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January 5th, 2015

Local Government Energy Program
Energy Audit Report

Building C
Electrochemical Society
65 South Main Street
Pennington, NJ 08534

Project Number: LGEA111

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EXECUTIVE SUMMARY

Building C is a two story, 6,408 ft2 facility, which operates as an office space. The building was originally constructed in 1977 and has not received any major renovations. There is one below grade level which is furnished but currently unoccupied.

The following chart provides a comparison of the current building energy usage based on the period from February 2013 through January 2014 with the proposed energy usage resulting from the installation of recommended Energy Conservation Measures (ECMs) excluding any renewable energy:

Table 1: State of Building—Energy Usage

	Electric Usage (kWh/yr)	Gas Usage (therms/yr)	Current Annual Cost of Energy ($)	Site Energy Use Intensity (kBtu/sq ft /yr)	Source Energy Use Intensity (kBtu/sq ft /yr)	Joint Energy Consumption (MMBtu/yr)
Current	79,938	1,934	$16,007	72.7	174	466
Proposed	66,876	1,898	$13,730	65.2	150	418
Savings	13,062	36	$2,277	7.5	24	48
% Savings	16.3%	1.9%	14.2%	10.3%	13.7%	10.3%
*Includes operation and maintenance savings						

SWA has entered energy information about Building C into the U.S. Environmental Protection Agency's (EPA) Energy Star Portfolio Manager Energy Benchmarking system. This facility is categorized as a "Office" space type. The ENERGY STAR Energy Performance Rating was calculated to be 35. The Site Energy Utilization Intensity (Site EUI) was calculated to be 71.6 kBtu/ft^2/yr compared to the National Median of 61.1 kBtu/ft^2/yr. See the ECM section for guidance on how to reduce the building's energy intensity.

Recommendations

Based on the current state of the building and its energy use, SWA recommends implementing the following Energy Conservation Measures:

Recommended ECMs	Incentive Program (APPENDIX G for Details)
Replace Incandescent Lamps with LED Lamps	SmartStart
Upgrade to Occupancy Sensor Controls	SmartStart
Install Weatherstripping and Door Sweeps on Exterior Doors	N/A
Replace Electric DHW Heater with Natural Gas	SmartStart
Upgrade AC Units	SmartStart

Appendix H contains an Energy Conservation Measures table.

In addition to these ECMs, SWA recommends the following Operation and Maintenance (O&M) measures that would contribute to reducing energy usage at low or no cost:

- Adjust Thermostat Schedules
- Install Water-Efficient Fixtures and Controls
- Purchase Energy Star® Rated Appliances

There may be energy procurement opportunities for Building C to reduce annual utility costs. The building currently pays a higher than average utility rate for electric and gas, and should be able to reduce utility costs. SWA recommends further evaluation with energy suppliers, listed in Appendix D.

Energy Conservation Measure Implementation

The following table shows an estimated implementation timeline for the recommended ECMs at Building C.

Table 2: Estimated Energy Conservation Timeline

Est. Implementation Timeline	Savings ($)	Simple Payback Period	Initial Investment ($)	CO2 Savings (lbs/yr)
0-5 Year	$709	2.9	$2,043	7,290
5-10 Year	$131	9.6	$1,253	1,439
>10 year	$1,438	11.6	$16,679	15,061
Total	**$2,277**	**8.8**	**$19,976**	**23,790**

Environmental Benefits

SWA estimates that implementing the recommended ECMs is equivalent to removing approximately 2 cars from the roads each year or is equivalent of planting 58 trees to absorb CO2 from the atmosphere.

INTRODUCTION

Launched in 2008, the Local Government Energy Audit (LGEA) Program provides subsidized energy audits for municipal and local government-owned facilities, including offices, courtrooms, town halls, police and fire stations, sanitation buildings, transportation structures, schools and community centers. The Program will subsidize up to 100% of the cost of the audit. The Board of Public Utilities (BPUs) Office of Clean Energy has assigned TRC Energy Services to administer the Program.

Steven Winter Associates, Inc. (SWA) is a 40-year-old architectural/engineering research and consulting firm, with specialized expertise in green technologies and procedures that improve the safety, performance, and cost effectiveness of buildings. SWA has a long-standing commitment to creating energy-efficient, cost-saving and resource-conserving buildings. As consultants on the built environment, SWA works closely with architects, developers, builders, and local, state, and federal agencies to develop and apply sustainable, 'whole building' strategies in a wide variety of building types: commercial, residential, educational and institutional.

SWA performed an energy audit and assessment for Building C of the Electrochemical Society at 65 South Main Street, Pennington, NJ. The process of the audit included a facility visit on July 2nd 2014, benchmarking and energy bill analysis, assessment of existing conditions, energy conservation measures and other recommendations for improvements. The scope of work includes providing a summary of current building conditions, current operating costs, potential savings, and investment costs to achieve these savings. The facility description includes energy usage, occupancy profiles and current building systems along with a detailed inventory of building energy systems, recommendations for improvement and recommendations for energy purchasing and procurement strategies.

The goal of this Local Government Energy Audit is to provide sufficient information to the Electrochemical Society to make decisions regarding the implementation of the most appropriate and most cost-effective energy conservation measures.

HISTORICAL ENERGY CONSUMPTION

Energy Usage, Load Profile and Cost Analysis

SWA reviewed electric and gas utility bills from February 2012 through January 2014 that were received from Pretium Property Management on behalf of the Electrochemical Society. A 12-month period of analysis from February 2013 through January 2014 was used for all calculations and for purposes of benchmarking the building.

Electricity – The building is currently served by three electric meters, supplied by Green Mountain Energy Company and delivered by PSE&G. Electricity is predominantly used for heating equipment, cooling equipment and miscellaneous plug loads. Electricity was purchased at an average aggregated rate of $0.171/kWh and Building C consumed approximately 79,938 kWh, or $13,663 of electricity, for the analyzed billing period. The annual monthly peak demand was approximately 32.3 kW for the month of July, while the average monthly demand was 21.6 kW.

The chart below shows the monthly electric usage and costs. The dashed green line represents the approximate base load or minimum electric usage required to operate the building. The baseline usage for the facility is approximately 5,118 kWh. The consumption profile seen is typical for a building with similar characteristics as peak consumption occurs in July. It is expected that the building with electric cooling systems experience peak consumption during the summer months.

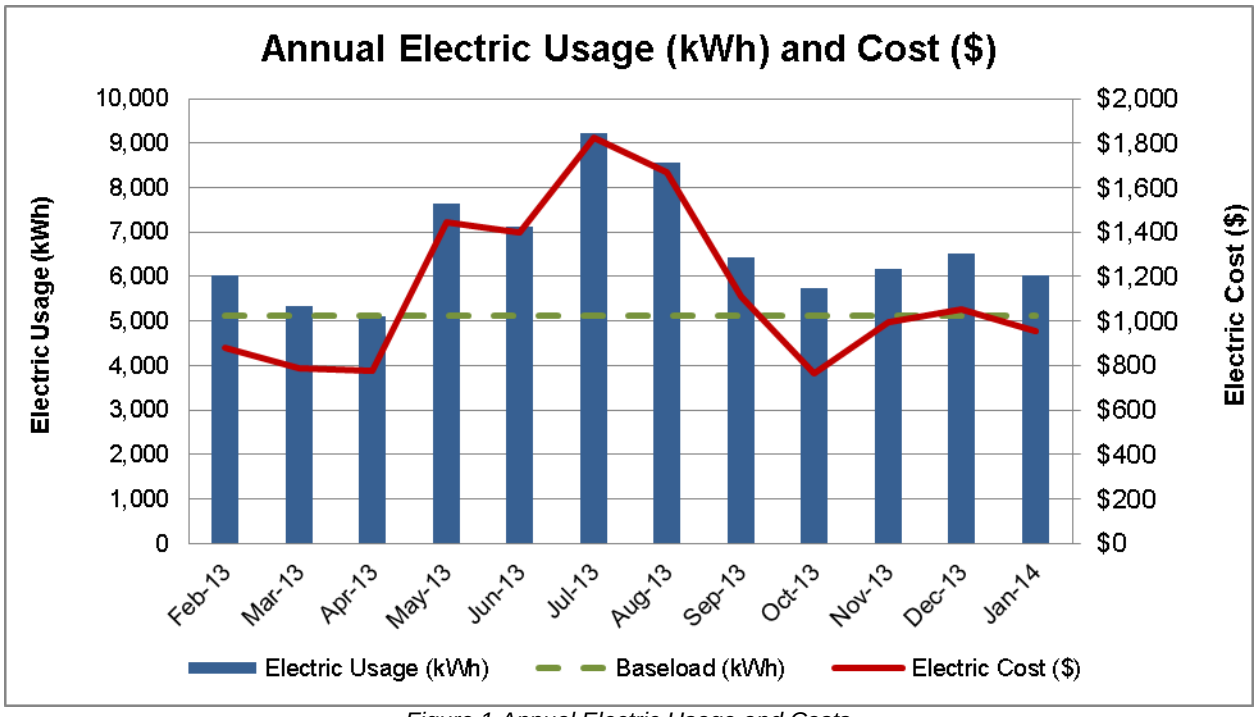

Figure 1 Annual Electric Usage and Costs

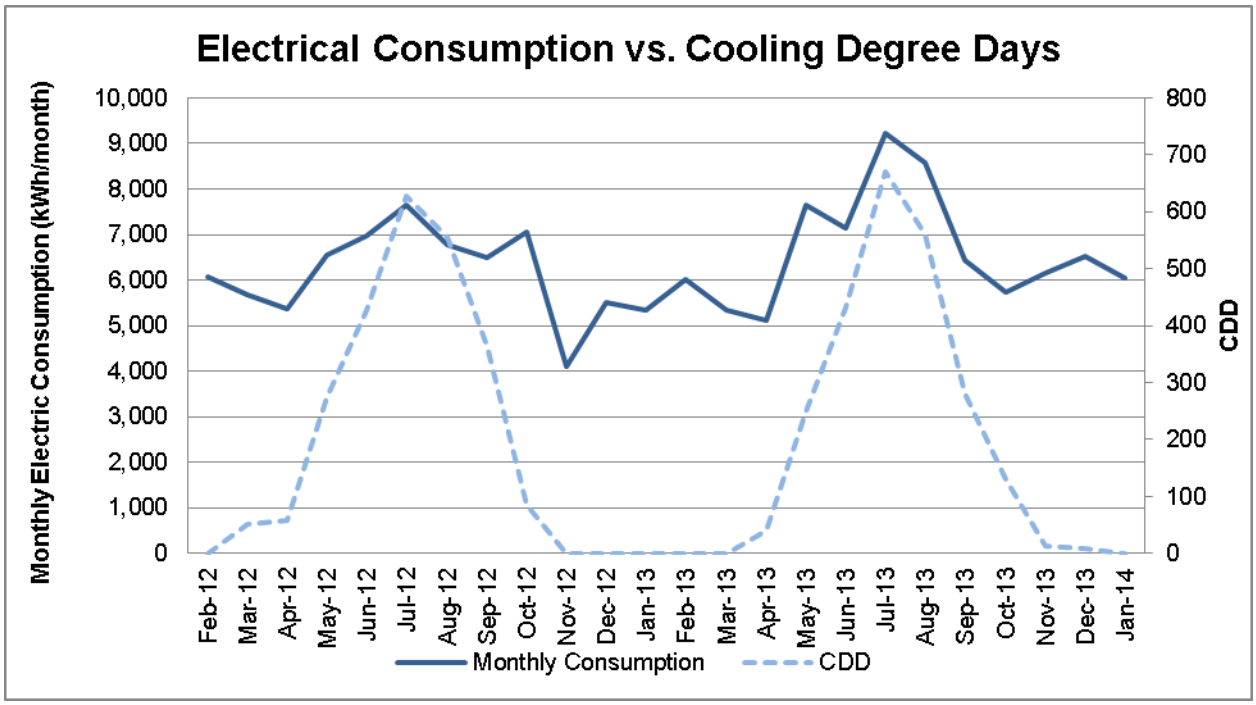

Figure 2 Electric Consumption and Cooling Degree Day Curves

The chart above shows the monthly electricity usage along with the cooling degree days or CDD. Cooling degree days is the difference of the average daily temperature and a base temperature of 50°F, on a particular day. As seen in the chart the building does appear to respond well to cooling degrees with coincidental peaks for both consumption and CDD. However, it is recommended that facility staff investigate the anomalies that occurred in October 2012 and June 2013. In both cases, the consumption profile did not continue to track CDD. Additionally, it is recommended that this analysis be performed periodically to provide a meaning of tracking performance with regard to cooling requirements.

Natural Gas – The building is served by one natural gas meter, which is supplied and delivered by Elizabeth Town Gas. Natural gas was purchased at an average aggregated rate of $1.21/therm and Building C consumed 1,934 therms, or $2,344 of natural gas, for the analyzed billing period. The chart below shows the monthly natural gas usage and costs. As expected, usage peaks in the winter months in conjunction with the enabling of heating mode. Consumption of natural gas then continues at a baseline value of 1 therms during the remainder of the year as there are no other uses for natural gas.

