LOCAL GOVERNMENT ENERGY AUDIT PROGRAM: ENERGY AUDIT REPORT

PREPARED FOR:

PASSAIC COUNTY
BOARD OF SOCIAL SERVICES BUILDING

80 HAMILTON ST.
PATERSON, NJ, 07505

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REPORT ISSUANCE: **FINAL, FEBRUARY 17, 2010**

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I. EXECUTIVE SUMMARY

This report presents the findings of the energy audit conducted for:

Passaic County
Boar of Public Services Building
80 Hamilton St.
Paterson, NJ, 07505

Municipal Contact Person: Timothy Cunningham, Esq.
Facility Contact Person: Jack Nigro

This audit is performed in connection with the New Jersey Clean Energy - Local Government Energy Audit Program. The energy audit is conducted to promote the mission of the office of Clean Energy, which is to use innovation and technology to solve energy and environmental problems in a way that improves the State's economy. This can be achieved through the wiser and more efficient use of energy.

The annual energy costs at this facility are as follows:

Electricity	$210,534
Natural Gas	$53,276
Total	$263,810

The potential annual energy cost savings for each energy conservation measure (ECM) and renewable energy measure (REM) are shown below in Table 1. Be aware that the ECM's and REM's are not additive because of the interrelation of some of the measures. This audit is consistent with an ASHRAE level 2 audit. The cost and savings for each measure is ± 20%. The evaluations are based on engineering estimations and industry standard calculation methods. More detailed analyses would require engineering simulation models, hard equipment specifications, and contractor bid pricing.

Table 1
Financial Summary Table

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST[A]**	**ANNUAL SAVINGS[B]**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
ECM #1	Replace Rooftop AC Units	$352,114	$14,732	23.9	-37.2%
ECM #2	Boiler Replacement	$119,360	$10,526	11.3	32.3%
ECM #3	VFD on Hot Water Pump	$4,210	$2,438	1.7	768.6%
ECM #4	Premium Motors for RTU Fans	$19,028	$2,924	6.5	130.5%
ECM #5	VFD on RTU Supply Fans	$31,050	$7,905	3.9	281.9%
ECM #6	Lighting Equipment Upgrade	$7,920	$1,294	6.1	145.1%
ECM #7	Lighting Controls	$4,320	$4,176	1.0	1350.0%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	Install Solar Photovoltaic Panels	$548,320	$41,685	13.2	14.0%

Notes: A. Cost takes into consideration applicable NJ Smart StartTM incentives.
B. Savings takes into consideration applicable maintenance savings.

The estimated demand and energy savings for each ECM and REM is shown below in Table 2. The descriptions in this table correspond to the ECM's and REM's listed in Table 1.

Table 2
Estimated Energy Savings Summary Table

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
ECM #1	Replace Rooftop AC Units	102.9	82303	0
ECM #2	Boiler Replacement	0.0	0	6156
ECM #3	VFD on Hot Water Pump	0.0	13620	0
ECM #4	Premium Motors for RTU Fans	6.1	16335	0
ECM #5	VFD on RTU Supply Fans	0.0	44164	0
ECM #6	Lighting Equipment Upgrade	2.2	7229	0
ECM #7	Lighting Controls	6.6	23327	0
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	Install Solar Photovoltaic Panels	68.5	78800.0	-

Concord Engineering Group (CEG) recommends proceeding with the implementation of all ECM's that provide a calculated simple payback at or under ten (10) years. The following Energy Conservation Measures are recommended for the facility:

- **ECM #3:** VFD on Hot Water Pumps
- **ECM #4:** Premium Motors for RTU Fans
- **ECM #5:** VFD on RTU Supply Fans
- **ECM #6:** Lighting Equipment Upgrade
- **ECM #7:** Lighting Controls

Although ECM #2 does not provide a payback less than 10 years, it is recommended to proceed with the installation of an efficient gas fired, fire tube hot water boiler for the building, since the existing boiler is an inefficient unit and it is near its expected lifespan.

In addition to the ECMs, there are maintenance and operational measures that can provide significant energy savings and provide immediate benefit. The ECMs listed above represent investments that can be made to the facility which are justified by the savings seen overtime. However, the maintenance items and small operational improvements below are typically achievable with on site staff or maintenance contractors and in turn have the potential to provide substantial operational savings compared to the costs associated. The following are recommendations which should be considered a priority in achieving an energy efficient building:

1. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
2. Maintain all weather stripping on entrance doors.
3. Clean all light fixtures to maximize light output.
4. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.
5. Check and confirm time-clocks in the building especially for exhaust fans and make sure all the pins are in place and working properly.

The rooftop air conditioning units on this building have surpassed their useful life span. It is reported that the units are expensive to maintain. Nevertheless, HVAC equipment replacements are difficult to justify with the energy savings alone. Due to the age of the existing air cooled units, the energy savings pays for the entire installation within 25 years. With the added incentive for increased reliability and due to the existing equipment's age and condition, this option is recommended to be considered despite the fact that the payback is not less than 10 years. If the replacement of these units is not considered in short term, CEG recommends retrofitting these roof top units' supply fans with premium efficiency motors and variable frequency drives.

Even though, it is beyond 10 years payback, CEG recommends proceeding with ECM #2 as well. The heating is provided to the building with two cast iron hot water boilers. The existing boilers are dated and can be replaced with more efficient fire tube condensing boilers with high efficiency burners and controls.

The Board of Social Services building has available space on the roof for a solar PV system with no adjacent obstacles and structures to cause panel shading. Although the payback for a typical solar array is longer than the recommended 10 years, a solar energy system has the potential to reduce energy dependence of the facility and reduce peak demand. Combined heat and power was also studied for this facility. However, the initial analysis quickly shows that the size of the necessary combined heat and power plant is below the industry's cost effective production capability since there is minimal heating requirement for this facility during most of the year.

II. INTRODUCTION

The comprehensive energy audit covers the 108,000 square foot facility, which houses the office of Board of Social Services.

Electrical and natural gas utility information is collected and analyzed for one full year's energy use of the building. The utility information allows for analysis of the building's operational characteristics; calculate energy benchmarks for comparison to industry averages, estimated savings potential, and baseline usage/cost to monitor the effectiveness of implemented measures. A computer spreadsheet is used to calculate benchmarks and to graph utility information (see the utility profiles below).

The Energy Use Index (EUI) is established for the building. Energy Use Index (EUI) is expressed in British Thermal Units/square foot/year (BTU/ft^2/yr), which is used to compare energy consumption to similar building types or to track consumption from year to year in the same building. The EUI is calculated by converting the annual consumption of all energy sources to BTU's and dividing by the area (gross square footage) of the building. Blueprints (where available) are utilized to verify the gross area of the facility. The EUI is a good indicator of the relative potential for energy savings. A low EUI indicates less potential for energy savings, while a high EUI indicates poor building performance therefore a high potential for energy savings.

Existing building architectural and engineering drawings (where available) are utilized for additional background information. The building envelope, lighting systems, HVAC equipment, and controls information gathered from building drawings allow for a more accurate and detailed review of the building. The information is compared to the energy usage profiles developed from utility data. Through the review of the architectural and engineering drawings a building profile can be defined that documents building age, type, usage, major energy consuming equipment or systems, etc.

The preliminary audit information is gathered in preparation for the site survey. The site survey provides critical information in deciphering where energy is spent and opportunities exist within a facility. The entire site is surveyed to inventory the following to gain an understanding of how each facility operates:

- Building envelope (roof, windows, etc.)
- Heating, ventilation, and air conditioning equipment (HVAC)
- Lighting systems and controls
- Facility-specific equipment

The building site visit is performed to survey all major building components and systems. The site visit includes detailed inspection of energy consuming components. Summary of building occupancy schedules, operating and maintenance practices, and energy management programs provided by the building manager are collected along with the system and components to determine a more accurate impact on energy consumption.

III. METHOD OF ANALYSIS

Post site visit work includes evaluation of the information gathered, researching possible conservation opportunities, organizing the audit into a comprehensive report, and making recommendations on HVAC, lighting and building envelope improvements. Data collected is processed using energy engineering calculations to anticipate energy usage for each of the proposed energy conservation measures (ECMs). The actual building's energy usage is entered directly from the utility bills provided by the owner. The anticipated energy usage is compared to the historical data to determine energy savings for the proposed ECMs.

It is pertinent to note, that the savings noted in this report are not additive. The savings for each recommendation is calculated as standalone energy conservation measures. Implementation of more than one ECM may in some cases affect the savings of each ECM. The savings may in some cases be relatively higher if an individual ECM is implemented in lieu of multiple recommended ECMs. For example implementing reduced operating schedules for inefficient lighting will result in a greater relative savings. Implementing reduced operating schedules for newly installed efficient lighting will result in a lower relative savings, because there is less energy to be saved. If multiple ECM's are recommended to be implemented, the combined savings is calculated and identified appropriately.

ECMs are determined by identifying the building's unique properties and deciphering the most beneficial energy saving measures available that meet the specific needs of the facility. The building construction type, function, operational schedule, existing conditions, and foreseen future plans are critical in the evaluation and final recommendations. Energy savings are calculated base on industry standard methods and engineering estimations. Energy consumption is calculated based on manufacturer's cataloged information when new equipment is proposed.

Cost savings are calculated based on the actual historical energy costs for the facility. Installation costs include labor and equipment costs to estimate the full up-front investment required to implement a change. Costs are derived from Means Cost Data, industry publications, and local contractors and equipment suppliers. The NJ Smart Start Building® program incentives savings (where applicable) are included for the appropriate ECM's and subtracted from the installed cost. Maintenance savings are calculated where applicable and added to the energy savings for each ECM. The life-time for each ECM is estimated based on the typical life of the equipment being replaced or altered. The costs and savings are applied and a simple payback, simple lifetime savings, and simple return on investment are calculated. See below for calculation methods:

ECM Calculation Equations:

$$Simple\ Payback = \left(\frac{Net\ Cost}{Yearly\ Savings} \right)$$

$$Simple\ Lifetime\ Savings = \left(Yearly\ Savings \times ECM\ Lifetime \right)$$

$$Simple\ Lifetime\ ROI = \frac{(Simple\ Lifetime\ Savings - Net\ Cost)}{Net\ Cost}$$

$$Lifetime\ Ma\,\mathrm{int}\,enance\ Savings = \left(Yearly\ Ma\,\mathrm{int}\,enance\ Savings \times ECM\ Lifetime \right)$$

$$Internal\ Rate\ of\ \mathrm{Re}\,turn = \sum_{n=0}^{N} \left(\frac{Cash\ Flow\ of\ Period}{(1 + IRR)^n} \right)$$

$$Net\ \mathrm{Pr}\,esent\ Value = \sum_{n=0}^{N} \left(\frac{Cash\ Flow\ of\ Period}{(1 + DR)^n} \right)$$

Net Present Value calculations based on Interest Rate of 3%.

IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage / Tariffs

The energy usage for the facility has been tabulated and plotted in graph form as depicted within this section. Each energy source has been identified and monthly consumption and cost noted per the information provided by the Owner.

The electric usage profile represents the actual electrical usage for the facility. Public Service Electric and Gas (PSE&G) provides electricity to the facility under their LPLS rate structure. The electric utility measures consumption in kilowatt-hours (KWH) and maximum demand in kilowatts (KW). One KWH usage is equivalent to 1000 watts running for one hour. One KW of electric demand is equivalent to 1000 watts running at any given time. The basic usage charges are shown as generation service and delivery charges along with several non-utility generation charges. Rates used in this report reflect the historical data received for the facility.

The gas usage profile shows the actual natural gas energy usage for the facility. Public Service Electric and Gas (PSE&G) provides natural gas to the facility under the LVG rate structure. The gas utility measures consumption in cubic feet x 100 (CCF), and converts the quantity into Therms of energy. One Therm is equivalent to 100,000 BTUs of energy.

The third party commodity provider Woodruff is responsible for providing the supply of gas to the building. Commodity (Supply) and delivery is billed separately for each respective utility service.

Description	Average
Electricity	17.9¢ / kWh
Natural Gas	$1.71 / Therm

Table 3
Electricity Billing Data

ELECTRIC USAGE SUMMARY

Utility Provider: PSEG
Rate: LPLS
Meter No: 778015793
Customer ID No: 3118547456
Third Party Utility None
TPS Meter / Acct No: -

MONTH OF USE	CONSUMPTION	DEMAND	TOTAL BILL
Jan-08	63,600	180.0	$8,877
Feb-08	66,600	180.0	$9,284
Mar-08	66,000	192.0	$9,137
Apr-08	64,800	456.0	$9,977
May-08	99,000	474.0	$18,537
Jun-08	181,800	522.0	$33,471
Jul-08	184,200	516.0	$34,838
Aug-08	146,400	540.0	$31,194
Sep-08	97,200	498.0	$18,464
Oct-08	69,600	474.0	$12,842
Nov-08	75,000	360.0	$12,697
Dec-08	63,849	240.0	$11,215
Totals	**1,178,049**	**540.0 Max**	**$210,534**

