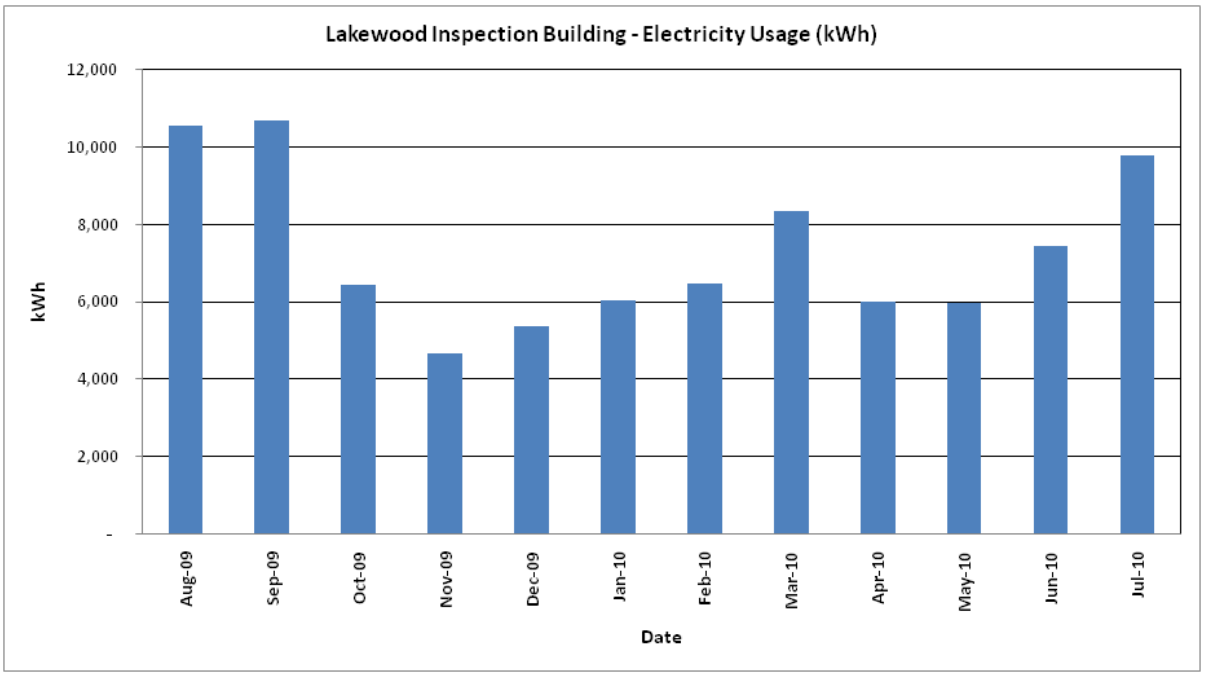
Wind power production is not appropriate for this location because required land is not available for the wind turbine. Also, the available wind energy resource is very low.

