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Local Government Energy Program
Final Energy Audit Report

For

Lakewood Township Municipal Building

231 Third St
Lakewood, NJ 08701

Project Number: LGEA80

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INTRODUCTION

On August 20th, 2010 Steven Winter Associates, Inc. (SWA) and Birdsall Services Group (BSG) performed an energy audit and assessment of the Lakewood Municipal 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 Municipal Building, 231 East 3rd Street, is a one and two-story steel framed building plus basement, with a gross floor area of approximately 40,072 square feet. The building was built in 1970, and there have been a major addition on the east side of the building and several renovations since then with regard to upgrading the gas service in the building and the HVAC system serving the 2nd floor and Courtroom/Auditorium spaces and lighting and power serving the Courtroom/Auditorium spaces, renovation of the Communications Center in the Basement and construction of Juvenile Holding Rooms.

The Lakewood Municipal Building is occupied consistently by approximately 50 employees for 50 hours a week, with the exception of the Police Department, which is occupied 24 hours a day 7 days 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 Municipal Building in Lakewood Township, NJ 08901.

Based on the field visit performed by Steven Winter Associates (SWA) and BSG staff on August 20th, 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 Municipal Building consumed a total of 891,400 kWh of electricity for a total cost of $103,863. In the most recent full year of natural gas data collected, August, 2009 through July, 2010, 26,517 therms of gas were consumed for a total cost of $32,126. With electricity and natural gas combined, the building consumed 5,693 MMBtus of energy at a total cost of $135,989.

SWA/BSG has entered energy information about the Lakewood Municipal Building in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. The building was classified as buildings type "Other" not allowing it to receive 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 146 kBtu/ft^{2}yr compared to the national average of a similar building consuming 90 kBtu/ft^{2}yr. Implementing the recommendations included in this report will reduce the building energy consumption by approximately 52.9 kBtu/ft^{2}yr.

Based on the assessment of the Lakewood Municipal 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:

The exterior walls of the facility currently have no insulation. It is recommended that 3½"-thick, R-13 batt insulation be installed behind the drywall. This measure would have a high cost and a high payback, and therefore would not make for a practical ECM.

The water heater is aging, but is not yet at the end of its useful life. It should be replaced on an as-fail basis.

Category II: Operations & Maintenance:

- Seal annular spaces, cracked bricks, deteriorated perimeter sealants around lighting fixtures, windows and brick-stone connections
- Insulate the roof hatch, abandoned exhaust fans on the roof, and overhead doors
- Insulate and weather-strip doors

Category III: Energy Conservation Measures:

At this time, SWA/BSG-PMK highly recommends a total of **6** Energy Conservation Measures (ECMs) for the Municipal Building that are summarized in the following table. The total investment cost for these ECMs, with incentives, is **$1,021,245** (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 **$84,063** with an aggregated simple payback of **12.1 years**. SWA/BSG-PMK estimates that implementing the highly recommended ECMs will reduce the carbon footprint of the facility by **440,664 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-PMK 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	$1.21 $/therm

Avg. Annual Demand: 0.00240 Area of Building (SF): 40,072

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, $	CO_2 Reduced, lbs/yr
1	Replace Surge Protectors with SmartStrips	Vendor Website	$9,825	$0	$9,825	45,046	9.03	0	3.84	$0	$5,406	10	$45,643	1.82	365%	36%	54%	$36,285	61,713
2	Demand-Controlled Ventilation	Similar Projects	$18,000	$0	$18,000	12,619	2.53	2,652	7.69	$0	$4,723	10	$39,879	3.81	122%	12%	23%	$22,287	48,313
TOTAL			$27,825	$0	$27,825	57,664	11.56	2,652	11.53	$0	$10,128	-	$85,522	2.75	-	-	-	$58,572	110,026

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
3	Lighting Upgrades	Empirical Data	$21,315	$0	$21,315	35,219	7.06	0	3.00	$0	$4,226	15	$49,731	5.04	133%	9%	18%	$29,138	48,250
	Occupancy Sensors		$7,380	$2,555	$4,825	6,543	1.31	0	0.56	$0	$785	10	$6,629	6.15	37%	4%	10%	$1,872	8,963
TOTAL			$28,695	$2,555	$26,140	41,761	8.37	0	3.56	$0	$5,011	-	$56,360	5.22	-	-	-	$31,010	57,213

Table 3 - Recommended 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
4	81-kW Roof-Mounted PV System	Similar Projects	$569,940	$0	$569,940	86,580	17.35	0	7.37	$0	$53,180	30	$1,015,912	10.72	78%	3%	9%	$472,411	118,615
5	HVAC Upgrade & Building Automation System	Similar Projects	$310,000	$5,660	$304,340	10,930	2.19	9,490	24.61	$0	$12,794	25	$217,905	23.79	-28%	-1%	0%	-$81,551	126,005
6	Thermal-Pane Windows & Doors	Similar Projects	$93,000	$0	$93,000	1,392	0.28	2,299	5.86	$0	$2,949	35	$61,552	31.54	-34%	-1%	1%	-$29,637	28,806
TOTAL			$972,940	$5,660	$967,280	98,903	19.82	11,789	37.84	$0	$68,923	-	$1,295,369	14.03	-	-	-	$361,223	273,425

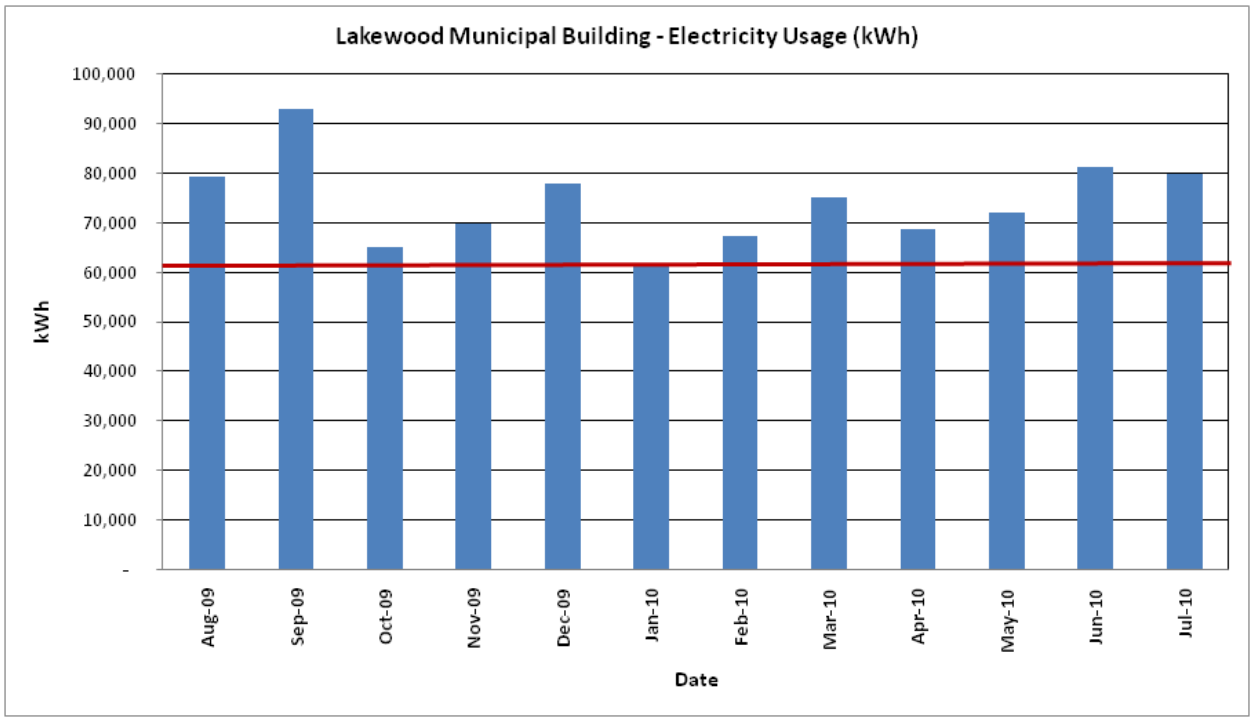
1. HISTORIC ENERGY CONSUMPTION

1.1. Energy Usage and Cost Analysis

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

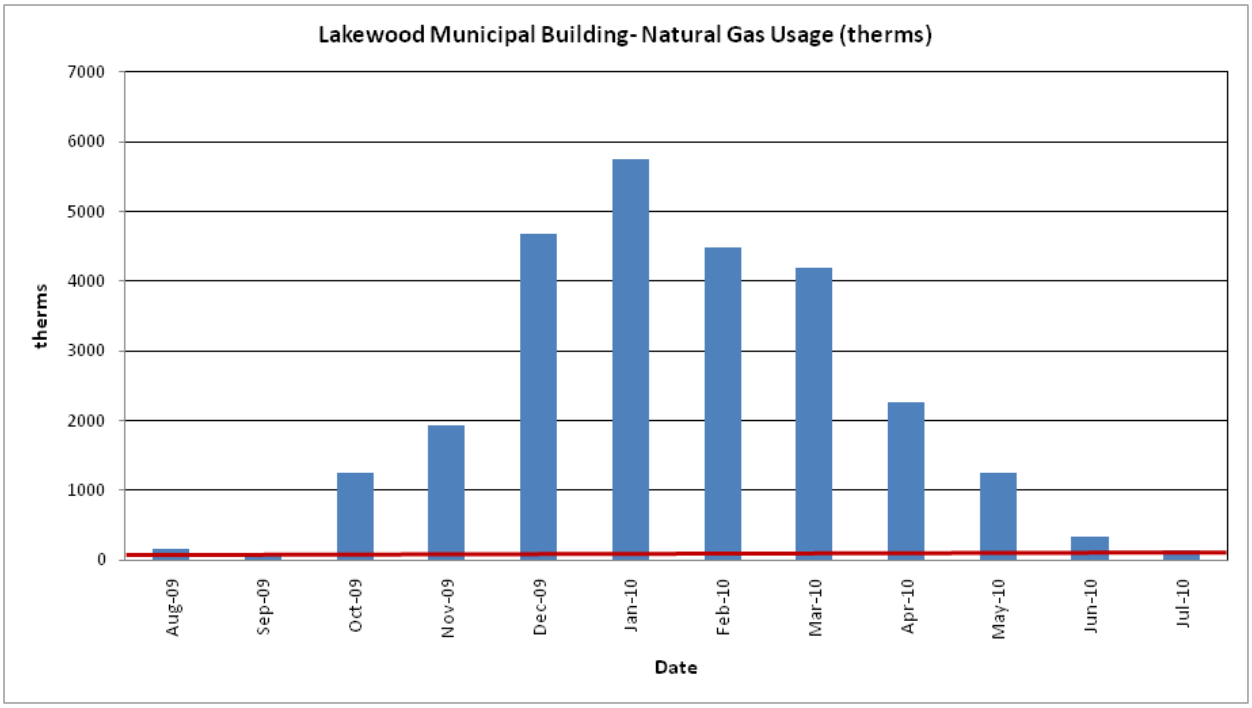
Electricity – The Lakewood Municipal Building is currently served by one electric meter. The facility currently receives electricity from Jersey Central Power & Light at **an average rate of $0.12/kWh** based on 12 months of utility bills from August, 2009 through July, 2010. The facility consumed **approximately 891,400 kWh or $103,863.36 worth of electricity** in the previous year with an average monthly demand of 178.7 kW.

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



Natural Gas – The Lakewood Municipal 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 $1.21/therm** based on 12 months of utility bills for August, 2009 through July, 2010. The facility consumed **approximately 26,517.447 therms or $32,126 worth of natural gas** in the previous year.

The following charts show the natural gas usage for the Lakewood Municipal 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 Lakewood Municipal 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 Lakewood Municipal 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 $1.21/therm based on the most recent 12 months of utility bills.

1.3. Energy Benchmarking

SWA/BSG has entered energy information about the Lakewood Municipal 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 other because the building is used as a courthouse, police department, and administrative offices. A classification of other does not allow it to receive a performance rating which could be used to achieve an Energy Star building certification.

The Site Energy Use Intensity is 146 kBtu/sq.ft/yr compared to the national average of buildings classified as Other consuming 90 kBtu/sq.ft./yr. Implementing this report's recommended Energy Conservations Measures (ECMs) will reduce use by approximately 52.9 kBtu/sq.ft./yr.

SWA/BSG has created the Portfolio Manager Site information for Lakewood Municipal 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 Town Hall

Building ID: 2428018
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 Town Hall 231 Third Street Lakewood, NJ 08701	Township of Lakewood 231 Third St Lakewood, NJ 08701	Tony Arecchi 1 America Ave Lakewood, NJ 08701

Year Built: 1970
Gross Floor Area (ft²): 40,072

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	3,052,864
Natural Gas (kBtu)[4]	2,803,356
Total Energy (kBtu)	5,856,220

Energy Intensity[5]	
Site (kBtu/ft²/yr)	146
Source (kBtu/ft²/yr)	328

Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	614

Electric Distribution Utility
FirstEnergy - Jersey Central Power & Lt Co

National Average Comparison	
National Average Site EUI	90
National Average Source EUI	189
% Difference from National Average Source EUI	73%
Building Type	Other

Stamp of Certifying Professional

Based on the conditions observed at the time of my visit to this building, I certify that the information contained within this statement is accurate.

Certifying Professional
N/A

Meets Industry Standards[6] **for Indoor Environmental Conditions:**	
Ventilation for Acceptable Indoor Air Quality	**N/A**
Acceptable Thermal Environmental Conditions	**N/A**
Adequate Illumination	**N/A**

Notes:
1. Application for the ENERGY STAR must be submitted to EPA within 4 months of the Period Ending date. Award of the ENERGY STAR is not final until approval is received from EPA.
2. The EPA Energy Performance Rating is based on total source energy. A rating of 75 is the minimum to be eligible for the ENERGY STAR.
3. Values represent energy consumption, annualized to a 12-month period.
4. Natural Gas values in units of volume (e.g. cubic feet) are converted to kBtu with adjustments made for elevation based on Facility zip code.
5. Values represent energy intensity, annualized to a 12-month period.
6. Based on Meeting ASHRAE Standard 62 for ventilation for acceptable indoor air quality, ASHRAE Standard 55 for thermal comfort, and IESNA Lighting Handbook for lighting quality.