AVERAGE DEMAND 386.0 KW average
AVERAGE RATE $0.179 $/kWh

Figure 1
Electricity Usage Profile

80 Hamilton St.
Jan-Dec 2008

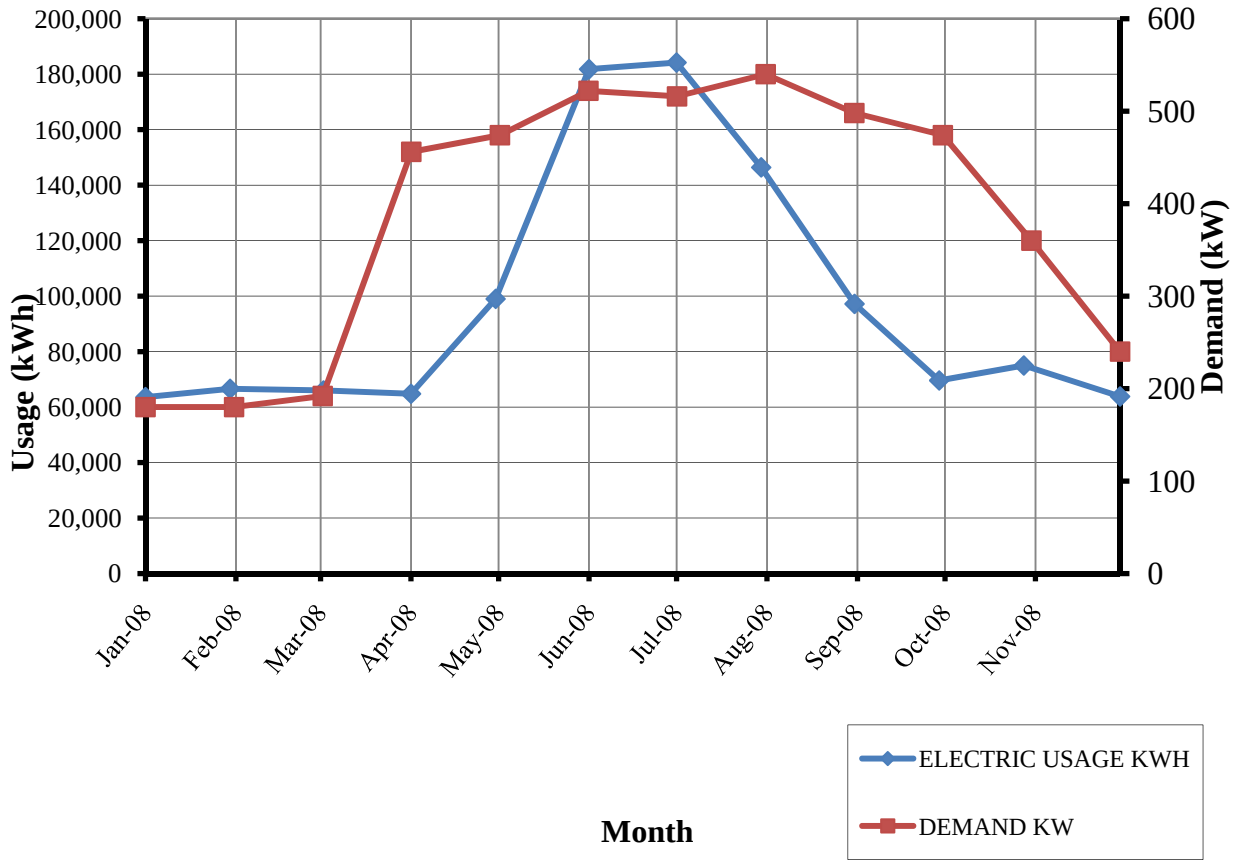


Table 4
Natural Gas Billing Data

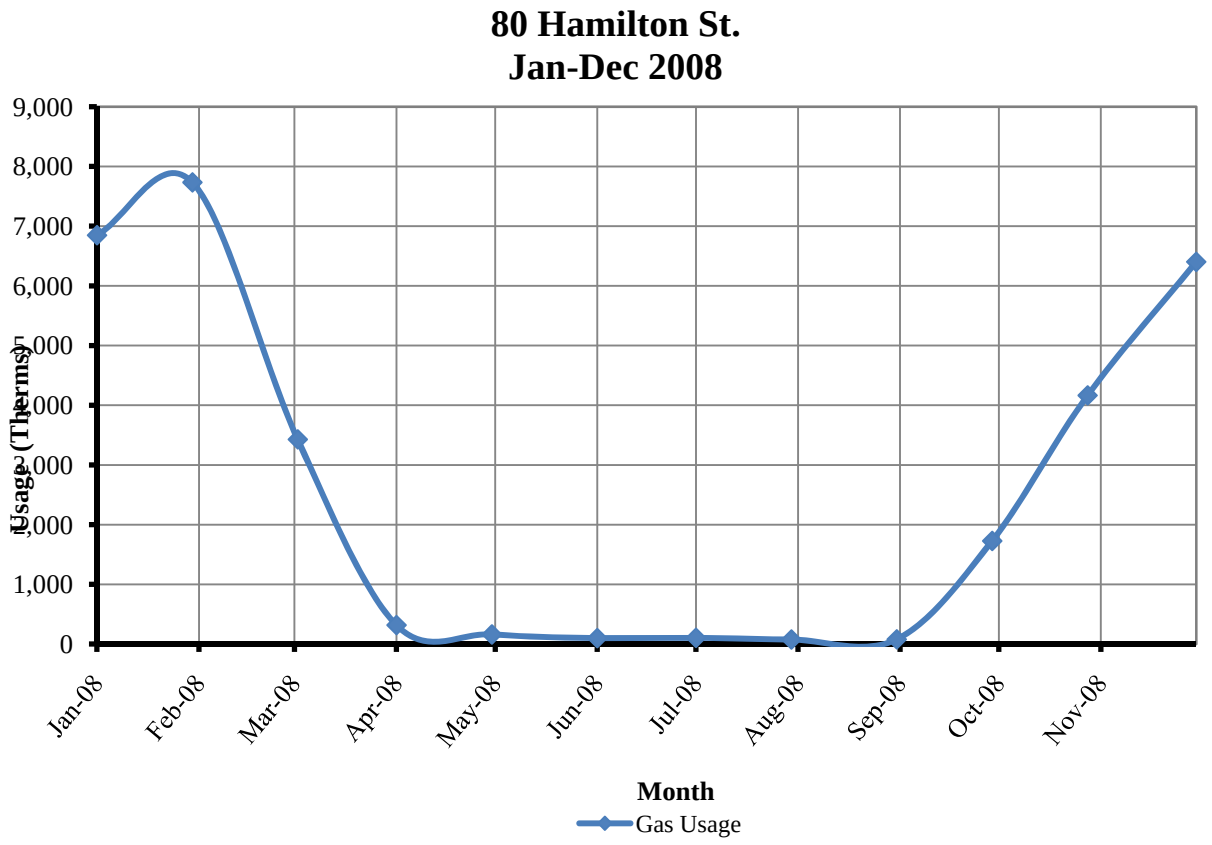
NATURAL GAS USAGE SUMMARY

Utility Provider: PSEG
Rate: LVG
Meter No: 2050028
Point of Delivery ID: 3118547456
Third Party Utility Provider: Woodroof Energy
TPS Meter No: 506-526

MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
Jan-08	6,847.70	$12,290.00
Feb-08	7,733.40	$12,011.35
Mar-08	3,428.00	$10,770.25
Apr-08	317.65	$4,231.93
May-08	160.80	$507.99
Jun-08	99.25	$279.58
Jul-08	104.77	$198.74
Aug-08	76.00	$231.34
Sep-08	79.10	$195.40
Oct-08	1,726.99	$1,348.78
Nov-08	4,165.03	$3,855.37
Dec-08	6,401.90	$7,355.71
TOTALS	**31,140.58**	**$53,276.44**

AVERAGE RATE: **$1.71** **$/THERM**

Figure 2
Natural Gas Usage Profile



B. Energy Use Index (EUI)

Energy Use Index (EUI) is a measure of a building's annual energy utilization per square foot of building. This calculation is completed by converting all utility usage consumed by a building for one year, to British Thermal Units (BTU) and dividing this number by the building square footage. EUI is a good measure of a building's energy use and is utilized regularly for comparison of energy performance for similar building types. The Oak Ridge National Laboratory (ORNL) Buildings Technology Center under a contract with the U.S. Department of Energy maintains a Benchmarking Building Energy Performance Program. The ORNL website determines how a building's energy use compares with similar facilities throughout the U.S. and in a specific region or state.

Source use differs from site usage when comparing a building's energy consumption with the national average. Site energy use is the energy consumed by the building at the building site only. Source energy use includes the site energy use as well as all of the losses to create and distribute the energy to the building. Source energy represents the total amount of raw fuel that is required to operate the building. It incorporates all transmission, delivery, and production losses, which allows for a complete assessment of energy efficiency in a building. The type of utility purchased has a substantial impact on the source energy use of a building. The EPA has determined that source energy is the most comparable unit for evaluation purposes and overall global impact. Both the site and source EUI ratings for the building are provided to understand and compare the differences in energy use.

The site and source EUI for this facility is calculated as follows:

$$Building\ \ Site\ EUI = \frac{(Electric\ Usage\ in\ kBtu + Gas\ Usage\ in\ kBtu)}{Building\ \ Square\ \ Footage}$$

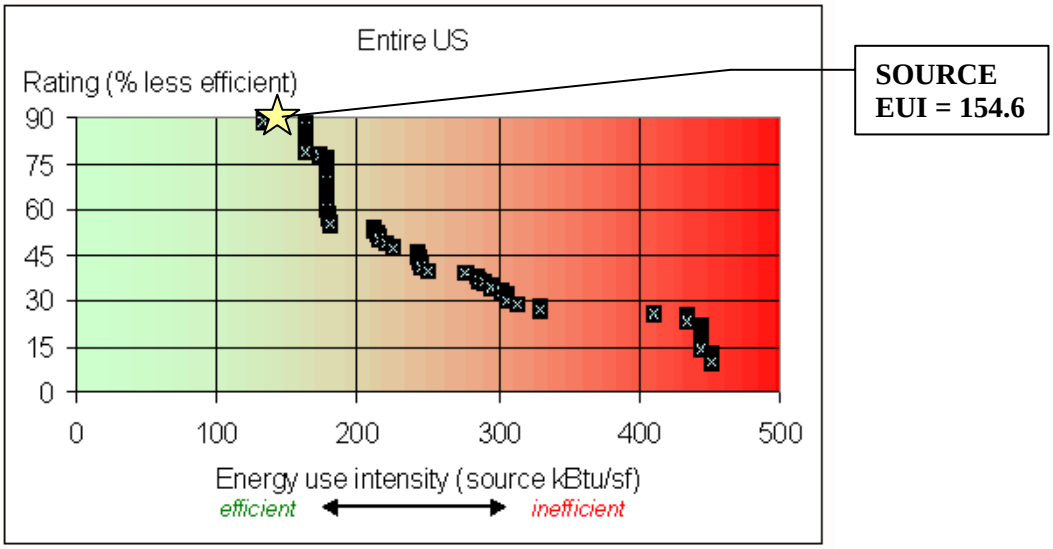
$$Building\ \ Source\ EUI = \frac{(Electric\ Usage\ in\ kBtu\ \ X\ \ SS\ \ Ratio + Gas\ Usage\ in\ kBtu\ \ X\ \ SS\ \ Ratio)}{Building\ \ Square\ \ Footage}$$

Table 5
Facility Energy Use Index (EUI) Calculation

ENERGY USE INTENSITY CALCULATION						
ENERGY TYPE	**BUILDING USE**			**SITE ENERGY**	**SITE-SOURCE RATIO**	**SOURCE ENERGY**
	kWh	**Therms**	**Gallons**	**kBtu**		**kBtu**
ELECTRIC	1178049.1			4,021,859	3.340	13,433,011
NATURAL GAS		31140.6		3,114,058	1.047	3,260,419
FUEL OIL			0.0	0	1.010	0
PROPANE			0.0	0	1.010	0
TOTAL				7,135,918		16,693,430
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
BUILDING AREA		108,000	SQUARE FEET			
BUILDING SITE EUI		*66.07*	kBtu/SF/YR			
BUILDING SOURCE EUI		*154.57*	kBtu/SF/YR			

Figure 3 below depicts a national EUI grading for the source use of *Public Order and Safety Buildings*.

Figure 3
Source Energy Use Intensity Distributions: Public Order Buildings



C. EPA Energy Benchmarking System

The United States Environmental Protection Agency (EPA) in an effort to promote energy management has created a system for benchmarking energy use amongst various end users. The benchmarking tool utilized for this analysis is entitled Portfolio Manager. The Portfolio Manager tool allows tracking and assessment of energy consumption via the template forms located on the ENERGY STAR website (www.energystar.gov). The importance of benchmarking for local government municipalities is becoming more important as utility costs continue to increase and emphasis is being placed on carbon reduction, greenhouse gas emissions and other environmental impacts.

Based on information gathered from the ENERGY STAR website, Government agencies spend more than $10 billion a year on energy to provide public services and meet constituent needs. Furthermore, energy use in commercial buildings and industrial facilities is responsible for more than 50 percent of U.S. carbon dioxide emissions. It is vital that local government municipalities assess facility energy usage, benchmark energy usage utilizing Portfolio Manager, set priorities and goals to lessen energy usage and move forward with priorities and goals.

In accordance with the Local Government Energy Audit Program, CEG has created an ENERGY STAR account for the municipality to access and monitoring the facility's yearly energy usage as it compares to facilities of similar type. The login page for the account can be accessed at the following web address; the username and password are also listed below:

https://www.energystar.gov/istar/pmpam/index.cfm?fuseaction=login.login

User Name: passaiccounty
Password: lgeaceg2009

Security Question: What city were you born in?
Security Answer: paterson

The utility bills and other information gathered during the energy audit process are entered into the Portfolio Manager. The following is a summary of the results for the facility:

Table 6
ENERGY STAR Performance Rating

ENERGY STAR PERFORMANCE RATING		
FACILITY DESCRIPTION	**ENERGY PERFORMANCE RATING**	**NATIONAL AVERAGE**
Office Building	84	50

Refer to **Statement of Energy Performance Appendix** for the detailed energy summary.

V. FACILITY DESCRIPTION

The 108,000 SF State Board of Social Services Building is a three (3) story facility with a basement, comprised of office spaces, meeting rooms, storage and mechanical spaces. The building is located between Lee and De Grasse Streets.

The hours of operation for this facility follow typical office schedules. The operation hours are between 7:00 am and 5:30 pm during weekdays. The facility does not operate on weekends. HVAC systems run between the hours of 7:00 am and 6:00 pm on weekdays and stays at unoccupied setting on weekends.

The exterior of the building consists of precast insulated concrete panel walls with brick veneer in certain places along with double pane, tinted windows with operable aluminum frames. The windows in this facility were replaced two (2) years ago. They are in good condition and appear to be well maintained. Blinds are utilized through the facility for occupant comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat gain in the summer. The building has two main entrances with double door configuration for energy efficiency.

This building roof is constructed of a built-up roof with rubber membrane covering, where the rooftop HVAC equipment is located. The amount of insulation below the roofing could not be verified. The boilers, hot water pumps and domestic hot water heater are located in the basement mechanical room. There are a number of smaller split air handling units and window AC units in this building as well. The building was built in 1934 and used as a High School until it was converted into an office space in 1980.

The facility houses the state offices of the Board of Social Services. The first two (2) floors of the building are occupied by the service offices while the third floor houses the director's offices as well as others.

HVAC Systems

The State Board of Social Services Building cooling is achieved mainly via six (6) Variable Air Volume (VAV) rooftop air conditioning units (RTUs) made by Trane. The RTUs are between the sizes of 30 and 75 Tons with a total installed cooling capacity of 305 Tons. The units are air cooled, 2-compressor units using R22 refrigerant. The units are not equipped with any heating coils.

The heating for the building is achieved via two (2) HB Smith cast iron sectional boilers in the basement. The boilers burn natural gas and they are approximately 30 years old. The original nameplates of each boiler indicates that each boiler's rated input capacity is 2,870 MBh and output capacity is 2,332 MBh, yielding approximately 81% thermal efficiency at ideal conditions. The boilers are coupled with Industrial Combustion burners. The burners do not have any turn down capacity. The boilers were recently retrofitted with ATC boiler control panels with hot water supply temperature re-set functionality based on outside air temperature.

The boilers are sized to provide heating hot water for the recessed hot water heating radiators on the perimeter of the building and unit heaters in the utility areas. Two (2) 10 HP hot water circulators feed the perimeter baseboard heaters. The boilers are old and maintained well.

The building is primarily conditioned by six (6) central variable air volume (VAV), cooling only rooftop air conditioning units (RTUs) made by Trane. Each RTU serves a corresponding temperature zone with fan powered VAV boxes through the spaces.

The 40 Ton RTU-1 feeds the North side of the building. The unit is equipped with a 20 HP supply fan and a 5 HP return fan. Supply fan is equipped with inlet guide vanes for static pressure control. The 60 Ton RTU-2 feeds the South side of the building and it is equipped with a 25 HP supply fan and a 7.5 HP return fan. RTU-3 is a 50 Ton unit with 25 HP supply and 7.5 HP return fans feeding East side offices of the building. RTU-4 feeds the director's office on the third floor. It is a 30 Ton unit with 10 HP supply and 3 HP return fans. AHU-5 and AHU-6 are 75 and 50 Ton units feeding the west and the lower floors on the north of the building. They are equipped with 30 and 20 HP supply fans and 7.5 HP return fans. Supply fans on all of the units are equipped with inlet guide vanes for static pressure control. Both of the supply and return fans on each unit are driven by standard efficiency motors for today's standards.

The system includes terminal variable air volume (VAV) boxes for office zoning. Local thermostats control each VAV box's airflow to regulate space temperature. Outside office VAV boxes are equipped with re-heat coils but they are not functional.

Perimeter heating of the building is achieved via fin-tube, recessed hot water radiators. The radiators are equipped with manually operated dampers for individual capacity controls. Damper simply closes the vents on the bottom of the radiator and blocks the natural air circulation. Entrance doorways, corridors and the stairwells are also heated with the same recessed radiators. There are two unit heaters in the basement mechanical room for supplemental heating of the space.

Exhaust System

Air is exhausted from the toilet rooms through the roof exhausters. The toilet room exhaust fan is operated based on the facility occupancy schedule.

HVAC System Controls

The Board of Social Services building does not have a central automation system. The packaged rooftop air conditioning units are scheduled through a set of digital controllers located in the basement. The controllers are made by Trane. The unit operation is often overridden in order to satisfy air conditioning demand of the office personnel.

The boilers in this facility are started and stopped manually by the boiler operators. The boilers are equipped with digital burner controllers. The controllers will reset hot water supply temperature based on outside air conditions. The controller will lock out the boilers when the outside air temperature reaches 55°F.

The VAV boxes in the spaces are controlled via local analog thermostat. The dampers on the VAV boxes are opened or closed based by the end switches on the local thermostats.

The hot water pumps for the perimeter baseboard heaters are run year round in order to eliminate air entering to the system.

Domestic Hot Water

Domestic hot water for the restrooms and office lounge is provided by a gas fired hot water heater located in the boiler room.

Lighting

Typical lighting throughout building is fluorescent tube lay-in fixtures with T-8 lamps and electronic ballasts. Few of the office spaces are lit with older 34W T-12 fixtures. Recommendations are summarized in the **Investment Grade Lighting Audit Appendix** of this report.

VI. MAJOR EQUIPMENT LIST

The equipment list contains major energy consuming equipment that through implementation of energy conservation measures could yield substantial energy savings. The list shows the major equipment in the facility and all pertinent information utilized in energy savings calculations. An approximate age was assigned to the equipment in some cases if a manufactures date was not shown on the equipment's nameplate. The ASHRAE service life for the equipment along with the remaining useful life is also shown in the Appendix.

Refer to the **Major Equipment List Appendix** for this facility.

VII. ENERGY CONSERVATION MEASURES

ECM #1: Rooftop Units Replacement

Description:

The Board of Social Services building is currently conditioned by six (6) packaged, cooling-only rooftop air conditioning units (RTUs). The unit's cooling efficiencies are as shown below. The existing units have suppressed their useful life. The units are in poor condition and in need of replacement. The efficiencies of the existing units are below today's standards for cooling efficiency. The proposed units are high efficiency one-for-one replacements of the existing units. The owner should have a professional engineer verify heating and cooling loads prior to moving forward with this ECM.

This ECM includes installation of six (6) high efficient cooling only rooftop units. The ECM calculations are based on Trane IntelliPak™ Packaged Rooftop Units or equivalent. Means Costworks software is used to estimate demolition and labor costs for a generic rooftop AC unit replacement.

Full Load Cooling Hrs. = 800 hrs/yr.
Average Cost of Electricity = $0.179/kWh

Tag	Cooling Capacity, Tons	Current Efficiency, EER	New Efficiency, EER
RTU-1	40	8	10.5
RTU-2	60	8	10.5
RTU-3	50	8	10.4
RTU-4	30	8	10.3
RTU-5	75	8	10
RTU-6	50	8	10.4

Energy Savings Calculations:
Cooling Savings for 40 Ton Unit Replacement:

$$EnergySavings = \frac{Cooling(Tons) \times 12{,}000 \left(\frac{Btu}{Ton\ hr}\right)}{1000 \left(\frac{Wh}{kWh}\right)} \times \left(\frac{1}{EER_{OLD}} - \frac{1}{EER_{NEW}}\right) \times Full\ Load\ Hrs.$$

$$EnergySavings = \frac{40\,(Tons)\times 12{,}000\left(\frac{Btu}{Ton\ hr}\right)}{1000\left(\frac{Wh}{kWh}\right)} \times \left(\frac{1}{8\left(\frac{Btu}{W}\right)} - \frac{1}{10.5\left(\frac{Btu}{W}\right)}\right) \times 800\ hours$$

$$= 11{,}429\ kWh$$

$$Demand\ Savings = \frac{Energy\ Savings\ (kWh)}{Hrs\ of\ Cooling}$$

$$Demand\ Savings = \frac{11{,}428\,(kWh)}{800\ Hrs.} = 14.3\ KW$$

$$Cooling\ Cost\ Savings = 11{,}429 kWh \times 0.179\left(\frac{\$}{kWh}\right) = \$2{,}046$$

The calculations are carried out for the rest of the units and the results are tabulated in the below table.