6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

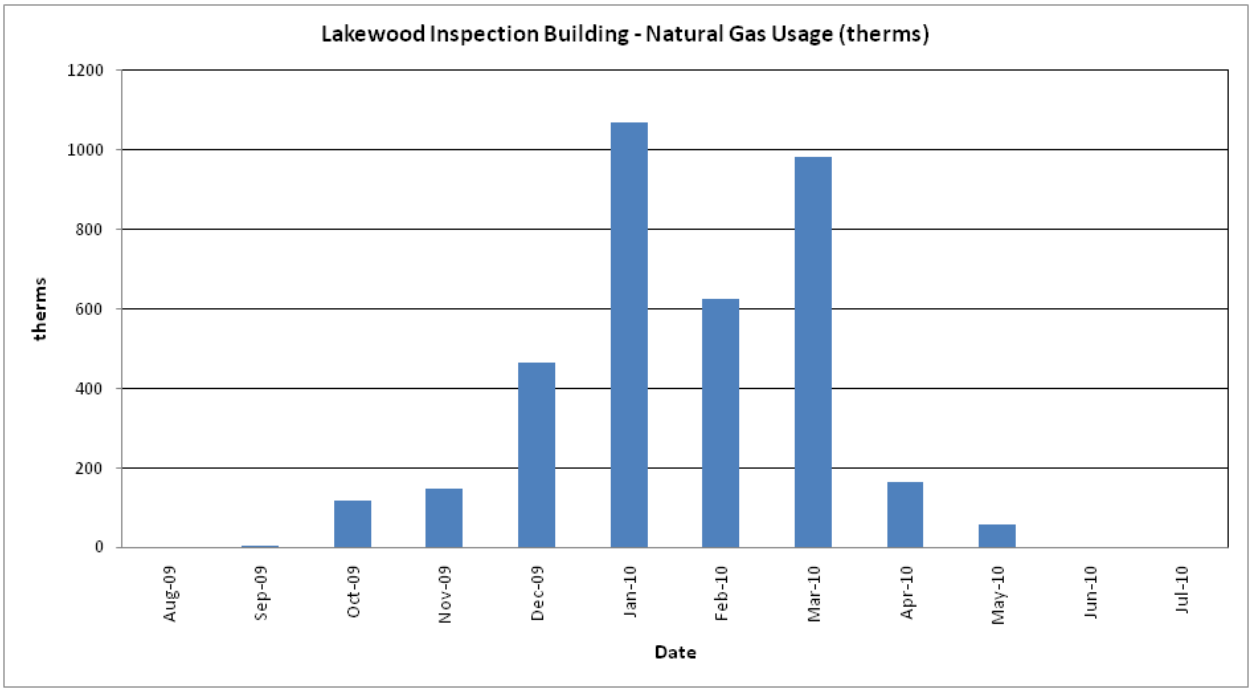
6.1. Energy Purchasing

The average electrical peak demand for the previous year was 33.8 kW and the maximum peak demand was 37.8 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.



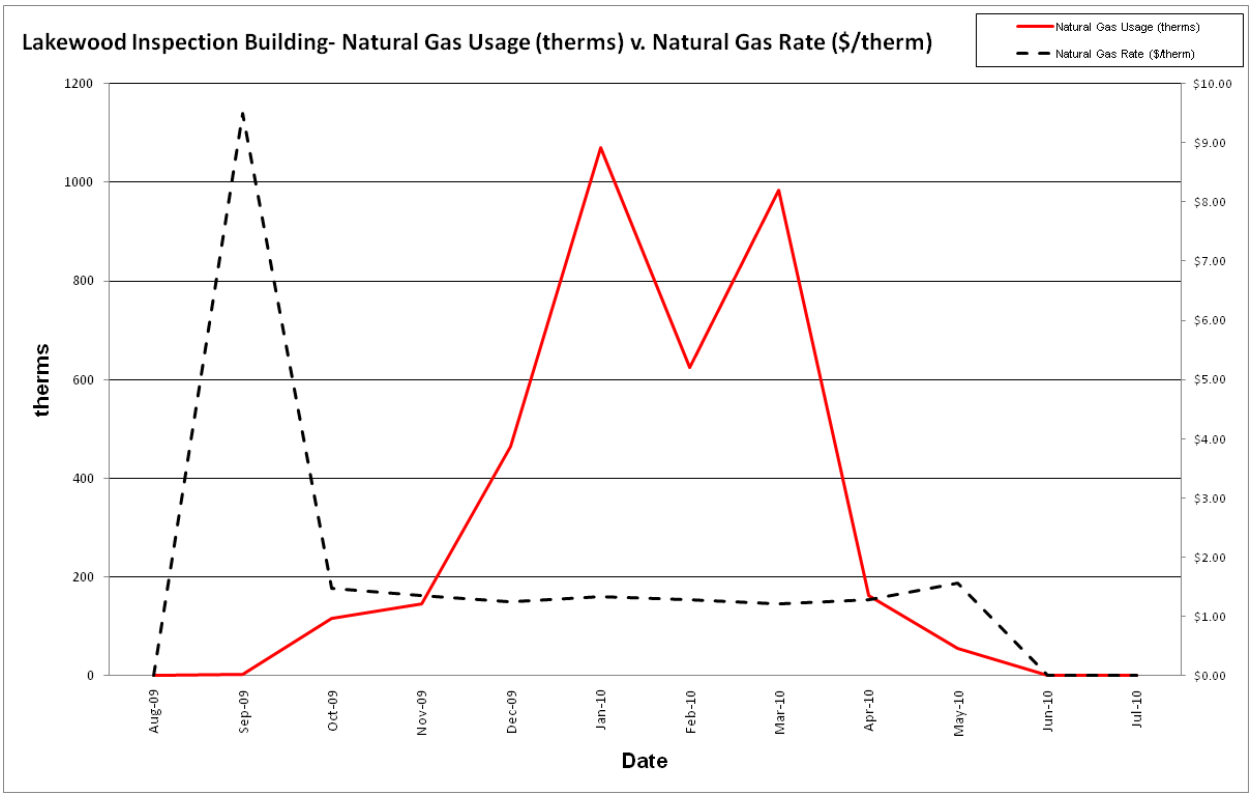
The natural gas usage shows that the most natural gas is consumed in the winter months, meaning the majority of natural gas use in this building is for heating.