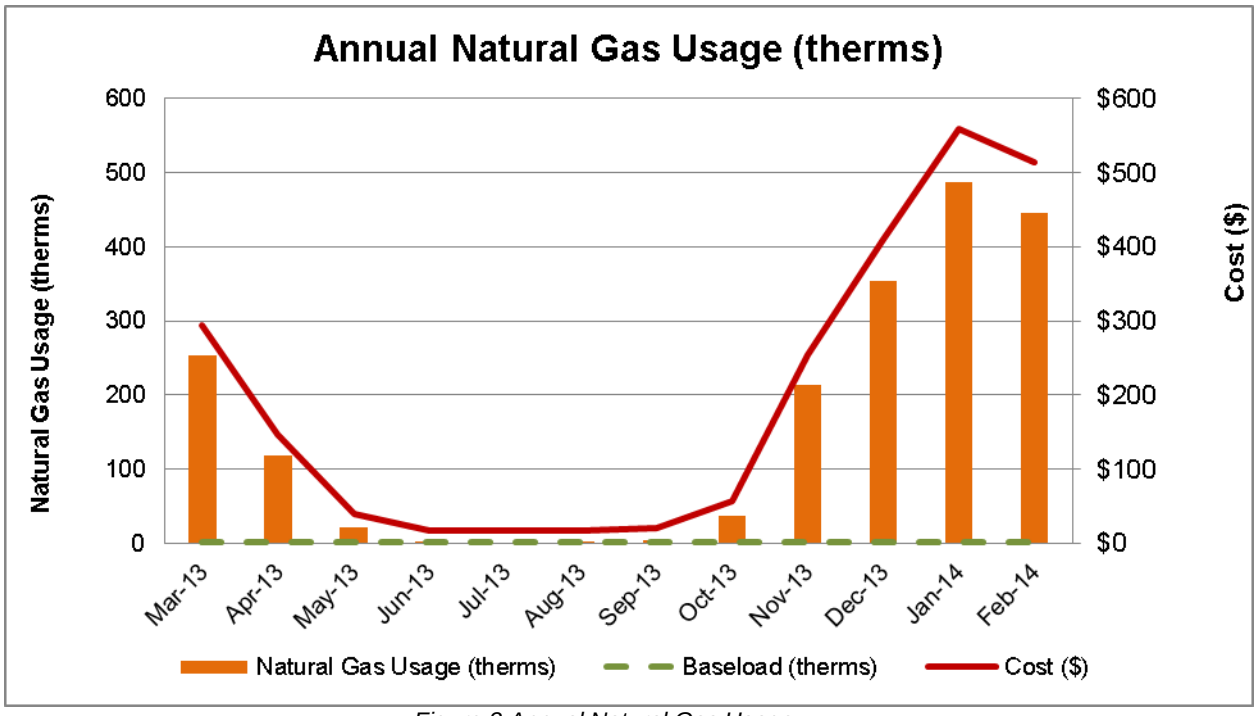

Figure 3 Annual Natural Gas Usage

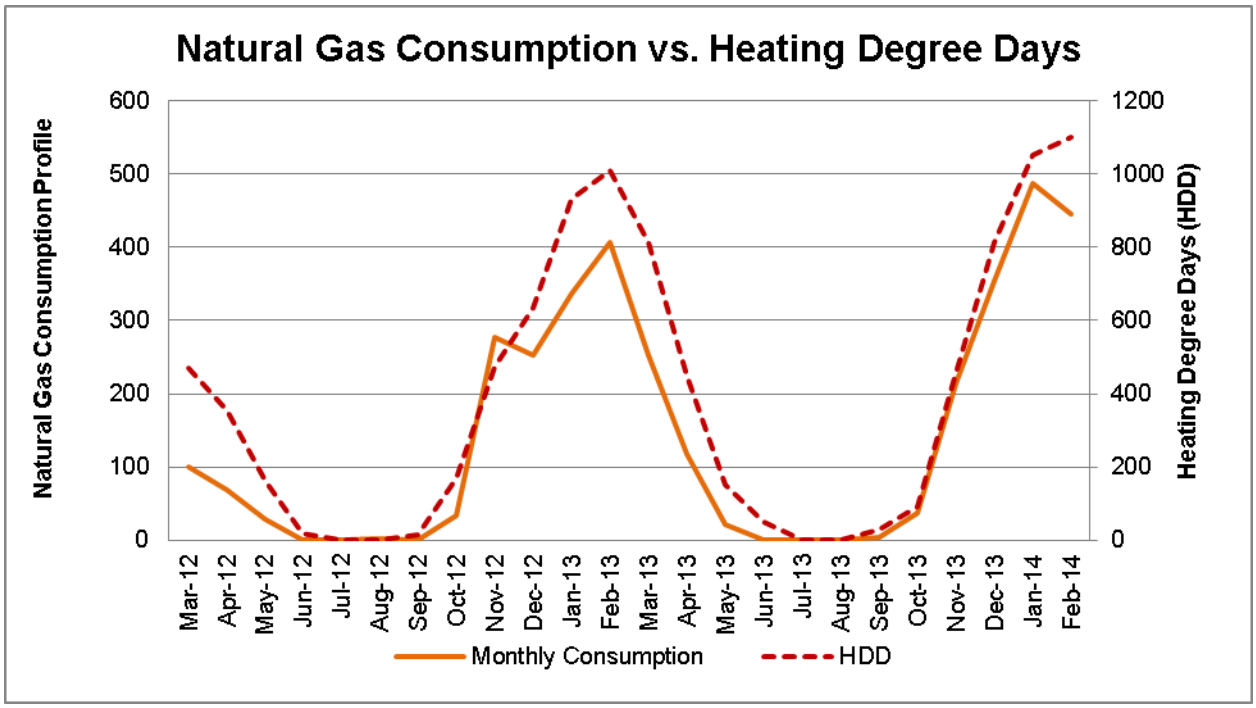

Figure 4 Natural Gas Usage and Heating Degree Day Curves

The chart above shows the monthly natural gas usage along with the heating degree days or HDD. As expected, the natural gas consumption profile follows a curve similar to the HDD curve. Here we also see that there is a single anomaly that requires investigation by facility staff in December 2012. As can be seen natural gas consumption decreases as heating requirements indicated by HDD increase. Additionally, any variation in consumption from year to year is due to changes in HDD and therefore heating requirements. It is recommended that this analysis be performed periodically to provide a meaning of tracking performance with regard to cooling requirements.

The following pie charts and table show energy use for Building C based on utility bills for the analyzed billing period. Note: Electrical cost at $50/MMBtu of energy is more than 4 times as expensive as natural gas at $12/MMBtu.

Annual Energy Consumption / Costs					
	MMBtu	**%MMBtu**	**$**	**%$**	**$/MMBtu**
Electric Misc	65	14%	$3,247	20%	$50
Electric for Cooling	84	18%	$4,203	26%	$50
Electric for Heating	53	11%	$2,678	17%	$50
Lighting	67	14%	$3,352	21%	$50
Domestic Hot Water (Elec)	4	1%	$182	1%	$50
Building Space Heating (Gas)	193	41%	$2,344	15%	$12
Totals	**466**	**100%**	**$16,007**	**100%**	**$34**
Total Electric Usage	273	59%	$13,663	85%	$50
Total Gas Usage	193	41%	$2,344	15%	$12
Totals	**466**	**100%**	**$16,007**	**100%**	**$34**

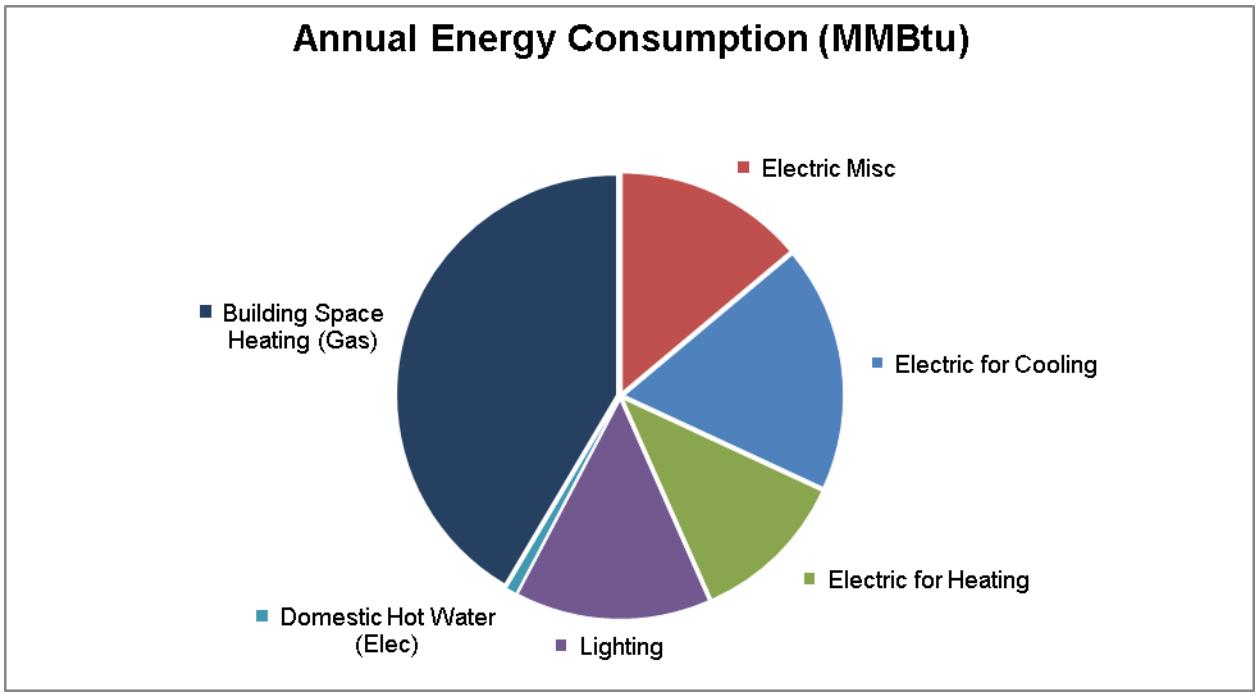

Figure 5 Annual Energy Consumption Breakdown Estimate

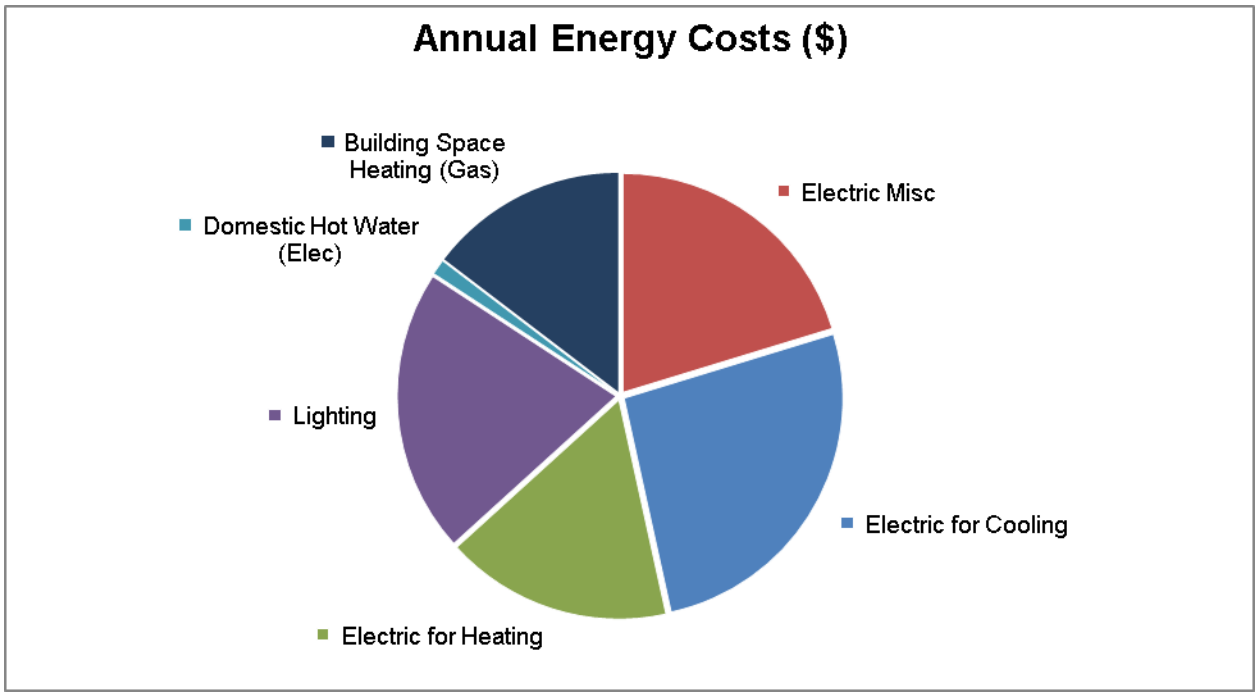

Figure 6 Annual Energy Cost Breakdown Estimate

Energy Benchmarking

SWA has entered energy information about the building in the U.S. Environmental Protection Agency's (EPA) ENERGY STAR® Portfolio Manager energy benchmarking system. This facility is categorized as a "Office" space type. The ENERGY STAR Energy Performance Rating was calculated to be 35. The Site Energy Utilization Intensity (Site EUI) was calculated to be 71.6 kBtu/ft^2/yr compared to the National Median of 61.1 kBtu/ft^2/yr. The Source Energy Utilization Intensity (Source EUI) was calculated to be 163.5 kBtu/ft^2/yr compared to the National Median of 139.5 kBtu/ft^2/yr Building C, therefore, has a higher source EUI, with approximately 17% difference from the national average kBtu/ft^2/yr. See the ECM section for guidance on how to further reduce the building's energy intensity.

The ENERGY STAR® Portfolio Manager uses a national survey conducted by the U.S. Energy Information Administration (EIA). This national survey, known as the Commercial Building Energy Consumption Survey (CBECS), is conducted every four years, and gathers data on building characteristics and energy use from thousands of buildings across the United States. Due to insufficient data in the 2007 survey, Portfolio Manager continues to use data provided by 2003 survey. The Portfolio Manager software uses this data to create a database by building type. By entering the building parameters and utility data into the software, Portfolio Manager is able to generate a performance scale from 1-100 by comparing it to similar library buildings. This 100 point scale determines how well the building performs relative to other buildings across the country, regardless of climate and other differentiating factors.

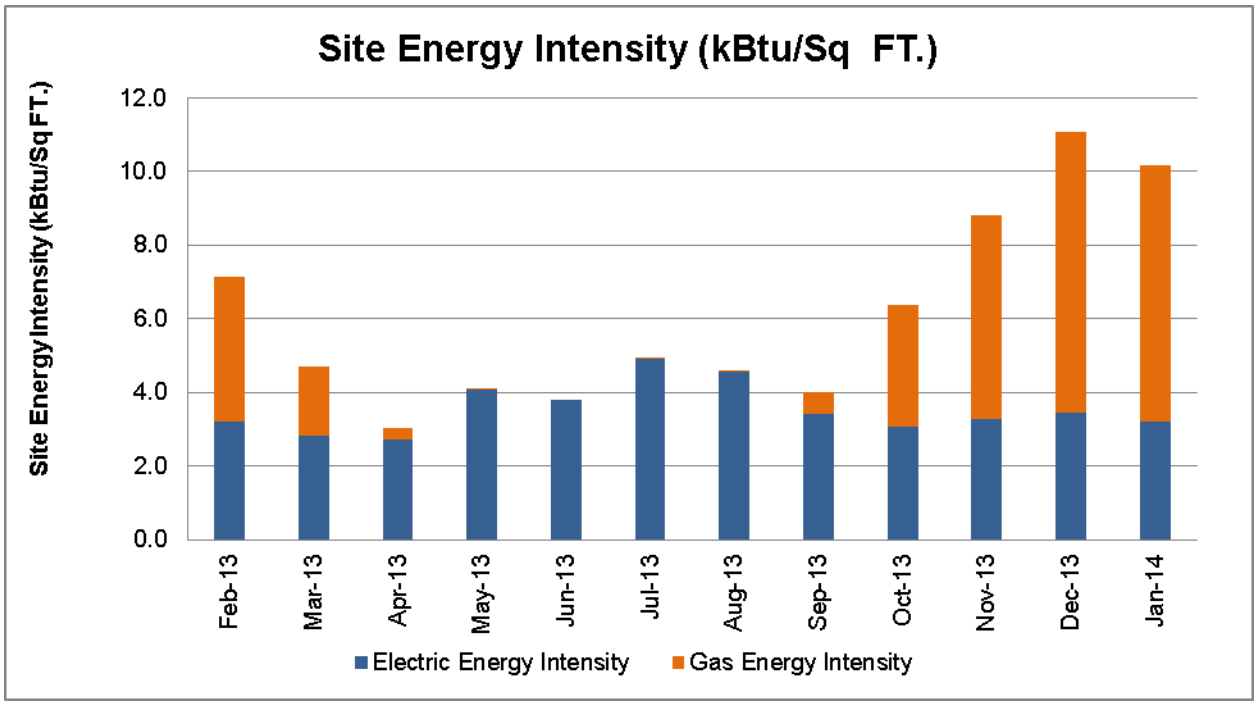

Figure 7 Monthly Site Energy Intensity Breakdowns per Energy Type

Per the LGEA program requirements, SWA has assisted the Electrochemical Society in creating an ENERGY STAR® Portfolio Manager account and sharing the library information to allow future data to be added and tracked using the benchmarking tool. SWA has shared this Portfolio Manager account information with the Electrochemical Society (user name of "[redacted]" with a password of "[redacted]").