Tag	Cooling Capacity, Tons	Energy Savings, kWh	Demand Savings, kW	Cooling Cost Savings	Total Cost
RTU-1	40	11429	14.3	$2,046	$53,450
RTU-2	60	17143	21.4	$3,069	$70,450
RTU-3	50	13846	17.3	$2,478	$59,950
RTU-4	30	8039	10	$1,439	$39,150
RTU-5	75	18000	22.5	$3,222	$83,764
RTU-6	50	13846	17.3	$2,478	$59,950
Total		**82303**	**102.9**	**$14,732**	**$366,714**

From the **NJ Smart Start® Program Appendix**, the packaged unit replacement falls under the category "Electric Unitary HVAC" and warrants an incentive based on efficiency (EER) at or above 9.5. The program incentives are calculated as follows:

$$\text{SmartStart®}\ Incentive = (Cooling Tons \times\ \$/Ton\ Incentive)$$

Central DX AC Systems

30 to 63 tons, minimum 9.5 EER, $40/ton
63+ tons, minimum 9.5 EER, $72/ton

Summary of Incentives:

Tag	Cooling Capacity (Tons)	Incentives
RTU-1	40	$1,600
RTU-2	60	$2,400
RTU-3	50	$2,000
RTU-4	30	$1,200
RTU-5	75	$5,400
RTU-6	50	$2,000

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$366,714
NJ Smart Start Equipment Incentive ($):	$14,600
Net Installation Cost ($):	$352,114
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$14,732
Total Yearly Savings ($/Yr):	$14,732
Estimated ECM Lifetime (Yr):	15
Simple Payback	23.9
Simple Lifetime ROI	-37.2%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$220,980
Internal Rate of Return (IRR)	-5%
Net Present Value (NPV)	($176,244.34)

ECM #2: Boiler Plant Upgrade

Description:

Heating is provided to the facility by two older, standard sectional hot water boilers. With a net rated output capacity of 2,332 MBh, HB Smith boilers have an estimated combustion efficiency of 81% for heating, when new. The boilers are approximately 27 years old. Although the units have not surpassed their expected useful service lives of thirty-five (35) years, substantial energy savings will be realized through the replacement. Based on discussion with the personnel, one boiler has enough capacity to supply hot water to the building during most of the year.

CEG recommends replacing one of the two boilers with two (2), 2,000 MBh high efficiency condensing hot water boilers. Condensing boilers can substantially improve the operating efficiency of the heating system of the building. A condensing boiler's peak efficiency tops out at 99% depending on return water temperature. The natural gas to water efficiency for a 2,000 MBh boiler with digital burner controls is approximately 95% over its operating range and with the advanced controls and high turn down ratio.

This energy conservation measure will replace one (1) of the two (2) the gas fired boiler serving the facility with (2) condensing boilers. Calculation is based on the following equipment: Aerco BMK-2.0LN, condensing boiler or equivalent. The remaining boiler can be utilized as a backup for the new boiler set.

Energy Savings Calculations:

Gas consumption of the boiler plant is gathered in order to calculate the estimated heat output of the existing boilers.

It is confirmed that the boilers are shut off during the months of June, July, August, September and October. Average of the gas consumption in these is calculated in order to determine energy used to make domestic hot water only. This amount is subtracted from the monthly gas consumption in the heating season to find the net amount of gas used by the HB Smith Hot water boilers.

MONTH OF USE	Gas Consumption, Therms
Jun-08	162
Jul-08	77
Aug-08	105
Sep-08	76
Oct-08	80
Average	**100**

MONTH OF USE	Total Consumption Therms	Hot Water Usage	Gas used by the boilers, Therms
Jan-08	7,746	**100**	7,646
Feb-08	6,882	**100**	6,782
Mar-08	7,772	**100**	7,672
Apr-08	3,445	**100**	3,345
May-08	319	**100**	219
Jun-08	162	162	0
Jul-08	77	77	0
Aug-08	105	105	0
Sep-08	76	76	0
Oct-08	80	80	0
Nov-08	1,736	**100**	1,636
Dec-08	4,186	**100**	4,086
TOTALS	**32,586**	**1200**	**31,386**

The results are used in a reverse calculation in the below equations to obtain proposed annual gas consumption based on improved efficiency. Calculations are summarized in a table below.

Annual Output, MMBTU

$$= \frac{\text{Consumption (Therms)} \times 100{,}000 \frac{\text{BTU}}{\text{Therm}} \times \text{ Current Boiler Effc}}{1{,}000{,}000}$$

$$\text{Proposed Gas Consumption, Therms} = \frac{\textbf{Annual Output (MMBTU)} \times 1{,}000{,}000}{100{,}000 \frac{\text{BTU}}{\text{Therm}} \times \text{ New Boiler Efficiency}}$$

The total installed cost of two (2) new 2,000 MBh boilers and the new boiler control panels including interfacing with the existing panels is $119,360. Pricing includes the cost of engineering, permitting, commissioning, measurement & verification of the energy savings and a small contingency.

Month of Use	Gas used by the boilers, Therms	Annual Output at 80% Efficiency, MMBtu	Gas Consumption if Efcy =95%, Therms	Gas Savings Therms	Cost Savings @ $1.71/Therm
Jan-08	7,646	61,171	6,439	1,307	$2,236
Feb-08	6,782	54,255	5,711	1,171	$2,002
Mar-08	7,672	61,376	6,461	1,311	$2,242
Apr-08	3,345	26,760	2,817	628	$1,074
May-08	219	1,754	185	135	$230
Jun-08	0	0	0	162	$276
Jul-08	0	0	0	77	$132
Aug-08	0	0	0	105	$180
Sep-08	0	0	0	76	$131
Oct-08	0	0	0	80	$136
Nov-08	1,636	13,085	1,377	358	$613
Dec-08	4,086	32,687	3,441	745	$1,274
TOTALS	**31,386**	**251,088**	**26,430**	**6,156**	**$10,526**

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$119,360
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$119,360
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$10,526
Total Yearly Savings ($/Yr):	$10,526
Estimated ECM Lifetime (Yr):	15
Simple Payback	11.3
Simple Lifetime ROI	32.3%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$157,890
Internal Rate of Return (IRR)	4%
Net Present Value (NPV)	$6,298.70

ECM #3: Install VFD on Hot Water Pump

Description:

The hot water is circulated through the building via two (2) ten (10) horsepower primary hot water pumps with one being a standby. One or both of the pumps operated as the heating load of the building increases. One of the pumps stay on 24 hours a day, year round in order to prevent air entering into the hydronic system and cause air bound spots. Because of the age and condition of the pipes, the hot water piping system needs to be thoroughly evaluated to detect leaks and replace piping if necessary. In the mean time, a variable frequency drive (VFD) can be installed on one of the pumps in order to reduce the flow and save pumping energy out of the heating season.

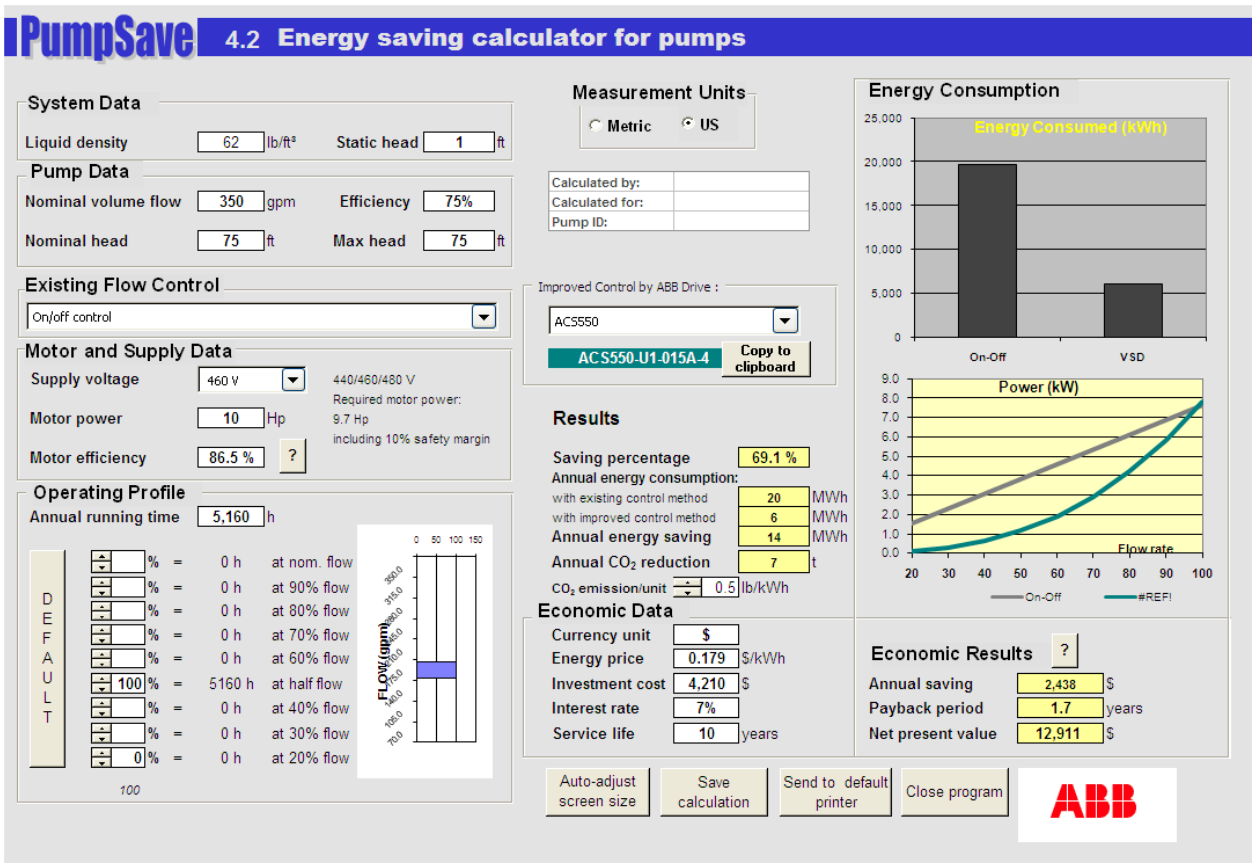
Energy Savings Calculations:

Energy and cost savings calculations are based on calculation software "PumpSave v4.2," provided by ABB.

Heating Season Run Hrs.	= 3600 hrs/yr. (5 months)
Non-heating Season Run Hrs.	= 5160 hrs/yr.
Average Cost of Electricity	= $0.179/kWh
Motor HP	= 10 HP
Total GPM (Estimated)	= 350 GPM
Nominal Piping System Head (Estimated)	= 75 Ft Head
Motor Efficiency	= 86.5%
Pump Efficiency	= 75%

It is assumed that during the heating season the pumps will run 24 hours a day at full speed by switching the VFD to bypass mode. At the end of the heating season, VFD will be enabled and set to 50% speed. This means the Pump will operate at 50% speed instead of full speed for 5160 hours.

Installation cost for the system conversion is estimated to be $4,210
There are currently no incentives from the NJ Smart Start® Program for hot water pumps.



ECM #3- ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$4,210
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$4,210
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$2,438
Total Yearly Savings ($/Yr):	$2,438
Estimated ECM Lifetime (Yr):	15
Simple Payback	1.7
Simple Lifetime ROI	768.6%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$36,570
Internal Rate of Return (IRR)	58%
Net Present Value (NPV)	$24,894.69

ECM #4: Install NEMA Premium® Efficient Motors

Description:

Supply fans on the rooftop air conditioning units (RTUs) are driven with standard efficiency motors. Replacing these motor with premium efficiency motors will generate energy savings. The improved efficiency of the NEMA Premium® efficient motors is primarily due to better designs with use of better materials to reduce losses. Surprisingly, the electricity used to power a motor represents 95 % of its total lifetime operating cost. Because many motors operate year round, even small increases in efficiency can yield substantial energy and dollar savings.

This energy conservation measure would replace the motors equal to or greater than 5 HP with NEMA Premium® Efficient Motors. NEMA Premium® is the most efficient motor designation in the marketplace today. The energy & cost savings were calculated for the fan/pump motors in this facility that are greater than or equal to 5 HP and have standard efficiency ratings.

Energy Savings Calculations:

For Example: 20 HP Supply Air Fan Motor in RTU-1 with the following:

Existing Motor Efficiency = 87.5%
Annual Hours of Operations = 3000
1 HP = 0.746 Watt
Load Factor = 80%
Cost of electricity = $0.179/kWh

New NEMA Premium® Motor Efficiency = 93%

Existing 20 HP Motor Operating Cost

$$= \frac{Motor\ HP \times 0.746 \frac{kW}{HP} \times LoadFactor\ \times Hours\ of\ Operation \times Cost\ of\ Electric}{Motor\ Efficiency\ \times Power\ Factor}$$

$$= \frac{20 \times 0.746 \times 80\%\ \times 3000 \times \$0.179}{87.5\%\ \times 90\%} = \$8{,}139\ /Year$$

New NEMA Premium® Efficiency Motor Operating Cost =

$$= \frac{20\ \times 0.746 \times 80\%\ \times 3000 \times \$0.179}{93\%\ \times 90\%} = \$7{,}658\ /Year$$

Savings = $8,139 - $7,658 = $481/Year

Installed Cost of a 20 HP NEMA Premium® Efficiency Motor = $3,081 minus the SmartStart Building® incentive of $125 is $2,956.

Below is a summary of Motor Replacements for the Roof Top Air Conditioning Units

Unit #	Motor HP	Standard Motor Efcy %	Annual Consumption kWh	Premium Motor Efcy %	Annual Consumption kWh	Annual Savings kWh	Demand Saving, kW
RTU-1	20	87.50%	45,470	93.00%	42,781	2,689	1
RTU-2	25	88.50%	56,196	93.60%	53,134	3,062	1.1
RTU-3	25	88.50%	56,196	93.60%	53,134	3,062	1.1
RTU-4	10	85.50%	23,267	91.70%	21,694	1,573	0.6
RTU-5	30	89.50%	66,682	94.10%	63,422	3,260	1.2
RTU-6	20	87.50%	45,470	93.00%	42,781	2,689	1
Total			**293,281**		**276,946**	**16,335**	**6.1**

Unit #	Energy Cost Savings	Equipment Cost	Total Cost	NJ SmartStart Incentives	Net Cost	Payback Term
RTU-1	$481	$1,350	$3,081	$125	$2,956	6.1
RTU-2	$548	$1,650	$3,766	$130	$3,636	6.6
RTU-3	$548	$1,650	$3,766	$130	$3,636	6.6
RTU-4	$282	$800	$1,937	$100	$1,837	6.5
RTU-5	$583	$1,800	$4,156	$150	$4,006	6.9
RTU-6	$481	$1,350	$3,081	$125	$2,956	6.1
Total	**$2,924**	**$8,600**	**$19,788**	**$760**	**$19,028**	**6.5**

Total cost includes labor, 15% engineering and design + 25% for retrofit work+ 15% controls OH&P+ 5% Commissioning+5% M&V
Savings calculations based on current operation schedule at constant speed.

Energy Savings Summary:

The following table outlines the summary of energy savings for this facility:

ECM #4- ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$19,788
NJ Smart Start Equipment Incentive ($):	$760
Net Installation Cost ($):	$19,028
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$2,924
Total Yearly Savings ($/Yr):	$2,924
Estimated ECM Lifetime (Yr):	15
Simple Payback	6.5
Simple Lifetime ROI	130.5%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$43,860
Internal Rate of Return (IRR)	13%
Net Present Value (NPV)	$15,878.52

ECM #5: Install VFDs on RTU Supply Fans

Description:

The rooftop air conditioning units on the Board of Social Services building are variable volume system feeding the office areas. The air distribution system consists of variable air volume (VAV) boxes with local analog controls. The amounts of conditioned air supplied by the air handling units vary in order to maintain a set supply air static pressure. Air flow is modulated via inlet guide vanes.

This ECM includes the installation of new variable frequency drives (VFDs) for the variable volume roof top units. The VFDs will be programmed to modulate fan speed based on static pressure. Energy and cost savings calculations are based on basic engineering principles along with a VFD savings calculation software "FanSave Version 4.0.B," provided by ABB.

It was reported that the air conditioning hours for the building is between 6 AM and 6 PM on weekdays only.