EPA Form 5900-16

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 Friday, August 20, 2010 the following data was collected and analyzed.

2.1. Building Characteristics

The two-story plus basement building, consists of a slab-on-grade at the basement level with the first and second floors and roof being framed slabs supported by steel framing. The two floors and basement total 40,072 square feet. The Municipal Building was originally constructed in 1970 as new construction. The building houses Reception, Offices, Lunch Room, Training Room, and Ancillary Spaces for the Court System, the Police Department, Tax Assessor and Ancillary uses.

2.2. Building occupancy profiles

Its occupancy is approximately 50 Occupants on a daily basis, 50 hours per week, Monday through Friday, except for Police personnel according to staff personnel.

2.3. Building Envelope

West Facade

South Facade

East Facade – Side

East & North Facade – Rear

Partial North Facade – Rear

It is our understanding that the building as initially construction was un-insulated and overtime insulation assemblies have been introduced in some areas of the building.

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 construction is comprised of multiple un-insulated assemblies.

The typical two story wall assembly is comprised of composite construction including 4-inch brick veneer and 8-inch nominal concrete unit masonry backup with metal furring and gypsum board interior finish. Some interior spaces are exposed backup masonry and do not have metal furring and gypsum board interior finish.

The alternate two story wall assembly is comprised of exposed aggregate finish on composite construction including 4-inch concrete masonry units and 8-inch nominal concrete unit masonry backup with metal furring and gypsum board interior finish. Some interior spaces are exposed backup and do not have metal furring and gypsum board interior finish.

The one story wall assembly at the Courtroom/Auditorium is comprised of composite construction including 4-inch brick veneer and 8-inch nominal concrete unit masonry backup with metal furring and gypsum board interior finish. Some interior spaces are exposed backup masonry and do not have metal furring and gypsum board interior finish.

The alternate one story wall assembly at the Courtroom/Auditorium is comprised of exposed aggregate finish cement panels anchored to composite construction including 4-inch concrete masonry units and 8-inch nominal concrete unit masonry backup with metal furring and gypsum board interior finish. Some interior spaces are exposed backup and do not have metal furring and gypsum board interior finish.

The one story wall assembly at the Sally Port is comprised of composite construction including 4-inch brick veneer and 6-inch nominal concrete unit masonry backup.

The Basement wall assemblies are either poured in place concrete or concrete masonry units exposed on exterior and interior of building.

The exterior wall transition between the low and high sections of the building are comprised of similar assemblies to the typical two story and the alternate two story sections described in the above paragraphs.

Note: Wall insulation levels as installed in some areas could not be verified in the field. Information was obtained from Lakewood Township Staff.

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

Annular space between pipes is not sealed

Annular space between pipes is not sealed

Failed Perimeter Sealant

Annular space between pipes is not sealed

Failed Perimeter Sealant

Cracked Brick

Provide Rain hood

2.3.2. Roof

The building is comprised of one type of roof assembly at both the one story and two story roofs. The main two story roof is relatively flat with the structure being sloped minimally for drainage with no parapet. The one story roofs are also relatively flat with structure being sloped minimally for drainage with low parapets.

The roofing assembly is comprised of 1 ½-inch metal decking on steel framing, with uniform thickness rigid insulation mechanically attached to the decking. Tapered insulation in the form of crickets on top of the uniform thickness insulation is installed to provide positive drainage to the roof drains and/or through-wall scupper locations. The insulation is covered with a multi-ply built-up roofing membrane with exposed gravel.

Main Roof

Sally Port Roof

Courtroom/Auditorium Roof

Roof surfaces were inspected during the field audit. They were found to be in overall good condition with no signs of uncontrolled moisture (ponding), air leakage or other energy comprising issues except for the following:

Roof Hatch Not Insulated

Abandoned Exhaust Fans Not Insulated

2.3.3. Base

The building's basement is comprised of a slab-on-grade floor with a perimeter foundation walls which are below grade except for the location of the areaways which are comprised of exposed concrete masonry units. There is no sign of any perimeter insulation on either the below grade basement exterior or interior walls.

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

2.3.4. Windows

The building contains one type of combination window (hinged and fixed).

Windows are aluminum without thermal-break construction. Glazing is clear single glazing. Exterior shading devices are located in front of the windows on the south facade only as an architectural feature. Interior shading devices vary from roll-up shades to venetian binds to vertical blinds. The windows are original and have never been replaced. Most windows have been subsequently wet glazed to prevent air leakage at glazing.

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 acceptable condition with some signs of uncontrolled moisture, air-leakage and/or other energy-comprising issues.

The following specific window problem spots were identified:

Cracked Sealant

Cracked Sealant

2.3.5. Exterior Doors

The building contains aluminum storefronts, aluminum entry doors and frames, and steel doors and steel frames at egress doors.

1. Aluminum entry doors in storefront are narrow stile (2 1/4-inch nominal width) un-insulated doors, clear tempered single glazed. Integral weather-stripping is supplied at fixed stops.

2. Aluminum storefront is comprised of non-thermally broken construction, clear tempered single glazing.

3. Steel egress doors do not appear to be insulated or galvanized. Door vision panels are single glazed. Steel frames are not insulated, but are filled solid with grout. Weather-stripping is installed at some of the door bottoms. Some weather-stripping is installed at head and jambs at select doors.

4. Sectional steel overhead doors at Sally Port Entry and Exit are not insulated. No vision panels are located in each door. Continuous weather-stripping is not installed at head, jambs and bottom of each door. Weather-stripping is not necessary because this space is

not heated or conditioned and there is another door to enter the building from the Sally Port.

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:

No Threshold or Weather-stripping

No Weather-stripping

Worn Weather-stripping

No Threshold Panel

Un-insulated, No Weather-stripping

Un-insulated Metal

2.3.6. Building Air Tightness

Overall, the field auditors found the building to be not 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

HB Smith boiler

Heating is generated by a variety of units. Two gas-fired, hot water boilers, both at least 30 years old, are located in the mechanical room. Boiler #1, an HB Smith 350 Mills unit rated at 1,826.1 MBH and 80% efficiency, provides heating to the watch command office, detective's bureau, main lobby, and jail cells.

This unit is in poor condition, as there are holes on the exterior that leave insulation exposed. Hot water from this boiler is fed to a hot water coil in a Trane multi-zone air-handler, which is also located in the mechanical room. These units at one time heated the court room, which is now heated by three (3) Carrier packaged rooftop DX units (labeled RTU-1 through RTU-3), installed in 2009. These units provide a total of 475 MBH of gas heating at 82% efficiency. Boiler #2, a multi-stage Hydrotherm boiler, has a heating capacity of 1,200 MBH and is 80% efficient. This unit feeds a hot water coil in a McQuay air-handler; the direct-expansion cooling in this AHU is no longer in use. These units service the east side of the 1st floor. The 2nd floor is heated by twelve (12) Carrier packaged rooftop DX units, installed in 2002, all of which provide 72 MBH of gas heating at 82% efficiency. The cell block is heated by a Trane HV air-handler.

Category III Recommendations – ECM #5: Replace both boilers, the York 10-ton condensing unit, the Carrier 20-ton condensing unit, and their corresponding air-handlers with high-efficiency units.

2.4.2. Cooling

Various units provide cooling to the facility. A 20-ton, 9.4 EER (Energy Efficiency Ratio) Carrier condensing unit feeds the Trane multi-zone air-handler, which services the west side of the 1st floor. A McQuay condensing unit is outside the building, however, it is no longer in use; this unit was replaced with a 10-ton, 10 EER York unit, which feeds the cooling coil in the McQuay air-handler that services the east side of the 1st floor; this cooling coil is not operational. The court room is cooled by three Carrier packaged DX rooftop units, two of which are 10-ton units and the other 6-tons, which are rated at 11 EER. Twelve (12) Carrier packaged DX rooftop units cool the 2nd floor; these units total 56 tons of cooling and all have an EER of 11. Several smaller units provide additional cooling. A 17 MBH, 10.2 SEER (Seasonal Energy Efficiency Ratio) Sanyo ductless split-system condensing unit feeds an evaporator in the data center. A 4-ton American Standard split-system condensing unit cools the police booking room. A 2 ½ ton, 10 SEER Bryant condensing unit feeds a Bryant cooling coil that cools the 911 communications room. There are also three (3) portable

Carrier packaged rooftop DX unit

air-conditioners. A 10 MBH, 8.9 EER Everstar unit cools the communications room; a 2-ton, 12.3 EER OceanAire unit cools the data center; and a 9 MBH Amcor unit cools the 911 call center.

Category III Recommendations – ECM #5: Replace both the boilers and condensing units, the York 10-ton condensing unit, the Carrier 20-ton condensing unit, and their corresponding air-handlers with high-efficiency units.

2.4.3. Ventilation

Ventilation is provided by seven (7) exhaust fans. Four (4) fans, located on the upper roof, vent restrooms throughout the building, and a fifth fan on the upper roof vents the lobby. An exhaust fan on the roof above the court room provides ventilation for the court room, and an exhaust fan on the lower back roof provides ventilation to the jail cells.

Category I Recommendations – Capital Improvements: The exterior walls of the facility currently have no insulation. It is recommended that 3½"-thick, R-13 batt insulation be installed behind the drywall. This measure would have a high cost and a high payback, and therefore would not make for a practical ECM.

Category III Recommendations – ECM #2: 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.

AO Smith water heater

2.4.4. Domestic Hot Water

Water is heated by a 100 gallon, 199 MBH AO Smith natural gas water heater, installed in 1999.Despite its age this unit was found to be in good condition.

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 #3: Recommend upgrading 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 one-hundred thirty-one (131) computers, eleven (11) refrigerators, eight (8) copy/fax machines, two (2) coffee makers, two (2) microwaves, one (1) electric stove, and one (1) toaster oven. In this facility, many of the appliances found and noted in the attached equipment list were older than the 10 year threshold and should be considered for the Energy Star program.

2.5.3.Elevators

There is one, hydraulic elevator in the building. The elevator has three stops and was found to be in good operating condition.

3. Building Systems Equipment List

Lakewood Municipal Building							
Building System	Description	Locations	Model #	Fuel	Space Served	Year Installed	Estimated Remaining Useful Life %
Heating/ Cooling	Boiler #1: Cast iron, hot water boiler, 1,826,100 BTUH, 80% efficient	Mechanical room	HB Smith 350 Mills	Natural gas	West-side 1st floor: watch command office, detective's bureau, main lobby, jail cells	1980	0%
	Gas burner, 2,500 MBH		Siemon, M# B255-20, S# 11672685	Natural Gas		Approx. 2000	52%
	AC burner motor, 1/2 HP, 3,450 RPM		GE, M# 5K37JG402, S# JCD	Electricity			
	Hot water circulation pump	Pipe-mounted	Bell & Gossett, M# P57281	Electricity		Approx. 2003	30%
	Pump motor; 3/4 HP, 1,750 RPM, 208-230/460 V		Bell & Gossett, M# M80039 B10				
	Hot water circulation pump	Pipe-mounted	Bell & Gossett, M# P57281	Electricity		Approx. 2003	30%
	Pump motor; 3/4 HP, 1,725 RPM, 200-230/460 V		AO Smith, M# H379, S# BZ11-29				
	Multi-zone AHU; direct-expansion cooling (R-22); hot water coil	Mechanical room	Trane, M# LZ-17, S# K134012	Electricity		Approx. 1980	0%
	AHU motor; 7.5 HP, 1,750 RPM, 89.5% efficient, 208-230/460 V		Hengshui Electric Motors, M# PBY754FBA, S# PBY754FBAD010045	Electricity		Approx. 2005	75%
	20-ton air-cooled condensing unit, 9.4 EER	Outside	Carrier, M# 38AK024, S# 0105F00262	Electricity		2005	67%
Heating/ Cooling	Boiler #2: Multi-stage, cast-iron boiler, 1,200 MBH, 80% efficient	Mechanical room	Hydrotherm, M# MR1200, S# JBB 1247X	Natural gas	East side 1st floor: court records, police records, Traffic & Safety Dept.	1979	0%

	(2) Hot water circulation pumps; 3 HP motors, 1,725 RPM, 200-208 V	Pipe-mounted	Bell & Gossett, M# 182JM, S# 188091 JV	Electricity		Approx. 2000	0%
	10-ton air-cooled condensing unit, 10 EER (operable)	Outside	York, M# H2CE 120 A25E, S# NGKM079239	Electricity		2001	40%
	Single-zone AHU (not in use for cooling); direct-expansion cooling (R-22); hot water coil	Mechanical room	McQuay, M# MSL 222 CH, S# 3HG 000 298 03	Electricity		1980	0%
	AHU motor; 15 HP, 1,770 RPM, 91% efficient, 83.5% PF, 208-230/460 V		World Motor, M# H17443A, S# B0311845-ST-003F			Approx. 2005	67%
	Air-cooled condensing unit (inoperable)	Outside	McQuay			1980	0%
Heating	Hot water expansion tank	Mechanical room	No nameplate	n/a	Boiler #2	Approx. 1990	10%
Heating/ Cooling	HV AHU	Mechanical room	Trane, M# MT-3	Electricity	Cell block	Approx. 1980	0%
Heating/ Cooling	AHU; 1.5 HP motor	Mechanical room	Trane, M# T-3, S# K134078	Electricity	Cell block	1980	0%
Heating/ Cooling	AHU; 10 HP motor, 1,740 HP, 200 V (no longer in service)	Mechanical room	York, M# CS-74-F0-FCMP Y, S# 74-700030-H-1	Electricity	Police locker & weight rooms	Approx. 2005	75%
Heating/ Cooling	RTU-1: Packaged rooftop DX unit; 120 MBH cooling, 11 EER; 180 MBH heating, 82% efficient	Roof	Carrier, M# 48HJD012PH-581HE, S# 2209G30352	Electricity / Natural Gas	Court - North	2009	93%
Heating/ Cooling	RTU-2: Packaged rooftop DX unit; 120 MBH cooling, 11 EER; 180 MBH heating, 82% efficient	Roof	Carrier, M# 48HJD012PH-581HE, S# 2209G30353	Electricity / Natural Gas	Court	2009	93%
Heating/ Cooling	RTU-3: Packaged rooftop DX unit; 73 MBH cooling, 11 EER; 115 MBH heating, 81% efficient	Roof	Carrier, M# 48HJE007PH-551HE, S# 2109G40215	Electricity / Natural Gas	Court - South	2009	93%