Tariff Analysis

Tariff analysis can help determine if the Building C is paying the lowest rate possible for electric and gas service. Tariffs are typically assigned to buildings based on size and building type. Rate fluctuations are expected during periods of peak usage. Natural gas prices often increase during winter months since large volumes of natural gas is needed for heating equipment. Similarly, electricity prices often increase during the summer months when additional electricity is needed for cooling equipment.

As part of the utility bill analysis, SWA evaluated the current utility rates and tariffs for Building C. The electric use for the building is direct-metered and purchased under the General Light and Power service rate schedule, which includes an annual demand charge, peak summer demand charge and societal benefits charge. The General Light and Power rate schedule is a market-rate based on electric usage and electric demand. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year. Building C is also paying for natural gas under the Small General Service rate schedule, which includes fixed costs such as customer service charges.

Energy Procurement Strategies

Utility analysis was conducted using an average aggregated rate which is estimated based on the total cost divided by the total energy usage for each utility over a 12 month period. Average aggregated rates do not separate demand charges from usage, and instead provide a metric of inclusive cost per unit of energy. Average aggregated rates are used in order to equitably compare building utility rates to average utility rates throughout the state of New Jersey.

The average estimated NJ commercial utility rate provided by US Energy Information Administration for electric is $0.137/kWh, while the Building C pays a rate of $0.171/kWh. The building's annual electric utility costs are $2,712 higher, when compared to the average estimated NJ commercial utility rates. Electric bill analysis shows rate fluctuations up to 21% over the analyzed billing period. The electric rate fluctuations in the winter and spring can be attributed to a combination of demand charges, market rate changes and actual and estimated meter readings. Building C already utilizes a third-party supplier, which reduces the supply costs and brings the overall electric costs down.

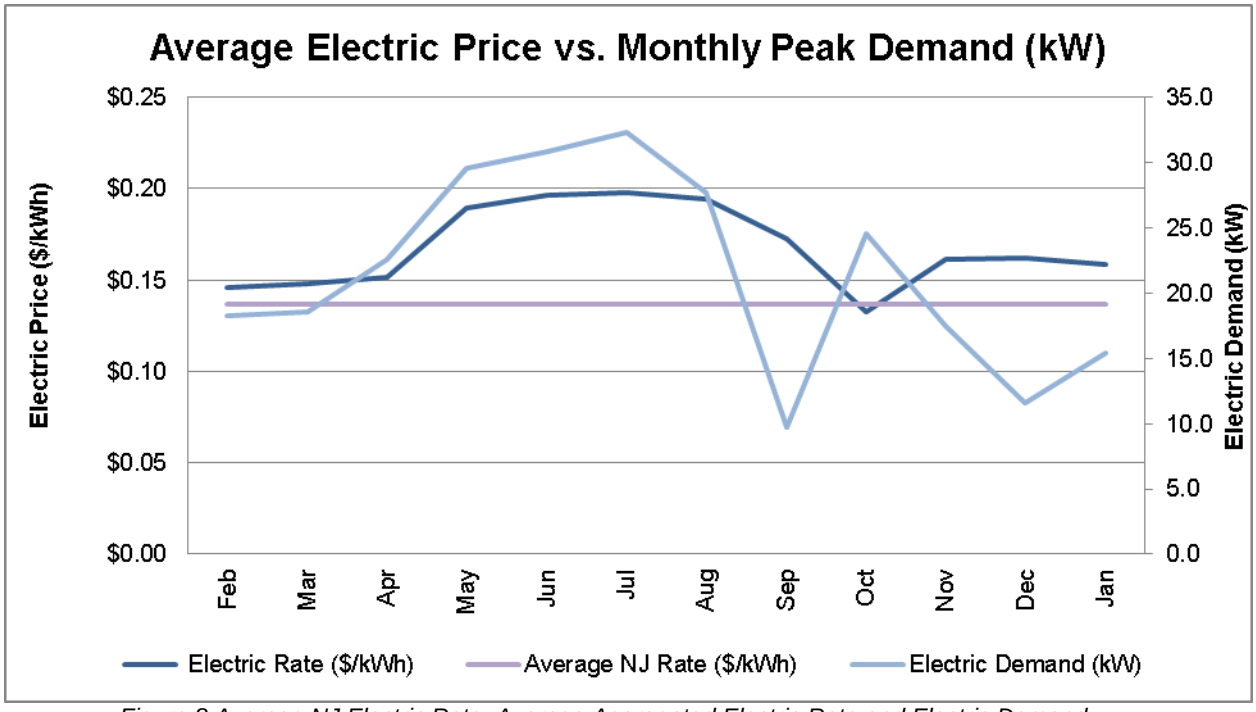

Figure 8 Average NJ Electric Rate, Average Aggregated Electric Rate and Electric Demand

The average estimated NJ commercial utility rate provided by US Energy Information Administration for gas is $0.811/therm, while the building pays a rate of $1.21/therm. Building C's annual natural gas costs are $776 higher, when compared to the average estimated NJ commercial utility rates. The natural gas rate analysis shows fluctuations up to 271% over the analyzed billing period excluding months where there was no natural gas consumption. These periods are shown in the graph as $0/Therm. Utility rate fluctuations in the spring and summer months were caused by a combination of low usage and the assessment of fixed fees and costs.

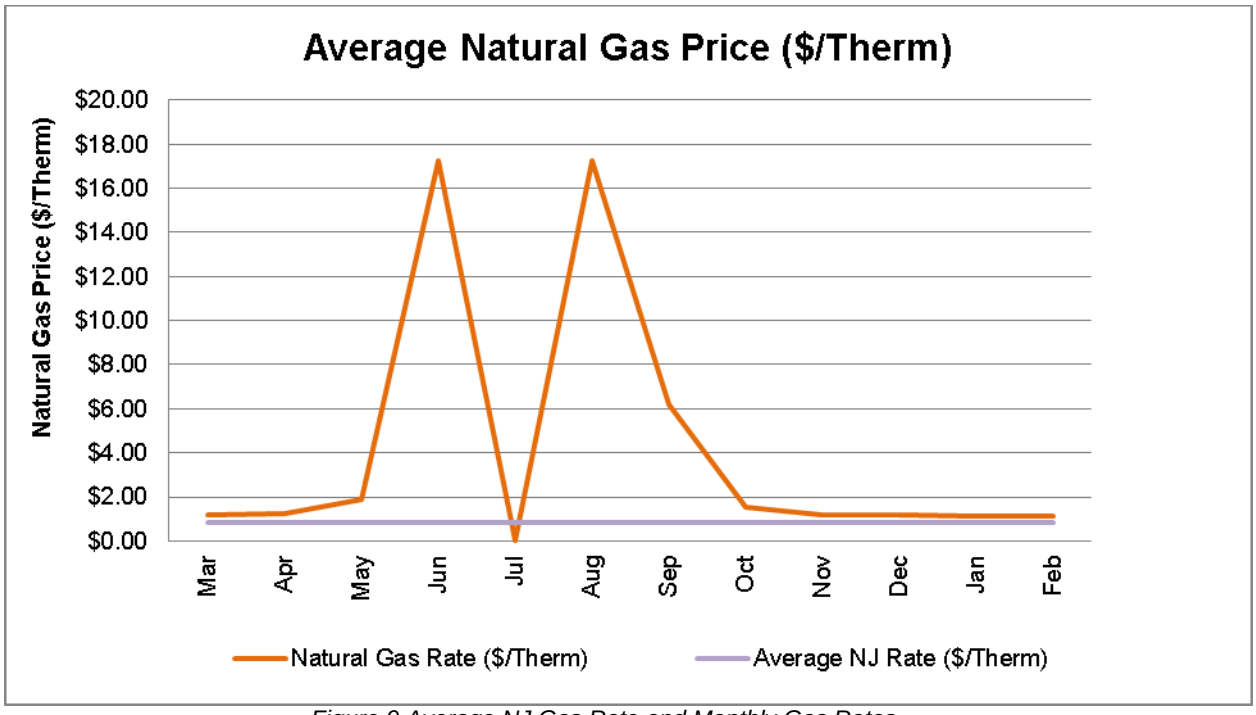

Figure 9 Average NJ Gas Rate and Monthly Gas Rates

SWA recommends that the building continue utilizing the opportunity of purchasing electricity from third-party supplier in order to maintain the reduced rate. Additionally, SWA recommends that the building further explore opportunities of purchasing natural gas from a third-party supplier to reduce the annual cost of energy for Building C. Appendix D contains a complete list of third-party energy suppliers for the Building C's service area.

EXISTING FACILITY AND SYSTEMS DESCRIPTION

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

Based on a visit from SWA in July 2014, the following data was collected and analyzed.

Building Characteristics

Building C is a two story, 6,408 ft2 facility, which operates as an office space. The building was originally constructed in 1977 and has not received any major renovations. There is one below grade level which is furnished but currently unoccupied.

Image 1: Front Entrance

Image 2: Side (Playground) Entrance

Building Occupancy Profiles

Building C contains approximately 12 occupants. The building is open Monday thru Friday 8:00am – 6pm; however, tenants may occupy the building outside of those hours.

Building Envelope

On July 2, 2014, SWA performed a building envelope analysis. At this time, the average outside dry bulb temperature was approximately 83°F with an average wind speed of 8 mph. The building envelope consists of the outer shell of the building including the walls, windows, doors, and roof. This section will examine the overall condition of the envelope and note any deficiencies discovered during the 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 detailed visual analysis, as far as accessibility and weather conditions allowed at the time of the field audit.

Exterior and Interior Walls

The exterior construction of the building is mainly comprised of white stucco and vinyl siding with an unconfirmed level of insulation. Based on the year of construction of the original building (1977) and staff provided information, SWA estimates that there is sufficient insulation installed in the exterior walls.

Exterior and interior wall surfaces were inspected during the field audit. They were found to be in overall fair condition with no signs of uncontrolled moisture, air-leakage, or other energy-compromising issues detected on all facades.

Image 3: Siding appears to be in good condition

Roof

The building's rooftop is a sloped, shingled roof which was inaccessible for inspection at the time of visit. Roofs, related flashing, gutters and downspouts were inspected during the field audit. They were reported to be in overall good condition. Although SWA could not access the exterior of the roof, building maintenance personnel have not had any issues or leaks associated with the roof.

Base

The building's base contains no basement level and the entire building is built slab on grade.

The building's base and its perimeter were inspected for signs of uncontrolled moisture or water presence and other energy-compromising issues. Overall, the base was reported to be in fair condition with a few signs of uncontrolled moisture, air-leakage and/or other energy-compromising issues that were neither visible on the interior nor exterior.

Windows

The buildings windows consist of the following types:

1. Double Pane Operable Windows with Vinyl Frames
    a. Whole Building

Windows, shading devices, sill, related flashing and caulking were inspected as far as accessibility allowed for signs of moisture, air-leakage, and other energy compromising issues. The windows throughout the building are double pane for which the caulking and window frames were found to be in good condition. One window on the second floor had condensation between the two panes of the window indicating a break in the seal of the window.

Image 4: Double pane vinyl window showing signs of breaks in seal.

Exterior Doors

The original and addition contain the following exterior doors:

1. Wooden Swing doors, some containing glass panels.

All exterior doors, thresholds, related flashing, caulking and weather-stripping were inspected for signs of moisture, air-leakage and other energy-compromising issues. Overall, weather-stripping for the doors was found to be in good condition with only a few signs of air-leakage. Poor weather stripping allows unconditioned air to enter the building, leading to increased energy using for space conditioning.

Image 5: Front Entrance

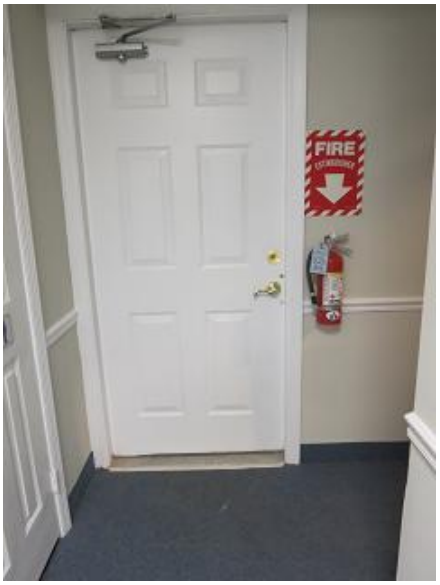

Image 6: Rear Exit

Building Air-Tightness

Overall, the field auditors found the building to adequately air-tight with a few areas of suggested improvements, such as the entry doors described above. The air tightness of buildings helps maximize all other implemented energy measures and investments, and minimizes potentially costly long-term maintenance, repair and replacement expenses.

Mechanical Systems

Heating, Ventilation and Air Conditioning

The primary HVAC system at Building C consists of five AC units with integral furnaces and one Ductless Split AC-unit. The AC units and furnaces are controlled by several wall-mounted thermostats installed within the spaces. There is one domestic hot water heater serving the building.

Equipment

Heating Systems

Heating within Building C is provided by five natural gas furnace sections within the AC units. The heating systems are enabled at the thermostat by the occupants, typically when the OA is below 60°F. The start and stop of the units is controlled by thermostats in the space the unit serves. Thermostats should be programmed to maintain a lower heating setpoint when the building is unoccupied.

A table of the AC units and heating capacities can be found below:

AC #	Heating Capacity
AC #1	89 MBH
AC #2	CNV
AC #3	92 MBH
AC #4	92 MBH
AC #5	80 MBH

CNV: Could Not Verify

Cooling Systems

Cooling in the Building C is provided by five AC units described above. Similar to the heating controls, the cooling systems are enabled by the occupants, typically when OA temperature is above 60°F. The space temperature is typically set to maintain 70-75°F during occupied hours and 75°F when unoccupied. However, many of the time schedules were improperly set and were not deactivating at nights and weekends. The ACs units have a cooling capacity of approximately 24 Tons and a table of the units with cooling capacities can be found below:

AC #	Cooling Capacity
AC #1	5 Tons
AC #2	5 Tons
AC #3	4 Tons
AC #4	4 Tons
AC #5	4 Tons
Split-AC #1	2 Tons

Image 7: Outdoor Condensing Units

Image 8: Energy Recovery Ventilator

Ventilation

Outside air is provided to the spaces via the AC units and operable windows. Each bathroom contains one exhaust fan.