Energy Savings Calculations:

Hours of Operation

Total occupied hours (Weekdays only)

$$= (18{:}00 - 6{:}00) \times 5\frac{days}{week} \times 50\frac{weeks}{Year} = 3000\ Hours$$

RTU-1 Supply Fan Horse power = 20 HP

FanSave Calculations

FanSave software calculates fan energy consumption savings based on the principles below.

$$Fan\ Electric\ HP = \frac{Q_{CFM} \times Total\ Pressure_{in\ WG}}{6356 \times \eta_{Fan} \times \eta_{motor} \times \eta_{transmission}}$$

$$Fan\ Energy\ Consumption\ (kWh) = Motor\ HP \times 0.746\frac{kW}{HP} \times Hours\ of\ operation\ (Hr)$$

$$Total\ Fan\ Energy\ Consumption\ (kWh) = \sum Energy\ Consumption\ of\ Each\ Motor$$

$$Fan\ Energy\ Cost\ (\$) = Total\ Comsumption(kWh) \times Average\ Cost\ of\ Electric\ \left(\frac{\$}{kWh}\right)$$

FanSave uses Affinity Laws in order to calculate energy savings by reducing fan speed. Affinity laws, also known as Fan Laws are as following:

Q = Flow, n = Fan Speed, p = total pressure

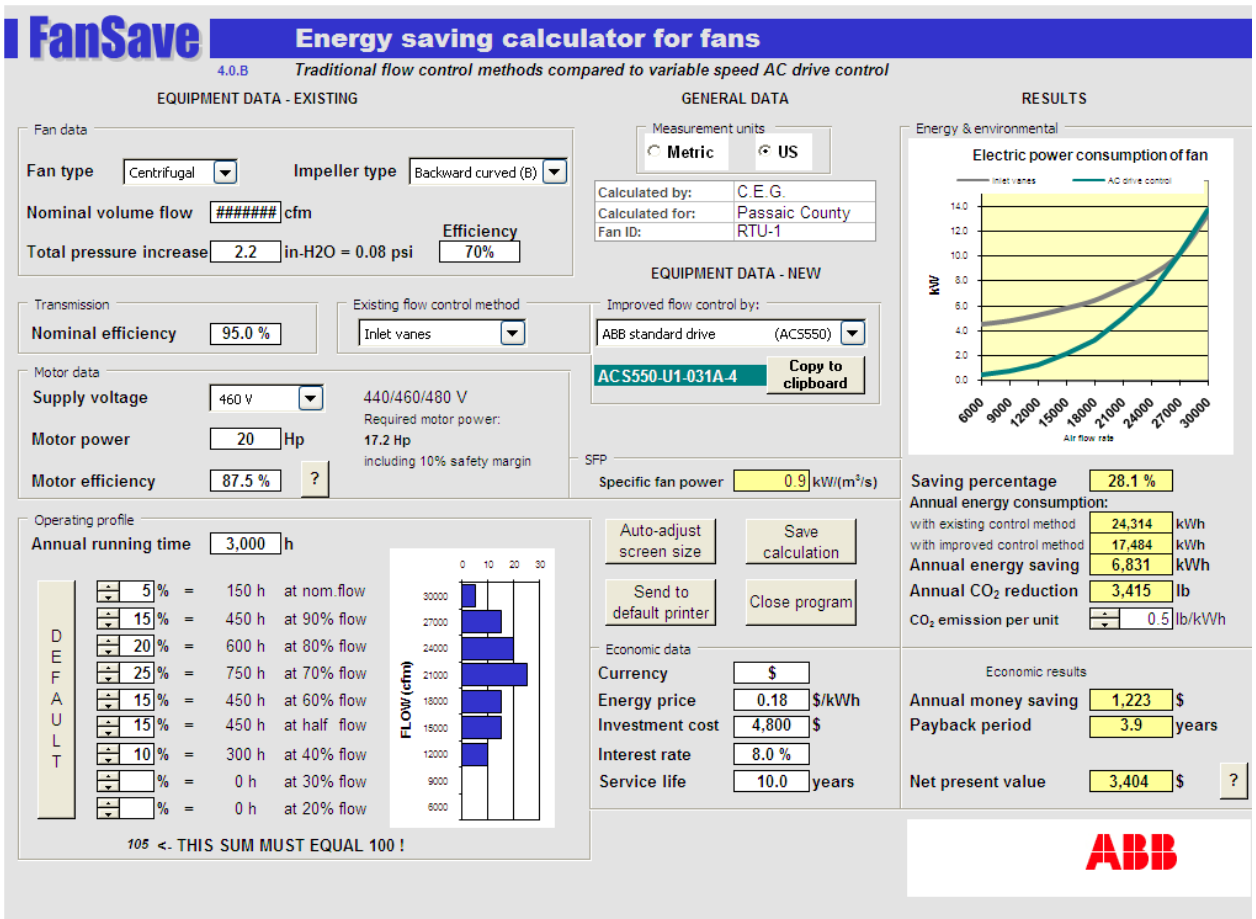
$$\frac{Q_2}{Q_1} = \frac{n_2}{n_1} \qquad \frac{p_2}{p_1} = \left(\frac{n_2}{n_1}\right)^2 \qquad \frac{HP_2}{HP_1} = \left(\frac{n_2}{n_1}\right)^3$$

Fan Save Input:

$\eta_{Fan} = 70\%$ $\eta_{motor} = 87.5\%$ $\eta_{transmission} = 95\%$ Flow = 30,000 CFM

Cost of electricity = $0.179/kWh

Existing Flow Control Method is selected as Inlet Vanes.
Other input values can be seen in the below screenshot from the software.



Results

FanSave 4.0.B calculates approximately 33.2% fan power for the particular flow bin. The calculations are carried out for all six RTU supply fans and results are tabulated as follows:

Fan	HP	Flow	Energy Savings, %	Energy Savings, kWh	Energy Savings ($)
RTU-1	20	30000	28.10%	6,831	$1,223
RTU-2	25	38000	28.10%	8,554	$1,531
RTU-3	25	38000	28.10%	8,554	$1,531
RTU-4	10	15000	28.10%	3,377	$604
RTU-5	30	45000	28.10%	10,017	$1,793
RTU-6	20	30000	28.10%	6,831	$1,223
Total				**44,164**	**$7,905**

The cost of this ECM includes cost of a variable frequency drive and work required for the installation, wiring and programming. The work required for this ECM is summarized below:

VFD	Material	Labor	Sensor, Wiring, Progr.	Installation Cost	NJ SmartStart	Net	Payback Term
RTU-1	$2,300	$2,700	1000	$6,000	$1,200	$4,800	3.9
RTU-2	$2,850	$3,450	1000	$7,300	$1,500	$5,800	3.8
RTU-3	$2,850	$3,450	1000	$7,300	$1,500	$5,800	3.8
RTU-4	$1,625	$1,838	1000	$4,463	$1,200	$3,263	5.4
RTU-5	$3,525	$3,863	1000	$8,388	$1,800	$6,588	3.7
RTU-6	$2,300	$2,700	1000	$6,000	$1,200	$4,800	3.9
Total	**$15,450**	**$18,000**	**$6,000**	**$39,450**	**$8,400**	**$31,050**	**3.9**

NJ Smartstart Incentives

$60/HP (for 20+ HP)
$120/HP (for 10 - <20 HP)
$155/HP (for 5 - <10 HP)

Energy Savings Summary:

ECM #5- ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$39,450
NJ Smart Start Equipment Incentive ($):	$8,400
Net Installation Cost ($):	$31,050
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$9,006
Total Yearly Savings ($/Yr):	$9,006
Estimated ECM Lifetime (Yr):	15
Simple Payback	3.4
Simple Lifetime ROI	335.1%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$135,090
Internal Rate of Return (IRR)	28%
Net Present Value (NPV)	$76,463.04

ECM #6: Lighting Upgrade

Description:

The majority of the lighting in the Board of Social Services building at 80 Hamilton Street is comprised of modern T8 lamps with electronic ballasts and efficient compact fluorescent lamps. Having already upgraded most of the older T12 lamps with magnetic ballasts which are wasteful by comparison, the buildings lighting is fairly efficient. There are however a handful of areas that still have T12 lamps and these are addressed in this report.

This ECM includes replacement of the existing fixtures containing T12 lamps and magnetic ballasts with fixtures containing T8 lamps and electronic ballasts. The new energy efficient, T8 fixtures will provide adequate lighting and will save the owner on electrical costs due to the better performance of the lamp and ballasts.

Energy Savings Calculations:

The **Investment Grade Lighting Audit Appendix** outlines the proposed retrofits, costs, savings, and payback periods.

NJ Smart Start® Program Incentives are calculated as follows:

From the **Smart Start Incentive Appendix**, the replacement of a T-12 U-bulb fixture to a T-5 or T-8 fixture warrants the following incentive: T-5 or T-8 (1-2 lamp) = $25 per fixture

$$\text{SmartStart®}\ Incentive = (\#\ of\ 1-2\ lamp\ \ fixtures \times\ \$\,25)$$

$$\text{SmartStart®}\ Incentive = (72 \times\ \$\,15) = \underline{\$}1{,}080$$

There is no significant maintenance savings generated with this ECM. This is because the maintenance savings due to increased lamp life is diminished by the increased number of lamps by replacing 2 lamp T12 fluorescent U-tubes with 3 lamp 2ft linear T8 fluorescent tubes.

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$9,000
NJ Smart Start Equipment Incentive ($):	$1,080
Net Installation Cost ($):	$7,920
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,294
Total Yearly Savings ($/Yr):	$1,294
Estimated ECM Lifetime (Yr):	15
Simple Payback	6.1
Simple Lifetime ROI	145.1%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	$19,410
Internal Rate of Return (IRR)	14%
Net Present Value (NPV)	$7,527.69

ECM #7: Lighting Controls

Description:

In some areas the lighting is left on unnecessarily. In many cases the lights are left on because of the inconvenience to manually switch lights off when a room is left or on when a room is first occupied. This is common in rooms that are occupied for only short periods and only a few times per day. In some instances lights are left on due to the misconception that it is better to keep the lights on rather than to continuously switch lights on and off. Although increased switching reduces lamp life, the energy savings outweigh the lamp replacement costs. The payback timeframe for when to turn the lights off is approximately two minutes. If the lights are expected to be off for at least a two minute interval, then it pays to shut them off.

Lighting controls come in many forms. Sometimes an additional switch is adequate to provide reduced lighting levels when full light output is not needed. Occupancy sensors detect motion and will switch the lights on when the room is occupied. Occupancy sensors can either be mounted in place of a current wall switch, or on the ceiling to cover large areas. Photocell control senses light levels and turn off or reduce lights when there is adequate daylight. Photocells are mostly used outside, but are becoming more popular in energy-efficient interior lighting designs as well.

The U.S. Department of Energy sponsored a study to analyze energy savings achieved through various types of building system controls. The referenced savings is based on the "Advanced Sensors and Controls for Building Applications: Market Assessment and Potential R&D Pathways," document posted for public use April 2005. The study has found that commercial buildings have the potential to achieve significant energy savings through the use of building controls. The average energy savings are as follows based on the report:

- Occupancy Sensors for Lighting Control - 20%-28% (20% used in calcs)

The ECM includes replacement of standard wall switches with sensor wall switches for individual offices, meeting rooms, and bathrooms. Sensors shall be manufactured by Sensorswitch, Watt Stopper or equivalent. See the "Investment Grade Lighting Audit" appendix for details.

The **Investment Grade Lighting Audit Appendix** of this report includes the summary of lighting controls implemented in this ECM and outlines the proposed controls, costs, savings, and payback periods. The calculations adjust the lighting power usage by 10% for all areas that include occupancy sensors.

Light Energy = 113,379 kWh/Yr. proposed lighting controlled energy

Hours of Operation:
Municipal Offices: 3,120 Hrs per year.
Municipal Corridors, Entrances, Restrooms, Maintenance Areas: 8,700 Hrs per year.

Energy Savings Calculations:

$$Energy\ Savings = \left(20\% \times Occuapancy\ Sensored\ Light\ Energy\ \left(kWh/Yr\right)\right)$$

$$Energy\ Savings = \left(20\% \times 113{,}379\ \left(kWh\right)\right) = 22{,}676\ \left(kWh\right)$$

$$Savings. = Energy\ Savings\ \left(kWh\right) \times Ave\ Elec\ Cost\left(\frac{\$}{kWh}\right)$$

$$Savings. = 22{,}676\ \left(kWh\right) \times 0.179\left(\frac{\$}{kWh}\right) = \$4{,}059$$

Installation cost per dual-technology sensor (Basis: Sensor switch or equivalent) is $110/unit including material and labor.

Installation Cost = $110 x 48 motion sensors = $5,280

From the NJ Smart Start appendix, the installation of a lighting control device warrants the following incentive: occupancy = $20 per fixture.

$$\text{Smart Start}\circledR\ Incentive = \left(\#\ of\ \ wall\ \ mount\ \ devices \times\ \$\ 20\right) = \left(48 \times \$20\right) = \$960$$

Energy Savings Summary:

ECM #7- ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$5,280
NJ Smart Start Equipment Incentive ($):	$960
Net Installation Cost ($):	$4,320
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$4,176
Total Yearly Savings ($/Yr):	$4,176
Estimated ECM Lifetime (Yr):	15
Simple Payback	1.0
Simple Lifetime ROI	1350.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$62,640
Internal Rate of Return (IRR)	97%
Net Present Value (NPV)	$45,532.82

VIII. RENEWABLE/DISTRIBUTED ENERGY MEASURES

Globally, renewable energy has become a priority affecting international and domestic energy policy. The State of New Jersey has taken a proactive approach, and has recently adopted in its Energy Master Plan a goal of 30% renewable energy by 2020. To help reach this goal New Jersey created the Office of Clean Energy under the direction of the Board of Public Utilities and instituted a Renewable Energy Incentive Program to provide additional funding to private and public entities for installing qualified renewable technologies. A renewable energy source can greatly reduce a building's operating expenses while producing clean environmentally friendly energy. CEG has assessed the feasibility of installing renewable energy measures (REM) for the municipality utilizing renewable technologies and concluded that there is potential for solar energy generation. The solar photovoltaic system calculation summary will be concluded as **REM#1** within this report.

Solar energy produces clean energy and reduces a building's carbon footprint. This is accomplished via photovoltaic panels which will be mounted on all south and southwestern facades of the building. Flat roof, as well as sloped areas can be utilized; flat areas will have the panels turned to an optimum solar absorbing angle. (A structural survey of the roof would be necessary before the installation of PV panels is considered). The state of NJ has instituted a program in which one Solar Renewable Energy Certificate (SREC) is given to the Owner for every 1000 kWh of generation. SREC's can be sold anytime on the market at their current market value. The value of the credit varies upon the current need of the power companies. The average value per credit is around $350, this value was used in our financial calculations. This equates to $0.35 per kWh generated.

CEG has reviewed the building roof in order determine if there is available space to install a roof mounted solar array. It was determined that a small portion of the roof could be utilized, providing a total available square-foot of 5,950, these areas can be seen in the associated **Renewable/Distributed Energy Measure Calculations Appendix**. Based on the available roof space a system size of approximately 68.5 kilowatts can be installed. The proposed system has an estimated generation potential of 78,800 kWh annually, reducing the overall utility bill by approximately 6.7% percent. A detailed financial analysis can be found in the **Renewable / Distributed Energy Measures Calculation Appendix**. This analysis illustrates the payback of the system over a 25 year period. The eventual degradation of the solar panels and the price of accumulated SREC's are factored into the payback.

The proposed photovoltaic array layout is designed based on the specifications for the Sun Power SPR-230 panel. This panel has a "DC" rated full load output of 230 watts, and has a total panel conversion efficiency of 18%. Although panels rated at higher wattages are available through Sun Power and other various manufacturers, in general most manufacturers who produce commercially available solar panels produce a similar panel in the 200 to 250 watt range. This provides more manufacturer options to the public entity if they wish to pursue the proposed solar recommendation without losing significant system capacity.

The array system capacity was sized on available roof space on the existing facility. Estimated solar array generation was then calculated based on the National Renewable Energy Laboratory

PVWatts Version 1.0 Calculator. In order to calculate the array generation an appropriate location with solar data on file must be selected. In addition the system DC rated kilowatt (kW) capacity must be inputted, a DC to AC de-rate factor, panel tilt angle, and array azimuth angle. The DC to AC de-rate factor is based on the panel nameplate DC rating, inverter and transformer efficiencies (95%), mismatch factor (98%), diodes and connections (100%), dc and ac wiring(98%, 99%), soiling, (95%), system availability (95%), shading (if applicable), and age(new/100%). The overall DC to AC de-rate factor has been calculated at an overall rating of 81%. The PVWatts Calculator program then calculates estimated system generation based on average monthly solar irradiance and user provided inputs. The monthly energy generation and offset electric costs from the PVWatts calculator is shown in the **Renewable/Distributed Energy Measures Calculation Appendix**.

The proposed solar array is qualified by the New Jersey Board of Public Utilities Net Metering Guidelines as a Class I Renewable Energy Source. These guidelines allow onsite customer generation using renewable energy sources such as solar and wind with a capacity of 2 megawatts (MW) or less. This limits a customer system design capacity to being a net user and not a net generator of electricity on an annual basis. Although these guidelines state that if a customer does net generate (produce more electricity than they use), the customer will be credited those kilowatt-hours generated to be carried over for future usage on a month to month basis. Then, on an annual basis if the customer is a net generator the customer will then be compensated by the utility the average annual PJM Grid LMP price per kilowatt-hour for the over generation. Due to the aforementioned legislation, the customer is at limited risk if they generate more than they use at times throughout the year. With the inefficiency of today's energy storage systems, such as batteries, the added cost of storage systems is not warranted and was not considered in the proposed design.