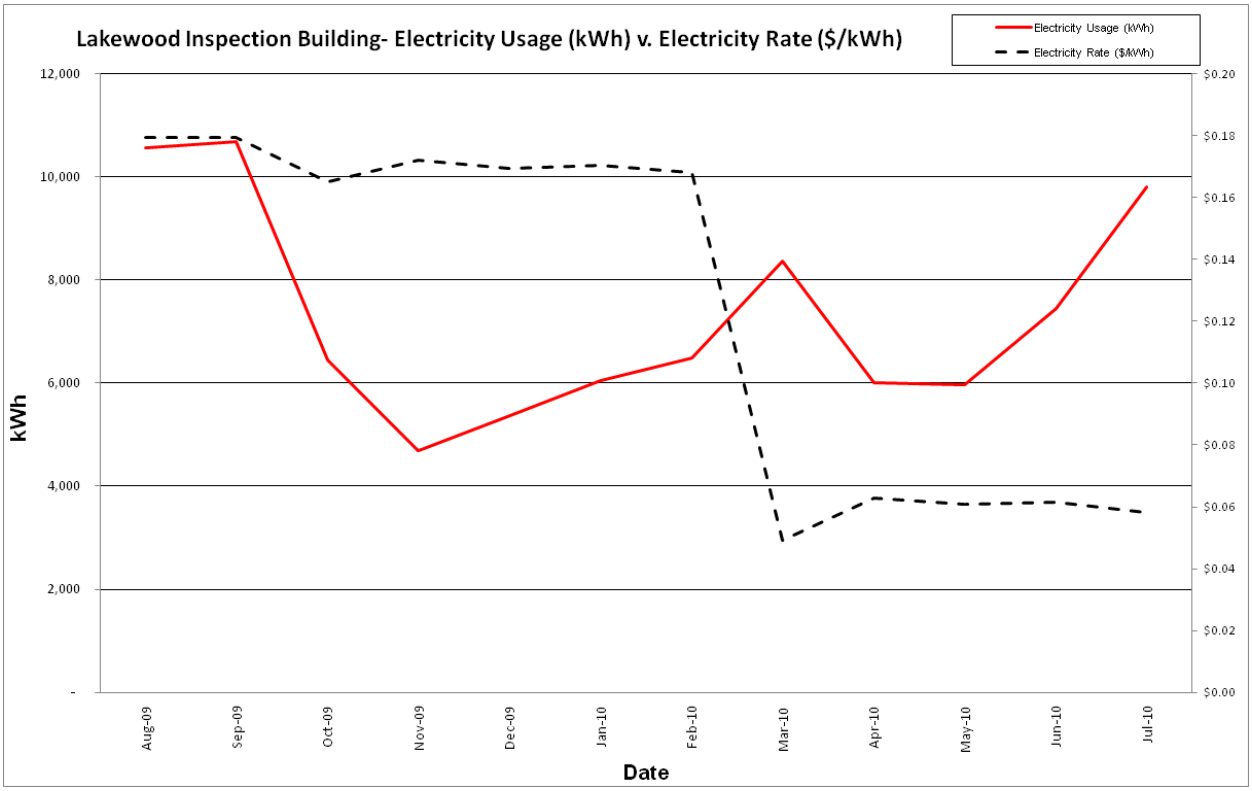
6.2. Tariff analysis

Currently, natural gas is provided via one gas meter with New Jersey Natural Gas serving as transmission and supply provider. The general service rate for natural gas charges a market-rate price based on use and the Inspection 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 Inspection Building is direct-metered (via one meter) and currently purchases electricity from Jersey Central Power& Light at a general service rate. The general service rate for electric charges are market-rate based on use and the Public Works Complex 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.