Additionally, there exists one energy recovery ventilator for the building. This device transfers heat between incoming outdoor air and outgoing exhaust air to reduce the energy necessary to condition outside air. During inspection it was discovered that the filter in the unit was dirty and has likely not been changed since its original installation. This increased the energy demand by the supply fan and reduces the amount and quality of incoming outside air. SWA recommends increasing the frequency of filter changes in this unit.

Controls

Wall mounted thermostats throughout the conditioned spaces control the respective AC unit. Occupants must manually set the units into heating or cooling mode. Occupied cooling setpoint is an appropriate 75°F. However, it was discovered that many thermostats throughout the properties did not have proper unoccupied times and were running the AC or heating when the building was unoccupied.

Image 9: Thermostat maintaining 76°F during unoccupied times

Domestic Hot Water

The building is provided domestic hot water (DHW) by one 1,500 watt electric AO Smith hot water heater located within the mechanical room. The heater has a storage capacity of 30 gallons. DHW is maintained and circulated at approximately 120°F.

Image 10: DHW Heater

Electrical Systems

Lighting

See attached lighting schedule in Appendix B for a complete inventory of lighting throughout the building including estimated power consumption and proposed lighting recommendations.

Interior lighting – Lighting throughout the building primarily consisted of a mix of CFL and T8 linear fluorescent fixtures with compact fluorescent fixtures found in a few locations. There were no occupancy sensors in the space.

Bathroom lighting consisted of a mix of fluorescent lighting and incandescent lamps.

All lighting upgrade recommendations can be found in the ECM section of this report.

Exit Lights – All of the emergency exits signs have been upgraded to LED exit signs, which operate on low wattage and have a long lifespan.

Exterior Lighting – Lighting along the exterior of the building varied and consisted of a mix of CFL lamps and 60 watt incandescent lamps. Exterior lighting is controlled by a timer.

Other Electrical Systems

In addition to the major building system described above, Building C is equipped with kitchen equipment such as refrigerators and microwave ovens.

RENEWABLE AND DISTRIBUTED ENERGY MEASURES

Renewable energy is defined as any power source generated from sources which are naturally replenished, such as sunlight, wind and geothermal. Technology for renewable energy is improving and the cost of installation is decreasing due to both demand and the availability of government-sponsored funding. Renewable energy reduces the need for using either electricity or fossil fuel, therefore lowering costs by reducing the amount of energy purchased from the utility company. Solar photovoltaic panels and wind turbines use natural resources to generate electricity. Geothermal systems offset the thermal loads in a building by using water stored in the ground as either a heat sink or heat source. Cogeneration or Combined Heat and Power (CHP) allows for heat recovery during electricity generation.

Existing systems

Currently there are no renewable energy systems installed in the building.

Evaluated Systems

Solar Photovoltaic

Photovoltaic panels convert light energy received from the sun into a usable form of electricity. Panels can be connected into arrays and mounted directly onto building roofs, as well as installed onto built canopies over areas such as parking lots, building roofs or other open areas. Electricity generated from photovoltaic panels is generally sold back to the utility company through a net meter. Net-metering allows the utility to record the amount of electricity generated in order to pay credits to the consumer that can offset usage and demand costs on the electric bill. In addition to generation credits, there are incentives available called Solar Renewable Energy Certificates (SRECs) that are subsidized by the state government. Specifically, the New Jersey State government pays a market-rate SREC to facilities that generate electricity in an effort to meet state-wide renewable energy requirements.

Building C's roof if sloped East-West, in addition to being obscured by tree cover. Due to this, the building is not a good candidate for a solar photovoltaic installation.

Solar Thermal Collectors

Solar thermal collectors are not cost-effective for this building and would not be recommended due to the insufficient and intermittent use of domestic hot water throughout the building to justify the expenditure.

Wind

The building is not a good candidate for wind power generation due to insufficient wind conditions in this area of New Jersey.

Geothermal

The building is not a good candidate for geothermal installation since it would require replacement of the entire existing HVAC system, as well as extensive installation of geothermal wells and pumping equipment.

Combined Heat and Power

The building is not a good candidate for CHP installation and would not be cost-effective due to the size and operations of the building. Typically, CHP is best suited for buildings with a constant electrical baseload to accommodate the electricity generated, as well as a means for using waste heat generated.

PROPOSED ENERGY CONSERVATION MEASURES

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

Recommendations: Energy Conservation Measures

#	Energy Conservation Measures
ECM 1	Replace Incandescent Lamps with LED Lamps
ECM 2	Upgrade to Occupancy Sensor Controls
ECM 3	Install Weatherstripping and Door Sweeps on Exterior Doors
ECM 4	Replace Electric DHW Heater with Natural Gas
ECM 5	Upgrade AC Units

In order to clearly present the overall energy opportunities for the building and ease the decision of which ECM to implement, SWA calculated each ECM independently and did not incorporate slight/potential overlaps between some of the listed ECMs (i.e. lighting change influence on heating/cooling.

ECM #1: Replace Incandescent Lamps with LED Lamps

Many of the lamps in Building C were found to be incandescent lamps ranging from 60-65 watts. Incandescent lamps are an inefficient means of lighting a space. Modern LED lamps of 9.5 watts can replace a 60 watt incandescent lamp without loss in lumen output or color quality. In addition, LED lamps have lifespans of 50,000 hours, compared with 1,000 to 2,000 hours for incandescent lamps.

Using either in-house maintenance staff or a contracted electrician, replace all incandescent lamps with an LED equivalent.

Installation Cost:

Estimated Installed Cost: $192 (Includes $72 of Labor)
Source of Cost Estimate: RS Means, Published and Established Costs

Economics:

ECM #	ECM Description	Est. Installed Cost ($)	Est. Incentives ($)	Net Est. ECM Cost with Incentives ($)	1st Yr Savings (kWh)	Demand Reduction/Mon (kW)	1st Yr Savings (Therms)	1st Yr Savings (kBtu/Sq FT)	Total 1st Yr Savings ($)	Life of Measure (Yr)	Est. Lifetime Cost Savings ($)	Simple Payback (Yr)	Lifetime Return on Investment (%)	Annual Return on Investment (%)	Internal Rate of Return (%)	Net Present Value ($)	CO_2 Reduced (lbs/Yr)
1	Replace Incandescent Lamps with LED Lamps	$192	$100	$92	627	0.6	0	0.3	$107	10	$1,072	0.9	1070%	107%	117%	$713	1,123

Assumptions: SWA calculated the savings for this measure using measurements taken on the day of the field visit and using the billing analysis. Refer to Lighting Study on Appendix B for further information.

Assumptions				
Average Electric Rate	$0.17	$/kWh	# of Summer Months	5
			# of Winter Months	7
			Cost Per CFL Lamp (material	$1.88
Existing			*Proposed*	
Lamp Type	Incandescent		Lamp Type	LED_Lamp
# of Fixtures	8		# of Fixtures	8
Total # of Lamps	10		Total # of Lamps	10
Watts per Lamp	60-65		Watts per Lamp	9.5
Operational Hours per Week	Varies - See Chart		Operational Hours per Week	Varies - See Chart
Operational Hours per Year	Varies - See Chart		Operational Hours per Year	Varies - See Chart
Total kW	9.4		Total kW	8.8
Annual Energy Use (kWh)	19610		Annual Energy Use (kWh)	18983
Rated Hours Per Lamp	2000		Rated Hours Per Lamp	10000
Annual Electric Cost	3351.747311		Annual Electric Cost	3244.535371
			Total Watts Saved (Watts)	0.6
			Total Energy Saved (kWh)	627.3
			Total Cost Savings	$107.21

Equations

Total operating hours =	([Hrs / weekday] x [5 Days / week] x [52 weeks / year]) + ([Hrs/weekend] x [2 days/week] x [52 weeks / year])
# of fixtures =	[from field survey]
Annual Energy Use (kWh) =	[wattage of fixture] x [# of fixtures] x [total operating hours] / 1000
Electricity cost for fixture type =	{[$ / kWh] x [annual kWh for fixture type]} + [Total kW x demand cost summer x 5 months] + [Total kW x demand cost winter x 7 months]
Estimated Implementation Cost =	{[Material Cost Per Fixture] x [Installation Cost Per Fixture] x [# of fixtures]}
Annual Savings =	{[Existing Annual Electric Cost] - [Proposed Annual Electric Cost]} + [Estimated Maintenance Cost]

Material Costs are based on the following:
9.5W LED retrofit is a 60W incandescent replaceement by Cree-
https://www.1000bulbs.com/product/113910/CREE-2597.html

Installation Labor costs are based on estimated 6 fixtures per hour and $60 per hour labor rate, equal to $6.00 per fixture.

Rebates/Financial Incentives:

- NJ Clean Energy – SmartStart Program – New LED (Screw-In) ($10 per Lamp), $100 for 10 lamps

Please see APPENDIX G for more information on Incentive Programs.

ECM #2: Install Occupancy Sensor Controls.

The building contains several areas that could benefit from the installation of occupancy sensors. These areas consisted mainly of bathrooms and office areas that are used sporadically throughout the day and could show energy savings by having the lights turn off after a period of no occupancy. Typically, occupancy sensors have an adjustable time delay that shuts down the lights automatically if no motion is detected within a set time period. Advanced ultrasonic lighting sensors include sound detection as a means to controlling lighting operation.

Using either in-house maintenance staff or a contracted electrician, replace switches with occupancy sensors. If in-house maintenance staff is utilized, the payback will be significantly shortened.

Installation Cost:

Estimated Installed Cost: $1,772 (Includes $1,222 of Labor)
Source of Cost Estimate: RS Means, Published and Established Costs

Economics:

ECM #	ECM Description	Est. Installed Cost ($)	Est. Incentives ($)	Net Est. ECM Cost with Incentives ($)	1st Yr Savings (kWh)	Demand Reduction/Mon (kW)	1st Yr Savings (Therms)	1st Yr Savings (kBtu/Sq FT)	Total 1st Yr Savings ($)	Life of Measure (Yr)	Est. Lifetime Cost Savings ($)	Simple Payback (Yr)	Lifetime Return on Investment (%)	Annual Return on Investment (%)	Internal Rate of Return (%)	Net Present Value ($)	CO_2 Reduced (lbs/Yr)
2	Upgrade to Occupancy Sensor Controls	$1,772	$220	$1,552	2,863	0.0	0	1.5	$489	20	$9,787	3.2	531%	27%	31%	$5,170	5,127

Assumptions: SWA calculated the savings for this measure using measurements taken on the day of the field visit and using the billing analysis. Refer to Lighting Study on Appendix B for further information.

Assumptions				
Average Electric Rate	$0.17	$/kWh	# of Summer Months	5
			# of Winter Months	7
			Cost Per Occupancy Sensor (Material & Labor)	$161.06
Existing			*Proposed*	
Control Type	Switch		Control Type	Occupancy Sensor
# of Controls	11		# of Controls	11
# of Lamps Being Controlled	251		# of Lamps Being Controlled	251
Total Wattage Controlled	6182.6		Total Wattage Controlled	6182.6
Operational Hours per Week	Varies - See Chart		Operational Hours per Week	Varies - See Chart
Operational Hours per Year	Varies - See Chart		Operational Hours per Year	Varies - See Chart
Total kW	9.4		Total kW	9.4
Annual Energy Use (kWh)	19611		Annual Energy Use (kWh)	16748
Rated Hours Per Lamp	0		Rated Hours Per Lamp	0
Annual Electric Cost	$3,351.88		Annual Electric Cost	$2,862.50
			Total Watts Saved (Watts)	0.0
			Total Energy Saved (kWh)	2863.2
			Total Cost Savings	$489.37

Equations

Total operating hours =	([Hrs / weekday] x [5 Days / week] x [52 weeks / year]) + ([Hrs/weekend] x [2 days/week] x [52 weeks / year])
# of fixtures =	[from field survey]
Annual Energy Use (kWh) =	[wattage of fixture] x [# of fixtures] x [total operating hours] / 1000
Electricity cost for fixture type =	{[$ / kWh] x [annual kWh for fixture type]} + [Total kW x demand cost summer x 5 months] + [Total kW x demand cost winter x 7 months]
Estimated Implementation Cost =	{[Material Cost Per Fixture] x [Installation Cost Per Fixture] x [# of fixtures]}
Annual Savings =	{[Existing Annual Electric Cost] - [Proposed Annual Electric Cost]} + [Estimated Maintenance Cost]

Installation Costs are based on R.S. Means values. Materials costs are from either R.S. Means, manufacturers quote, or 100Bulbs costs.

Rebates/Financial Incentives:

- NJ Clean Energy – SmartStart Program – $20/unit, or a total of $220 for 11 sensors

Please see APPENDIX G for more information on Incentive Programs.

ECM #3: Install Weatherstripping and Door Sweeps on Exterior Doors

The front and rear entry doors of Building C were found to have deficient weatherstripping. These doors have gaps between the doors themselves and the framing, which allows for unwanted air infiltration and heat transfer between conditioned indoor spaces and unconditioned spaces or the outdoors. This results in increased natural gas and electrical consumption to heat and cool the spaces, as well as in the infiltration of air that contains dust and particulates that impact cleanliness and indoor environmental quality.

SWA recommends installing durable, high-quality weatherstripping and door sweeps on these doors. Maintenance should inspect doors and frames and repair any damage or misalignment prior to the installation of this measure.