Direct purchase involves the facility paying for 100% of the total project cost upfront via one of the methods noted in the Installation Funding Options section below. Calculations include a utility inflation rate as well as the degradation of the solar panels over time. Based on our calculations the following is the payback period:

Table 7
Financial Summary – Photovoltaic System

FINANCIAL SUMMARY - PHOTOVOLTAIC SYSTEM			
PAYMENT TYPE	**SIMPLE PAYBACK**	**SIMPLE ROI**	**INTERNAL RATE OF RETURN**
Self-Finance	13.2 Years	14.0%	7.7%
Direct Purchase	13.2 Years	14.0%	6.4%

*The solar energy measure is shown for reference in the executive summary Renewable Energy Measure (REM) table

The resultant Internal Rate of Return indicates that if the Owner was able to "self-finance" the solar project, the project would be slightly more beneficial to the Owner. However, if the Owner was able to work out a Power Purchase Agreement with a third-party and agree upon a decent

base energy rate for kilowatt hour production, the "direct purchase" option could also, prove to be a beneficial route.

In addition to the Solar Analysis, CEG also conducted a review of the applicability of wind energy for the facility. Wind energy production is another option available through the Renewable Energy Incentive Program. Wind turbines of various types can be utilized to produce clean energy on a per building basis. Cash incentives are available per kWh of electric usage. Based on CEG's review of the applicability of wind energy for the facility, it was determined that the facility is in a densely populated urban area and the average wind speed is not adequate. Therefore, wind energy is not a viable option to implement.

IX. ENERGY PURCHASING AND PROCUREMENT STRATEGY

Load Profile:

Load Profile analysis was performed to determine the seasonal energy usage of the facility. Irregularities in the load profile will indicate potential problems within the facility. Consequently based on the profile a recommendation will be made to remedy the irregularity in energy usage. For this report, the facility's energy consumption data was gathered in table format and plotted in graph form to create the load profile. The Electric and Natural Gas Usage Profiles included within this report to reference the respective electricity and natural gas usage load profile for January 2008 through December 2008.

Electricity:

This facility is comprised of office spaces, meeting rooms, storage and mechanical spaces. The hours of operation for this facility are between 7:00 am and 5:30 pm during weekdays. The facility does not operate on weekends. HVAC systems run between the hours of 7:00 am and 6:00 pm on weekdays and stays at unoccupied setting on weekends.

The Electric Usage Profile demonstrates a typical load profile for building of this type. The load profile is said to be typical in that the summer (May – September) because it has an increased peak throughout this period. The winter (October – April) has a lower flat or consistent load shape. The winter shape is however elevated. The summer usage is typically contributed by cooling (air conditioning) consumption. In this facility air-conditioning is provided by (6) six, Variable Air Volume (VAV) rooftop air conditioning units (RTU's) made by Trane. The units have capacity from between 30 and 75 Tons.

This facility utilizes the Delivery service (LPLS) and its Commodity service (BGS) from Public Service Electric and Gas Company (PSE&G). A base-load shaping is important because a flat consumption profile will yield more competitive pricing when shopping for a Third Party Supplier.

Natural Gas:

The Natural Gas Usage Profile demonstrates a typical heating load (November –March), and complimentary cooling load (April –October). Consequently there is a clear separation between summer and winter loads consistent with Wholesale Energy Pricing. Heating loads carry a much higher average cost because of the higher demand for natural gas during the winter. In this facility the primary heating is provided by (2) two Weil McLean cast iron sectional boilers. The boilers use natural gas as a fuel source. Perimeter heating of the building is provided by fin-tube recessed hot water radiators. Domestic hot water is supplied by natural gas fired hot water heater.

This facility utilizes the Delivery service (LVG) from Public Service Electric and Gas (PSE&G) while it receives its Commodity service from Woodruff Energy, the Third Party Supplier.

Tariff Analysis:

Electricity:

Passaic County receives electrical service through Public Service Electric and Gas Company (PSE&G) on a LPLS (Large Power Lighting Service) rate schedule.

The LPLS utility tariff is for delivery service for general purposes at secondary distribution voltages where the customers measured peak demand exceeds 150 kW in any given month and also at primary distribution voltages. Customers may either purchase electric supply from a Third Party Supplier (TPS) of from PSE&G's Basic Generation Service default service as detailed in the rate schedule. The rate schedule has a Delivery Charge; Distribution kW and kWh Charge, Societal Benefits Charge, Non-utility Generation Charge, Securitization Charge, System Control Charge, Customer Account Services Charge, Standby Fee, Base Rate Distribution Adjustment Charge, Solar Pilot Recovery Charge and RGGI Charge. The customer can elect to have the Commodity Charge serviced through the utility or by a Third Party Supplier (TPS). This facility currently utilizes Public Service's Basic Generation Service default service as detailed in this rate schedule.

A flat load profile will allow for a more competitive energy price when shopping for an "alternate energy source". CEG recommends the use of an energy advisor for advisement on energy procurement utilizing a "managed approach" to energy procurement.

Natural Gas:

Passaic County receives natural gas Delivery service through Public Service Electric and Gas Company LVG (Large Volume Gas) rate class. The facility uses Woodruff Energy (a Third Party Supplier) for its Commodity service.

This utility tariff is for firm Delivery service for general purposes. This rate schedule has a Delivery Charge, Balancing Charge, Societal Benefits Charge, Realignment Adjustment Charge, Margin Adjustment Charge, RGGI Charge and Customer Account Service Charge. The customer can elect to have the Commodity Charge serviced through the utility or by a Third Party Supplier (TPS). It is pertinent to note, should the TPS not deliver, the customer may receive service from PSE&G under Emergency Sales Service. Emergency Sales Service carries an extremely high penalty cost of service.

Imbalances occur when Third Party Suppliers are used to supply natural gas, full-delivery is not made, and when a new supplier is contracted or the customer returns to the utility. It is important when utilizing a Third Party Supplier, that an experienced regional supplier is used. Otherwise, imbalances can occur, jeopardizing economics and scheduling.

From review of the information provided The County is utilizing the services of a Third Party Supplier, Woodruff Energy for natural gas service. Based on the limited data available, it appears that Passaic County is paying approximately up to and possibly over 30% in its natural gas costs when looking at the price-to-compare.

The "price-to-compare" is the natural gas price net of utility charges. The price of natural gas that is delivered to the utility is said to be delivered to its City-Gate. The utility charges, Transportation and Distribution, are not included. This is the price that will be supplied by an alternative supplier or a Third Party Supplier.

It should be noted that there was not a Woodruff Energy contract available for review.

Recommendations:

CEG recommends a global approach that will be consistent with all facilities. CEG's observation is seen in electricity and natural gas costs. Passaic Counties "weighted average price-to-compare" per kWh (kilowatt hour) for all buildings is $.1327/kWh (kWh is the common unit of electric measure).

The "price to compare" is for electricity is defined as the price that would be compared to the equivalent utility price extracting the utility transmission and distribution costs (wires charges). This would be a market based price that would be supplied by a Third Party Supplier (TPS) or an alternative supplier.

The average "price-to-compare" per decatherm for natural gas is $13.11/dth (Dth is the common unit of measure). Energy commodities are among the most volatile of all commodities, however at this point and time, energy is extremely competitive. The County could see significant savings if it were to take advantage of these current market prices quickly, before energy costs increase. Based on last year's historical consumption (January 2008 through December 2008) and current electric rates, The County would see an improvement of over $200,000 or 20% annually. Note: Savings were calculated using Passaic County's Average Annual Consumption of 7,570,505 kWh's and a variance of approximately $.03/kWh, and utilizing a fixed one-year flat commodity contract). Passaic County should aggregate its entire electric load to gain the most optimal energy costs. CEG recommends advisement for alternative sourcing and supply of energy on a "managed approach". CEG recommends the use of any energy advisor to guide The County through this process.

CEG's secondary recommendation coincides with the natural gas costs and the contract with Woodruff Energy. CEG has recognized that while The County is utilizing a Third Party Supplier (TPS) for natural gas supply, prices can be improved. Based on contractual pricing provided by The County and analysis performed, this demonstrates that pricing can be improved by over 30% or $90,000 annually. Note: The Average "price-to-compare" as supplied by Woodruff Energy is $13.11 / Dth (Dth the common unit of measure).

The "price-to-compare" for natural gas is the wellhead price (from producer), plus pipeline transportation (basis) all the way to the respective utility. This is said to be delivered to the utility City-Gate. In this case it is Public Service Electric & Gas Company. The utility will add its fee for delivery, to the "price-to-compare".

CEG recommends that The County of Passaic schedule a meeting with their current utility providers to review their utility charges and current tariff structures for electricity and natural

gas. This meeting would provide insight regarding alternative procurement options that might be available. Through its meeting with the Local Distribution Company (LDC), The County will learn more about the competitive supply process. You can acquire a list of approved Third Party Suppliers from the New Jersey Board of Public Utilities website at www.nj.gov/bpu. The County should also consider using a billing-auditing service to further analyze the utility invoices, manage the data and use the data to manage ongoing demand-side management projects. Furthermore, CEG recommends paying attention to credit mechanisms, imbalances, balancing charges and commodity charges when meeting with their utility representative. In addition, The County should also ask the utility representative about alternative billing options. Some utilities allow for consolidated billing options when utilizing the service of a Third Party Supplier.

Finally, if the County frequently changes its supplier for energy (natural gas), it needs to closely monitor balancing, particularly when the contract is close to termination.

X. INSTALLATION FUNDING OPTIONS

CEG has reviewed various funding options for the facility owner to utilize in subsidizing the costs for installing the energy conservation measures noted within this report. Below are a few alternative funding methods:

i. *Energy Savings Improvement Program (ESIP)* – Public Law 2009, Chapter 4 authorizes government entities to make energy related improvements to their facilities and par for the costs using the value of energy savings that result from the improvements. The "Energy Savings Improvement Program (ESIP)" law provides a flexible approach that can allow all government agencies in New Jersey to improve and reduce energy usage with minimal expenditure of new financial resources.

ii. *Municipal Bonds* – Municipal bonds are a bond issued by a city or other local government, or their agencies. Potential issuers of municipal bonds include cities, counties, redevelopment agencies, school districts, publicly owned airports and seaports, and any other governmental entity (or group of governments) below the state level. Municipal bonds may be general obligations of the issuer or secured by specified revenues. Interest income received by holders of municipal bonds is often exempt from the federal income tax and from the income tax of the state in which they are issued, although municipal bonds issued for certain purposes may not be tax exempt.

iii. *Power Purchase Agreement* – Public Law 2008, Chapter 3 authorizes contractor of up to fifteen (15) years for contracts commonly known as "power purchase agreements." These are programs where the contracting unit (Owner) procures a contract for, in most cases, a third party to install, maintain, and own a renewable energy system. These renewable energy systems are typically solar panels, windmills or other systems that create renewable energy. In exchange for the third party's work of installing, maintaining and owning the renewable energy system, the contracting unit (Owner) agrees to purchase the power generated by the renewable energy system from the third party at agreed upon energy rates.

iv. *Pay For Performance* – The New Jersey Smart Start Pay for Performance program includes incentives based on savings resulted from implemented ECMs. The program is available for all buildings that were audited as part of the NJ Clean Energy's Local Government Energy Audit Program. The facility's participation in the program is assisted by an approved program partner. An "Energy Reduction Plan" is created with the facility and approved partner to shown at least 15% reduction in the building's current energy use. Multiple energy conservation measures implemented together are applicable toward the total savings of at least 15%. No more than 50% of the total energy savings can result from lighting upgrades / changes.

Total incentive is capped at 50% of the project cost. The program savings is broken down into three benchmarks; Energy Reduction Plan, Project Implementation, and Measurement and Verification. Each step provides additional incentives as the energy reduction project continues. The benchmark incentives are as follows:

1. *Energy Reduction Plan* – Upon completion of an energy reduction plan by an approved program partner, the incentive will grant $0.10 per square foot between $5,000 and $50,000, and not to exceed 50% of the facility's annual energy expense. (Benchmark #1 is not provided in addition to the local government energy audit program incentive.)

2. *Project Implementation* – Upon installation of the recommended measures along with the "Substantial Completion Construction Report," the incentive will grant savings per KWH or Therm based on the program's rates. Minimum saving must be 15%. (Example $0.11 / kWh for 15% savings, $0.12/ kWh for 17% savings, … and $1.10 / Therm for 15% savings, $1.20 / Therm for 17% saving, …) Increased incentives result from projected savings above 15%.

3. *Measurement and Verification* – Upon verification 12 months after implementation of all recommended measures, that actual savings have been achieved, based on a completed verification report, the incentive will grant additional savings per kWh or Therm based on the program's rates. Minimum savings must be 15%. (Example $0.07 / kWh for 15% savings, $0.08/ kWh for 17% savings, … and $0.70 / Therm for 15% savings, $0.80 / Therm for 17% saving, …) Increased incentives result from verified savings above 15%.

v. *Direct Install Program* – The New Jersey Clean Energy's Direct Install Program is a state funded program that targets small commercial and industrial facilities with peak demand of less than 200 kW. This turnkey program is aimed at providing owners a seamless, comprehensive process for analysis, equipment replacement and financial incentives to reduce consumption, lower utility costs and improve profitability. The program covers up to 80% of the cost for eligible upgrades including lighting, lighting controls, refrigeration, HVAC, motors, variable speed drives, natural gas and food service. Participating contractors (refer to www.njcleanenergy.com) conduct energy assessments in addition to your standard local government energy audit and install the cost-effective measures.

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

XI. ADDITIONAL RECOMMENDATIONS

The following recommendations include no cost/low cost measures, Operation & Maintenance (O&M) items, and water conservation measures with attractive paybacks. These measures are not eligible for the Smart Start Buildings incentives from the office of Clean Energy but save energy none the less.

A. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.

B. Maintain all weather stripping on windows and doors.

C. Clean all light fixtures to maximize light output.

D. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.

E. Confirm that outside air economizers on the rooftop units are functioning properly to take advantage of free cooling and avoid excess outside air during occupied periods.

F. Confirm operation of the time-clocks utilized in the building. Make sure all the pins are in space and functioning properly.

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Passaic County - Board of Social Services Building (80 Hamilton St.)

ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY														
ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Svaing * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^{N} \frac{C_n}{(1+IRR)^n}$	$\sum_{n=0}^{N} \frac{C_n}{(1+DR)^n}$
		($)	($)	($)	($)	($/Yr)	($/Yr)	($/Yr)	(Yr)	($)	($)	(%)	(Yr)	($)	($)
ECM #1	Replace Rooftop AC Units	$366,714	$0	$14,600	$352,114	$14,732	$0	$14,732	15	$220,980	$0	-37.2%	23.9	-5.33%	($176,244.34)
ECM #2	Boiler Replacement	$119,360	$0	$0	$119,360	$10,526	$0	$10,526	15	$157,890	$0	32.3%	11.3	3.72%	$6,298.70
ECM #3	VFD on Hot Water Pump	$1,625	$2,585	$0	$4,210	$2,438	$0	$2,438	15	$36,570	$0	768.6%	1.7	57.85%	$24,894.69
ECM #4	Premium Motors for RTU Fans	$8,600	$11,188	$760	$19,028	$2,924	$0	$2,924	15	$43,860	$0	130.5%	6.5	12.87%	$15,878.52
ECM #5	VFD on RTU Supply Fans	$15,450	$24,000	$8,400	$31,050	$7,905	$0	$7,905	15	$118,575	$0	281.9%	3.9	24.51%	$63,319.38
ECM #6	Lighting Equipment Upgrade	$9,000	$0	$1,080	$7,920	$1,294	$0	$1,294	15	$19,410	$0	145.1%	6.1	14.07%	$7,527.69
ECM #7	Lighting Controls	$5,280	$0	$960	$4,320	$4,176	$0	$4,176	15	$62,640	$0	1350.0%	1.0	96.66%	$45,532.82
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	Install Solar Photovoltaic Panels	$548,320	$0	$0	$548,320	$14,105	$27,580	$41,685	15	$625,275	$413,700	14.0%	13.2	1.69%	($50,687.18)

Notes: 1) The variable Cn in the formulas for Internal Rate of Return and Net Present Value stands for the cash flow during each period.
2) The variable DR in the NPV equation stands for Discount Rate
3) For NPV and IRR calculations: From n=0 to N periods where N is the *lifetime of ECM* and Cn is the *cash flow during each period* .