Heating/ Cooling	MBR-1: Packaged rooftop DX unit; 5 tons cooling, 11 EER (13 SEER); 72 MBH heating, 82% efficient	Roof	Carrier, M# HJD006---541HY, S# 3502G30323	Electricity / Natural Gas	Tax Collector, Treasurer	2002	47%
Heating/ Cooling	MBR-2: Packaged rooftop DX unit; 6 tons cooling, 11 EER (13 SEER); 72 MBH heating, 82% efficient	Roof	Carrier, M# 48HJD007-551HY, S# 3502G30378	Electricity / Natural Gas	Tax assessor	2002	47%
Heating/ Cooling	MBR-3: Packaged rooftop DX unit; 5 tons cooling, 11 EER (13 SEER); 72 MBH heating, 82% efficient	Roof	Carrier, M# 48HJD006---541HY, S# 3502G30320	Electricity / Natural Gas	Meeting Room A	2002	47%
Heating/ Cooling	MBR-4: Packaged rooftop DX unit; 4 tons cooling, 11.05 EER (13 SEER); 72 MBH heating, 82% efficient	Roof	Carrier, M# 48HJD005---551HY, S# 3502G30239	Electricity / Natural Gas	Purchasing Agency, Senior Clerk, Senior & Social Services	2002	47%
Heating/ Cooling	MBR-5: Packaged rooftop DX unit; 5 tons cooling, 11 EER (13 SEER); 72 MBH heating, 82% efficient	Roof	Carrier, M# 48HJD006---541HY, S# 3502G30322	Electricity / Natural Gas	Engineering Department	2002	47%
Heating/ Cooling	MBR-6: Packaged rooftop DX unit; 5 tons cooling, 11 EER (13 SEER); 72 MBH heating, 82% efficient	Roof	Carrier, M# 48HJD006---541HY, S# 3502G30321	Electricity / Natural Gas	Township Clerk, Kitchen	2002	47%
Heating/ Cooling	MBR-7: Packaged rooftop DX unit; 5 tons cooling, 11 EER (13 SEER); 72 MBH heating, 82% efficient	Roof	Carrier, M# HJD006---541HY, S# 3502G30325	Electricity / Natural Gas	Storage, Janitor, Machine Room, Conference Room # 18, Treasurer	2002	47%
Heating/ Cooling	MBR-8: Packaged rooftop DX unit; 4 tons cooling, 11.05 EER (13 SEER); 72 MBH heating, 82% efficient	Roof	Carrier, M# 48HJD005---551HY, S# 3502G30243	Electricity / Natural Gas	Lakewood Development Corp.	2002	47%

Heating/ Cooling	MBR-9: Packaged rooftop DX unit; 4 tons cooling, 11.05 EER (13 SEER); 72 MBH heating, 82% efficient	Roof	Carrier, M# 48HJD005---551HY, S# 3502G30242	Electricity / Natural Gas	Lakewood Job Link	2002	47%
Heating/ Cooling	MBR-10: Packaged rooftop DX unit; 4 tons cooling, 11.05 EER (13 SEER); 72 MBH heating, 82% efficient	Roof	Carrier, M# 48HJD005---551HY, S# 3502G30240	Electricity / Natural Gas	Conferenc e Room C	2002	47%
Heating/ Cooling	MBR-11: Packaged rooftop DX unit; 4 tons cooling, 11.05 EER (13 SEER); 72 MBH heating, 82% efficient	Roof	Carrier, M# 48HJD005---551HY, S# 3502G30241	Electricity / Natural Gas	Mayor	2002	47%
Heating/ Cooling	MBR-12: Packaged rooftop DX unit; 5 tons cooling, 11 EER (13 SEER); 72 MBH heating, 82% efficient	Roof	Carrier, M# 48HJD006---541HY, S# 3502G30324	Electricity / Natural Gas	Computer Room, MTA Statistics, Manager	2002	47%
Heating	Hot water circulation pump (base-mounted)	Mechanical room	Federal Pump, M# B56123, S# VSP3C	Electricity	Boiler #1	1980	0%
	Motor; 3 HP, 1,725 RPM, 82% efficient, 75% PF, 208-230/460		Baldor, M# VWM32117, S# 36B05-107			Approx. 2000	44%
Heating	Hot water circulation pump (base-mounted)	Mechanical room	Federal Pump, M# B56123, S# VSP3C	Electricity	Boiler #1	1980	0%
	Motor; 3 HP, 1,725 RPM, 82% efficient, 75% PF, 208-230/460		Baldor, M# VWM32117, S# 36B05-107			Approx. 2000	44%
Heating	Hot water circulation pump (base-mounted)	Mechanical room	Federal Pump, M# 100506-03 S# VF-2	Electricity	Boiler #1	Approx. 2005	75%
	Motor; 1/2 HP, 1,725 RPM, 200 V		Westinghouse, M# BK77, S# 312P121			Approx. 2005	72%
Heating	Hot water circulation pump (base-mounted)	Mechanical room	Federal Pump, M# B-54948, S# VF-2	Electricity	Boiler #1	1980	0%
	Motor; 1/2 HP, 1,725 RPM, 200 V		Westinghouse, M# BK77, S# 312P121			Approx. 2005	72%

Heating	Hot water circulation pump (base-mounted)	Mechanical room	Federal Pump, S# VSA-17	Electricity	Boiler #2	1980	0%
	Motor, 1 HP, 1,725 RPM, 230/460 V		Westinghouse, M# C0M, S# 311P241-A			Approx. 2000	44%
Heating	Hot water circulation pump (base-mounted)	Mechanical room	Federal Pump, M# B-17316	Electricity	Boiler #2	1980	0%
	Motor, 1 HP, 1,725 RPM, 230/460 V		Westinghouse, M# C0M, S# 311P241-A			Approx. 2000	44%
Cooling	MBR-13: Ductless split-system condensing unit, 17 MBH cooling, 10.2 SEER	Roof	Sanyo, M# CL1822, S# 0015991	Electricity	Computer room	2000	33%
	Ductless split-system evaporator	Data center	Sanyo, M# KS1822, S# 0026491			2000	33%
Cooling	4-ton condensing unit	Outside	American Standard, M# 2A7C0048A3000AA, S# 53141U93F	Electricity	Police booking room	2005	67%
Cooling	Ductless split-system evaporator	Police booking room	Sanyo, M# TS2422A, S# 0000781			2005	67%
Cooling	4-ton ductless split-system condensing unit	Outside	Sanyo, M# C4822N, S# 0003581	Electricity	Data center	2000	33%
	Ductless split-system evaporator	Wall-mounted	Sanyo, M# TS2422B, S# 0001281				
Cooling	2 1/2 ton condensing unit, 10 SEER	Outside	Bryant, M# 561CJ030-E, S# 1604E11925	Electricity	911 communications room	2004	60%
	2 1/2 ton cooling coil	Basement storage closet	Bryant, M# FB4ANF030, S# 4598A14402				
Cooling	Portable air-conditioner, 10,000 BTUH, 8.9 EER	Communication room	Everstar, M# MPM2-10CR-BB6	Electricity	Communication room	Approx. 2007	70%
Cooling	2-ton portable air-conditioner, 12.3 EER	Data center	OceanAire, M# PWC2412, S# D2-13428	Electricity	Data center	Approx. 2007	70%
Cooling	Portable air-conditioner, 9,000 BTUH	911 call center	Amcor, M# KF9000E, S# 080432708	Electricity	911 call center	Approx. 2007	70%
Domestic Hot Water	100 gallon, 199 MBH water heater	Mechanical room	AO Smith, M# BTR 197 104, S# MJ990869015	Natural gas	Entire building	1999	15%

Emergency Power	Back-up generator, 30 kW, 1,800 RPM	Mechanical room	Onan, M# 30EK-4R8/7295, S# 0968062201	Natural gas	Entire building	Approx. 2005	75%
Ventilation	Exhaust fan	Upper roof	No nameplate	Electricity	Lobby	Approx. 1990	10%
Ventilation	Exhaust fan	Upper roof	No nameplate	Electricity	Restrooms	Approx. 1990	10%
Ventilation	Exhaust fan, 1 HP motor	Upper roof	Dayton, M# 4HX83A	Electricity	Restrooms	Approx. 2005	75%
Ventilation	Exhaust fan	Upper roof	No access	Electricity	Restrooms	Approx. 1990	10%
Ventilation	Exhaust fan	Upper roof	No access	Electricity	Restrooms	Approx. 1990	10%
Ventilation	Exhaust fan	Roof above court	No access	Electricity	Court room ceiling vent	Approx. 1990	10%
Ventilation	Exhaust fan	Lower back roof	No access	Electricity	Cell block	Approx. 1990	10%

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:

The exterior walls of the facility currently have no insulation. It is recommended that 3½"-thick, R-13 batt insulation be installed behind the drywall. This measure would have a high cost and a high payback, and therefore would not make for a practical ECM.

Category II: Operations & Maintenance:

- Seal annular spaces, cracked bricks, deteriorated perimeter sealants around lighting fixtures, windows and brick-stone connections
- Insulate the roof hatch, abandoned exhaust fans on the roof, and overhead doors
- Insulate and weather-strip doors

Category III Recommendations: Energy Conservation Measures:

Summary Table

ECM #	Description
1	Replace Surge Protectors with SmartStrips
2	Demand-Controlled Ventilation
3	Lighting Upgrades & Occupancy Sensors
4	81-kW Roof-Mounted PV System
5	HVAC Upgrade & Building Automation System
6	Thermal-Pane Windows & Doors

ECM #1: Replace Surge Protectors with SmartStrips

Description:

The computers at the Municipal 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, $9,825 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
1	Replace Surge Protectors with SmartStrips	Vendor Website	$9,825	$0	$9,825	45,046	9.03	0	3.84	$0.00	$5,406	10	$45,643	1.82	365%	36%	54%	$36,285	61,713

Assumptions:

The cost of electricity, taken from 12 months of the Municipal Building's electricity bills, is $0.12 per kWh. 131 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, 45,046 kWh of electricity are saved per year.

Rebates/financial incentives:

There are no incentives available for SmartStrips at this time.

ECM #2: Demand Control 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: $900 per zone, $18,000 total
Source of cost estimate: Similar Projects

Economics:

ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, $	Total 1st Yr Savings $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO_2 Reduced, lbs/yr
2	Demand-Controlled Ventilation	Similar Projects	$18,000	$0	$18,000	12,619	2.53	2,652	7.69	$0	$4,723	10	$39,879	3.81	122%	12%	23%	$22,287	48,313

Assumptions:

Natural gas and electricity costs are $1.21 per therm and $0.12 per kWh, respectively. In the 12 month period ranging from August, 2009 through July, 2010, the Municipal Building consumed 26,517 therms of natural gas. 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 Demand Ventilation Controlled retrofitted systems:

Rebates/financial incentives:

There are no incentives available for Demand Control Ventilation at this time.

ECM #3: Lighting Upgrades & Occupancy Sensors

Description:

Lighting at the Municipal 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 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	$21,315.00	$7,380.00	$28,695.00
Rebate	$0.00	$2,555.00	$2,555.00
Net Cost	$21,315.00	$4,825.00	$26,140.00
Savings (kWh)	29,333	6,543	35,219
Savings ($)	$3,519.95	$785.12	$4,226.26
Payback	6.1	6.1	6.2

Source of cost estimate: Empirical Data

Economics (without incentives):

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	Lighting Upgrades	Empirical Data	$21,315	$0	$18,760	35,219	7.06	0	3.00	$0	$4,226	15	$49,731	4.44	165%	11%	21%	$31,693	48,250
	Occupancy Sensors		$7,380	$2,555	$4,825	6,543	1.31	0	0.56	$0	$785	10	$6,629	6.15	37%	4%	10%	$1,872	8,963

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 $2,555.

ECM #4: 81-kW Roof-Mounted PV System

Description:

Currently, the Municipal 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 an 81-kW PV system to offset electrical demand for the building and reduce the annual net electric consumption for the building. A system of 354 commercial multi-crystalline 230 watt panels would generate 86,580 kWh of electricity per year, or 9.7% of the Municipal Building's annual electric consumption.

Installation cost:

Estimated installed cost: $569,940; SREC revenue included in "Total 1st Year Savings"
Source of cost estimate: Similar projects

Economics:

ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, $	Total 1st Yr Savings, $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO2 Reduced, lbs/yr
4	81-kW Roof-Mounted PV System	Similar Projects	$569,940	$0	$569,940	86,580	17.35	0.00	7.37	$0	$53,180	30	$1,015,912	10.72	78%	3%	9%	$472,411	118,615

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 #5: HVAC Upgrade & Building Automation System

Description:

Heating and cooling at the Municipal Building is provided by a combination of several packaged rooftop DX units with gas heating, gas fired boilers, outdoor condensing units, and air handlers. The rooftop units are all in good condition. The boilers, condensing units, and air-handlers, however, are all in poor condition and should be replaced. A 1,826,100 BTUH, 80%-efficient HB Smith cast-iron boiler, located in basement, is in particularly poor condition and has reached the end of its useful life. After the HB Smith boiler was installed, rooftop Dx units with Gas fired heat, were installed to condition the courtroom area, reducing the heating requirements of the boiler that will enable the replacement for this boiler with a reduced capacity unit. The second boiler is a 1,200 MBH, 80%-efficient Hydrotherm multi-stage unit that has also reached the end of its useful life. It is recommended that these two boilers be replaced with high-efficiency, condensing hot water boilers, which have efficiencies up to 95%; the existing units, due to their age and condition, have decreased in efficiency, and are likely no greater than 70% efficient.