Installation Cost:

Estimated Installed Cost: $400 (Includes $200 of Labor)
Source of Cost Estimate: RS Means, Published and Established Costs

Economics:

ECM #	ECM Description	Est. Installed Cost ($)	Est. Incentives ($)	Net Est. ECM Cost with Incentives ($)	1st Yr Savings (kWh)	Demand Reduction/Mon (kW)	1st Yr Savings (Therms)	1st Yr Savings (kBtu/Sq FT)	Total 1st Yr Savings ($)	Life of Measure (Yr)	Est. Lifetime Cost Savings ($)	Simple Payback (Yr)	Lifetime Return on Investment (%)	Annual Return on Investment (%)	Internal Rate of Return (%)	Net Present Value ($)	CO_2 Reduced (lbs/Yr)
3	Install Weatherstripping and Door Sweeps on Exterior	$400	$0	$400	92	0.0	79	1.3	$112	3	$336	3.6	-16%	-5%	-31%	-$181	1,040

Assumptions: SWA calculated the savings for this measure using measurements taken on the day of the field visit and using the billing analysis.

gap area	9	sqin	heating setpoint T	68	F	cooling setpoint T	75	F
pressure diff	0.02	in wc	night/weekend heating enabled <	55	F	relative h umidity	50%	%
est. infiltration	23.07	CFM	night/weekend cooling enabled >	65	F	room enthalpy	28.11	btu/lb
heating enabled <	50	F	total heating hours	**4,214**	Hrs	total cooling hours	**2,408**	Hrs
cooling enabled >	60	F	heating load	3,174	kBtu/year	cooling load	540	kBtu/year

Assumptions

# Doors Requiring Weatherstripping	2		Annual Cooling Hours	2,408	
Gap Area Per Unit	9	in^2	Annual Heating Hours	4,214	
Pressure Difference	0.02	in. wc	Annual Cooling Load Per Door	540	kBtuh/yr
Air Infiltration Per Door	23	CFM	Annual Heating Load Per Door	3,174	kBtuh/yr
Total Infiltration	46	CFM	Space Cooling Setpoint	75	°F
Cost to Weatherstrip Door	$200		Space Heating Setpoint	68	°F
Cooling Energy Type	Electricity		Cooling Equipment Efficiency	11.7	EER
Heating Energy Type	Natural Gas		Heating Equipment Efficiency	80%	%
Utilities Cost			Energy content per type		
Electricity	$0.17	kWh	Electricity	3.412	kBtu/kWh
Natural Gas	$1.21	therms	Natural Gas	100	kBtu/therms
Energy Savings			Cost Savings		
Electricity	92	kWh/year	Electricity	$ 16	/ year
Natural Gas	79	therms/year	Natural Gas	$ 96	/ year

Equations

Airflow Through Leakage Area = 2610 x [Gap Area] x [Pressure Difference] ^ (0.5)

Annual Heating Load = {1.08 x [Airflow Through Leakage Area] x ([Temp of Conditioned Space] - [Temp of Unconditioned Space]) x [annual heating hours]} / 1000

Annual Cooling Load = {4.5 x [Airflow Through Leakage Area] x [(Outside Air Enthalpy - Room Enthalpy)] x [annual cooling hours]} / 1000

Annual Electricity Savings = (([Annual Cooling Load Per Door] x [# of Doors]) x 1000) / [Cooling Equipment Efficiency]

Annual Natural Gas Savings = (([Annual Heating Load Per Door] x [# of Doors]) / [Heating Energy Content]) / [Heating Equipment Efficiency]

Rebates/Financial Incentives:

- None

Please see APPENDIX G for more information on Incentive Programs.

ECM #4: Replace Electric DHW Heater with Natural Gas

Building C currently heats its domestic hot water using electric hot water heaters. Electricity may not be the most cost-effective way to heat water, as natural gas currently costs significantly less than electricity, per BTU.

SWA recommends replacing the electric hot water heater with a gas-fired domestic hot water heater of equivalent size. By heating water with gas instead of electricity, lower per-BTU costs can be taken advantage of, $12/MMBTU for gas compared with $50/MMBTU for electricity.

Because there exist natural-gas fired furnaces near to the electric hot water heater, it may be easy to route a gas line to a small gas-fired domestic hot water heater. An additional 100' of copper piping has been accounted for to serve the addition, which has a small electric instantaneous heater serving the restroom.

Installation Cost:

Estimated Installed Cost: $1,303 (Includes $301 of Labor)
Source of Cost Estimate: RS Means, Published and Established Costs

Economics:

ECM #	ECM Description	Est. Installed Cost ($)	Est. Incentives ($)	Net Est. ECM Cost with Incentives ($)	1st Yr Savings (kWh)	Demand Reduction/Mon (kW)	1st Yr Savings (Therms)	1st Yr Savings (kBtu/Sq FT)	Total 1st Yr Savings ($)	Life of Measure (Yr)	Est. Lifetime Cost Savings ($)	Simple Payback (Yr)	Lifetime Return on Investment (%)	Annual Return on Investment (%)	Internal Rate of Return (%)	Net Present Value ($)	CO_2 Reduced (lbs/Yr)
4	Replace Electric DHW Heater with Natural Gas	$1,303	$50	$1,253	1,068	0.0	-43	-0.1	$131	15	$1,958	9.6	56%	4%	5%	$195	1,439

Assumptions: SWA calculated the savings for this measure using measurements taken on the day of the field visit and using the billing analysis.

Inputs	Existing		Proposed	
Type of building	Office			
Number of Occupants	12			
Daily Hot Water Consumption (gallons)	24			
Annual Occupied Days	260			
Energy Type	Electricity		Natural Gas	
Energy Conversion	3.412		100.000	
Boiler Efficiency	100%		85%	
Density of Water	8.34		lb/gal	
Annual Hot Water Consumption (gallons)	6,240	gallons	6,240	gallons
Entering Water Temperature	50	°F	50	°F
Exiting Water Temperatue*	120	°F	120	°F
Utility Rate	$0.171	$/kWh	$1.212	$/therms
DHW Energy Consumption	3,643	kBtu	4,286	kBtu
DHW Energy Consumption	1,068	kWh	43	therms
Energy Cost	$182		$52	
Energy Cost Savings	$131			

Equations
Energy Usage (Btu) = Annual Hot Usage * Density of Water * ΔT / Boiler Efficiency
Energy Usage (kBtu) = Energy Useage (Btu) / 1000
Energy Usage (kWh) = [Energy Useage (kBtu)] / [3.412 (kBtu/kWh)]
Energy Cost ($) = [Energy Useage (kWh)] x [0.170915158620443 $/kWh]
Proposed DHW Energy (42.8577882352941) = Existing DHW Energy (kBtu) x 100 (kBtu/therms)
Energy Cost Savings ($) = Existing DHW Cost - Proposed DHW Cost

Rebates/Financial Incentives:

- NJ Clean Energy – SmartStart Program – $50

Please see APPENDIX G for more information on Incentive Programs.

ECM #5: Upgrade AC Units.

The existing AC units have an SEER rating of 12-13. New units exist with significantly higher efficiency ratings. The age of the currently installed equipment is estimated to be between 4 and 20 years old. AC units have an estimated useful life of 14 years and air-source heat pumps of 12 years.

AC units should be replaced with the most efficient units available. As units age, their efficiency decreases, furthering the incentive to replace with the most efficient unit. Any condensing unit over the estimated useful life of 12-14 years should be replaced with a more efficient unit.

The savings calculation below shows savings due to the replacement of each AC units where the payback period for an individual unit replacement can be viewed as well as the cumulative total.

Installation Cost:

Estimated Installed Cost: $18,703 (Includes $7,283 of Labor)
Source of Cost Estimate: RS Means, Published and Established Costs

Economics:

ECM #	ECM Description	Est. Installed Cost ($)	Est. Incentives ($)	Net Est. ECM Cost with Incentives ($)	1st Yr Savings (kWh)	Demand Reduction/Mon (kW)	1st Yr Savings (Therms)	1st Yr Savings (kBtu/Sq FT)	Total 1st Yr Savings ($)	Life of Measure (Yr)	Est. Lifetime Cost Savings ($)	Simple Payback (Yr)	Lifetime Return on Investment (%)	Annual Return on Investment (%)	Internal Rate of Return (%)	Net Present Value ($)	CO_2 Reduced (lbs/Yr)
5	Upgrade AC Units	$18,703	$2,024	$16,679	8,412	6.5	0	4.5	$1,438	12	$17,252	11.6	3%	0%	-1%	-$3,413	15,061

Assumptions: SWA calculated the savings for this measure using measurements taken on the day of the field visit and using the billing analysis.

Inputs (Cooling)		
Cooling Activation Temp	60	°F
Equivalent Full Load Cooling Hours (From BIN data analysis EFL calculation)	1299.6	Hours
Cost of Electric	$0.17	$/kWh

Ductless Split Unit Specifications	Existing			Energy Usage		
Unit #	Cooling Capacity (MBH)	Existing Model #	Cooling Efficiency (SEER)	Estimated Full Load Hours	kWh	$
AC-1	60	Bryant 113RNA060-D	13	1300	5,998	$1,025.16
AC-2	60	Carrier 24ABB360W340	13	1300	5,998	$1,025.16
AC-3	48	HEIL CA5548VKA1	12	1300	5,198	$888.47
AC-4	48	Thermal Zone TZAA-3482A757	13	1300	4,798	$820.13
AC-5	48	HEIL CA5548VKA1	12	1300	5,198	$888.47
				Total	27,191	$4,647.40

Proposed			Energy Usage			Replacement Cost		Simple Payback
Cooling Capacity (MBH)	Replacement Model #	Cooling Efficiency (SEER)	Estimated Full Load Hours	kWh	$	Material	Installation	Years
60	Carrier - 25VNA048A**30	18	1300	4,332	$740.40	$2,576.88	$1,815.75	15.4
60	Carrier - 25VNA048A**30	18	1300	4,332	$740.40	$2,576.88	$1,815.75	15.4
48	Carrier - 25VNA036A**30	18.5	1300	3,372	$576.31	$2,088.63	$1,217.23	10.6
48	Carrier - 25VNA036A**30	18.5	1300	3,372	$576.31	$2,088.63	$1,217.23	13.6
48	Carrier - 25VNA036A**30	18.5	1300	3,372	$576.31	$2,088.63	$1,217.23	10.6
			Total	18,780	$3,209.71	$11,419.65	$7,283.19	13.0
			Savings	8,412	$1,437.69	$18,702.84		

Rebates/Financial Incentives:

- NJ Clean Energy – SmartStart Program – $92/ton, or a total of $2,024 for all units

Please see APPENDIX G for more information on Incentive Programs.

PROPOSED FURTHER RECOMMENDATIONS

Operations and Maintenance

Operations and Maintenance measures consist of low/no cost measures that are within the capability of the current building staff to handle. These measures typically require little investment, and they yield a short payback period. These measures may address equipment settings or staff operations that, when addressed will reduce energy consumption or costs.

- Adjust Thermostat Schedules – Thermostats throughout the building are controlled by the tenants. During the walkthrough it was discovered that several thermostats are not programmed to the actual building occupancy. Conditioning a building during unoccupied hours causes unnecessary amounts of energy to be used.

  SWA recommends that the building management survey all thermostats throughout the building and set the appropriate conditioning schedules (i.e. 8 am – 6 pm, Mon-Fri). It is best practice to set the cooling setpoint to 72°F and heating setpoint to 70°F. Additionally, if it is suspected that tenants may tamper with the scheduling, management may consider locking out the thermostat, either through programming or physical locks.

- Install Water-Efficient Fixtures and Controls – Building maintenance staff can also easily install faucet aerators and/or low-flow fixtures to reduce water consumption. There are many retrofit options, which can be installed now or incorporated as equipment is replaced. Routine maintenance practices that identify and quickly address water leaks are a low-cost way to save water and energy. Retrofitting with more efficient water-consumption fixtures/appliances will reduce energy consumption for water heating, while also decreasing water/sewer bills. This measure can be conducted by in-house maintenance staff with little investment, and yield a short payback.

- Purchase Energy Star® Rated Appliances - SWA recommends that the building considers purchasing the most energy-efficient equipment, including ENERGY STAR® labeled appliances, when equipment is installed or replaced. ENERGY STAR® appliances meet stricter standards compared to standard appliances. Stricter standards include exceeding Federal minimum efficiencies and reduced environmental impact. More information can be found in the “Products” section of the ENERGY STAR® website at: http://www.energystar.gov.

APPENDIX A: EQUIPMENT LIST

Building System	Description	Model #	Fuel	Location	Space Served	Year Installed	Estimated Remaining Useful Life %
Cooling / Heating	AC #1 Cooling. MBH - 60, SEER - 13.0 Heating MBH - 89, EFF % - 81%	AC: Make: Bryant Model #: 113RNA060-D Serial #: 1406E14081 Furnance: Make: Bryant Model #: 310AAV066110 Serial #: 4105A31964	Electricity / Natural Gas	Basement	CNV	2005	40%
Cooling / Heating	AC #2 Cooling. MBH - 60, SEER - 13.0 Heating MBH - CNV, EFF % - CNV	AC: Make: Carrier Model #: 24ABB360W340 Serial #: 1214E00369 Furnance: Make: Carrier Model #:CNV Serial #: CNV	Electricity / Natural Gas	Basement	2nd Floor	2014	100%
Cooling / Heating	AC #3 Cooling. MBH - 48, SEER - 12.0 Heating MBH - 92, EFF % - 80%	AC: Make: HEIL Model #: CA5548VKA1 Serial #: 1710E04546 Furnance: Make: Goodman Model #: GMH81005CNAA Serial #: 1108650383	Electricity / Natural Gas	Basement	CNV	1994	-33%
Cooling / Heating	AC #4 Cooling. MBH - 48, SEER - 13.0 Heating MBH - 92, EFF % - 80%	AC: Make: Thermal Zone Model #: TZAA-3482A757 Serial #: 8346W041110378 Furnance: Make: Goodman Model #: GMH81005CNAA Serial #: 1110347683	Electricity / Natural Gas	Basement	CNV	2011	80%
Cooling / Heating	AC #5 Cooling. MBH - 48, SEER - 12.0 Heating MBH - 80, EFF % - 80%	AC: Make: HEIL Model #: CA5548VKA1 Serial #: L940976226 Furnance: Make: Goodman Model #: GMP100-5 Serial #: CNV	Electricity / Natural Gas	Basement	CNV	1994	-33%
Cooling	Split-AC #1 Cooling MBH - 24, SEER - 17.0	Make: Sanyo Model #: C2472 Serial #: 0052572	Electricity	2nd Floor Office	2nd Floor Office	2007	53%
Cooling	Portable AC #1 Clg. MBH - 7.2, SEER - CNV	Make: Sanyo Model: P0811 Serial #: 164100942	Electricity	2nd Floor Office - Server Room	2nd Floor Office - Server Room	2001	13%
Heating	Filter/Heat Recovery Unit #1 Recovery Efficiency - 60%	Make: Broan-NuTone Model: GSEH3K Serial: G404050706699	Electricity	Basement	CNV	2005	40%
Domestic Hot Water	DHW-1 Input - 1,500 Watts Capacity - 30 Gallons Efficiency - 100%	Make: Bradford White Model #: M230U6SS2 Serial #: AC4390039	Electricity	Basement	1st and 2nd Floor Bathrooms	Approx. 5-20 Years Old	CNV
Exhaust Fan	Exhaust Fan - Qty - 5 Fan Motor - Qty - 1, HP - CNV	Make: CNV Model #: CNV	Electricity	Basement, 1st Floor and 2nd Floor Bathrooms	Basement, 1st Floor and 2nd Floor Bathrooms	Approx. 5-20 Years Old	CNV

Note: The remaining useful life of a system (in %) is an estimate based on the system date of built and existing conditions derived from visual inspection.