Lakewood Inspection Building- Natural Gas Usage (therms) v. Natural Gas Rate ($/therm)
Natural Gas Usage (therms)
Natural Gas Rate ($/therm)
therms
1200
1000
800
600
400
200
0
$10.00
$9.00
$8.00
$7.00
$6.00
$5.00
$4.00
$3.00
$2.00
$1.00
$0.00
Aug-09
Sep-09
Oct-09
Nov-09
Dec-09
Jan-10
Feb-10
Mar-10
Apr-10
May-10
Jun-10
Jul-10
Date


Lakewood Inspection Building- Electricity Usage (kWh) v. Electricity Rate ($/kWh)
Electricity Usage (kWh)
Electricity Rate ($/kWh)
kWh
12,000
10,000
8,000
6,000
4,000
2,000
-
$0.20
$0.18
$0.16
$0.14
$0.12
$0.10
$0.08
$0.06
$0.04
$0.02
$0.00
Aug-09
Sep-09
Oct-09
Nov-09
Dec-09
Jan-10
Feb-10
Mar-10
Apr-10
May-10
Jun-10
Jul-10
Date

6.3. Energy Procurement strategies

Billing analysis shows large price fluctuations of over the course of the year for the Inspection Building natural gas account. Selecting 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.

Lakewood already purchases natural gas and electric for lower rate than the average rate.

7. METHOD OF ANALYSIS

7.1. 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.

7.2. 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

Lakewood Township
Inspection Building
212 4th Street

Birdsall Services Group
Engineers & Consultants

Upgrade Code	Description	Existing Fixture	Existing Watts	Proposed Fixture	Proposed Watts	Lighting Total # of Upgrades	Lighting Cost per Upgrade ($)	Lighting SmartStart Rebate per Upgrade
1	Recessed 2x2 fixture with (2) u-tube lamps / replace the (2) 32w u-tube lamps with energy saving lamps	2L22"	62	2L22" LO	48	42	$25.00	$0.00
2	Recessed 2x4 fixture with (4) 4' T8 lamps / replace the (4) 32w lamps with 28w energy saving lamps	4L4' T8/ELEC	110	4L4' T8/ELEC LO	99	57	$35.00	$0.00
3	75W Incandescent Flood Lamp / Replace with 15W Compact Fluorescent	75W INCANDESCENT	75	15W CF/SI	15	2	$6.00	$0.00
4	15W Exit Sign / Retrofit with LED	15W EXIT	15	LED	2	7	$40.00	$10.00
5						0	$0.00	$0.00
6						0	$0.00	$0.00
7						0	$0.00	$0.00
8						0	$0.00	$0.00
9						0	$0.00	$0.00
10						0	$0.00	$0.00
11						0	$0.00	$0.00
12						0	$0.00	$0.00

Summary

	Lighting (Only)	Sensors (Only)	Complete Lighting Upgrade
Cost	$3,337.00	$720.00	$4,057.00
Rebate	$70.00	$90.00	$160.00
Net Cost	$3,267.00	$630.00	**$3,897.00**
Savings (kWh)	3,207	501	**3,610**
Savings ($)	$384.88	$60.15	**$433.18**
Payback	8.5	10.5	**9.0**

Variables:

$0.12	Avg. Electric Rate ($/kWh)
	Avg. Demand Rate ($/kW)
2080	Operating Hours/Year
8	Operating Hours/Work Day

Assumptions:

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

Notes:

Seq. #	Upgrade Code	Room/Area	Hrs/ Work Day	Hrs/ Year	Existing Fixture	Existing Qty.	Existing Watts	Existing Foot Candles	Proposed Fixture	Proposed Qty.	Proposed Watts	kW Reduction	Lighting Energy Savings, kWh	Lighting Cost ($)	Lighting Savings ($)	Lighting Payback (yrs)	Controls Type	Controls Qty.	Occupancy Sensors (ONLY) Energy Savings, kWh	Occupancy Sensors (ONLY) Cost ($)	Occupancy Sensors (ONLY) Savings ($)	Occupancy Sensors (ONLY) Payback (yrs)	SmartStart Rebate Lighting	SmartStart Rebate Sensors	Lighting & Occupancy Sensors Energy Savings, kWh	Lighting & Occupancy Sensors Post-Rebate Cost ($)	Lighting & Occupancy Sensors Savings ($)	Lighting & Occupancy Sensors Payback (yrs)
		Totals:					9129				7703	1.426	3207	$3,337.00	$384.88	8.7			501	$720.00	$60.15	12.0	$70.00	$90.00	3610	$3,897.00	$433.18	9.0
1	1	Foyer	10	2600	2L22"	2	124		2L22" LO	2	96	0.028	73	$50.00	$8.74	5.7			0	$0.00	$0.00		$0.00	$0.00	73	$50.00	$8.74	5.7
2	1	Lobby	10	2600	2L22"	4	248		2L22" LO	4	192	0.056	146	$100.00	$17.47	5.7			0	$0.00	$0.00		$0.00	$0.00	146	$100.00	$17.47	5.7
3	2	Office Area	8	2080	4L4' T8/ELEC	32	3520		4L4' T8/ELEC LO	32	3168	0.352	732	$1,120.00	$87.86	12.7			0	$0.00	$0.00		$0.00	$0.00	732	$1,120.00	$87.86	12.7
4	1	Office	8	2080	2L22"	6	372		2L22" LO	6	288	0.084	175	$150.00	$20.97	7.2	OSR	1	193	$260.00	$23.21	11.2	$0.00	$35.00	324	$375.00	$38.94	9.6
5	1	Office	8	2080	2L22"	6	372		2L22" LO	6	288	0.084	175	$150.00	$20.97	7.2	OSR	1	193	$260.00	$23.21	11.2	$0.00	$35.00	324	$375.00	$38.94	9.6
6	2	Office	8	2080	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	46	$70.00	$5.49	12.7	OSW	1	114	$200.00	$13.73	14.6	$0.00	$20.00	149	$250.00	$17.85	14.0
7	2	Office Area	10	2600	4L4' T8/ELEC	6	660		4L4' T8/ELEC LO	6	594	0.066	172	$210.00	$20.59	10.2			0	$0.00	$0.00		$0.00	$0.00	172	$210.00	$20.59	10.2
8	1		10	2600	2L22"	2	124		2L22" LO	2	96	0.028	73	$50.00	$8.74	5.7			0	$0.00	$0.00		$0.00	$0.00	73	$50.00	$8.74	5.7
9	2	Hallway	10	2600	4L4' T8/ELEC	1	110		4L4' T8/ELEC LO	1	99	0.011	29	$35.00	$3.43	10.2			0	$0.00	$0.00		$0.00	$0.00	29	$35.00	$3.43	10.2
10	1	Office	8	2080	2L22"	8	496		2L22" LO	8	384	0.112	233	$200.00	$27.96	7.2			0	$0.00	$0.00		$0.00	$0.00	233	$200.00	$27.96	7.2
11	2	Utility Room	1	260	4L4' T8/ELEC	1	110		4L4' T8/ELEC LO	1	99	0.011	3	$35.00	$0.34	102.0			0	$0.00	$0.00		$0.00	$0.00	3	$35.00	$0.34	102.0
12	2	Bathroom	4	1040	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	23	$70.00	$2.75	25.5			0	$0.00	$0.00		$0.00	$0.00	23	$70.00	$2.75	25.5
13	2	Bathroom	4	1040	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	23	$70.00	$2.75	25.5			0	$0.00	$0.00		$0.00	$0.00	23	$70.00	$2.75	25.5
14	1	Conference Room	6	1560	2L22"	12	744		2L22" LO	12	576	0.168	262	$300.00	$31.45	9.5			0	$0.00	$0.00		$0.00	$0.00	262	$300.00	$31.45	9.5
15	2	Café	10	2600	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	57	$70.00	$6.86	10.2			0	$0.00	$0.00		$0.00	$0.00	57	$70.00	$6.86	10.2
16	2	Supply Room	1	260	4L4' T8/ELEC	4	440		4L4' T8/ELEC LO	4	396	0.044	11	$140.00	$1.37	102.0			0	$0.00	$0.00		$0.00	$0.00	11	$140.00	$1.37	102.0
17	2	Utility Closet	1	260	4L4' T8/ELEC	1	110		4L4' T8/ELEC LO	1	99	0.011	3	$35.00	$0.34	102.0			0	$0.00	$0.00		$0.00	$0.00	3	$35.00	$0.34	102.0
18	1	Hallway	10	2600	2L22"	2	124		2L22" LO	2	96	0.028	73	$50.00	$8.74	5.7			0	$0.00	$0.00		$0.00	$0.00	73	$50.00	$8.74	5.7
19	2	Hallway	10	2600	4L4' T8/ELEC	4	440		4L4' T8/ELEC LO	4	396	0.044	114	$140.00	$13.73	10.2			0	$0.00	$0.00		$0.00	$0.00	114	$140.00	$13.73	10.2
20	3	Exterior	7	1820	75W INCANDESC	2	150		15W CF/SI	2	30	0.12	218	$12.00	$26.21	0.5			0	$0.00	$0.00		$0.00	$0.00	218	$12.00	$26.21	0.5
21	4	Exit Signs	24	6240	15W EXIT	7	105		LED	7	14	0.091	568	$280.00	$68.14	4.1			0	$0.00	$0.00		$70.00	$0.00	568	$210.00	$68.14	3.1