Three (3) direct-expansion, air-cooled condensing units are located outside of the building. One of these units, a McQuay unit, is no longer in use and should be removed. A 20-ton, Carrier Unit rated as 9.4 EER (Energy Efficiency Ratio, in BTUs of cooling per Watt-hour of electricity) and a 10-ton, York 10 EER unit should be replaced with a 30-ton air-cooled chiller, with an EER of 13. The two coinciding air-handling units located in the basement mechanical room that serve the first floor zones will need to be replaced with new air handlers equipped with chilled water coils.

Along with these replacements, the current system of thermostats should be replaced with a small building automation system (BAS). A BAS would have a similar effect as setback thermostats: the temperature would be adjusted automatically when the facility is not in use, and save energy by not causing the boilers and chiller to not produce excess heating or cooling when the building is unoccupied.

Installation cost:

Estimated installed cost: $310,000
Source of cost estimate: Contractor

Economics:

ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, $	Total 1st Yr Savings $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO_2 Reduced, lbs/yr
5	HVAC Upgrade & Building Automation System	Similar Projects	$310,000	$5,660	$304,340	10,930	2.19	9,489.80	24.61	$0	$12,794	25	$217,905	23.79	-28%	-1%	0%	-$81,551	126,005

Assumptions:

Boiler upgrade:
The cost per therm of natural gas that was used, taken from twelve months of the Municipal Building's energy bills, was $1.21. Per the American Society of Heating, Refrigeration & Air-Conditioning Engineers (ASHRAE), the outdoor drybulb temperature is above 11°F 99.6% percent of a year, and the number of heating degree days for one year is 4,947. The desired indoor temperature was estimated to be 68°F. The building operates 50 hours per week. The savings were calculated using the following equations:

Cooling upgrade:
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. The building operates 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:

BAS installation:
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. Using data from the heating and cooling calculations above, the heating and cooling consumptions were calculated to be 14,750 therms of natural gas and 26,517 kWh of electricity, respectively. The hours of setback were estimated to be 24 hours-per-day on the weekends and 12 hours every night on weekdays. 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. A BAS system would have similar setback capabilities as a system of programmable thermostats.

Rebates/financial incentives:

This ECM is calculated based on a projected eligibility for New Jersey's SmartStart Rebate, which pays $1 per MBH for boilers between 1,500 MBH and 4,000 MBH (the HB Smith boiler), $1.75 per MBH for boilers between 300 and 1,500 MBH (the Hydrotherm units), and $52 per ton for air-cooled electric chillers. The total incentive for this ECM is $5,660.

ECM #6: Install Thermal-Pane Windows & Doors

Description:

The windows and entrance doors at the Municipal Building have passed their useful life of 35 years. They are single-pane, non-thermal glass and 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: $93,000 at $62 per square-foot
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	Thermal-Pane Windows & Doors	Similar Projects	$93,000	$0	$93,000	1,392	0.28	2,299	5.86	$0	$2,949	35	$61,552	31.54	-34%	-1%	1%	-$29,637	28,806

Assumptions:

The area of the windows that are recommended to be replaced is approximately 1,500 square feet. The electric cost used, taken from 12 months of the Municipal Building's energy bills, is $0.12 per kWh. The cost of natural gas is $1.21/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 operable, and have a thermal resistance (R-value) of 0.78, equivalent to an overall heat transfer coefficient (U-factor) of 1.27. 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 72°F, and for the heating season, 68°F. The calculations were performed using a heat transfer analysis, with 5°F bin temperature data for nearby 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:

There are no incentives available for window upgrades at this time.

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 Lakewood Municipal 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 81 kW was selected. The total annual generating capacity of the system is 86,580 kWh as estimated using PV WATTS calculator provided by the Department of Energy (DOE), National Renewable Energy Laboratory (NREL).

(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:	81.4 kW
DC to AC Derate Factor:	0.770
AC Rating:	62.7 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	3839	429.97
2	2.87	4962	555.74
3	3.95	7548	845.38
4	4.95	8987	1006.54
5	5.73	10561	1182.83
6	6.09	10424	1167.49
7	5.97	10437	1168.94
8	5.32	9372	1049.66
9	4.48	7716	864.19
10	3.28	5850	655.20
11	2.20	3767	421.90
12	1.80	3116	348.99
Year	4.07	86580	9696.96

This proposed PV system would include 354 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 10 percent of the electric power consumed annually by the Lakewood Municipal 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 10 percent. The estimated cost of construction would be approximately $569,940 for this system. The system that is being recommended would not meet the qualifications for an upfront incentive through the New Jersey Clean Energy Program because the system size is over 50 kW. The approximate annual savings would be $53,180, which would make the approximate payback 11 years

PV System – Lakewood Municipal Building		
	Savings	**Cost**
Estimated Cost Of Construction		$569,940
REIP Incentive		$0
Township Investment		$569,940
First Year Electric Energy Savings	$10,390	
Estimated Annual SREC Revenue	$43,290	
Annual Maintenance		$500
First Year Savings	$53,180	
Simple Payback Analysis	Approximately 11 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.

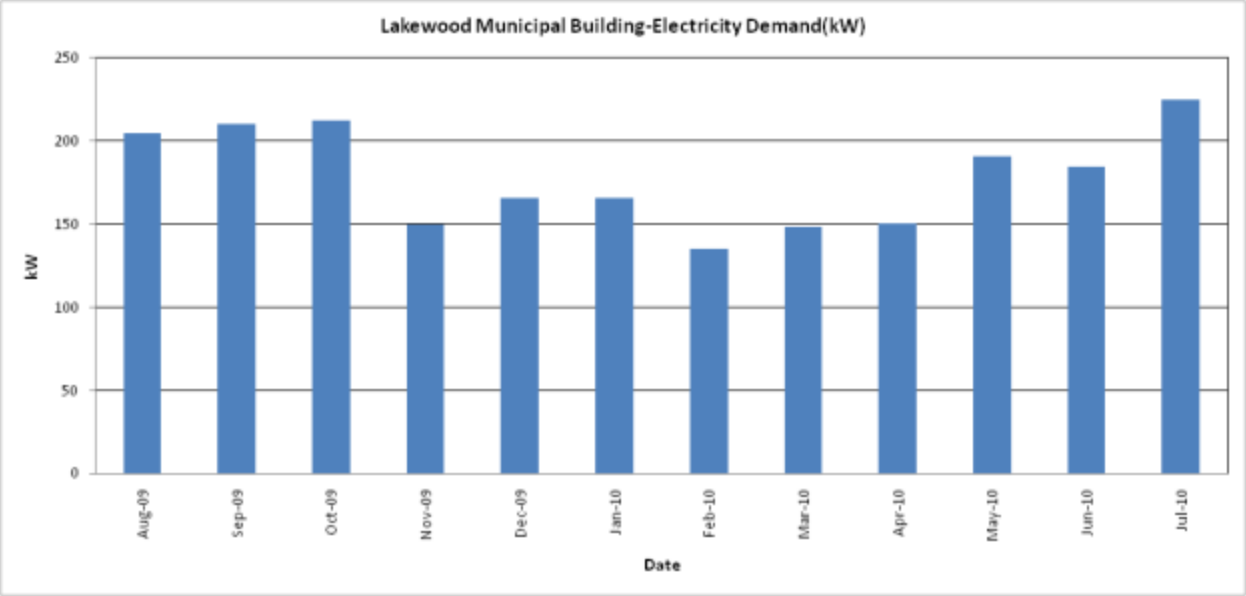
5.6. Wind

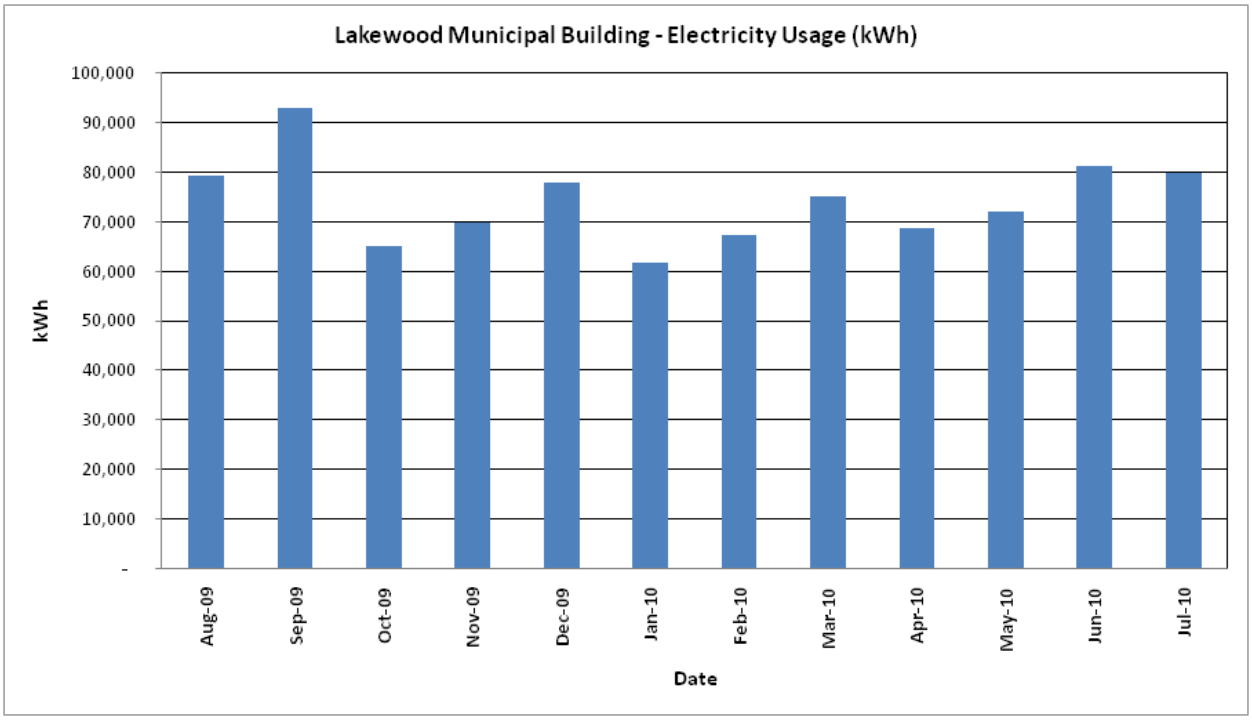
Wind power production is not appropriate for this location because required land is not available for the wind turbine. Also, the available wind energy resource is very low.

6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

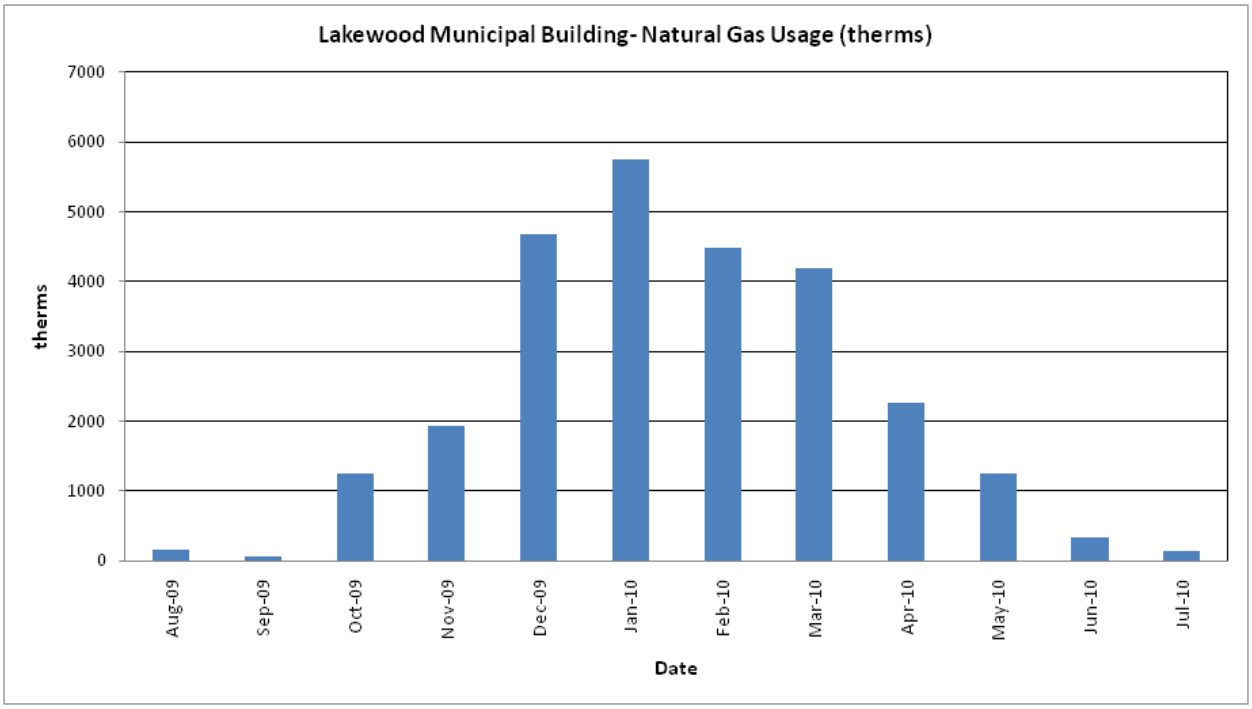
6.1. Energy Purchasing

The average electrical peak demand for the previous year was 178.7kW and the maximum peak demand was 225.2 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.