APPENDIX B: LIGHTING STUDY

Existing Fixtures

Space Data (optional)						Existing Lighting Equipment											
#	Building	Level/Floor	Room Number	Room Type	Measured Lighting Level (FC)	Lamp Type	Lamp Wattage	# lamps per fixture	Ballast Type	Fixture Wattage	Fixture Quantity	Hrs/Day [weekday]	Hrs/Day [weekend]	Months used per year	Controls	Control Qty.	Annual Energy Use [kwh/year]
1	C	All			N/A	Exit Sign	5W	1	Electronic	5	8	24	24	12	None	1	322.6
2	C	1	Corridor		N/A	T8_Fluorescent	32W	4	Electronic	106.7	1	10	0	12	Switch	1	256.1
3	C	1	Corridor		N/A	T8_U_Shaped_Fluorescent	32W	2	Electronic	65	1	10	0	12	Switch	1	156.0
4	C	1	Closet		N/A	T8_Fluorescent	17W	2	Electronic	33	1	0.1	0	12	Switch	1	0.8
5	C	Bsmnt	Corridor		N/A	T8_U_Shaped_Fluorescent	32W	2	Electronic	65	1	10	0	12	Switch	1	156.0
6	C	Bsmnt	Corridor		N/A	T8_Fluorescent	32W	4	Electronic	106.7	12	10	0	12	Switch	1	3073.0
7	C	Bsmnt	Corridor		N/A	Incandescent	60W	1	n/a	60	3	10	0	12	Switch	1	432.0
8	C	Bsmnt	Corridor		N/A	CFL_Screw_In	13W	1	n/a	13	3	10	0	12	Switch	1	93.6
9	C	Bsmnt	Janitor Closet		N/A	Incandescent	60W	1	n/a	60	1	0.1	0	12	Switch	1	1.4
10	C	Bsmnt	Janitor Closet		N/A	CFL_Screw_In	13W	1	n/a	13	1	0.1	0	12	Switch	1	0.3
11	C	Bsmnt	MER		N/A	Incandescent	60W	1	n/a	60	1	0.1	0	12	Switch	1	1.4
12	C	Bsmnt	Vacant		N/A	CFL_Screw_In	13W	1	n/a	13	1	0	0	12	Switch	1	0.0
13	C	Bsmnt	Vacant		N/A	T8_Fluorescent	32W	4	Electronic	106.7	6	0	0	12	Switch	1	0.0
14	C	Bsmnt	BR-M		N/A	T8_Fluorescent	17W	1	Electronic	18.3	1	3	0	12	Switch	1	13.2
15	C	Bsmnt	BR-M		N/A	Incandescent	60W	1	n/a	60	1	3	0	12	Switch	1	43.2
16	C	Bsmnt	BR-W		N/A	T8_Fluorescent	17W	1	Electronic	18.3	1	3	0	12	Switch	1	13.2
17	C	Bsmnt	BR-W		N/A	Incandescent	60W	1	n/a	60	1	3	0	12	Switch	1	43.2
18	C	Bsmnt	MER-2		N/A	CFL_Screw_In	13W	1	n/a	13	1	0.1	0	12	Switch	1	0.3
19	C	1	Reproductive Hea		N/A	T8_U_Shaped_Fluorescent	32W	2	Electronic	65	12	10	0	12	Switch	1	1872.0
20	C	1	Reproductive Hea		N/A	T8_Fluorescent	32W	4	Electronic	106.7	9	10	0	12	Switch	1	2304.7
21	C	1	Reprodu	BR	N/A	CFL_Screw_In	13W	1	n/a	13	1	10	0	12	Switch	1	31.2
22	C	1	Reprodu	BR	N/A	T8_U_Shaped_Fluorescent	32W	2	Electronic	65	1	10	0	12	Switch	1	156.0
23	C	1	Suzuki		N/A	T8_Fluorescent	17W	4	Electronic	59.8	16	10	0	12	Switch	1	2296.3
24	C	1	Suzuki		N/A	T8_Fluorescent	32W	4	Electronic	106.7	10	10	0	12	Switch	1	2560.8
25	C	1	Suzuki		N/A	T8_U_Shaped_Fluorescent	32W	2	Electronic	65	1	10	0	12	Switch	1	156.0
26	C	2	Corridor		N/A	T8_Fluorescent	32W	4	Electronic	106.7	1	10	0	12	Switch	1	256.1
27	C	2	Automated Eng		N/A	T8_Fluorescent	32W	4	Electronic	106.7	11	10	0	12	Switch	1	2816.9
28	C	2	Automated Eng		N/A	T8_Fluorescent	32W	2	Electronic	62	1	10	0	12	Switch	1	148.8
29	C	2	Automated Eng		N/A	CFL_Screw_In	13W	1	n/a	13	1	10	0	12	Switch	1	31.2
30	C	2	Vacant		N/A	T8_Fluorescent	32W	1	Electronic	33.2	5	0	0	12	Switch	1	0.0
31	C	2	Princo		N/A	T8_Fluorescent	32W	4	Electronic	106.7	8	10	0	12	Switch	1	2048.6
32	C	2	BR-M		N/A	T8_Fluorescent	17W	1	Electronic	18.3	1	3	0	12	Switch	1	13.2
33	C	2	BR-M		N/A	Incandescent	60W	1	n/a	60	1	3	0	12	Switch	1	43.2
34	C	2	BR-W		N/A	T8_Fluorescent	17W	1	Electronic	18.3	1	3	0	12	Switch	1	13.2
35	C	2	BR-W		N/A	Incandescent	60W	1	n/a	60	1	3	0	12	Switch	1	43.2
36	C	Exterior			N/A	Incandescent	60W	1	n/a	60	1	5	0	12	Switch	1	72.0
37	C	Exterior			N/A	Floor Lamp	65W	2	n/a	65	1	5	0	12	Switch	1	78.0
38	C	Exterior			N/A	CFL_Screw_In	13W	1	n/a	13	4	5	0	12	Switch	1	62.4
													0	0	12			**19610.0**

Proposed Fixtures

Space Data (optional)						Proposed Lighting Equipment									Savings			Cost		Simple Payback
#	Building	Level/Floor	Room Number	Room Type	Measured Lighting Level (FC)	Lamp Type	Lamp Wattage	# lamps per fixture	Ballast Type	Fixture Wattage	Fixture Quantity	Proposed Controls	Control Qty.	Annual Energy Use [kwh/year]	Total Energy Savings [kWh]	Demand Savings [kW]	Total Savings[$]	Material Cost	Installation Cost	Years
1	C	All			N/A	Exit Sign	5W	1	Electronic	5	8	None	1	322.6	0.0	0.0	$0.0			
2	C	1	Corridor		N/A	T8_Fluorescent	32W	4	Electronic	106.7	1	Switch	1	256.1	0.0	0.0	$0.0			
3	C	1	Corridor		N/A	T8_U_Shaped_Fluorescent	32W	2	Electronic	65	1	Switch	1	156.0	0.0	0.0	0.0			
4	C	1	Closet		N/A	T8_Fluorescent	17W	2	Electronic	33	1	Switch	1	0.8	0.0	0.0	0.0			
5	C	Bsmnt	Corridor		N/A	T8_U_Shaped_Fluorescent	32W	2	Electronic	65	1	Switch	1	156.0	0.0	0.0	0.0			
6	C	Bsmnt	Corridor		N/A	T8_Fluorescent	32W	4	Electronic	106.7	12	Switch	1	3073.0	0.0	0.0	0.0			
7	C	Bsmnt	Corridor		N/A	LED_Lamp	9.5W	1	n/a	9.5	3	Switch	1	68.4	363.6	0.2	62.1	$29.91	$18.00	0.8
8	C	Bsmnt	Corridor		N/A	CFL_Screw_In	13W	1	n/a	13	3	Switch	1	93.6	0.0	0.0	0.0			
9	C	Bsmnt	Janitor Closet		N/A	LED_Lamp	9.5W	1	n/a	9.5	1	Switch	1	0.2	1.2	0.1	0.2	$9.97	$6.00	77.1
10	C	Bsmnt	Janitor Closet		N/A	CFL_Screw_In	13W	1	n/a	13	1	Switch	1	0.3	0.0	0.0	0.0			
11	C	Bsmnt	MER		N/A	LED_Lamp	9.5W	1	n/a	9.5	1	Switch	1	0.2	1.2	0.1	0.2	$9.97	$6.00	77.1
12	C	Bsmnt	Vacant		N/A	CFL_Screw_In	13W	1	n/a	13	1	Switch	1	0.0	0.0	0.0	0.0			
13	C	Bsmnt	Vacant		N/A	T8_Fluorescent	32W	4	Electronic	106.7	6	Switch	1	0.0	0.0	0.0	0.0			
14	C	Bsmnt	BR-M		N/A	T8_Fluorescent	17W	1	Electronic	18.3	1	Switch	1	13.2	0.0	0.0	0.0			
15	C	Bsmnt	BR-M		N/A	LED_Lamp	9.5W	1	n/a	9.5	1	Switch	1	6.8	36.4	0.1	6.2	$9.97	$6.00	2.6
16	C	Bsmnt	BR-W		N/A	T8_Fluorescent	17W	1	Electronic	18.3	1	Switch	1	13.2	0.0	0.0	0.0			
17	C	Bsmnt	BR-W		N/A	LED_Lamp	9.5W	1	n/a	9.5	1	Switch	1	6.8	36.4	0.1	6.2	$9.97	$6.00	2.6
18	C	Bsmnt	MER-2		N/A	CFL_Screw_In	13W	1	n/a	13	1	Switch	1	0.3	0.0	0.0	0.0			
19	C	1	Reproductive Hea		N/A	T8_U_Shaped_Fluorescent	32W	2	Electronic	65	12	Switch	1	1872.0	0.0	0.0	0.0			
20	C	1	Reproductive Hea		N/A	T8_Fluorescent	32W	4	Electronic	106.7	9	Switch	1	2304.7	0.0	0.0	0.0			
21	C	1	Reprodu	BR	N/A	CFL_Screw_In	13W	1	n/a	13	1	Switch	1	31.2	0.0	0.0	0.0			
22	C	1	Reprodu	BR	N/A	T8_U_Shaped_Fluorescent	32W	2	Electronic	65	1	Switch	1	156.0	0.0	0.0	0.0			
23	C	1	Suzuki		N/A	T8_Fluorescent	17W	4	Electronic	59.8	16	Switch	1	2296.3	0.0	0.0	0.0			
24	C	1	Suzuki		N/A	T8_Fluorescent	32W	4	Electronic	106.7	10	Switch	1	2560.8	0.0	0.0	0.0			
25	C	1	Suzuki		N/A	T8_U_Shaped_Fluorescent	32W	2	Electronic	65	1	Switch	1	156.0	0.0	0.0	0.0			
26	C	2	Corridor		N/A	T8_Fluorescent	32W	4	Electronic	106.7	1	Switch	1	256.1	0.0	0.0	0.0			
27	C	2	Automated Eng		N/A	T8_Fluorescent	32W	4	Electronic	106.7	11	Switch	1	2816.9	0.0	0.0	0.0			
28	C	2	Automated Eng		N/A	T8_Fluorescent	32W	2	Electronic	62	1	Switch	1	148.8	0.0	0.0	0.0			
29	C	2	Automated Eng		N/A	CFL_Screw_In	13W	1	n/a	13	1	Switch	1	31.2	0.0	0.0	0.0			
30	C	2	Vacant		N/A	T8_Fluorescent	32W	1	Electronic	33.2	5	Switch	1	0.0	0.0	0.0	0.0			
31	C	2	Princo		N/A	T8_Fluorescent	32W	4	Electronic	106.7	8	Switch	1	2048.6	0.0	0.0	0.0			
32	C	2	BR-M		N/A	T8_Fluorescent	17W	1	Electronic	18.3	1	Switch	1	13.2	0.0	0.0	0.0			
33	C	2	BR-M		N/A	LED_Lamp	9.5W	1	n/a	9.5	1	Switch	1	6.8	36.4	0.1	6.2	$9.97	$6.00	2.6
34	C	2	BR-W		N/A	T8_Fluorescent	17W	1	Electronic	18.3	1	Switch	1	13.2	0.0	0.0	0.0			
35	C	2	BR-W		N/A	LED_Lamp	9.5W	1	n/a	9.5	1	Switch	1	6.8	36.4	0.1	6.2	$9.97	$6.00	2.6
36	C	Exterior			N/A	LED_Lamp	9.5W	1	n/a	9.5	1	Switch	1	11.4	60.6	0.1	10.4	$9.97	$6.00	1.5
37	C	Exterior			N/A	LED_Lamp	9.5W	2	n/a	19	1	Switch	1	22.8	55.2	0.0	9.4	$19.94	$12.00	3.4
38	C	Exterior			N/A	CFL_Screw_In	13W	1	n/a	13	4	Switch	1	62.4	0.0	0.0	0.0			
														Total:	**627.3**	**0.6**	**$107.2**	**$119.64**	**$72.00**	**1.8**