Appendix B: Third Party Energy Suppliers (ESCOs)

JCP&L SERVICE TERRITORY
Last Updated: 08/26/10

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

Supplier	Telephone & Web Site	*Customer Class
Champion Energy Services, LLC 72 Avenue L Newark, NJ 07105	(877) 653-5090 www.championenergyservices.com	**C/I** **ACTIVE**
Community Energy, Inc.*** 51 Sandbrook Headquarters Road Stockton, NJ 08559	(877) NJWIND-1 (877) 659–4631 www.CommunityEnergyInc.com	**R/C/I** **ACTIVE**
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(888) 635-0827 www.newenergy.com	**C/I** **ACTIVE**
Constellation Energy 900A Lake Street, Suite 2 Ramsey, NJ 07446	(877) 997-9995 www.home.newenergy.com	**R** **ACTIVE**
Direct Energy Business, LLC 120 Wood Avenue Suite 611 Iselin, NJ 08830	(888) 925-9115 www.directenergybusiness.com	**C/I** **ACTIVE**
Direct Energy Services, LLC 120 Wood Avenue Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com	**C/I** **ACTIVE**
Dominion Retail, Inc. **d/b/a Dominion Energy Solutions** 395 Route 70, Suite 125 Lakewood, NJ 08701	(866) 645-9802 www.dom.com/products	**R/C/I** **ACTIVE**
FirstEnergy Solutions Corp. 300 Madison Avenue Morristown, NJ 07962	(800) 977-0500 www.fes.com	**C/I** **ACTIVE**

Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, NJ 08701	(800) 805-8586 www.gesc.com	**R/C/I** **ACTIVE**
GDF SUEZ Energy Resources NA, Inc. 333 Thornall Street Sixth Floor Edison, NJ 08837	(866) 999-8374 www.gdfsuezenergyresources.com	**C/I** **ACTIVE**
Gexa Energy New Jersey LLC 651 Jernee Mill Road Sayreville, NJ 08872	(866) 961-9399 www.gexaenergy.com	**C/I** **ACTIVE**
Glacial Energy of New Jersey, Inc. 75 Route 15 Building E Lafayette, NJ 07848	(888) 452-2425 www.glacialenergy.com	**C/I** **ACTIVE**
Green Mountain Energy Company*** 3000 Atrium Way Mount Laurel, NJ 08054	(800) 810-7300 www.greenmountain.com	**R/C/I** **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 3000 Atrium Way Suite 273 Mt. Laurel, NJ 08054	(866) 769-3799 www.libertypowercorp.com	**C/I** **ACTIVE**
Liberty Power Holdings, LLC 3000 Atrium Way Suite 273 Mt. Laurel, NJ 08054	(866) 769-3799 www.libertypowercorp.com	**C/I** **ACTIVE**
Linde Energy Services 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644	**C/I**