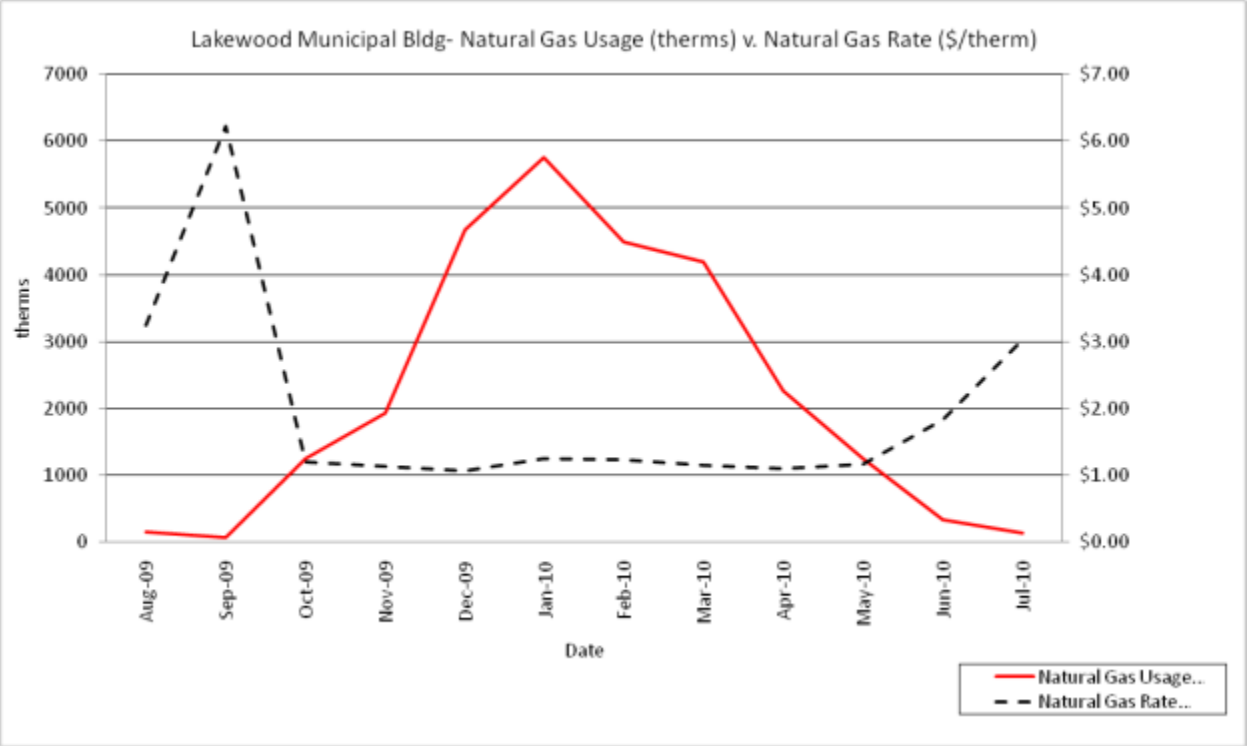
The natural gas usage shows that the most natural gas is consumed in the winter months, meaning the majority of natural gas use in this building is for heating.

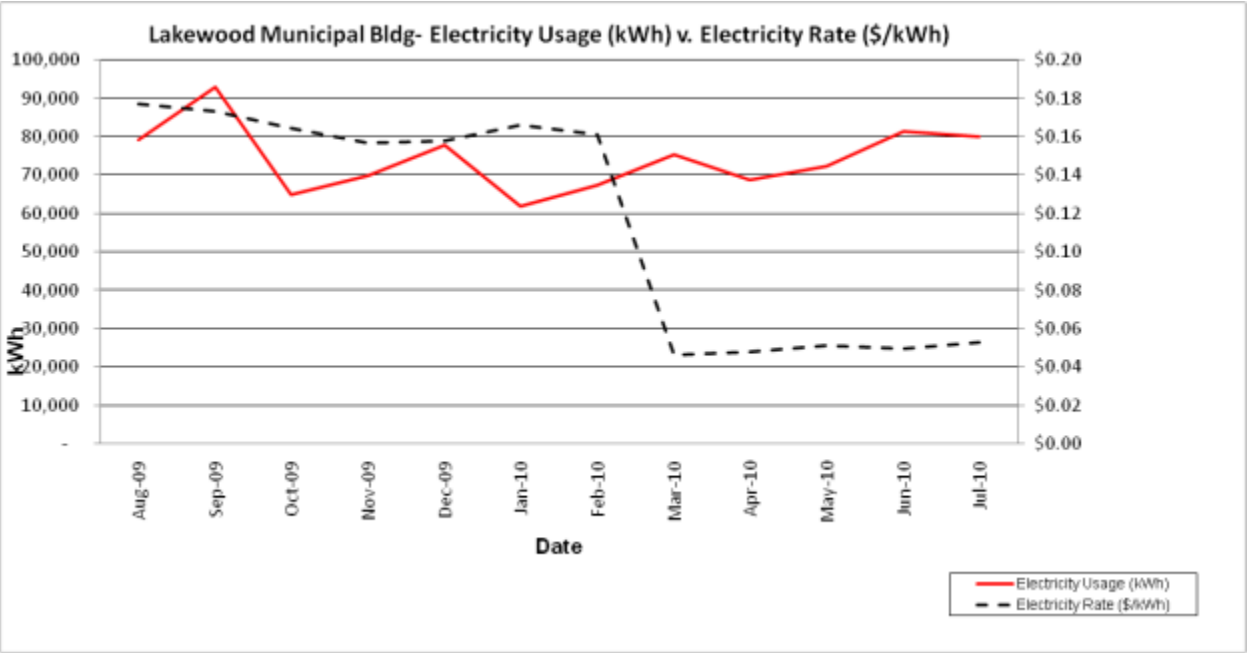
6.2. Tariff analysis

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 Lakewood Municipal 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 Lakewood Municipal 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 Jersey Central Power & Light 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 Municipal Bldg- Natural Gas Usage (therms) v. Natural Gas Rate ($/therm)
therms
7000
6000
5000
4000
3000
2000
1000
0
$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
Natural Gas Usage...
Natural Gas Rate...


Lakewood Municipal Bldg- Electricity Usage (kWh) v. Electricity Rate ($/kWh)
kWh
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
-
$0.20
$0.18
$0.16
$0.14
$0.12
$0.10
$0.08
$0.06
$0.04
$0.02
$0.00
Aug-09
Sep-09
Oct-09
Nov-09
Dec-09
Jan-10
Feb-10
Mar-10
Apr-10
May-10
Jun-10
Jul-10
Date
Electricity Usage (kWh)
Electricity Rate ($/kWh)

6.3. Energy Procurement strategies

Billing analysis shows large price fluctuations of over the course of the year for the Lakewood Municipal Building natural gas account. Choosing a 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 electricity and natural gas for below state average prices.

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
Municipal Building
231 Third Street

BIRDSALL SERVICES GROUP
ENGINEERS & CONSULTANTS

Upgrade Code	Existing / Upgrade Description	Existing Fixture	Existing Watts	Proposed Fixture	Proposed Watts	Lighting Total # of Upgrades	Lighting Cost per Upgrade ($)	Lighting SmartStart Rebate per Upgrade
1	Recessed 2x4 fixture with (2) 4' T8 lamps / replace the (2) 32w lamps with 28w energy saving lamps	2L4' T8/ELEC	61	2L4' T8/ELEC LO	55	26	$25.00	$0.00
2	Recessed 2x4 fixture with (2) 4' T8 lamps / replace the (4) 32w lamps with 28w energy saving lamps	4L4' T8/ELEC	110	4L4' T8/ELEC LO	99	407	$35.00	$0.00
3	Recessed 2x2 fixture with (2) 2' T12 lamps / replace the (2) 20w T12 lamps with 17w T8 lamps	(2) F20T12/HPFMA G	56	(2) FO17T8/ELEC	34	1	$40.00	$0.00
4	Recessed 2x2 fixture with (2) u-tube lamps / replace the (2) 32w u-tube lamps with energy saving lamps	2L22"	62	2L22" LO	55	36	$35.00	$0.00
5	Recessed 2x2 fixture with (3) FB031 Compact Fluorescent Lamps	(3)FB031	93	No Upgrade	93	13	$0.00	$0.00
6	Ceiling Mounted 4' fixture with (2) 4' T8 Lamps / replace the (2) 32w lamps with 28w energy saving lamps	2L4' T8/ELEC	61	2L4' T8/ELEC LO	55	8	$25.00	$0.00
7	Track Lighting fixture with 60w Incandescent lamps / replace lamps with 13w Compact Fluorescents	60W Incandescent	60	13W CF/SI	15	5	$10.00	$0.00
8	Ceiling Mounted 4' fixture with (1) 4' T8 Lamp	1L4' T8/ELEC	31	No Upgrade	31	3	$0.00	$0.00
9	Ceiling Mounted 4' fixture with (2) 4' T8 Lamps / replace the (2) 32w lamps with 28w energy saving lamps	2L4' T8/ELEC	61	2L4' T8/ELEC LO	55	1	$25.00	$0.00
10	Recessed 2x4 fixture with (2) 4' T8 lamps / replace the (2) 32w lamps with 28w energy saving lamps	2L4' T8/ELEC	61	2L4' T8/ELEC LO	55	29	$25.00	$0.00
11	Ceiling Mounted 4' fixture with (2) 4' T8 Lamps / replace the (2) 32w lamps with 28w energy saving lamps	2L4' T8/ELEC	61	2L4' T8/ELEC LO	55	62	$25.00	$0.00
12	2 Prong 15W Compact Fluorescent	15W CF/SI	15	No Upgrade	15	2	$0.00	$0.00
13	Ceiling Mounted 8' fixture with (1) T8 Lamp	1L8' T8/ELEC	67	No Upgrade	67	4	$0.00	$0.00
14	75W Incandescent Flood Lamp / Replace with 15W Compact Fluorescent	75W Incandescent	75	15W CF/SI	15	20	$6.00	$0.00
15	4' open channel fixture with (1) T8 lamp	1L4' T8/ELEC	31	No Upgrade	31	5	$0.00	$0.00
16	4' open channel fixture with (1) T8 lamp	1L4' T8/ELEC	31	No Upgrade	31	3	$0.00	$0.00
17	Recessed 4x4 fixture with (6) 4' T8 lamps / replace the (6) 32w lamps with 28w energy saving lamps	6L4' T8/ELEC	178	6L4' T8/ELEC LO	158	12	$45.00	$0.00
18	65W Inc. High Hat Recessed / Replace lamps with 15W Compact Fluorescents	65W Incandescent	65	15W CF/SI	15	3	$6.00	$0.00
19	Wall Mounted 4' fixture with (2) 4' T8 Lamps / replace the (2) 32w lamps with 28w energy saving lamps	2L4' T8/ELEC	61	2L4' T8/ELEC LO	55	9	$25.00	$0.00
20	90W Recessed Halogens / Replace lamps with 26W Compact Fluorescents	90W Halogen	90	26W CF/SI	28	11	$10.00	$0.00
21	60W Incandescent / Replace with 13W Compact Fluorescents	60W Incandescent	60	13W CF/SI	15	6	$6.00	$0.00
22	150W Metal Halide Wall Pack	150W MH/Ballast	195	No Upgrade	195	1	$0.00	$0.00
23	75W Incandescent Flood Lamp / Replace with 15W Compact Fluorescent	75W Incandescent	75	15W CF/SI	15	41	$6.00	$0.00
24	4' fixture with (1) T12 lamp and magnetic ballast / replace with (1) T8 lamp and an electronic ballast	1L4' EE/STD	50	1L4' T8/ELEC	31	1	$35.00	$0.00
25	15W Exit Sign / Retrofit with LED	15W Exit	15	LED	2	31	$40.00	$0.00

Summary

	Lighting (Only)	Sensors (Only)	Complete Lighting Upgrade
Cost	$21,315.00	$7,380.00	$28,695.00
Rebate	$0.00	$2,555.00	$2,555.00
Net Cost	$21,315.00	$4,825.00	**$26,140.00**
Savings (kWh)	29,333	6,543	**35,219**
Savings ($)	$3,519.95	$785.12	**$4,226.26**
Payback	6.1	6.1	**6.2**

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:				66407				55197	11.21	29333	$21,315.00	$3,519.95	6.1			6543	$7,380.00	$785.12	9.4	$0.00	$2,555.00	35219	$26,140.00	$4,226.26	6.2
1	1	Boiler Room	8	2080	2L4' T8/ELEC	14	854		2L4' T8/ELEC LO	14	770	0.084	175	$350.00	$20.97	16.7			0	$0.00	$0.00		$0.00	$0.00	175	$350.00	$20.97	16.7
2	2	Hallway	24	6240	4L4' T8/ELEC	5	550		4L4' T8/ELEC LO	5	495	0.055	343	$175.00	$41.18	4.2			0	$0.00	$0.00		$0.00	$0.00	343	$175.00	$41.18	4.2
3	2	Hallway	24	6240	4L4' T8/ELEC	3	330		4L4' T8/ELEC LO	3	297	0.033	206	$105.00	$24.71	4.2			0	$0.00	$0.00		$0.00	$0.00	206	$105.00	$24.71	4.2
4	5	911 Communications Room/Break area	24	6240	(3)FB031	4	372		No Upgrade	4	372	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
5	5	Rest Room	24	6240	(3)FB031	1	93		No Upgrade	1	93	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
6	6	Closet	1	260	2L4' T8/ELEC	1	61		2L4' T8/ELEC LO	1	55	0.006	2	$25.00	$0.19	133.5			0	$0.00	$0.00		$0.00	$0.00	2	$25.00	$0.19	133.5