Proposed Controls

Space Data (optional)						Proposed Lighting Equipment									Savings			Cost		Simple Payback
#	Building	Level/Floor	Room Number	Room Type	Measured Lighting Level (FC)	Lamp Type	Lamp Wattage	# lamps per fixture	Ballast Type	Fixture Wattage	Fixture Quantity	Proposed Controls	Control Qty.	Annual Energy Use [kwh/year]	Total Energy Savings [kWh]	Demand Savings [kW]	Total Savings[$]	Material Cost	Installation Cost	Years
1	C	All			N/A	Exit Sign	5W	1	Electronic	5	8	None	1	322.6	0.0	0.0	$0.0			
2	C	1	Corridor		N/A	T8_Fluorescent	32W	4	Electronic	106.7	1	Switch	1	256.1	0.0	0.0	0.0			
3	C	1	Corridor		N/A	T8_U_Shaped_Fluorescent	32W	2	Electronic	65	1	Switch	1	156.0	0.0	0.0	0.0			
4	C	1	Closet		N/A	T8_Fluorescent	17W	2	Electronic	33	1	Switch	1	0.8	0.8	0.0	0.1			0
5	C	Bsmnt	Corridor		N/A	T8_U_Shaped_Fluorescent	32W	2	Electronic	65	1	Switch	1	156.0	0.0	0.0	0.0			
6	C	Bsmnt	Corridor		N/A	T8_Fluorescent	32W	4	Electronic	106.7	12	Switch	1	3073.0	0.0	0.0	0.0			
7	C	Bsmnt	Corridor		N/A	Incandescent	60W	1	n/a	60	3	Switch	1	432.0	0.0	0.0	0.0			
8	C	Bsmnt	Corridor		N/A	CFL_Screw_In	13W	1	n/a	13	3	Switch	1	93.6	0.0	0.0	0.0			
9	C	Bsmnt	Janitor Closet		N/A	Incandescent	60W	1	n/a	60	1	Switch	1	1.4	0.0	0.0	0.0			
10	C	Bsmnt	Janitor Closet		N/A	CFL_Screw_In	13W	1	n/a	13	1	Switch	1	0.3	0.0	0.0	0.0			
11	C	Bsmnt	MER		N/A	Incandescent	60W	1	n/a	60	1	Switch	1	1.4	0.0	0.0	0.0			
12	C	Bsmnt	Vacant		N/A	CFL_Screw_In	13W	1	n/a	13	1	Switch	1	0.0	0.0	0.0	0.0			
13	C	Bsmnt	Vacant		N/A	T8_Fluorescent	32W	4	Electronic	106.7	6	Switch	1	0.0	0.0	0.0	0.0			
14	C	Bsmnt	BR-M		N/A	T8_Fluorescent	17W	1	Electronic	18.3	1	Occupancy Sensor	1	10.5	2.6	0.0	0.5	$50.00	$111.06	358
15	C	Bsmnt	BR-M		N/A	Incandescent	60W	1	n/a	60	1	Occupancy Sensor	0	34.6	8.6	0.0	1.5			0
16	C	Bsmnt	BR-W		N/A	T8_Fluorescent	17W	1	Electronic	18.3	1	Occupancy Sensor	1	10.5	2.6	0.0	0.5	$50.00	$111.06	358
17	C	Bsmnt	BR-W		N/A	Incandescent	60W	1	n/a	60	1	Occupancy Sensor	0	34.6	8.6	0.0	1.5			0
18	C	Bsmnt	MER-2		N/A	CFL_Screw_In	13W	1	n/a	13	1	Switch	1	0.3	0.0	0.0	0.0			
19	C	1	Reproductive Hea		N/A	T8_U_Shaped_Fluorescent	32W	2	Electronic	65	12	Occupancy Sensor	1	1497.6	374.4	0.0	64.0	$50.00	$111.06	3
20	C	1	Reproductive Hea		N/A	T8_Fluorescent	32W	4	Electronic	106.7	9	Occupancy Sensor	1	1843.8	460.9	0.0	78.8	$50.00	$111.06	2
21	C	1	Reprodu	BR	N/A	CFL_Screw_In	13W	1	n/a	13	1	Occupancy Sensor	1	25.0	6.2	0.0	1.1	$50.00	$111.06	151
22	C	1	Reprodu	BR	N/A	T8_U_Shaped_Fluorescent	32W	2	Electronic	65	1	Occupancy Sensor	0	124.8	31.2	0.0	5.3			0
23	C	1	Suzuki		N/A	T8_Fluorescent	17W	4	Electronic	59.8	16	Occupancy Sensor	1	1837.1	459.3	0.0	78.5	$50.00	$111.06	2
24	C	1	Suzuki		N/A	T8_Fluorescent	32W	4	Electronic	106.7	10	Occupancy Sensor	1	2048.6	512.2	0.0	87.5	$50.00	$111.06	2
25	C	1	Suzuki		N/A	T8_U_Shaped_Fluorescent	32W	2	Electronic	65	1	Switch	1	156.0	0.0	0.0	0.0			
26	C	2	Corridor		N/A	T8_Fluorescent	32W	4	Electronic	106.7	1	Switch	1	256.1	0.0	0.0	0.0			
27	C	2	Automated Eng		N/A	T8_Fluorescent	32W	4	Electronic	106.7	11	Occupancy Sensor	1	2253.5	563.4	0.0	96.3	$50.00	$111.06	2
28	C	2	Automated Eng		N/A	T8_Fluorescent	32W	2	Electronic	62	1	Switch	1	148.8	0.0	0.0	0.0			
29	C	2	Automated Eng		N/A	CFL_Screw_In	13W	1	n/a	13	1	Switch	1	31.2	0.0	0.0	0.0			
30	C	2	Vacant		N/A	T8_Fluorescent	32W	1	Electronic	33.2	5	Switch	1	0.0	0.0	0.0	0.0			
31	C	2	Princo		N/A	T8_Fluorescent	32W	4	Electronic	106.7	8	Occupancy Sensor	1	1638.9	409.7	0.0	70.0	$50.00	$111.06	2
32	C	2	BR-M		N/A	T8_Fluorescent	17W	1	Electronic	18.3	1	Occupancy Sensor	1	10.5	2.6	0.0	0.5	$50.00	$111.06	358
33	C	2	BR-M		N/A	Incandescent	60W	1	n/a	60	1	Occupancy Sensor	0	34.6	8.6	0.0	1.5			0
34	C	2	BR-W		N/A	T8_Fluorescent	17W	1	Electronic	18.3	1	Occupancy Sensor	1	10.5	2.6	0.0	0.5	$50.00	$111.06	358
35	C	2	BR-W		N/A	Incandescent	60W	1	n/a	60	1	Occupancy Sensor	0	34.6	8.6	0.0	1.5			0
36	C	Exterior			N/A	Incandescent	60W	1	n/a	60	1	Switch	1	72.0	0.0	0.0	0.0			
37	C	Exterior			N/A	Floor Lamp	65W	2	n/a	65	1	Switch	1	78.0	0.0	0.0	0.0			
38	C	Exterior			N/A	CFL_Screw_In	13W	1	n/a	13	4	Switch	1	62.4	0.0	0.0	0.0			
														Total:	2863.2	0.0	$489.4	$550.00	$1,221.66	3.6

APPENDIX C: UPCOMING EQUIPMENT PHASEOUTS

LIGHTING:

- As of **July 1, 2010** magnetic ballasts most commonly used for the operation of T12 lamps are no longer being produced for commercial and industrial applications.

- As of **January 1, 2012** 100 watt incandescent bulbs have been phased out in accordance with the Energy Independence and Security Act of 2007.

- As of **July 2012** many non energy saver model T12 lamps have been phased out of production.

- As of **January 1, 2013** 75 watt incandescent bulbs have been phased out in accordance with the Energy Independence and Security Act of 2007.

- As of **January 1, 2014** 60 and 40 watt incandescent bulbs will be phased out in accordance with the Energy Independence and Security Act of 2007.

- Energy Independence and Security Act of 2007 incandescent lamp phase-out exclusions:
  1. Appliance lamp (e.g. refrigerator or oven light)
  2. Black light lamp
  3. Bug lamp
  4. Colored lamp
  5. Infrared lamp
  6. Left-hand thread lamp
  7. Marine lamp
  8. Marine signal service lamp
  9. Mine service lamp
  10. Plant light lamp
  11. Reflector lamp
  12. Rough service lamp
  13. Shatter-resistant lamp (including a shatter-proof lamp and a shatter-protected lamp)
  14. Sign service lamp
  15. Silver bowl lamp
  16. Showcase lamp
  17. 3-way incandescent lamp
  18. Traffic signal lamp
  19. Vibration service lamp
  20. Globe shaped “G” lamp (as defined in ANSI C78.20-2003 and C79.1-2002 with a diameter of 5 inches or more
  21. T shape lamp (as defined in ANSI C78.20-2003 and C79.1-2002) and that uses not more than 40 watts or has a length of more than 10 inches
  22. A B, BA, CA, F, G16-1/2, G-25, G30, S, or M-14 lamp (as defined in ANSI C79.1-2002 and ANSI C78.20-2003) of 40 watts or less
  23. Candelabra incandescent and other lights not having a medium Edison screw base.

- When installing compact fluorescent lamps (CFLs), be advised that they contain a very small amount of mercury sealed within the glass tubing and EPA guidelines concerning

cleanup and safe disposal of compact fluorescent light bulbs should be followed. Additionally, all lamps to be disposed should be recycled in accordance with EPA guidelines through state or local government collection or exchange programs instead.

HCFC (Hydro chlorofluorocarbons):

- As of **January 1, 2010,** no production and no importing of R-142b and R-22, except for use in equipment manufactured before January 1, 2010, in accordance with adherence to the Montreal Protocol.

- As of **January 1, 2015,** No production and no importing of any HCFCs, except for use as refrigerants in equipment manufactured before January 1, 2010.

- As of **January 1, 2020** No production and no importing of R-142b and R-22.

APPENDIX D: THIRD PARTY ENERGY SUPPLIERS

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

PSE&G ELECTRIC SERVICE TERRITORY
Last Updated: 9/06/13

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

Supplier	Telephone & Web Site	*Customer Class
AEP Energy, Inc. 309 Fellowship Road, Fl. 2 Mount Laurel, NJ 08054	(866) 258-3782 www.aepenergy.com	R/C/I ACTIVE
Alpha Gas and Electric, LLC 641 5th Street Lakewood, NJ 08701	(855) 553-6374 www.alphagasandelectric.com	R/C ACTIVE
Ambit Northeast, LLC 103 Carnegie Center Suite 300 Princeton, NJ 08540	(877)-30-AMBIT (877) 302-6248 www.ambitenergy.com	R/C ACTIVE
American Powernet Management, LP 437 North Grove St. Berlin, NJ 08009	(877) 977-2636 www.americanpowernet.com	C ACTIVE
Amerigreen Energy, Inc. 1463 Lamberton Road Trenton, NJ 08611	888-423-8357 www.amerigreen.com	R/C ACTIVE
AP Gas & Electric, LLC 10 North Park Place, Suite 420 Morristown, NJ 07960	(855) 544-4895 www.apge.com	R/C/I ACTIVE
Astral Energy LLC 16 Tyson Place Bergenfield, NJ 07621	(201) 384-5552 www.astralenergyllc.com	R/C/I ACTIVE
Barclays Capital Services, Inc. 70 Hudson Street Jersey City, NJ 07302-4585	(888) 526-7000 www.group.barclays.com	C ACTIVE
BBPC, LLC d/b/a Great Eastern Energy 116 Village Blvd. Suite 200 Princeton, NJ 08540	(888) 651-4121 www.greateasternenergy.com	C ACTIVE
Blue Pilot Energy, LLC 197 State Rte. 18 South Ste. 3000 East Brunswick, NJ 08816	(800) 451-6356 www.bluepilotenergy.com	R/C ACTIVE

Champion Energy Services, LLC 72 Avenue L Newark, NJ 07105	(877) 653-5090 www.championenergyservices.com	**R/C/I** **ACTIVE**
Choice Energy, LLC 4257 US Highway 9, Suite 6C Freehold, NJ 07728	888-565-4490 www.4choiceenergy.com	**R/C** **ACTIVE**
Clearview Electric, Inc. 505 Park Drive Woodbury, NJ 08096	(888) CLR-VIEW (800) 746-4702 www.clearviewenergy.com	**R/C/I** **ACTIVE**
Commerce Energy, Inc. 7 Cedar Terrace Ramsey, NJ 07446	1-866-587-8674 www.commerceenergy.com	**R** **ACTIVE**
ConEdison Solutions Cherry Tree Corporate Center 535 State Highway Suite 180 Cherry Hill, NJ 08002	(888) 665-0955 www.conedsolutions.com	**C/I** **ACTIVE**
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(866) 237-7693 www.constellation.com	**R/C/I** **ACTIVE**
Constellation Energy 900A Lake Street, Suite 2 Ramsey, NJ 07446	(877) 997-9995 www.constellation.com	**R** **ACTIVE**
Credit Suisse, (USA) Inc. 700 College Road East Princeton, NJ 08450	(212) 538-3124 www.creditsuisse.com	**C** **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) 348-4193 www.directenergy.com	**R** **ACTIVE**
Discount Energy Group, LLC 811 Church Road, Suite 149 Cherry Hill, New Jersey 08002	(800) 282-3331 www.discountenergygroup.com	**R/C** **ACTIVE**

Dominion Retail, Inc. **d/b/a Dominion Energy Solutions** 395 Route #70 West Suite 125 Lakewood, NJ 08701	(866) 275-4240 www.dom.com/products	**R/C** **ACTIVE**
DTE Energy Supply, Inc. One Gateway Center, Suite 2600 Newark, NJ 07102	(877) 332-2450 www.dtesupply.com	**C/I** **ACTIVE**
Energy.me Midwest LLC 90 Washington Blvd Bedminster, NJ 07921	(855) 243-7270 www.energy.me	**R/C/I** **ACTIVE**
Energy Plus Holdings LLC 309 Fellowship Road East Gate Center, Suite 200 Mt. Laurel, NJ 08054	(877) 866-9193 www.energypluscompany.com	**R/C** **ACTIVE**
Ethical Electric Benefit Co. **d/b/a Ethical Electric** 100 Overlook Center, 2nd Fl. Princeton, NJ 08540	(888) 444-9452 www.ethicalelectric.com	**R/C** **ACTIVE**
FirstEnergy Solutions 300 Madison Avenue Morristown, NJ 07962	(800) 977-0500 www.fes.com	**C/I** **ACTIVE**
Gateway Energy Services Corp. 120 Wood Avenue Suite 611 Iselin, NJ 08830	(800) 313-8333 Residential (800) 715-8777 Commercial www.gesc.com	**R/C** **ACTIVE**
GDF SUEZ Energy Resources NA, Inc. 333 Thornall Street Sixth Floor Edison, NJ 08837	(866) 999-8374 www.gdfsuezenergyresources.com	**C/I** **ACTIVE**
Glacial Energy of New Jersey, Inc. 21 Pine Street, Suite 237 Rockaway, NJ 07866	(888) 452-2425 www.glacialenergy.com	**C/I** **ACTIVE**
Global Energy Marketing LLC 129 Wentz Avenue Springfield, NJ 07081	(800) 542-0778 www.globalp.com	**C/I** **ACTIVE**

Green Mountain Energy Company 211 Carnegie Center Drive Princeton, NJ 08540	(866) 767-5818 www.greenmountain.com/commercial-home	**C/I** **ACTIVE**
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com	**C/I** **ACTIVE**
Hess Small Business Services, LLC One Hess Plaza Woodbridge, NJ 07095	888-494-4377 www.hessenergy.com	**C/I** **ACTIVE**
HIKO Energy, LLC 655 Suffern Road Teaneck, NJ 07666	(888) 264-4908 www.hikoenergy.com	**R/C** **ACTIVE**
HOP Energy, LLC d/b/a Metro Energy, HOP Fleet Fueling, HOP Energy Fleet Fueling 1011 Hudson Avenue Ridgefield, NJ 07657	(877) 390-7155 www.hopenergy.com	**R/C/I** **ACTIVE**
Hudson Energy Services, LLC 7 Cedar Street Ramsey, New Jersey 07446	(877) Hudson 9 www.hudsonenergyservices.com	**C** **ACTIVE**
IDT Energy, Inc. 550 Broad Street Newark, NJ 07102	(877) 887-6866 www.idtenergy.com	**R/C** **ACTIVE**
Independence Energy Group, LLC 3711 Market Street, 10th Fl. Philadelphia, PA 19104	(877) 235-6708 www.chooseindependence.com	**R/C** **ACTIVE**
Integrys Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830	(877) 763-9977 www.integrysenergy.com	**C/I** **ACTIVE**
Keil & Sons, Inc. **d/b/a Systrum Energy** 1 Bergen Blvd. Fairview, NJ 07022	(877) 797-8786 www.systrumenergy.com	**R/C/I** **ACTIVE**