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VOORHEES, NEW JERSEY 08043
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SmartStart Building Incentives

The NJ SmartStart Buildings Program offers financial incentives on a wide variety of building system equipment. The incentives were developed to help offset the initial cost of energy-efficient equipment. The following tables show the current available incentives as of February, 2010:

Electric Chillers

Water-Cooled Chillers	$12 - $170 per ton
Air-Cooled Chillers	$8 - $52 per ton

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Cooling

Gas Absorption Chillers	$185 - $400 per ton
Gas Engine-Driven Chillers	Calculated through custom measure path)

Desiccant Systems

$1.00 per cfm – gas or electric

Electric Unitary HVAC

Unitary AC and Split Systems	$73 - $93 per ton
Air-to-Air Heat Pumps	$73 - $92 per ton
Water-Source Heat Pumps	$81 per ton
Packaged Terminal AC & HP	$65 per ton
Central DX AC Systems	$40- $72 per ton
Dual Enthalpy Economizer Controls	$250
Occupancy Controlled Thermostat (Hospitality & Institutional Facility)	$75 per thermostat

Energy Efficiency must comply with ASHRAE 90.1-2004

Ground Source Heat Pumps

Closed Loop & Open Loop	$450 per ton, EER ≥ 16 $600 per ton, EER ≥ 18 $750 per ton, EER ≥ 20

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Heating

Gas Fired Boilers < 300 MBH	$300 per unit
Gas Fired Boilers ≥ 300 - 1500 MBH	$1.75 per MBH
Gas Fired Boilers ≥1500 - ≤ 4000 MBH	$1.00 per MBH
Gas Fired Boilers > 4000 MBH	(Calculated through Custom Measure Path)
Gas Furnaces	$300 - $400 per unit, AFUE ≥ 92%

Variable Frequency Drives

Variable Air Volume	$65 - $155 per hp
Chilled-Water Pumps	$60 per hp
Compressors	$5,250 to $12,500 per drive

Natural Gas Water Heating

Gas Water Heaters ≤ 50 gallons	$50 per unit
Gas-Fired Water Heaters > 50 gallons	$1.00 - $2.00 per MBH
Gas-Fired Booster Water Heaters	$17 - $35 per MBH
Gas Fired Tankless Water Heaters	$300 per unit

Premium Motors

Three-Phase Motors	$45 - $700 per motor
Fractional HP Motors Electronic Communicated Motors (replacing shaded pole motors in refrigerator/freezer cases)	$40 per electronic communicated motor

Prescriptive Lighting

T-5 and T-8 Lamps w/Electronic Ballast in Existing Facilities	$15 per fixture (1-4 lamps)
T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	$10 per fixture
Hard-Wired Compact Fluorescent	$25 - $30 per fixture
Metal Halide w/Pulse Start	$25 per fixture
LED Exit Signs	$10 - $20 per fixture
T-5 and T-8 High Bay Fixtures	$16 - $284 per fixture
HID ≥ 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	$50 per fixture
HID ≥ 100w Replacement with new HID ≥ 100w	$70 per fixture
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	$42 per 5 foot $65 per 6 foot

Lighting Controls – Occupancy Sensors

Wall Mounted	$20 per control
Remote Mounted	$35 per control
Daylight Dimmers	$25 per fixture
Occupancy Controlled hi-low Fluorescent Controls	$25 per fixture controlled

Lighting Controls – HID or Fluorescent Hi-Bay Controls

Occupancy hi-low	$75 per fixture controlled
Daylight Dimming	$75 per fixture controlled
Daylight Dimming - office	$50 per fixture controlled

Other Equipment Incentives

Performance Lighting	$1.00 per watt per SF below program incentive threshold, currently 5% more energy efficient than ASHRAE 90.1-2004 for New Construction and Complete Renovation
Custom Electric and Gas Equipment Incentives	not prescriptive
Custom Measures	$0.16 KWh and $1.60/Therm of 1st year savings, or a buy down to a 1 year payback on estimated savings. Minimum required savings of 75,000 KWh or 1,500 Therms and a IRR of at least 10%.
Multi Measures Bonus	15%

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Board of Social Services

Building ID: 1956885
For 12-month Period Ending: August 31, 2009[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: February 02, 2010

Facility
Board of Social Services
80 Hamilton St.
Paterson, NJ 07505

Facility Owner
County of Passaic
401 Grand St.
Paterson, NJ 07505

Primary Contact for this Facility
Michael Fischette
520 S. Burnt Mill Rd.
Voorhees, NJ 08543

Year Built: 1934
Gross Floor Area (ft²): 108,000

Energy Performance Rating[2] (1-100) 84

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	4,134,345
Natural Gas (kBtu)[4]	2,432,427
Total Energy (kBtu)	6,566,772

Energy Intensity[5]

Site (kBtu/ft²/yr)	61
Source (kBtu/ft²/yr)	151

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	759

Electric Distribution Utility
Public Service Elec & Gas Co

National Average Comparison

National Average Site EUI	97
National Average Source EUI	241
% Difference from National Average Source EUI	-37%
Building Type	Office

Stamp of Certifying Professional

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

Meets Industry Standards[6] **for Indoor Environmental Conditions:**

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

Certifying Professional
Michael Fischette
520 S. Burnt Mill Rd.
Voorhees, NJ 08543

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

ENERGY STAR® Data Checklist for Commercial Buildings

In order for a building to qualify for the ENERGY STAR, a Professional Engineer (PE) must validate the accuracy of the data underlying the building's energy performance rating. This checklist is designed to provide an at-a-glance summary of a property's physical and operating characteristics, as well as its total energy consumption, to assist the PE in double-checking the information that the building owner or operator has entered into Portfolio Manager.

Please complete and sign this checklist and include it with the stamped, signed Statement of Energy Performance.
NOTE: You must check each box to indicate that each value is correct, OR include a note.

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	Board of Social Services	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Office	Is this an accurate description of the space in question?		☐
Location	80 Hamilton St., Paterson, NJ 07505	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐
Office (Office)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	108,000 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Weekly operating hours	40 Hours	Is this the total number of hours per week that the Office space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	300	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100. The normal worker density ranges between 0.3 and 10 workers per 1000 square feet (92.8 square meters)		☐
Number of PCs	300	Is this the number of personal computers in the Office?		☐
Percent Cooled	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Public Service Elec & Gas Co

Fuel Type: Electricity

Meter: 778015793 (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
07/09/2009	08/08/2009	163,800.00
06/09/2009	07/08/2009	148,800.00
05/09/2009	06/08/2009	97,800.00
04/09/2009	05/08/2009	79,800.00
03/09/2009	04/08/2009	76,800.00
02/09/2009	03/08/2009	57,600.00
01/09/2009	02/08/2009	112,800.00
12/09/2008	01/08/2009	63,849.00
11/09/2008	12/08/2008	75,000.00
10/09/2008	11/08/2008	69,600.00
09/09/2008	10/08/2008	97,200.00
778015793 Consumption (kWh (thousand Watt-hours))		**1,043,049.00**
778015793 Consumption (kBtu (thousand Btu))		**3,558,883.19**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**3,558,883.19**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas

Meter: 2050028 (therms)
Space(s): Entire Facility

Start Date	End Date	Energy Use (therms)
07/09/2009	08/08/2009	90.50
06/09/2009	07/08/2009	114.00
05/09/2009	06/08/2009	183.00
04/09/2009	05/08/2009	1,565.88
03/09/2009	04/08/2009	4,724.90
02/09/2009	03/08/2009	6,407.70
01/09/2009	02/08/2009	5,076.00
12/09/2008	01/08/2009	4,185.85
11/09/2008	12/08/2008	1,735.62
10/09/2008	11/08/2008	79.50
09/09/2008	10/08/2008	76.43

2050028 Consumption (therms)	**24,239.38**
2050028 Consumption (kBtu (thousand Btu))	**2,423,938.00**
Total Natural Gas Consumption (kBtu (thousand Btu))	**2,423,938.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?	☐

Additional Fuels	
Do the fuel consumption totals shown above represent the total energy use of this building? Please confirm there are no additional fuels (district energy, generator fuel oil) used in this facility.	☐

On-Site Solar and Wind Energy	
Do the fuel consumption totals shown above include all on-site solar and/or wind power located at your facility? Please confirm that no on-site solar or wind installations have been omitted from this list. All on-site systems must be reported.	☐

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same as the PE that signed and stamped the SEP.)

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

Please keep this Facility Summary for your own records; do not submit it to EPA. Only the Statement of Energy Performance (SEP), Data Checklist and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Facility
Board of Social Services
80 Hamilton St.
Paterson, NJ 07505

Facility Owner
County of Passaic
401 Grand St.
Paterson, NJ 07505

Primary Contact for this Facility
Michael Fischette
520 S. Burnt Mill Rd.
Voorhees, NJ 08543

General Information

Board of Social Services	
Gross Floor Area Excluding Parking: (ft^2)	108,000
Year Built	1934
For 12-month Evaluation Period Ending Date:	August 31, 2009

Facility Space Use Summary

Office	
Space Type	Office
Gross Floor Area(ft^2)	108,000
Weekly operating hours	40
Workers on Main Shift	300
Number of PCs	300
Percent Cooled	50% or more
Percent Heated	50% or more

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 08/31/2009)	**Baseline** (Ending Date 01/31/2009)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	84	83	75	N/A	50
Energy Intensity					
Site (kBtu/ft^2)	61	67	72	N/A	97
Source (kBtu/ft^2)	151	158	178	N/A	241
Energy Cost					
$/year	$ 76,083.03	$ 248,104.89	$ 89,535.21	N/A	$ 121,057.11
$/$ft^2$/year	$ 0.70	$ 2.30	$ 0.82	N/A	$ 1.11
Greenhouse Gas Emissions					
$MtCO_2e$/year	759	794	893	N/A	1,208
$kgCO_2e/ft^2$/year	7	7	8	N/A	11

More than 50% of your building is defined as Office. Please note that your rating accounts for all of the spaces listed. The National Average column presents energy performance data your building would have if your building had an average rating of 50.

Notes:
o - This attribute is optional.
d - A default value has been supplied by Portfolio Manager.

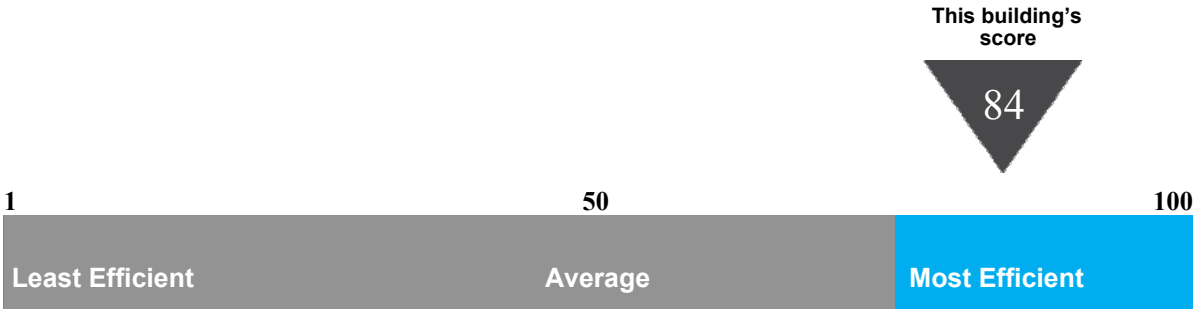
Statement of Energy Performance

2009

Board of Social Services
80 Hamilton St.
Paterson, NJ 07505

Portfolio Manager Building ID: 1956885

The energy use of this building has been measured and compared to other similar buildings using the Environmental Protection Agency's (EPA's) Energy Performance Scale of 1–100, with 1 being the least energy efficient and 100 the most energy efficient. For more information, visit energystar.gov/benchmark.



This building uses 151 kBtu per square foot per year.*

*Based on source energy intensity for the 12 month period ending August 2009

Buildings with a score of 75 or higher may qualify for EPA's ENERGY STAR.

I certify that the information contained within this statement is accurate and in accordance with U.S. Environmental Protection Agency's measurement standards, found at energystar.gov

Date of certification

EPA United States Environmental Protection Agency

Date Generated: 02/02/2010

MAJOR EQUIPMENT LIST

Passaic County

Board of Public Services - 80 Hamilton St.

Boilers

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Input (MBh)	Output (MBh)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Boiler-1	Basement	AHUs and HW baseboard	HB Smith	1	Series 28	-	2870	2332	81%	Natural Gas	27	30	3	Cast iron, sectional, duel fuel boilers currently running on gas.
Boiler-2	Basement	AHUs and HW baseboard	HB Smith	1	Series 28	-	2870	2332	81%	Natural Gas	27	30	3	

ATC Control Panel for the boilers provide supply temperature reset based on outside air temperature.

Boiler - Burners

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Input (MBh)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Burner-1	Boiler-1	Boiler-1	Industrial Combustion Inc.	1	FPGL-427	A-0606	-	-	Gas/Fuel Oil	27	30	3	
Burner-2	Boiler-2	Boiler-2		1	FPGL-427	-	-	-	Gas/Fuel Oil	27	30	3	

Pumps

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	HP	RPM	GPM	Pumping Head (Feet)	Motor Frame Size	Volts / Phase	Approx. Age	ASHRAE Service Life	Remaining Life	
P-1	Basement	Perimeter HW	BG	1	80	-	10	1745	250	80	215T	208/3	10	10	0	HW Baseboard - Lead/Lag
P-2	Basement	Perimeter HW	BG	1	80	-	10	1745	250	80	215T	208/3	10	10	0	
Pump	On boiler	Boiler	BG	1	-	-	Fractional	-	-	-	-	-	-	-	-	Circulation within boiler

Roof Top Air Handling Units

Tag	Location	Area Served	Manufacturer	Qty	Model #	Serial #	Flow - CFM	Cooling Coil	Cooling Capacity (Tons)	Heating Type	Supply Fan HP	Exhaust Fan HP	Volts / Phase	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
RTU-1	Roof	Lee Place Side (North)	Trane	1	SXH004060B43A64D3D01 AEBLMNRT	J84D71014	18,000	DX	40	None	20	5	208/3	25	15	(10)	4 x 1HP Condenser Fans, Standard Effcy Supply and Return Fans
RTU-2	Roof	De Grasse St Side (South)	Trane	1	SXH006060B52A75D3D01 AEBLMNRT	J84071015	22,000	DX	60	None	25	7.5	208/3	25	15	(10)	6 x 1HP Condenser Fans, Standard Effcy Supply and Return Fans
RTU-3	Roof	Hamilton Side (East)	Trane	1	SXH005060B53A74D3D01 AEBLMNRT	J84D71016	20,000	DX	50	None	25	7.5	208/3	25	15	(10)	6 x 1HP Condenser Fans, Standard Effcy Supply and Return Fans
RTU-4	Roof	Directors Office (Upper North)	Trane	1	SXH003060035A46D3D01A EBLMNRT	J84D71017	10,500	DX	30	None	10	3	208/3	25	15	(10)	3 x 1HP Condenser Fans, Standard Effcy Supply and Return Fans
RTU-5	Roof	West of the Building	Trane	1	SXH007560B52A85D3D01 AEBLMNRT	J84D71018	22,000	DX	75	None	30	7.5	208/3	25	15	(10)	6 x 1HP Condenser Fans, Standard Effcy Supply and Return Fans
RTU-6	Roof	Lower Floors North	Trane	1	SXH005060B53A64D3D01 AEBLMNRT	J84D71019	18,250	DX	50	None	20	7.5	208/3	25	15	(10)	6 x 1HP Condenser Fans, Standard Effcy Supply and Return Fans

All six (6) units are equipped with 100% Outside Air Economizer Functionality

Window AC Units

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Cooling Capacity - DX	Heating Capacity - HW	Efficiency	Volts/Ph	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
-	Server Rooms	Server Rooms	Electrolux	2	FAS256R2A	IK70459292	24700	-	9.4 EER	1	3	10	7	Provides critical cooling for the computer server room

Split Systems and AC Condensers

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Cooling Capacity Mbh	Efficiency	Refrigerant	Volts / Phase	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
AHUs	Inner spaces	Inner spaces	Mammoth	4	D034VSC2T	87K131753	38	~10 EER	R22	208/1	3	15	12	Supplies supplemental cooling for the inner offices.

Unit Heaters and Cabinet Heaters

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Heating Type	Heating Capacity (MBH)	CFM	RPM / HP	GPM	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
UH	Boiler Room	Boiler Room	Trane	2	UHSA100S8A A AF	D84F06608	HW	100	-	-	-	10	20	10	
CH 1- 4	Entry	Entry	Trane	4	N46A004	-	HW	28.9	400	-	1.5	10	20	10	

HW Convectors

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Type	Heating Type	Heating Capacity (MBH)	Heat Controls	RPM / HP	GPM	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
C1 - C14	Perimeter offices	Perimeter offices	Sterling	~200	MH, RH	Fully Recessed	HW	5 to 22.5	Manual damper controls	None	1 ro 3	20	20	-	Main source of perimeter and corridor heating. Equipped with dampers for heat control. Number of units approximated based on perimeter office.