					Existing				Proposed				Lighting				Controls		Occupancy Sensors (ONLY)				SmartStart Rebate		Lighting & Occupancy Sensors			
Seq. #	Upgrade Code	Room/Area	Hrs/ Work Day	Hrs/ Year	Fixture	Qty.	Watts	Foot Candles	Fixture	Qty.	Watts	kW Reduction	Energy Savings, kWh	Cost ($)	Savings ($)	Payback (yrs)	Type	Qty.	Energy Savings, kWh	Cost ($)	Savings ($)	Payback (yrs)	Lighting	Sensors	Energy Savings, kWh	Post-Rebate Cost ($)	Savings ($)	Payback (yrs)
7	6	Office	8	2080	2L4' T8/ELEC	2	122		2L4' T8/ELEC LO	2	110	0.012	25	$50.00	$3.00	16.7			0	$0.00	$0.00		$0.00	$0.00	25	$50.00	$3.00	16.7
8	1	Electric Control Room	1	260	2L4' T8/ELEC	1	61		2L4' T8/ELEC LO	1	55	0.006	2	$25.00	$0.19	133.5			0	$0.00	$0.00		$0.00	$0.00	2	$25.00	$0.19	133.5
9	5	Communication Room	2	520	(3)FB031	8	744		No Upgrade	8	744	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
10	7		2	520	60W Incandescen	4	240		13W CF/SI	4	60	0.18	94	$40.00	$11.23	3.6			0	$0.00	$0.00		$0.00	$0.00	94	$40.00	$11.23	3.6
11	6	Closet	8	2080	2L4' T8/ELEC	2	122		2L4' T8/ELEC LO	2	110	0.012	25	$50.00	$3.00	16.7			0	$0.00	$0.00		$0.00	$0.00	25	$50.00	$3.00	16.7
12	2	Data Center	1	260	4L4' T8/ELEC	3	330		4L4' T8/ELEC LO	3	297	0.033	9	$105.00	$1.03	102.0			0	$0.00	$0.00		$0.00	$0.00	9	$105.00	$1.03	102.0
13	3		1	260	(2) F20T12/HPFM	1	56		(2) FO17T8/ELEC	1	34	0.022	6	$40.00	$0.69	58.3			0	$0.00	$0.00		$0.00	$0.00	6	$40.00	$0.69	58.3
14	8	Storage	1	260	1L4' T8/ELEC	1	31		No Upgrade	1	31	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
15	1	Telephone Room	1	260	2L4' T8/ELEC	2	122		2L4' T8/ELEC LO	2	110	0.012	3	$50.00	$0.37	133.5			0	$0.00	$0.00		$0.00	$0.00	3	$50.00	$0.37	133.5
16	2	Locker Room	24	6240	4L4' T8/ELEC	3	330		4L4' T8/ELEC LO	3	297	0.033	206	$105.00	$24.71	4.2			0	$0.00	$0.00		$0.00	$0.00	206	$105.00	$24.71	4.2
17	9		24	6240	2L4' T8/ELEC	1	61		2L4' T8/ELEC LO	1	55	0.006	37	$25.00	$4.49	5.6			0	$0.00	$0.00		$0.00	$0.00	37	$25.00	$4.49	5.6
18	2	Weight Room	6	1560	4L4' T8/ELEC	11	1210		4L4' T8/ELEC LO	11	1089	0.121	189	$385.00	$22.65	17.0			0	$0.00	$0.00		$0.00	$0.00	189	$385.00	$22.65	17.0
19	2	Office	8	2080	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	46	$70.00	$5.49	12.7	OSR	1	114	$260.00	$13.73	18.9	$0.00	$70.00	149	$260.00	$17.85	14.6
20	1	Closet	1	260	2L4' T8/ELEC	1	61		2L4' T8/ELEC LO	1	55	0.006	2	$25.00	$0.19	133.5			0	$0.00	$0.00		$0.00	$0.00	2	$25.00	$0.19	133.5
21	2	Break Room	24	6240	4L4' T8/ELEC	6	660		4L4' T8/ELEC LO	6	594	0.066	412	$210.00	$49.42	4.2	OSR	1	1030	$260.00	$123.55	2.1	$0.00	$210.00	1338	$260.00	$160.62	1.6
22	4	Locker Room	24	6240	2L22"	4	248		2L22" LO	4	220	0.028	175	$140.00	$20.97	6.7			0	$0.00	$0.00		$0.00	$0.00	175	$140.00	$20.97	6.7
23	2		24	6240	4L4' T8/ELEC	1	110		4L4' T8/ELEC LO	1	99	0.011	69	$35.00	$8.24	4.2			0	$0.00	$0.00		$0.00	$0.00	69	$35.00	$8.24	4.2
24	2		24	6240	4L4' T8/ELEC	20	2200		4L4' T8/ELEC LO	20	1980	0.22	1373	$700.00	$164.74	4.2			0	$0.00	$0.00		$0.00	$0.00	1373	$700.00	$164.74	4.2
25	10	Hallway	24	6240	2L4' T8/ELEC	6	366		2L4' T8/ELEC LO	6	330	0.036	225	$150.00	$26.96	5.6			0	$0.00	$0.00		$0.00	$0.00	225	$150.00	$26.96	5.6
26	2		24	6240	4L4' T8/ELEC	1	110		4L4' T8/ELEC LO	1	99	0.011	69	$35.00	$8.24	4.2			0	$0.00	$0.00		$0.00	$0.00	69	$35.00	$8.24	4.2
27	11	Storage	1	260	2L4' T8/ELEC	60	3660		2L4' T8/ELEC LO	60	3300	0.36	94	$1,500.00	$11.23	133.5			0	$0.00	$0.00		$0.00	$0.00	94	$1,500.00	$11.23	133.5
28	6		1	260	2L4' T8/ELEC	3	183		2L4' T8/ELEC LO	3	165	0.018	5	$75.00	$0.56	133.5			0	$0.00	$0.00		$0.00	$0.00	5	$75.00	$0.56	133.5
29	12		1	260	15W CF/SI	2	30		No Upgrade	2	30	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
30	11	Office	8	2080	2L4' T8/ELEC	2	122		2L4' T8/ELEC LO	2	110	0.012	25	$50.00	$3.00	16.7			0	$0.00	$0.00		$0.00	$0.00	25	$50.00	$3.00	16.7
31	8	Custodian Storage	1	260	1L4' T8/ELEC	2	62		No Upgrade	2	62	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
32	1	Bike Storage	1	260	2L4' T8/ELEC	2	122		2L4' T8/ELEC LO	2	110	0.012	3	$50.00	$0.37	133.5			0	$0.00	$0.00		$0.00	$0.00	3	$50.00	$0.37	133.5
33	13	Bike Impound	1	260	1L8' T8/ELEC	4	268		No Upgrade	4	268	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
34	14		1	260	75W Incandescen	5	375		15W CF/SI	5	75	0.3	78	$30.00	$9.36	3.2			0	$0.00	$0.00		$0.00	$0.00	78	$30.00	$9.36	3.2
35	2	Hallway	12	3120	4L4' T8/ELEC	3	330		4L4' T8/ELEC LO	3	297	0.033	103	$105.00	$12.36	8.5			0	$0.00	$0.00		$0.00	$0.00	103	$105.00	$12.36	8.5
36	4	Slop Sink	1	260	2L22"	1	62		2L22" LO	1	55	0.007	2	$35.00	$0.22	160.3			0	$0.00	$0.00		$0.00	$0.00	2	$35.00	$0.22	160.3
37	2	Office	8	2080	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	46	$70.00	$5.49	12.7	OSR	1	114	$260.00	$13.73	18.9	$0.00	$70.00	149	$260.00	$17.85	14.6
38	10	Closet	1	260	2L4' T8/ELEC	2	122		2L4' T8/ELEC LO	2	110	0.012	3	$50.00	$0.37	133.5			0	$0.00	$0.00		$0.00	$0.00	3	$50.00	$0.37	133.5
39	2	Office	8	2080	4L4' T8/ELEC	4	440		4L4' T8/ELEC LO	4	396	0.044	92	$140.00	$10.98	12.7	OSR	1	229	$260.00	$27.46	9.5	$0.00	$140.00	297	$260.00	$35.69	7.3
40	15	Elevator	1	260	1L4' T8/ELEC	1	31		No Upgrade	1	31	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
41	2	BR	3	780	4L4' T8/ELEC	1	110		4L4' T8/ELEC LO	1	99	0.011	9	$35.00	$1.03	34.0			0	$0.00	$0.00		$0.00	$0.00	9	$35.00	$1.03	34.0
42	2	Engineering Dept. Office	12	3120	4L4' T8/ELEC	12	1320		4L4' T8/ELEC LO	12	1188	0.132	412	$420.00	$49.42	8.5			0	$0.00	$0.00		$0.00	$0.00	412	$420.00	$49.42	8.5
43	2	Office	8	2080	4L4' T8/ELEC	4	440		4L4' T8/ELEC LO	4	396	0.044	92	$140.00	$10.98	12.7	OSW	1	229	$200.00	$27.46	7.3	$0.00	$20.00	297	$320.00	$35.69	9.0
44	2	Office Area	8	2080	4L4' T8/ELEC	1	110		4L4' T8/ELEC LO	1	99	0.011	23	$35.00	$2.75	12.7			0	$0.00	$0.00		$0.00	$0.00	23	$35.00	$2.75	12.7
45	4	Hallway	12	3120	2L22"	1	62		2L22" LO	1	55	0.007	22	$35.00	$2.62	13.4			0	$0.00	$0.00		$0.00	$0.00	22	$35.00	$2.62	13.4
46	4	BR	3	780	2L22"	12	744		2L22" LO	12	660	0.084	66	$420.00	$7.86	53.4	OSR	1	145	$260.00	$17.41	14.9	$0.00	$420.00	194	$260.00	$23.31	11.2
47	2	Office	8	2080	4L4' T8/ELEC	4	440		4L4' T8/ELEC LO	4	396	0.044	92	$140.00	$10.98	12.7	OSW	1	229	$200.00	$27.46	7.3	$0.00	$20.00	297	$320.00	$35.69	9.0
48	2	Office Area	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
49	2	Office	8	2080	4L4' T8/ELEC	1	110		4L4' T8/ELEC LO	1	99	0.011	23	$35.00	$2.75	12.7			0	$0.00	$0.00		$0.00	$0.00	23	$35.00	$2.75	12.7
50	24	Closet	1	260	1L4' EE/STD	1	50		1L4' T8/ELEC LO	1	31	0.019	5	$35.00	$0.59	59.0			0	$0.00	$0.00		$0.00	$0.00	5	$35.00	$0.59	59.0
51	2	Closet	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
52	17	Office Area	10	2600	6L4' T8/ELEC	6	1068		6L4' T8/ELEC LO	6	948	0.12	312	$270.00	$37.44	7.2			0	$0.00	$0.00		$0.00	$0.00	312	$270.00	$37.44	7.2
53	2		10	2600	4L4' T8/ELEC	3	330		4L4' T8/ELEC LO	3	297	0.033	86	$105.00	$10.30	10.2			0	$0.00	$0.00		$0.00	$0.00	86	$105.00	$10.30	10.2
54	2	Office Area	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