Liberty Power Delaware, LLC 1973 Highway 34, Suite 211 Wall, NJ 07719	(866) 769-3799 www.libertypowercorp.com	**C/I** **ACTIVE**
Liberty Power Holdings, LLC 1973 Highway 34, Suite 211 Wall, NJ 07719	(866) 769-3799 www.libertypowercorp.com	**R/C/I** **ACTIVE**
Linde Energy Services 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 www.linde.com	**C/I** **ACTIVE**
Marathon Power LLC 302 Main Street Paterson, NJ 07505	(888) 779-7255 www.meeny.com	**R/C/I** **ACTIVE**
MXenergy Electric Inc. 900 Lake Street Ramsey, NJ 07446	(800) 785-4374 www.mxenergy.com	**R/C/I** **ACTIVE**
NATGASCO, Inc. (Supreme Energy, Inc.) 532 Freeman St. Orange, NJ 07050	(800) 840-4427 www.supremeenergyinc.com	**R/C** **ACTIVE**
NextEra Energy Services New Jersey, LLC 651 Jernee Mill Road Sayreville, NJ 08872	(877) 528-2890 Commercial (800) 882-1276 Residential www.nexteraenergyservices.com	**R/C/I** **ACTIVE**
New Jersey Gas & Electric 1 Bridge Plaza fl. 2 Fort Lee, NJ 07024	(866) 568-0290 www.NJGandE.com	**R/C** **ACTIVE**
Noble Americas Energy Solutions The Mac-Cali Building 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 www.noblesolutions.com	**C/I** **ACTIVE**
North American Power and Gas, LLC 222 Ridgedale Avenue Cedar Knolls, NJ 07927	(888) 313-9086 www.napower.com	**R/C/I** **ACTIVE**

Palmco Power NJ, LLC One Greentree Centre 10,000 Lincoln Drive East, Suite 201 Marlton, NJ 08053	(877) 726-5862 www.PalmcoEnergy.com	**R/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**
Plymouth Rock Energy, LLC 338 Maitland Avenue Teaneck, NJ 07666	(855) 32-POWER (76937) www.plymouthenergy.com	**R/C/I** **ACTIVE**
PPL Energy Plus, LLC 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.com	**C/I** **ACTIVE**
Public Power & Utility of New Jersey, LLC 39 Old Ridgebury Rd. Suite 14 Danbury, CT 06810	(888) 354-4415 www.ppandu.com	**R/C/I** **ACTIVE**
Reliant Energy 211 Carnegie Center Princeton, NJ 08540	(877) 297-3795 (877) 297-3780 www.reliant.com/pjm	**R/C/I** **ACTIVE**
ResCom Energy LLC 18C Wave Crest Ave. Winfield Park, NJ 07036	(888) 238-4041 http://rescomenergy.com	**R/C/I** **ACTIVE**
Respond Power LLC 10 Regency CT Lakewood, NJ 08701	(877) 973-7763 www.respondpower.com	**R/C/I** **ACTIVE**
South Jersey Energy Company 1 South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 266-6020 www.southjerseyenergy.com	**C/I** **ACTIVE**
Sperian Energy Corp. 1200 Route 22 East, Suite 2000 Bridgewater, NJ 08807	(888) 682-8082	**R/C/I** **ACTIVE**
S.J. Energy Partners, Inc. 208 White Horse Pike, Suite 4 Barrington, N.J. 08007	(800) 695-0666 www.sjnaturalgas.com	**R/C** **ACTIVE**
Spark Energy, L.P. 2105 CityWest Blvd., Ste 100 Houston, Texas 77042	(800) 441-7514 www.sparkenergy.com	**R/C/I** **ACTIVE**

Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	(800) 225-1560 www.spragueenergy.com	**C/I** **ACTIVE**
Starion Energy PA Inc. 101 Warburton Avenue Hawthorne, NJ 07506	(800) 600-3040 www.starionenergy.com	**R/C/I** **ACTIVE**
Stream Energy 309 Fellowship Rd., Suite 200 Mt. Laurel, NJ 08054	(877) 39-8150 www.streamenergy.net	**R** **ACTIVE**
Texas Retail Energy LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(866) 532-0761	**C/I** **ACTIVE**
UGI Energy Services, Inc. dba UGI Energy Link 224 Strawbridge Drive Suite 107 Moorestown, NJ 08057	(800) 427-8545 www.ugienergyservices.com	**C/I** **ACTIVE**
Verde Energy USA, Inc. 2001 Route 46 Waterview Plaza Suite 301 Parsippany, NJ 07054	(800) 388-3862 www.lowcostpower.com	**R/C/I** **ACTIVE**
Viridian Energy 2001 Route 46, Waterview Plaza Suite 310 Parsippany, NJ 07054	(866) 663-2508 www.viridian.com	**R/C/I** **ACTIVE**
Xoom Energy New Jersey, LLC 744 Broad Street Newark, NJ 07102	(888) 997-8979 www.xoomenergy.com	**R/C/I** **ACTIVE**
YEP Energy 89 Headquarters Plaza North #1463 Morristown, NJ 07960	(855) 363-7736 www.yepenergyNJ.com	**R/C/I** **ACTIVE**
Your Energy Holdings, LLC One International Boulevard Suite 400 Mahwah, NJ 07495-0400	(855) 732-2493 www.thisisyourenergy.com	**R/C/I** **ACTIVE**

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APPENDIX E: GLOSSARY AND METHOD OF CALCULATIONS

Net ECM Cost: The net ECM cost is the cost experienced by the customer, which is typically the total cost (materials + labor) of installing the measure minus any available incentives. Both the total cost and the incentive amounts are expressed in the summary for each ECM.

Annual Energy Cost Savings (AECS): This value is determined by the audit firm based on the calculated energy savings (kWh or Therm) of each ECM and the calculated energy costs of the building.

Lifetime Energy Cost Savings (LECS): This measure estimates the energy cost savings over the lifetime of the ECM. It can be a simple estimation based on fixed energy costs. If desired, this value can factor in an annual increase in energy costs as long as the source is provided.

Simple Payback: This is a simple measure that displays how long the ECM will take to break-even based on the annual energy and maintenance savings of the measure.

ECM Lifetime: This is included with each ECM so that the owner can see how long the ECM will be in place and whether or not it will exceed the simple payback period. Additional guidance for calculating ECM lifetimes can be found below. This value can come from manufacturer's rated lifetime or warranty, the ASHRAE rated lifetime, or any other valid source.

Operating Cost Savings (OCS): This calculation is an annual operating savings for the ECM. It is the difference in the operating, maintenance, and / or equipment replacement costs of the existing case versus the ECM. In the case where an ECM lifetime will be longer than the existing measures (such as LED lighting versus fluorescent) the operating savings will factor in the cost of replacing the units to match the lifetime of the ECM. In this case or in one where one-time repairs are made, the total replacement / repair sum is averaged over the lifetime of the ECM.

Return on Investment (ROI): The ROI is expresses the percentage return of the investment based on the lifetime cost savings of the ECM. This value can be included as an annual or lifetime value, or both.

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

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

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

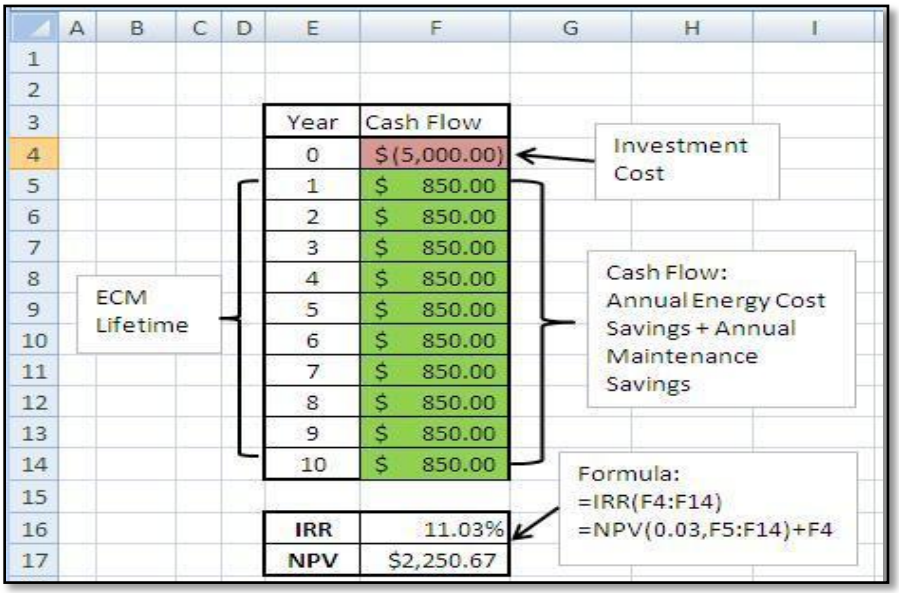
Calculation References

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

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

Excel NPV and IRR Calculation

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



Solar PV ECM Calculation

There are several components to the calculation:

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

Total lifetime PV energy cost savings =
kWh produced by panel * [$/kWh cost * 25 years + $180/Megawatt hour /1000 * 15 years]

ECM and Equipment Lifetimes

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

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

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

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

New Jersey Clean Energy Program Commercial Equipment Life Span

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

APPENDIX F: STATEMENT OF ENERGY PERFORMANCE FROM ENERGY STAR®

ENERGY STAR® Statement of Energy Performance

35

ENERGY STAR® Score[1]

Building C

Primary Property Function: Office
Gross Floor Area (ft²): 6,408
Built: 1977

For Year Ending: January 31, 2014
Date Generated: July 09, 2014

1. The ENERGY STAR score is a 1-100 assessment of a building's energy efficiency as compared with similar buildings nationwide, adjusting for climate and business activity.

Property & Contact Information

Property Address	Property Owner	Primary Contact
Building C 65 South Main Street Pennington, New Jersey 08534	_____ , (___)___-____	___ _____ , (___)___-____ _____

Property ID: 4100031

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
71.6 kBtu/ft²

Source EUI
163.5 kBtu/ft²

Annual Energy by Fuel		National Median Comparison	
Natural Gas (kBtu)	188,512 (41%)	National Median Site EUI (kBtu/ft²)	61.1
Electric - Grid (kBtu)	270,618 (59%)	National Median Source EUI (kBtu/ft²)	139.5
		% Diff from National Median Source EUI	17%
		Annual Emissions	
		Greenhouse Gas Emissions (Metric Tons CO2e/year)	44

Signature & Stamp of Verifying Professional

I _____ (Name) verify that the above information is true and correct to the best of my knowledge.

Signature: _____ Date: _____

Licensed Professional

____ _____
,
(___)___-____
_____

Professional Engineer Stamp (if applicable)

APPENDIX G: INCENTIVE PROGRAMS

New Jersey Clean Energy Pay for Performance

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

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

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

Direct Install 2011 Program*

Direct Install is a division of the New Jersey Clean Energy Programs' Smart Start Buildings. It is a turn-key program for small to mid-sized facilities to aid in upgrading equipment to more efficient types. It is designed to cut overall energy costs by upgrading lighting, HVAC, and other equipment with energy efficient alternatives. The program pays **up to 70%** of the retrofit costs, including equipment cost and installation costs. Each project is limited to $75,000 in incentives.

Eligibility:

- Existing small and mid-sized commercial and industrial facilities with peak electrical demand **below 200 kW** within 12 months of applying (the 200 kW peak demand threshold has been waived for local government entities who receive and utilize their Energy Efficiency and Conservation Block Grant in conjunction with Direct Install)
- Must be located in New Jersey
- Must be served by one of the state's public, regulated or natural gas companies

Energy Provider Incentives

- **South Jersey Gas** – Program offers financing up to $25,000 on customer's 40% portion of the project and combines financing rate based on portion of the project devoted to gas and electric measures. All gas measures financed at 0%, all electric measures financed at normal rate. Does not offer financing on projects that only include electric measures.
- **Atlantic City Electric –** Provides a free audit, and additional incentives up to 20% of the current incentive up to a maximum of $5,000 per customer.

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

Smart Start

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

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

Energy Provider Incentives

- **South Jersey Gas –** Program to finance projects up to $25,000 not covered by incentive
- **New Jersey Natural Gas** – Will match SSB incentives on gas equipment
  PSE&G - Provides funding for site-specific uses of emerging technology. The incentives are determined on a case by case basis.

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

Renewable Energy Incentive Program*

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

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

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

Utility Sponsored Programs

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

Energy Efficiency and Conservation Block Grant Rebate Program

The Energy Efficiency and Conservation Block Grant (EECBG) Rebate Program provides supplemental funding up to $20,000 for eligible New Jersey local government entities to lower

the cost of installing energy conservation measures. Funding for the EECBG Rebate Program is provided through the American Recovery and Reinvestment Act (ARRA).

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

Other Federal and State Sponsored Programs

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

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

APPENDIX H: ENERGY CONSERVATION MEASURES

ECM Summary Table

ECM #	ECM Description	Est. Installed Cost ($)	Est. Incentives ($)	Net Est. ECM Cost with Incentives ($)	1st Yr Savings (kWh)	Demand Reduction/Mon (kW)	1st Yr Savings (Therms)	1st Yr Savings (kBtu/Sq FT)	Total 1st Yr Savings ($)	Life of Measure (Yr)	Est. Lifetime Cost Savings ($)	Simple Payback (Yr)	Lifetime Return on Investment (%)	Annual Return on Investment (%)	Internal Rate of Return (%)	Net Present Value ($)	CO_2 Reduced (lbs/Yr)
1	Replace Incandescent Lamps with LED Lamps	$192	$100	$92	627	0.6	0	0.3	$107	10	$1,072	0.9	1070%	107%	117%	$713	1,123
2	Upgrade to Occupancy Sensor Controls	$1,772	$220	$1,552	2,863	0.0	0	1.5	$489	20	$9,787	3.2	531%	27%	31%	$5,170	5,127
3	Install Weatherstripping and Door Sweeps on Exterior	$400	$0	$400	92	0.0	79	1.3	$112	3	$336	3.6	-16%	-5%	-31%	-$181	1,040
4	Replace Electric DHW Heater with Natural Gas	$1,303	$50	$1,253	1,068	0.0	-43	-0.1	$131	15	$1,958	9.6	56%	4%	5%	$195	1,439
5	Upgrade AC Units	$18,703	$2,024	$16,679	8,412	6.5	0	4.5	$1,438	12	$17,252	11.6	3%	0%	-1%	-$3,413	15,061
Total		**$22,370**	**$2,394**	**$19,976**	**13,062**	**7.0**	**36**	**7.5**	**$2,277**		**$30,406**	**8.8**	**52%**		**-89%**	**-$17,218**	**23,790**

Assumptions: Discount Rate: 3.2%; Energy Price Escalation Rate: 0%
Note: A 0.0 electrical demand reduction/month indicates that it is very low/negligible

APPENDIX I: METHOD OF ANALYSIS

Assumptions and Tools

Cost Estimates:	RS Means Online Version 5.0.3 Published and established specialized equipment material and labor costs Cost estimates also based on utility bill analysis and prior experience with similar projects

Disclaimer

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

THE RECOMMENDATIONS PRESENTED IN THIS REPORT ARE BASED ON THE RESULTS OF ANALYSIS, INSPECTION, AND PERFORMANCE TESTING OF A SAMPLE OF COMPONENTS OF THE 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.