Domestic Hot Water Heater

Tag	Location	Area Served	Manufacturer	Qty	Model #	Serial #	Input (MBh)	Recovery (gal/h)	Capacity (gal)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
DWH	Boiler Room	Bathrooms and Kitchenettes	AO Smith	1	BTR 197 118	0842M0012 43	199	193	96	80%	Natural Gas	1	10	9	

DHW - Pumps

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	HP	Volts / Phase	Amps	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Pump	Boiler Room	DHW	BG	1	-	-	Fractional	120/1	-	1	10	9	Pump runs 24/7

Exhaust Fans

Tag	Location	Area Served	Manufacturer	Qty.	Model #	Serial #	Fan HP	Fan RPM	Volts / Phase	Drive	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
EF-1	Roof		ILG	1	S CBF 20	-	1/3	706	-	Direct	20	20	0	Information gathered from HVAC Schedules
EF-2	Roof		ILG	1	S CBF 20	-	1/3	708	-	Direct	20	20	0	

CEG Job #: **9C09122**
Project: County of Passaic
Address: 80 Hamilton
Passaic, NJ
Building SF: 108,000

"80 Hamilton"

KWH COST: **$0.179**

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING											PROPOSED LIGHTING								SAVINGS			
CEG Type	Room No.	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
8.21		3rd Floor Corridor	8700	40	2	2x2 2 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	36	1.44	12,528.0	$2,242.51	40	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
8.21		Men's Restroom	8700	3	2	2x2 2 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	36	0.11	939.6	$168.19	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
8.21		Women's Restroom	8700	3	2	2x2 2 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	36	0.11	939.6	$168.19	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	327	Office	3120	9	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.52	1,628.6	$291.53	9	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	326	Office	3120	12	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.70	2,171.5	$388.70	12	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	325	Office	3120	9	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.52	1,628.6	$291.53	9	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	306	Office	3120	41	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	2.38	7,419.4	$1,328.07	41	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	303	Board Room	3120	16	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.93	2,895.4	$518.27	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	303A	Office	3120	6	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.35	1,085.8	$194.35	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	322	Office	3120	4	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.23	723.8	$129.57	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	301	Deputy Director	3120	36	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	2.09	6,514.6	$1,166.11	36	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	320	Personnel Office	3120	19	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.10	3,438.2	$615.44	19	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	319	Office	3120	6	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.35	1,085.8	$194.35	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	318	Office	3120	6	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.35	1,085.8	$194.35	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

2.21	317	Office	3120	10	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.58	1,809.6	$323.92	10	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
9.21	317A	Office	3120	12	2	2x2 2 Lamp, 34w T12 ULamp, Mag. Ballast, Recessed, Prismatic	78	0.94	2,920.3	$522.74	12	3	2x2 3 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	48	0.58	1797.12	$321.68	$125.00	$1,500.00	0.36	1123.2	$201.05	7.46
2.21	316	Office	3120	6	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.35	1,085.8	$194.35	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	315	Office	3120	6	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.35	1,085.8	$194.35	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	329	DCU	3120	15	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.87	2,714.4	$485.88	15	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	329A	DCU	3120	20	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.16	3,619.2	$647.84	20	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	312	Storage	500	4	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.23	116.0	$20.76	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
8.21		2nd Floor Corridor	8700	40	2	2x2 2 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	36	1.44	12,528.0	$2,242.51	40	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
8.21		Men's Restroom	8700	3	2	2x2 2 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	36	0.11	939.6	$168.19	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
8.21		Women's Restroom	8700	3	2	2x2 2 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	36	0.11	939.6	$168.19	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	229	Office	3120	25	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.45	4,524.0	$809.80	25	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	228	Office	3120	10	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.58	1,809.6	$323.92	10	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	212	Training	3120	6	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.35	1,085.8	$194.35	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	211/10	Training	3120	12	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.70	2,171.5	$388.70	12	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	206	Training	3120	30	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.74	5,428.8	$971.76	30	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	201	Child Support	3120	70	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	4.06	12,667.2	$2,267.43	70	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	203	Training Supervisor	3120	6	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.35	1,085.8	$194.35	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	224	Office	3120	4	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.23	723.8	$129.57	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

2.21	223	Job Search	3120	22	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.28	3,981.1	$712.62	22	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	225	Office	3120	2	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.12	361.9	$64.78	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	222	Mail Distribution	3800	12	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.70	2,644.8	$473.42	12	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
9.21	226	Office	3120	12	2	2x2 2 Lamp, 34w T12 ULamp, Mag. Ballast, Recessed, Prismatic	78	0.94	2,920.3	$522.74	12	3	2x2 3 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	48	0.58	1797.12	$321.68	$125.00	$1,500.00	0.36	1123.2	$201.05	7.46
2.21	219	Mail Room	3800	9	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.52	1,983.6	$355.06	9	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	230	Testing	3120	22	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.28	3,981.1	$712.62	22	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	230B	CWEP	3120	15	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.87	2,714.4	$485.88	15	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
8.21		1st Floor Corridor	8700	40	2	2x2 2 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	36	1.44	12,528.0	$2,242.51	40	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
8.21		Men's Restroom	8700	3	2	2x2 2 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	36	0.11	939.6	$168.19	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
8.21		Women's Restroom	8700	3	2	2x2 2 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	36	0.11	939.6	$168.19	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	125	Office	3120	9	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.52	1,628.6	$291.53	9	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	126	SAI	3120	48	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	2.78	8,686.1	$1,554.81	48	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	125A	Income Maintenance	3120	9	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.52	1,628.6	$291.53	9	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	106C	Income Maintenance	3120	42	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	2.44	7,600.3	$1,360.46	42	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Office	3120	4	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.23	723.8	$129.57	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	104	Income Maintenance	3120	30	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.74	5,428.8	$971.76	30	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	105	Office	3120	4	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.23	723.8	$129.57	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	109	Social Services	3120	90	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	5.22	16,286.4	$2,915.27	90	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

2.21	101	Income Maintenance	3120	30	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.74	5,428.8	$971.76	30	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	121	Assistant Supervisor	3120	4	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.23	723.8	$129.57	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	122	Income Maintenance	3120	56	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	3.25	10,133.8	$1,813.94	56	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
9.21	123	Life Skills	3120	10	2	2x2 2 Lamp, 34w T12 ULamp, Mag. Ballast, Recessed, Prismatic	78	0.78	2,433.6	$435.61	10	3	2x2 3 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	48	0.48	1497.6	$268.07	$125.00	$1,250.00	0.30	936	$167.54	7.46
2.21	114	File Room	3120	13	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.75	2,352.5	$421.09	13	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
8.21		Grnd Floor Corridor	8700	40	2	2x2 2 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	36	1.44	12,528.0	$2,242.51	40	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
8.21		Men's Restroom	8700	3	2	2x2 2 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	36	0.11	939.6	$168.19	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
8.21		Women's Restroom	8700	3	2	2x2 2 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	36	0.11	939.6	$168.19	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	29	Supply	3120	16	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.93	2,895.4	$518.27	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	7	Office	3120	33	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.91	5,971.7	$1,068.93	33	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
9.21	27	EBT	3120	14	2	2x2 2 Lamp, 34w T12 ULamp, Mag. Ballast, Recessed, Prismatic	78	1.09	3,407.0	$609.86	14	3	2x2 3 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	48	0.67	2096.64	$375.30	$125.00	$1,750.00	0.42	1310.4	$234.56	7.46
2.21	14	EBT	3120	3	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.17	542.9	$97.18	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	6	Medicaid Data Imput	3120	6	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.35	1,085.8	$194.35	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	5	Medicaid Data Imput	3120	3	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.17	542.9	$97.18	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	3B	Office	3120	18	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.04	3,257.3	$583.05	18	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	9	Office	3120	4	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.23	723.8	$129.57	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	10	Office	3120	15	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.87	2,714.4	$485.88	15	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	3	Waiting Area	3120	12	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.70	2,171.5	$388.70	12	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

2.21	10	Reception	3120	25	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.45	4,524.0	$809.80	25	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	1	Medicad	3120	30	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.74	5,428.8	$971.76	30	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21		Office	3120	4	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.23	723.8	$129.57	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	25	Intake	3120	24	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.39	4,343.0	$777.40	24	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	18	Food Stamps	3120	25	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.45	4,524.0	$809.80	25	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	25B	Career Center	3120	18	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.04	3,257.3	$583.05	18	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
9.21		Lunch Room	3800	24	2	2x2 2 Lamp, 34w T12 ULamp, Mag. Ballast, Recessed, Prismatic	78	1.87	7,113.6	$1,273.33	24	3	2x2 3 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	48	1.15	4377.6	$783.59	$125.00	$3,000.00	0.72	2736	$489.74	6.13
2.21			3800	2	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.12	440.8	$78.90	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2.21	30	Office	3120	15	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.87	2,714.4	$485.88	15	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
6.31		Boiler Room	8700	13	1	6"x4 1 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	28	0.36	3,166.8	$566.86	13	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
6.11		Stairway A	8700	10	1	6"x4 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic	28	0.28	2,436.0	$436.04	10	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
6.11		Stairway B	8700	10	1	6"x4 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic	28	0.28	2,436.0	$436.04	10	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
6.11		Stairway C	8700	10	1	6"x4 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic	28	0.28	2,436.0	$436.04	10	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
6.11		Stairway D	8700	10	1	6"x4 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic	28	0.28	2,436.0	$436.04	10	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
		Totals		1371	159			75.32	281,813	$50,444.58	1371	15			3.46	11,566	$2,070.33		$9,000.00	2.16	7229	$1,293.96	6.96

NOTES: 1. Simple Payback noted in this spreadsheet does not include Maintenance Savings and NJ Smart Start Incentives.
2. Lamp totals only include T-12 tube replacment calculations

CEG Job #: **9C09122**
Project: Passaic County **"80 Hamilton"** **KWH COST** **$0.179**
Address:

Building SF:

ECM #5: Lighting Control - General

EXISTING LIGHTING										PROPOSED LIGHTING										SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Savings %	Total KW	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	KW SAVINGS	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
8.21	3rd Floor Corridor	8700	40	2	2x2 2 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	36	1.44	12,528.0	$2,242.51	40	0	No Change	36	0%	1.44	12528	$2,242.51	$0	$0.00	0.00	0.0	$0.00	0.00
8.21	Men's Restroom	8700	3	2	2x2 2 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	36	0.11	939.6	$168.19	3	0	Dual Technology Occupancy Sensor	36	20%	0.09	751.68	$134.55	$110	$110.00	0.02	187.9	$33.64	3.27
8.21	Women's Restroom	8700	3	2	2x2 2 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	36	0.11	939.6	$168.19	3	0	Dual Technology Occupancy Sensor	36	20%	0.09	751.68	$134.55	$110	$110.00	0.02	187.9	$33.64	3.27
2.21	Office	3120	9	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.52	1,628.6	$291.53	9	0	Dual Technology Occupancy Sensor	58	20%	0.42	1302.91	$233.22	$110	$110.00	0.10	325.7	$58.31	1.89
2.21	Office	3120	12	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.70	2,171.5	$388.70	12	0	Dual Technology Occupancy Sensor	58	20%	0.56	1737.22	$310.96	$110	$110.00	0.14	434.3	$77.74	1.41
2.21	Office	3120	9	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.52	1,628.6	$291.53	9	0	Dual Technology Occupancy Sensor	58	20%	0.42	1302.91	$233.22	$110	$110.00	0.10	325.7	$58.31	1.89
2.21	Office	3120	41	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	2.38	7,419.4	$1,328.07	41	0	Dual Technology Occupancy Sensor	58	20%	1.90	5935.49	$1,062.45	$110	$110.00	0.48	1483.9	$265.61	0.41
2.21	Board Room	3120	16	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.93	2,895.4	$518.27	16	0	Dual Technology Occupancy Sensor	58	20%	0.74	2316.29	$414.62	$110	$110.00	0.19	579.1	$103.65	1.06
2.21	Office	3120	6	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.35	1,085.8	$194.35	6	0	Dual Technology Occupancy Sensor	58	20%	0.28	868.608	$155.48	$110	$110.00	0.07	217.2	$38.87	2.83
2.21	Office	3120	4	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.23	723.8	$129.57	4	0	Dual Technology Occupancy Sensor	58	20%	0.19	579.072	$103.65	$110	$110.00	0.05	144.8	$25.91	4.24
2.21	Deputy Director	3120	36	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	2.09	6,514.6	$1,166.11	36	0	Dual Technology Occupancy Sensor	58	20%	1.67	5211.65	$932.88	$110	$110.00	0.42	1302.9	$233.22	0.47
2.21	Personnel Office	3120	19	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.10	3,438.2	$615.44	19	0	Dual Technology Occupancy Sensor	58	20%	0.88	2750.59	$492.36	$110	$110.00	0.22	687.6	$123.09	0.89
2.21	Office	3120	6	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.35	1,085.8	$194.35	6	0	Dual Technology Occupancy Sensor	58	20%	0.28	868.608	$155.48	$110	$110.00	0.07	217.2	$38.87	2.83
2.21	Office	3120	6	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.35	1,085.8	$194.35	6	0	Dual Technology Occupancy Sensor	58	20%	0.28	868.608	$155.48	$110	$110.00	0.07	217.2	$38.87	2.83

2.21	Office	3120	10	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.58	1,809.6	$323.92	10	0	Dual Technology Occupancy Sensor	58	20%	0.46	1447.68	$259.13	$110	$110.00	0.12	361.9	$64.78	1.70
9.21	Office	3120	12	2	2x2 2 Lamp, 34w T12 ULamp, Mag. Ballast, Recessed, Prismatic	78	0.94	2,920.3	$522.74	12	0	Dual Technology Occupancy Sensor	78	20%	0.75	2336.26	$418.19	$110	$110.00	0.19	584.1	$104.55	1.05
2.21	Office	3120	6	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.35	1,085.8	$194.35	6	0	Dual Technology Occupancy Sensor	58	20%	0.28	868.608	$155.48	$110	$110.00	0.07	217.2	$38.87	2.83
2.21	Office	3120	6	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.35	1,085.8	$194.35	6	0	Dual Technology Occupancy Sensor	58	20%	0.28	868.608	$155.48	$110	$110.00	0.07	217.2	$38.87	2.83
2.21	DCU	3120	15	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.87	2,714.4	$485.88	15	0	Dual Technology Occupancy Sensor	58	20%	0.70	2171.52	$388.70	$110	$110.00	0.17	542.9	$97.18	1.13
2.21	DCU	3120	20	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.16	3,619.2	$647.84	20	0	Dual Technology Occupancy Sensor	58	20%	0.93	2895.36	$518.27	$110	$110.00	0.23	723.8	$129.57	0.85
2.21	Storage	500	4	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.23	116.0	$20.76	4	0	Dual Technology Occupancy Sensor	58	20%	0.19	92.8	$16.61	$110	$110.00	0.05	23.2	$4.15	26.49
8.21	2nd Floor Corridor	8700	40	1	Chain Hung, 1 Lamp, 26w CFL, Alabaster Globe	26	1.04	9,048.0	$1,619.59	40	0	No Change	26	0%	1.04	9048	$1,619.59	$0	$0.00	0.00	0.0	$0.00	0.00
8.21	Men's Restroom	8700	3	2	2x2 2 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	36	0.11	939.6	$168.19	3	0	Dual Technology Occupancy Sensor	36	20%	0.09	751.68	$134.55	$110	$110.00	0.02	187.9	$33.64	3.27
8.21	Women's Restroom	8700	3	2	2x2 2 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	36	0.11	939.6	$168.19	3	0	Dual Technology Occupancy Sensor	36	20%	0.09	751.68	$134.55	$110	$110.00	0.02	187.9	$33.64	3.27
2.21	Office	3120	25	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.45	4,524.0	$809.80	25	0	Dual Technology Occupancy Sensor	58	20%	1.16	3619.2	$647.84	$110	$110.00	0.29	904.8	$161.96	0.68
2.21	Office	3120	10	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.58	1,809.6	$323.92	10	0	Dual Technology Occupancy Sensor	58	20%	0.46	1447.68	$259.13	$110	$110.00	0.12	361.9	$64.78	1.70
2.21	Training	3120	6	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.35	1,085.8	$194.35	6	0	Dual Technology Occupancy Sensor	58	20%	0.28	868.608	$155.48	$110	$110.00	0.07	217.2	$38.87	2.83
2.21	Training	3120	12	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.70	2,171.5	$388.70	12	0	Dual Technology Occupancy Sensor	58	20%	0.56	1737.22	$310.96	$110	$110.00	0.14	434.3	$77.74	1.41
2.21	Training	3120	30	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.74	5,428.8	$971.76	30	0	Dual Technology Occupancy Sensor	58	20%	1.39	4343.04	$777.40	$110	$110.00	0.35	1085.8	$194.35	0.57
2.21	Child Support	3120	70	1	Pendant Mnt., 1 Lamp, 26w CFL, Globe	26	1.82	5,678.4	$1,016.43	70	0	No Change	26	0%	1.82	5678.4	$1,016.43	$0	$0.00	0.00	0.0	$0.00	0.00
2.21	Training Supervisor	3120	6	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.35	1,085.8	$194.35	6	0	No Change	58	0%	0.35	1085.76	$194.35	$0	$0.00	0.00	0.0	$0.00	0.00
2.21	Office	3120	4	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.23	723.8	$129.57	4	0	Dual Technology Occupancy Sensor	58	20%	0.19	579.072	$103.65	$110	$110.00	0.05	144.8	$25.91	4.24

2.21	Job Search	3120	22	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.28	3,981.1	$712.62	22	0	Dual Technology Occupancy Sensor	58	20%	1.02	3184.9	$570.10	$110	$110.00	0.26	796.2	$142.52	0.77
2.21	Office	3120	2	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.12	361.9	$64.78	2	0	No Change	58	0%	0.12	361.92	$64.78	$0	$0.00	0.00	0.0	$0.00	0.00
2.21	Mail Distribution	3800	12	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.70	2,644.8	$473.42	12	0	Dual Technology Occupancy Sensor	58	20%	0.56	2115.84	$378.74	$110	$110.00	0.14	529.0	$94.68	1.16
9.21	Office	3120	12	2	2x2 2 Lamp, 34w T12 ULamp, Mag. Ballast, Recessed, Prismatic	78	0.94	2,920.3	$522.74	12	0	Dual Technology Occupancy Sensor	78	20%	0.75	2336.26	$418.19	$110	$110.00	0.19	584.1	$104.55	1.05
2.21	Mail Room	3800	9	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.52	1,983.6	$355.06	9	0	Dual Technology Occupancy Sensor	58	20%	0.42	1586.88	$284.05	$110	$110.00	0.10	396.7	$71.01	1.55
2.21	Testing	3120	22	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.28	3,981.1	$712.62	22	0	Dual Technology Occupancy Sensor	58	20%	1.02	3184.9	$570.10	$110	$110.00	0.26	796.2	$142.52	0.77
2.21	CWEP	3120	15	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.87	2,714.4	$485.88	15	0	Dual Technology Occupancy Sensor	58	20%	0.70	2171.52	$388.70	$110	$110.00	0.17	542.9	$97.18	1.13
8.21	1st Floor Corridor	8700	40	2	2x2 2 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	36	1.44	12,528.0	$2,242.51	40	0	Dual Technology Occupancy Sensor	36	20%	1.15	10022.4	$1,794.01	$110	$110.00	0.29	2505.6	$448.50	0.25
8.21	Men's Restroom	8700	3	2	2x2 2 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	36	0.11	939.6	$168.19	3	0	Dual Technology Occupancy Sensor	36	20%	0.09	751.68	$134.55	$110	$110.00	0.02	187.9	$33.64	3.27
8.21	Women's Restroom	8700	3	2	2x2 2 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	36	0.11	939.6	$168.19	3	0	Dual Technology Occupancy Sensor	36	20%	0.09	751.68	$134.55	$110	$110.00	0.02	187.9	$33.64	3.27
2.21	Office	3120	9	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.52	1,628.6	$291.53	9	0	Dual Technology Occupancy Sensor	58	20%	0.42	1302.91	$233.22	$110	$110.00	0.10	325.7	$58.31	1.89
2.21	SAI	3120	48	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	2.78	8,686.1	$1,554.81	48	0	No Change	58	0%	2.78	8686.08	$1,554.81	$0	$0.00	0.00	0.0	$0.00	0.00
2.21	Income Maintenance	3120	9	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.52	1,628.6	$291.53	9	0	Dual Technology Occupancy Sensor	58	20%	0.42	1302.91	$233.22	$110	$110.00	0.10	325.7	$58.31	1.89
2.21	Income Maintenance	3120	42	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	2.44	7,600.3	$1,360.46	42	0	No Change	58	0%	2.44	7600.32	$1,360.46	$0	$0.00	0.00	0.0	$0.00	0.00
2.21	Office	3120	4	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.23	723.8	$129.57	4	0	No Change	58	0%	0.23	723.84	$129.57	$0	$0.00	0.00	0.0	$0.00	0.00
2.21	Income Maintenance	3120	30	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.74	5,428.8	$971.76	30	0	No Change	58	0%	1.74	5428.8	$971.76	$0	$0.00	0.00	0.0	$0.00	0.00
2.21	Office	3120	4	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.23	723.8	$129.57	4	0	No Change	58	0%	0.23	723.84	$129.57	$0	$0.00	0.00	0.0	$0.00	0.00
2.21	Social Services	3120	90	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	5.22	16,286.4	$2,915.27	90	0	No Change	58	0%	5.22	16286.4	$2,915.27	$0	$0.00	0.00	0.0	$0.00	0.00