55	2	Office	8	2080	4L4' T8/ELEC	1	110		4L4' T8/ELEC LO	1	99	0.011	23	$35.00	$2.75	12.7			0	$0.00	$0.00		$0.00	$0.00	23	$35.00	$2.75	12.7
56	2	Conference Room	6	1560	4L4' T8/ELEC	4	440		4L4' T8/ELEC LO	4	396	0.044	69	$140.00	$8.24	17.0			0	$0.00	$0.00		$0.00	$0.00	69	$140.00	$8.24	17.0
57	2	Office	8	2080	4L4' T8/ELEC	5	550		4L4' T8/ELEC LO	5	495	0.055	114	$175.00	$13.73	12.7	OSW	1	286	$200.00	$34.32	5.8	$0.00	$20.00	372	$355.00	$44.62	8.0
58	2	Office	8	2080	4L4' T8/ELEC	8	880		4L4' T8/ELEC LO	8	792	0.088	183	$280.00	$21.96	12.7	OSW	1	458	$200.00	$54.91	3.6	$0.00	$20.00	595	$460.00	$71.39	6.4
59	2	Supply Closet	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
60	2	Office	8	2080	4L4' T8/ELEC	8	880		4L4' T8/ELEC LO	8	792	0.088	183	$280.00	$21.96	12.7	OSW	1	458	$200.00	$54.91	3.6	$0.00	$20.00	595	$460.00	$71.39	6.4
61	4	BR	12	3120	2L22"	1	62		2L22" LO	1	55	0.007	22	$35.00	$2.62	13.4			0	$0.00	$0.00		$0.00	$0.00	22	$35.00	$2.62	13.4
62	2	Lobby	12	3120	4L4' T8/ELEC	6	660		4L4' T8/ELEC LO	6	594	0.066	206	$210.00	$24.71	8.5			0	$0.00	$0.00		$0.00	$0.00	206	$210.00	$24.71	8.5
63	2	Office	8	2080	4L4' T8/ELEC	1	110		4L4' T8/ELEC LO	1	99	0.011	23	$35.00	$2.75	12.7			0	$0.00	$0.00		$0.00	$0.00	23	$35.00	$2.75	12.7
64	2	Closet	1	260	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	6	$70.00	$0.69	102.0			0	$0.00	$0.00		$0.00	$0.00	6	$70.00	$0.69	102.0
65	2	Hallway	12	3120	4L4' T8/ELEC	5	550		4L4' T8/ELEC LO	5	495	0.055	172	$175.00	$20.59	8.5			0	$0.00	$0.00		$0.00	$0.00	172	$175.00	$20.59	8.5
66	2	Cafeteria	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
67	2	Office	8	2080	4L4' T8/ELEC	3	330		4L4' T8/ELEC LO	3	297	0.033	69	$105.00	$8.24	12.7	OSW	1	172	$200.00	$20.59	9.7	$0.00	$20.00	223	$285.00	$26.77	10.6
68	2	Computer 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
69	2	Closet	8	2080	4L4' T8/ELEC	3	330		4L4' T8/ELEC LO	3	297	0.033	69	$105.00	$8.24	12.7			0	$0.00	$0.00		$0.00	$0.00	69	$105.00	$8.24	12.7
70	2	BR	12	3120	4L4' T8/ELEC	4	440		4L4' T8/ELEC LO	4	396	0.044	137	$140.00	$16.47	8.5	OSR	1	343	$260.00	$41.18	6.3	$0.00	$140.00	446	$260.00	$53.54	4.9
71	20	Stairwell	24	6240	90W Halogen	2	180		26W CF/SI	2	56	0.124	774	$20.00	$92.85	0.2			0	$0.00	$0.00		$0.00	$0.00	774	$20.00	$92.85	0.2
72	10		24	6240	2L4' T8/ELEC	2	122		2L4' T8/ELEC LO	2	110	0.012	75	$50.00	$8.99	5.6			0	$0.00	$0.00		$0.00	$0.00	75	$50.00	$8.99	5.6
73	2	Court Room	12	3120	4L4' T8/ELEC	24	2640		4L4' T8/ELEC LO	24	2376	0.264	824	$840.00	$98.84	8.5			0	$0.00	$0.00		$0.00	$0.00	824	$840.00	$98.84	8.5
74	20	Hallway	12	3120	90W Halogen	9	810		26W CF/SI	9	252	0.558	1741	$90.00	$208.92	0.4			0	$0.00	$0.00		$0.00	$0.00	1741	$90.00	$208.92	0.4
75	10	BR	3	780	2L4' T8/ELEC	2	122		2L4' T8/ELEC LO	2	110	0.012	9	$50.00	$1.12	44.5			0	$0.00	$0.00		$0.00	$0.00	9	$50.00	$1.12	44.5
76	1	Prep Room	8	2080	2L4' T8/ELEC	2	122		2L4' T8/ELEC LO	2	110	0.012	25	$50.00	$3.00	16.7			0	$0.00	$0.00		$0.00	$0.00	25	$50.00	$3.00	16.7
77	2	Judges' Chambers	8	2080	4L4' T8/ELEC	1	110		4L4' T8/ELEC LO	1	99	0.011	23	$35.00	$2.75	12.7			0	$0.00	$0.00		$0.00	$0.00	23	$35.00	$2.75	12.7
78	2	Court Lobby	12	3120	4L4' T8/ELEC	8	880		4L4' T8/ELEC LO	8	792	0.088	275	$280.00	$32.95	8.5			0	$0.00	$0.00		$0.00	$0.00	275	$280.00	$32.95	8.5
79	2	Lobby	12	3120	4L4' T8/ELEC	3	330		4L4' T8/ELEC LO	3	297	0.033	103	$105.00	$12.36	8.5			0	$0.00	$0.00		$0.00	$0.00	103	$105.00	$12.36	8.5
80	4		12	3120	2L22"	1	62		2L22" LO	1	55	0.007	22	$35.00	$2.62	13.4			0	$0.00	$0.00		$0.00	$0.00	22	$35.00	$2.62	13.4
81	2	BR	3	780	4L4' T8/ELEC	1	110		4L4' T8/ELEC LO	1	99	0.011	9	$35.00	$1.03	34.0			0	$0.00	$0.00		$0.00	$0.00	9	$35.00	$1.03	34.0
82	2	BR	3	780	4L4' T8/ELEC	1	110		4L4' T8/ELEC LO	1	99	0.011	9	$35.00	$1.03	34.0			0	$0.00	$0.00		$0.00	$0.00	9	$35.00	$1.03	34.0
83	14	Lobby	12	3120	75W Incandescen	5	375		15W CF/SI	5	75	0.3	936	$30.00	$112.32	0.3			0	$0.00	$0.00		$0.00	$0.00	936	$30.00	$112.32	0.3
84	14	Hallway	12	3120	75W Incandescen	8	600		15W CF/SI	8	120	0.48	1498	$48.00	$179.71	0.3			0	$0.00	$0.00		$0.00	$0.00	1498	$48.00	$179.71	0.3
85	10		12	3120	2L4' T8/ELEC	3	183		2L4' T8/ELEC LO	3	165	0.018	56	$75.00	$6.74	11.1			0	$0.00	$0.00		$0.00	$0.00	56	$75.00	$6.74	11.1
86	2		12	3120	4L4' T8/ELEC	3	330		4L4' T8/ELEC LO	3	297	0.033	103	$105.00	$12.36	8.5			0	$0.00	$0.00		$0.00	$0.00	103	$105.00	$12.36	8.5
87	2	Tax Office Area	10	2600	4L4' T8/ELEC	17	1870		4L4' T8/ELEC LO	17	1683	0.187	486	$595.00	$58.34	10.2			0	$0.00	$0.00		$0.00	$0.00	486	$595.00	$58.34	10.2
88	2	Office Area	10	2600	4L4' T8/ELEC	11	1210		4L4' T8/ELEC LO	11	1089	0.121	315	$385.00	$37.75	10.2			0	$0.00	$0.00		$0.00	$0.00	315	$385.00	$37.75	10.2
89	4		10	2600	2L22"	1	62		2L22" LO	1	55	0.007	18	$35.00	$2.18	16.0			0	$0.00	$0.00		$0.00	$0.00	18	$35.00	$2.18	16.0
90	16	Vault	4	1040	1L4' T8/ELEC	2	62		No Upgrade	2	62	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
91	2	Office	8	2080	4L4' T8/ELEC	4	440		4L4' T8/ELEC LO	4	396	0.044	92	$140.00	$10.98	12.7	OSW	1	229	$200.00	$27.46	7.3	$0.00	$20.00	297	$320.00	$35.69	9.0
92	2	Closet	1	260	4L4' T8/ELEC	3	330		4L4' T8/ELEC LO	3	297	0.033	9	$105.00	$1.03	102.0			0	$0.00	$0.00		$0.00	$0.00	9	$105.00	$1.03	102.0
93	2	Office	8	2080	4L4' T8/ELEC	3	330		4L4' T8/ELEC LO	3	297	0.033	69	$105.00	$8.24	12.7			0	$0.00	$0.00		$0.00	$0.00	69	$105.00	$8.24	12.7
94	2	Office	8	2080	4L4' T8/ELEC	3	330		4L4' T8/ELEC LO	3	297	0.033	69	$105.00	$8.24	12.7			0	$0.00	$0.00		$0.00	$0.00	69	$105.00	$8.24	12.7
95	2	Office Area	10	2600	4L4' T8/ELEC	8	880		4L4' T8/ELEC LO	8	792	0.088	229	$280.00	$27.46	10.2			0	$0.00	$0.00		$0.00	$0.00	229	$280.00	$27.46	10.2
96	2	Office	8	2080	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	46	$70.00	$5.49	12.7			0	$0.00	$0.00		$0.00	$0.00	46	$70.00	$5.49	12.7
97	10	Closet	1	260	2L4' T8/ELEC	2	122		2L4' T8/ELEC LO	2	110	0.012	3	$50.00	$0.37	133.5			0	$0.00	$0.00		$0.00	$0.00	3	$50.00	$0.37	133.5
98	2	Conference/Meeting Room	5	1300	4L4' T8/ELEC	11	1210		4L4' T8/ELEC LO	11	1089	0.121	157	$385.00	$18.88	20.4			0	$0.00	$0.00		$0.00	$0.00	157	$385.00	$18.88	20.4
99	2	Bathroom	3	780	4L4' T8/ELEC	1	110		4L4' T8/ELEC LO	1	99	0.011	9	$35.00	$1.03	34.0			0	$0.00	$0.00		$0.00	$0.00	9	$35.00	$1.03	34.0
100	2	Bathroom	3	780	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	17	$70.00	$2.06	34.0			0	$0.00	$0.00		$0.00	$0.00	17	$70.00	$2.06	34.0
101	4		3	780	2L22"	1	62		2L22" LO	1	55	0.007	5	$35.00	$0.66	53.4			0	$0.00	$0.00		$0.00	$0.00	5	$35.00	$0.66	53.4
102	2	Office	8	2080	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	46	$70.00	$5.49	12.7	OSR	1	114	$260.00	$13.73	18.9	$0.00	$70.00	149	$260.00	$17.85	14.6
103	2	Copy Room	6	1560	4L4' T8/ELEC	1	110		4L4' T8/ELEC LO	1	99	0.011	17	$35.00	$2.06	17.0			0	$0.00	$0.00		$0.00	$0.00	17	$35.00	$2.06	17.0
104	10		6	1560	2L4' T8/ELEC	1	61		2L4' T8/ELEC LO	1	55	0.006	9	$25.00	$1.12	22.3			0	$0.00	$0.00		$0.00	$0.00	9	$25.00	$1.12	22.3