	www.linde.com	**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**
PPL EnergyPlus, LLC 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.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 1 South Jersey Plaza Route 54 Folsom, NJ 08037	(800) 800-266-6020 www.southjerseyenergy.com	**R/C/I** **ACTIVE**
Sterling Planet, Inc.*** 58 Otto Avenue Beverly, NJ 08010	(877) 457-2306 www.sterlingplanet.com	**R/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**

NJ NATURAL GAS CO. SERVICE TERRITORY
Last Updated: 08/26/10

***CUSTOMER CLASS** - R – RESIDENTIAL C – COMMERCIAL I – INDUSTRIAL

Supplier	Telephone & Web Site	*Customer Class
Colonial Energy, Inc. 3975 Fair Ridge Dr. Suite T 10 N Fairfax, Va. 22033	845-429-3229 www.colonialgroupinc.com	**C/I** **ACTIVE**
Cooperative Industries 412-420 Washington Avenue Belleville, NJ 07109	800-6-BUYGAS (6-289427) www.cooperativenet.com	**C/I** **ACTIVE**
Direct Energy Services, LLP 120 Wood Avenue, Suite 611 Iselin, NJ 08830	866-547-2722 www.directenergy.com	**R/C/I** **INACTIVE**
Dominion Retail, Inc. **d/b/a Dominion Energy Solutions** 395 Route 70, Suite 125 Lakewood, NJ 08701	866-275-4240 www.dom.com/products	**R/C/I** **ACTIVE**
Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, NJ 08701	800-805-8586 www.gesc.com	**R/C/I** **ACTIVE**
UGI Energy Services, Inc. **d/b/a/ GASMARK** 224 Strawbridge Drive, Suite 107 Moorestown, NJ 08057	856-273-9995 www.ugienergyservices.com	**C/I** **ACTIVE**
Hess Energy, Inc. One Hess Plaza Woodbridge, NJ 07095	800-437-7872 www.hess.com	**C/I** **ACTIVE**
Intelligent Energy 2050 Center Avenue, Suite 500 Fort Lee, NJ 07024	800-724-1880 www.intelligentenergy.org	**R/C/I** **ACTIVE**
Metromedia Energy, Inc. 6 Industrial Way Eatontown, NJ 07724	877-750-7046 www.metromediaenergy.com	**C/I** **ACTIVE**
MxEnergy, Inc. 510 Thornall Street, Suite 270Edison, NJ 08837	800-375-1277	**R/C/I**

	www.mxenergy.com	**ACTIVE**
NATGASCO (Mitchell Supreme) 532 Freeman Street Orange, NJ 07050	800-840-4GAS www.natgasco.com	**C** **ACTIVE**
NJ Gas & Electric 1 Bridge Plaza, Fl. 2 Fort Lee, NJ 07024	866-568-0290 www.NJGandE.com	**R/C** **ACTIVE**
Palmco Energy 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 Street Lebanon, NJ 08833	800-363-7499 www.pepco-services.com	**C/I** **ACTIVE**
PPL EnergyPlus, LLC 811 Church Road - Office 105 Cherry Hill, NJ 08002	800-281-2000 www.pplenergyplus.com	**C/I** **ACTIVE**
South Jersey Energy Company 1 South Jersey Plaza, Route 54 Folsom, NJ 08037	800-266-6020 www.southjerseyenergy.com	**R/C/I** **ACTIVE**
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	800-225-1560 www.spragueenergy.com	**C/I** **ACTIVE**
Woodruff Energy 73 Water Street Bridgeton, NJ 08302	800-557-1121 www.woodruffenergy.com	**R/C/I** **ACTIVE**