					Existing				Proposed				Lighting				Controls		Occupancy Sensors (ONLY)				SmartStart Rebate		Lighting & Occupancy Sensors			
Seq. #	Upgrade Code	Room/Area	Hrs/ Work Day	Hrs/ Year	Fixture	Qty.	Watts	Foot Candles	Fixture	Qty.	Watts	kW Reduction	Energy Savings, kWh	Cost ($)	Savings ($)	Payback (yrs)	Type	Qty.	Energy Savings, kWh	Cost ($)	Savings ($)	Payback (yrs)	Lighting	Sensors	Energy Savings, kWh	Post-Rebate Cost ($)	Savings ($)	Payback (yrs)
105	2	Office	8	2080	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	46	$70.00	$5.49	12.7	OSR	1	114	$260.00	$13.73	18.9	$0.00	$70.00	149	$260.00	$17.85	14.6
106	2	Dispatch	24	6240	4L4' T8/ELEC	3	330		4L4' T8/ELEC LO	3	297	0.033	206	$105.00	$24.71	4.2			0	$0.00	$0.00		$0.00	$0.00	206	$105.00	$24.71	4.2
107	18		24	6240	65W Incandescen	3	195		15W CF/SI	3	45	0.15	936	$18.00	$112.32	0.2			0	$0.00	$0.00		$0.00	$0.00	936	$18.00	$112.32	0.2
108	2	Office	8	2080	4L4' T8/ELEC	1	110		4L4' T8/ELEC LO	1	99	0.011	23	$35.00	$2.75	12.7			0	$0.00	$0.00		$0.00	$0.00	23	$35.00	$2.75	12.7
109	2	Hallway	24	6240	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	137	$70.00	$16.47	4.2			0	$0.00	$0.00		$0.00	$0.00	137	$70.00	$16.47	4.2
110	4		24	6240	2L22"	2	124		2L22" LO	2	110	0.014	87	$70.00	$10.48	6.7			0	$0.00	$0.00		$0.00	$0.00	87	$70.00	$10.48	6.7
111	10		24	6240	2L4' T8/ELEC	2	122		2L4' T8/ELEC LO	2	110	0.012	75	$50.00	$8.99	5.6			0	$0.00	$0.00		$0.00	$0.00	75	$50.00	$8.99	5.6
112	2	Office Area	24	6240	4L4' T8/ELEC	11	1210		4L4' T8/ELEC LO	11	1089	0.121	755	$385.00	$90.60	4.2			0	$0.00	$0.00		$0.00	$0.00	755	$385.00	$90.60	4.2
113	2	Office	8	2080	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	46	$70.00	$5.49	12.7	OSR	1	114	$260.00	$13.73	18.9	$0.00	$70.00	149	$260.00	$17.85	14.6
114	2	Office	8	2080	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	46	$70.00	$5.49	12.7	OSR	1	114	$260.00	$13.73	18.9	$0.00	$70.00	149	$260.00	$17.85	14.6
115	2	Office	8	2080	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	46	$70.00	$5.49	12.7	OSR	1	114	$260.00	$13.73	18.9	$0.00	$70.00	149	$260.00	$17.85	14.6
116	2	Break Area	24	6240	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	137	$70.00	$16.47	4.2	OSR	1	343	$260.00	$41.18	6.3	$0.00	$70.00	446	$260.00	$53.54	4.9
117	10	Office	8	2080	2L4' T8/ELEC	2	122		2L4' T8/ELEC LO	2	110	0.012	25	$50.00	$3.00	16.7			0	$0.00	$0.00		$0.00	$0.00	25	$50.00	$3.00	16.7
118	2	Office	8	2080	4L4' T8/ELEC	1	110		4L4' T8/ELEC LO	1	99	0.011	23	$35.00	$2.75	12.7			0	$0.00	$0.00		$0.00	$0.00	23	$35.00	$2.75	12.7
119	10	Holding Cell	8	2080	2L4' T8/ELEC	1	61		2L4' T8/ELEC LO	1	55	0.006	12	$25.00	$1.50	16.7			0	$0.00	$0.00		$0.00	$0.00	12	$25.00	$1.50	16.7
120	10	Holding Cell	8	2080	2L4' T8/ELEC	1	61		2L4' T8/ELEC LO	1	55	0.006	12	$25.00	$1.50	16.7			0	$0.00	$0.00		$0.00	$0.00	12	$25.00	$1.50	16.7
121	2	Cell Area	8	2080	4L4' T8/ELEC	4	440		4L4' T8/ELEC LO	4	396	0.044	92	$140.00	$10.98	12.7			0	$0.00	$0.00		$0.00	$0.00	92	$140.00	$10.98	12.7
122	10		8	2080	2L4' T8/ELEC	3	183		2L4' T8/ELEC LO	3	165	0.018	37	$75.00	$4.49	16.7			0	$0.00	$0.00		$0.00	$0.00	37	$75.00	$4.49	16.7
123	1	Sally Port	8	2080	2L4' T8/ELEC	4	244		2L4' T8/ELEC LO	4	220	0.024	50	$100.00	$5.99	16.7			0	$0.00	$0.00		$0.00	$0.00	50	$100.00	$5.99	16.7
124	21	Storage	1	260	60W Incandescen	2	120		13W CF/SI	2	30	0.09	23	$12.00	$2.81	4.3			0	$0.00	$0.00		$0.00	$0.00	23	$12.00	$2.81	4.3
125	2	Prep Room	8	2080	4L4' T8/ELEC	3	330		4L4' T8/ELEC LO	3	297	0.033	69	$105.00	$8.24	12.7			0	$0.00	$0.00		$0.00	$0.00	69	$105.00	$8.24	12.7
126	2	Office	8	2080	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	46	$70.00	$5.49	12.7	OSR	1	114	$260.00	$13.73	18.9	$0.00	$70.00	149	$260.00	$17.85	14.6
127	2	Office Area	24	6240	4L4' T8/ELEC	7	770		4L4' T8/ELEC LO	7	693	0.077	480	$245.00	$57.66	4.2			0	$0.00	$0.00		$0.00	$0.00	480	$245.00	$57.66	4.2
128	10		24	6240	2L4' T8/ELEC	1	61		2L4' T8/ELEC LO	1	55	0.006	37	$25.00	$4.49	5.6			0	$0.00	$0.00		$0.00	$0.00	37	$25.00	$4.49	5.6
129	7		24	6240	60W Incandescen	1	60		13W CF/SI	1	15	0.045	281	$10.00	$33.70	0.3			0	$0.00	$0.00		$0.00	$0.00	281	$10.00	$33.70	0.3
130	2	Breathalyzer 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
131	2	Breathlyzer Room 2	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
132	10	BR	3	780	2L4' T8/ELEC	1	61		2L4' T8/ELEC LO	1	55	0.006	5	$25.00	$0.56	44.5			0	$0.00	$0.00		$0.00	$0.00	5	$25.00	$0.56	44.5
133	2	Server/Computer 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
134	10	Hallway	24	6240	2L4' T8/ELEC		0		2L4' T8/ELEC LO										0	$0.00	$0.00			$0.00				
135	4	Holding Cell	8	2080	2L22"	1	62		2L22" LO	1	55	0.007	15	$35.00	$1.75	20.0			0	$0.00	$0.00		$0.00	$0.00	15	$35.00	$1.75	20.0
136	14	Holding Cell	8	2080	75W Incandescen	1	75		15W CF/SI	1	15	0.06	125	$6.00	$14.98	0.4			0	$0.00	$0.00		$0.00	$0.00	125	$6.00	$14.98	0.4
137	14	Holding Cell	8	2080	75W Incandescen	1	75		15W CF/SI	1	15	0.06	125	$6.00	$14.98	0.4			0	$0.00	$0.00		$0.00	$0.00	125	$6.00	$14.98	0.4
138	19	Holding Cell	8	2080	2L4' T8/ELEC	1	61		2L4' T8/ELEC LO	1	55	0.006	12	$25.00	$1.50	16.7			0	$0.00	$0.00		$0.00	$0.00	12	$25.00	$1.50	16.7
139	19	Holding Cell	8	2080	2L4' T8/ELEC	1	61		2L4' T8/ELEC LO	1	55	0.006	12	$25.00	$1.50	16.7			0	$0.00	$0.00		$0.00	$0.00	12	$25.00	$1.50	16.7
140	19	Holding Cell	8	2080	2L4' T8/ELEC	1	61		2L4' T8/ELEC LO	1	55	0.006	12	$25.00	$1.50	16.7			0	$0.00	$0.00		$0.00	$0.00	12	$25.00	$1.50	16.7
141	19	Holding Cell	8	2080	2L4' T8/ELEC	1	61		2L4' T8/ELEC LO	1	55	0.006	12	$25.00	$1.50	16.7			0	$0.00	$0.00		$0.00	$0.00	12	$25.00	$1.50	16.7
142	19	Holding Cell	8	2080	2L4' T8/ELEC	1	61		2L4' T8/ELEC LO	1	55	0.006	12	$25.00	$1.50	16.7			0	$0.00	$0.00		$0.00	$0.00	12	$25.00	$1.50	16.7
143	19	Holding Cell	8	2080	2L4' T8/ELEC	1	61		2L4' T8/ELEC LO	1	55	0.006	12	$25.00	$1.50	16.7			0	$0.00	$0.00		$0.00	$0.00	12	$25.00	$1.50	16.7
144	19	Holding Cell	8	2080	2L4' T8/ELEC	1	61		2L4' T8/ELEC LO	1	55	0.006	12	$25.00	$1.50	16.7			0	$0.00	$0.00		$0.00	$0.00	12	$25.00	$1.50	16.7
145	19	Holding Cell	8	2080	2L4' T8/ELEC	1	61		2L4' T8/ELEC LO	1	55	0.006	12	$25.00	$1.50	16.7			0	$0.00	$0.00		$0.00	$0.00	12	$25.00	$1.50	16.7
146	19	Holding Cell	8	2080	2L4' T8/ELEC	1	61		2L4' T8/ELEC LO	1	55	0.006	12	$25.00	$1.50	16.7			0	$0.00	$0.00		$0.00	$0.00	12	$25.00	$1.50	16.7
147	2	Lobby	24	6240	4L4' T8/ELEC	1	110		4L4' T8/ELEC LO	1	99	0.011	69	$35.00	$8.24	4.2			0	$0.00	$0.00		$0.00	$0.00	69	$35.00	$8.24	4.2
148	2	Court Clerk Lobby	12	3120	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	69	$70.00	$8.24	8.5			0	$0.00	$0.00		$0.00	$0.00	69	$70.00	$8.24	8.5
149	2	Court Clerk Desk Area	10	2600	4L4' T8/ELEC	15	1650		4L4' T8/ELEC LO	15	1485	0.165	429	$525.00	$51.48	10.2			0	$0.00	$0.00		$0.00	$0.00	429	$525.00	$51.48	10.2
150	15		10	2600	1L4' T8/ELEC	4	124		No Upgrade	4	124	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
151	4		10	2600	2L22"	3	186	0.021	2L22" LO	3	165	0.021	55	$105.00	$6.55	16.0			0	$0.00	$0.00		$0.00	$0.00	55	$105.00	$6.55	16.0
152	2	Office	8	2080	4L4' T8/ELEC	4	440		4L4' T8/ELEC LO	4	396	0.044	92	$140.00	$10.98	12.7	OSR	1	229	$260.00	$27.46	9.5	$0.00	$140.00	297	$260.00	$35.69	7.3
153	16	Closet	1	260	1L4' T8/ELEC	1	31		No Upgrade	0	0		0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
154	2	Hallway	12	3120	4L4' T8/ELEC	7	770		4L4' T8/ELEC LO	7	693	0.077	240	$245.00	$28.83	8.5			0	$0.00	$0.00		$0.00	$0.00	240	$245.00	$28.83	8.5
155	2	Office	8	2080	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	46	$70.00	$5.49	12.7	OSR	1	114	$260.00	$13.73	18.9	$0.00	$70.00	149	$260.00	$17.85	14.6
156	2	Office	8	2080	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	46	$70.00	$5.49	12.7	OSR	1	114	$260.00	$13.73	18.9	$0.00	$70.00	149	$260.00	$17.85	14.6
157	4	Hallway	12	3120	2L22"	4	248		2L22" LO	4	220	0.028	87	$140.00	$10.48	13.4			0	$0.00	$0.00		$0.00	$0.00	87	$140.00	$10.48	13.4
158	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
159	2	Office	8	2080	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	46	$70.00	$5.49	12.7	OSR	1	114	$260.00	$13.73	18.9	$0.00	$70.00	149	$260.00	$17.85	14.6
160	2	Closet	8	2080	4L4' T8/ELEC	1	110		4L4' T8/ELEC LO	1	99	0.011	23	$35.00	$2.75	12.7			0	$0.00	$0.00		$0.00	$0.00	23	$35.00	$2.75	12.7
161	17	Office Area	10	2600	6L4' T8/ELEC	6	1068		6L4' T8/ELEC LO	6	948	0.12	312	$270.00	$37.44	7.2			0	$0.00	$0.00		$0.00	$0.00	312	$270.00	$37.44	7.2
162	2		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
163	2	Hallway	12	3120	4L4' T8/ELEC	3	330		4L4' T8/ELEC LO	3	297	0.033	103	$105.00	$12.36	8.5			0	$0.00	$0.00		$0.00	$0.00	103	$105.00	$12.36	8.5
164	2	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
165	2	Office Area	10	2600	4L4' T8/ELEC	8	880		4L4' T8/ELEC LO	8	792	0.088	229	$280.00	$27.46	10.2			0	$0.00	$0.00		$0.00	$0.00	229	$280.00	$27.46	10.2
166	2	Office	8	2080	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	46	$70.00	$5.49	12.7	OSR	1	114	$260.00	$13.73	18.9	$0.00	$70.00	149	$260.00	$17.85	14.6
167	2	Break Room	12	3120	4L4' T8/ELEC	1	110		4L4' T8/ELEC LO	1	99	0.011	34	$35.00	$4.12	8.5			0	$0.00	$0.00		$0.00	$0.00	34	$35.00	$4.12	8.5
168	4		12	3120	2L22"	1	62		2L22" LO	1	55	0.007	22	$35.00	$2.62	13.4	OSR		48	$0.00	$5.80	0.0	$0.00	$0.00	65	$35.00	$7.77	4.5
169	2	Office	8	2080	4L4' T8/ELEC	3	330		4L4' T8/ELEC LO	3	297	0.033	69	$105.00	$8.24	12.7	OSR	1	172	$260.00	$20.59	12.6	$0.00	$105.00	223	$260.00	$26.77	9.7
170	2	Office Area	10	2600	4L4' T8/ELEC	10	1100		4L4' T8/ELEC LO	10	990	0.11	286	$350.00	$34.32	10.2			0	$0.00	$0.00		$0.00	$0.00	286	$350.00	$34.32	10.2
171	2	Office	8	2080	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	46	$70.00	$5.49	12.7	OSR	1	114	$260.00	$13.73	18.9	$0.00	$70.00	149	$260.00	$17.85	14.6
172	2	Conference Room	5	1300	4L4' T8/ELEC	4	440		4L4' T8/ELEC LO	4	396	0.044	57	$140.00	$6.86	20.4			0	$0.00	$0.00		$0.00	$0.00	57	$140.00	$6.86	20.4
173	2	Office	8	2080	4L4' T8/ELEC	4	440		4L4' T8/ELEC LO	4	396	0.044	92	$140.00	$10.98	12.7	OSR	1	229	$260.00	$27.46	9.5	$0.00	$140.00	297	$260.00	$35.69	7.3
174	4	BR	3	780	2L22"	1	62		2L22" LO	1	55	0.007	5	$35.00	$0.66	53.4			0	$0.00	$0.00		$0.00	$0.00	5	$35.00	$0.66	53.4
175	2	Office	8	2080	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	46	$70.00	$5.49	12.7	OSR	1	114	$260.00	$13.73	18.9	$0.00	$70.00	149	$260.00	$17.85	14.6
176	2	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
177	2	Office	8	2080	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	46	$70.00	$5.49	12.7			0	$0.00	$0.00		$0.00	$0.00	46	$70.00	$5.49	12.7
178	2	BR	3	780	4L4' T8/ELEC	1	110		4L4' T8/ELEC LO	1	99	0.011	9	$35.00	$1.03	34.0			0	$0.00	$0.00		$0.00	$0.00	9	$35.00	$1.03	34.0
179	4		3	780	2L22"	1	62		2L22" LO	1	55	0.007	5	$35.00	$0.66	53.4			0	$0.00	$0.00		$0.00	$0.00	5	$35.00	$0.66	53.4
180	2	BR	3	780	4L4' T8/ELEC	1	110		4L4' T8/ELEC LO	1	99	0.011	9	$35.00	$1.03	34.0			0	$0.00	$0.00		$0.00	$0.00	9	$35.00	$1.03	34.0
181	4		3	780	2L22"	1	62		2L22" LO	1	55	0.007	5	$35.00	$0.66	53.4			0	$0.00	$0.00		$0.00	$0.00	5	$35.00	$0.66	53.4
182	2	Hallway	12	3120	4L4' T8/ELEC	4	440		4L4' T8/ELEC LO	4	396	0.044	137	$140.00	$16.47	8.5			0	$0.00	$0.00		$0.00	$0.00	137	$140.00	$16.47	8.5
183	2	Office	8	2080	4L4' T8/ELEC	2	220		4L4' T8/ELEC LO	2	198	0.022	46	$70.00	$5.49	12.7	OSR	1	114	$260.00	$13.73	18.9	$0.00	$70.00	149	$260.00	$17.85	14.6
184	2	Lobby Area	12	3120	4L4' T8/ELEC	1	110		4L4' T8/ELEC LO	1	99	0.011	34	$35.00	$4.12	8.5			0	$0.00	$0.00		$0.00	$0.00	34	$35.00	$4.12	8.5
185	25	Exit Signs	24	6240	15W Exit	31	465		LED	31	62	0.403	2515	$1,240.00	$301.77	4.1			0	$0.00	$0.00		$0.00	$0.00	2515	$1,240.00	$301.77	4.1
186	21	Exterior	7	1820	60W Incandescen	4	240		13W CF/SI	4	60	0.18	328	$24.00	$39.31	0.6			0	$0.00	$0.00		$0.00	$0.00	328	$24.00	$39.31	0.6
187	22	Exterior	7	1820	150W MH/Ballast	1	195		No Upgrade	1	195	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
188	23	Exterior	7	1820	75W Incandescen	41	3075		15W CF/SI	41	615	2.46	4477	$246.00	$537.26	0.5			0	$0.00	$0.00		$0.00	$0.00	4477	$246.00	$537.26	0.5

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	(866) 663-2508	**R/C/I**
Parsippany, NJ 07054	www.viridian.com	**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**