2.21	Income Maintenance	3120	30	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.74	5,428.8	$971.76	30	0	No Change	58	0%	1.74	5428.8	$971.76	$0	$0.00	0.00	0.0	$0.00	0.00
2.21	Assistant Supervisor	3120	4	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.23	723.8	$129.57	4	0	Dual Technology Occupancy Sensor	58	20%	0.19	579.072	$103.65	$110	$110.00	0.05	144.8	$25.91	4.24
2.21	Income Maintenance	3120	56	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	3.25	10,133.8	$1,813.94	56	0	No Change	58	0%	3.25	10133.8	$1,813.94	$0	$0.00	0.00	0.0	$0.00	0.00
9.21	Life Skills	3120	10	2	2x2 2 Lamp, 34w T12 ULamp, Mag. Ballast, Recessed, Prismatic	78	0.78	2,433.6	$435.61	10	0	Dual Technology Occupancy Sensor	78	20%	0.62	1946.88	$348.49	$110	$110.00	0.16	486.7	$87.12	1.26
2.21	File Room	3120	13	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.75	2,352.5	$421.09	13	0	No Change	58	0%	0.75	2352.48	$421.09	$0	$0.00	0.00	0.0	$0.00	0.00
8.21	Grnd Floor Corridor	8700	40	2	2x2 2 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	36	1.44	12,528.0	$2,242.51	40	0	No Change	36	0%	1.44	12528	$2,242.51	$0	$0.00	0.00	0.0	$0.00	0.00
8.21	Men's Restroom	8700	3	2	2x2 2 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	36	0.11	939.6	$168.19	3	0	Dual Technology Occupancy Sensor	36	20%	0.09	751.68	$134.55	$110	$110.00	0.02	187.9	$33.64	3.27
8.21	Women's Restroom	8700	3	2	2x2 2 Lamp, 17w T8, Elect. Ballast, Recessed, Prismatic	36	0.11	939.6	$168.19	3	0	Dual Technology Occupancy Sensor	36	20%	0.09	751.68	$134.55	$110	$110.00	0.02	187.9	$33.64	3.27
2.21	Supply	3120	16	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.93	2,895.4	$518.27	16	0	No Change	58	0%	0.93	2895.36	$518.27	$0	$0.00	0.00	0.0	$0.00	0.00
2.21	Office	3120	33	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.91	5,971.7	$1,068.93	33	0	No Change	58	0%	1.91	5971.68	$1,068.93	$0	$0.00	0.00	0.0	$0.00	0.00
9.21	EBT	3120	14	2	2x2 2 Lamp, 34w T12 ULamp, Mag. Ballast, Recessed, Prismatic	78	1.09	3,407.0	$609.86	14	0	Dual Technology Occupancy Sensor	78	20%	0.87	2725.63	$487.89	$110	$110.00	0.22	681.4	$121.97	0.90
2.21	EBT	3120	3	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.17	542.9	$97.18	3	0	No Change	58	0%	0.17	542.88	$97.18	$0	$0.00	0.00	0.0	$0.00	0.00
2.21	Medicaid Data Imput	3120	6	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.35	1,085.8	$194.35	6	0	Dual Technology Occupancy Sensor	58	20%	0.28	868.608	$155.48	$110	$110.00	0.07	217.2	$38.87	2.83
2.21	Medicaid Data Imput	3120	3	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.17	542.9	$97.18	3	0	No Change	58	0%	0.17	542.88	$97.18	$0	$0.00	0.00	0.0	$0.00	0.00
2.21	Office	3120	18	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.04	3,257.3	$583.05	18	0	No Change	58	0%	1.04	3257.28	$583.05	$0	$0.00	0.00	0.0	$0.00	0.00
2.21	Office	3120	4	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.23	723.8	$129.57	4	0	No Change	58	0%	0.23	723.84	$129.57	$0	$0.00	0.00	0.0	$0.00	0.00
2.21	Office	3120	15	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.87	2,714.4	$485.88	15	0	Dual Technology Occupancy Sensor	58	20%	0.70	2171.52	$388.70	$110	$110.00	0.17	542.9	$97.18	1.13
2.21	Waiting Area	3120	12	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.70	2,171.5	$388.70	12	0	No Change	58	0%	0.70	2171.52	$388.70	$0	$0.00	0.00	0.0	$0.00	0.00

2.21	Reception	3120	25	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.45	4,524.0	$809.80	25	0	No Change	58	0%	1.45	4524	$809.80	$0	$0.00	0.00	0.0	$0.00	0.00
2.21	Medicad	3120	30	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.74	5,428.8	$971.76	30	0	No Change	58	0%	1.74	5428.8	$971.76	$0	$0.00	0.00	0.0	$0.00	0.00
2.21	Office	3120	4	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.23	723.8	$129.57	4	0	No Change	58	0%	0.23	723.84	$129.57	$0	$0.00	0.00	0.0	$0.00	0.00
2.21	Intake	3120	24	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.39	4,343.0	$777.40	24	0	No Change	58	0%	1.39	4343.04	$777.40	$0	$0.00	0.00	0.0	$0.00	0.00
2.21	Food Stamps	3120	25	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.45	4,524.0	$809.80	25	0	No Change	58	0%	1.45	4524	$809.80	$0	$0.00	0.00	0.0	$0.00	0.00
2.21	Career Center	3120	18	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	1.04	3,257.3	$583.05	18	0	Dual Technology Occupancy Sensor	58	20%	0.84	2605.82	$466.44	$110	$110.00	0.21	651.5	$116.61	0.94
9.21	Lunch Room	3800	24	2	2x2 2 Lamp, 34w T12 ULamp, Mag. Ballast, Recessed, Prismatic	78	1.87	7,113.6	$1,273.33	24	0	No Change	78	0%	1.87	7113.6	$1,273.33	$0	$0.00	0.00	0.0	$0.00	0.00
2.21		3800	2	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.12	440.8	$78.90	2	0	No Change	58	0%	0.12	440.8	$78.90	$0	$0.00	0.00	0.0	$0.00	0.00
2.21	Office	3120	15	2	2x4 2 Lamp, 32w T8, Elect. Ballast, Recessed, Prismatic	58	0.87	2,714.4	$485.88	15	0	Dual Technology Occupancy Sensor	58	20%	0.70	2171.52	$388.70	$110	$110.00	0.17	542.9	$97.18	1.13
6.31	Boiler Room	8700	13	1	6"x4 1 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	28	0.36	3,166.8	$566.86	13	0	No Change	28	0%	0.36	3166.8	$566.86	$0	$0.00	0.00	0.0	$0.00	0.00
6.11	Stairway A	8700	10	1	6"x4 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic	28	0.28	2,436.0	$436.04	10	0	No Change	28	0%	0.28	2436	$436.04	$0	$0.00	0.00	0.0	$0.00	0.00
6.11	Stairway B	8700	10	1	6"x4 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic	28	0.28	2,436.0	$436.04	10	0	No Change	28	0%	0.28	2436	$436.04	$0	$0.00	0.00	0.0	$0.00	0.00
6.11	Stairway C	8700	10	1	6"x4 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic	28	0.28	2,436.0	$436.04	10	0	No Change	28	0%	0.28	2436	$436.04	$0	$0.00	0.00	0.0	$0.00	0.00
6.11	Stairway D	8700	10	1	6"x4 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic	28	0.28	2,436.0	$436.04	10	0	No Change	28	0%	0.28	2436	$436.04	$0	$0.00	0.00	0.0	$0.00	0.00
	Totals		1371	157			72.68	271,344	$48,570.66	1371	0					248,017	$44,395.10		$5,280.00	6.64	23327	$4,175.56	1.26

NOTES: 1. Simple Payback noted in this spreadsheet does not include Maintenance Savings and NJ Smart Start Incentives.
2. Lamp totals only include T-12 tube replacment calculations

Project Name: LGEA Solar PV Project - 80 Hamilton Street
Location: Patterson, NJ
Description: Photovoltaic System 95% Financing - 25 year

Simple Payback Analysis

	Photovoltaic System 95% Financing - 25 year
Total Construction Cost	$548,320
Annual kWh Production	78,800
Annual Energy Cost Reduction	$14,105
Annual SREC Revenue	$27,580
First Cost Premium	**$548,320**
Simple Payback:	**13.15** Years

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	95%
Financing Term (mths):	300	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.179**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	7.00%	SREC Value ($/kWh)	$0.350

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Interest Expense	Loan Principal	Net Cash Flow	Cumulative Cash Flow
0	$27,416	0	0	0	$0	0	0	(27,416)	0
1	$0	78,800	$14,105	$0	$27,580	$36,211	$7,969	($2,494)	($29,910)
2	$0	78,406	$14,528	$0	$27,442	$35,635	$8,545	($2,209)	($32,120)
3	$0	78,014	$14,964	$0	$27,305	$35,017	$9,163	($1,911)	($34,030)
4	$0	77,624	$15,413	$0	$27,168	$34,355	$9,825	($1,598)	($35,629)
5	$0	77,236	$15,876	$796	$27,033	$33,644	$10,535	($2,067)	($37,696)
6	$0	76,850	$16,352	$792	$26,897	$32,883	$11,297	($1,722)	($39,418)
7	$0	76,465	$16,842	$788	$26,763	$32,066	$12,114	($1,362)	($40,780)
8	$0	76,083	$17,348	$784	$26,629	$31,191	$12,989	($987)	($41,767)
9	$0	75,703	$17,868	$780	$26,496	$30,252	$13,928	($595)	($42,362)
10	$0	75,324	$18,404	$776	$26,363	$29,245	$14,935	($188)	($42,550)
11	$0	74,947	$18,956	$772	$26,232	$28,165	$16,015	$236	($42,314)
12	$0	74,573	$19,525	$768	$26,100	$27,007	$17,172	$678	($41,636)
13	$0	74,200	$20,111	$764	$25,970	$25,766	$18,414	$1,137	($40,500)
14	$0	73,829	$20,714	$760	$25,840	$24,435	$19,745	$1,614	($38,886)
15	$0	73,460	$21,335	$757	$25,711	$23,007	$21,172	$2,110	($36,776)
16	$0	73,092	$21,975	$753	$25,582	$21,477	$22,703	$2,625	($34,150)
17	$0	72,727	$22,635	$749	$25,454	$19,836	$24,344	$3,160	($30,990)
18	$0	72,363	$23,314	$745	$25,327	$18,076	$26,104	$3,716	($27,274)
19	$0	72,002	$24,013	$742	$25,201	$16,189	$27,991	$4,292	($22,982)
20	$0	71,642	$24,734	$738	$25,075	$14,165	$30,014	$4,890	($18,091)
21	$0	71,283	$25,476	$734	$24,949	$12,906	$27,592	$9,192	($8,899)
22	$0	70,927	$26,240	$731	$24,824	$10,429	$22,706	$17,199	$8,300
23	$0	70,572	$27,027	$727	$24,700	$0	$0	$51,000	$59,300
24	$0	70,219	$27,838	$723	$24,577	$0	$0	$51,691	$110,992
25	$0	69,868	$28,673	$720	$24,454	$0	$0	$52,407	$163,399
	Totals:	1,856,209	$514,265	$15,897	$649,673	$571,954	$385,272	$190,815	($376,768)
				Net Present Value (NPV)			**$4,830**		
				Internal Rate of Return (IRR)			**7.7%**		

Project Name: LGEA Solar PV Project - 80 Hamilton Street
Location: Patterson, NJ
Description: Photovoltaic System - Direct Purchase

Simple Payback Analysis

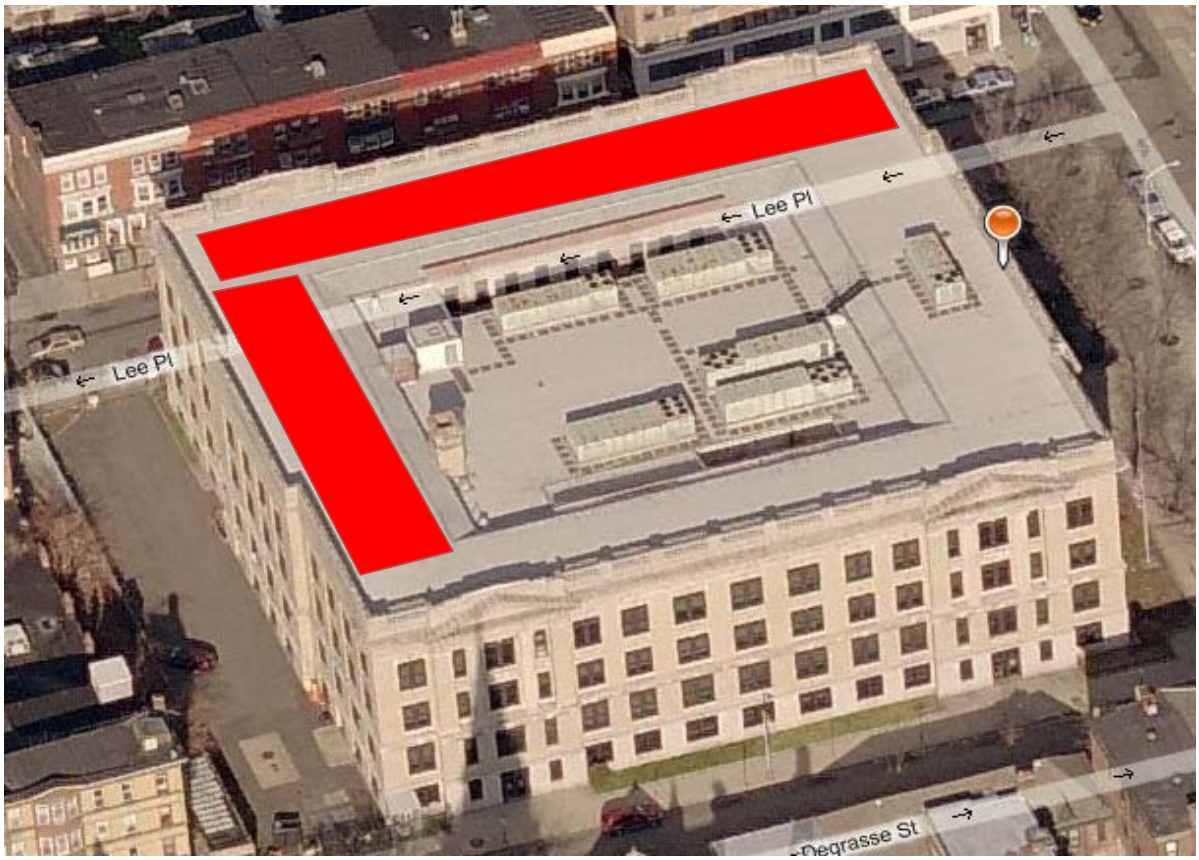
	Photovoltaic System - Direct Purchase
Total Construction Cost	$548,320
Annual kWh Production	78,800
Annual Energy Cost Reduction	$14,105
Annual SREC Revenue	$27,580
First Cost Premium	**$548,320**
Simple Payback:	**13.15** **Years**

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	0	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.179**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/kWh)	$0.350

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Net Cash Flow	Cumulative Cash Flow
0	$548,320	0	0	0	$0	(548,320)	0
1	$0	78,800	$14,105	$0	$27,580	$41,685	($506,635)
2	$0	78,406	$14,528	$0	$27,442	$41,970	($464,664)
3	$0	78,014	$14,964	$0	$27,305	$42,269	($422,395)
4	$0	77,624	$15,413	$0	$27,168	$42,581	($379,814)
5	$0	77,236	$15,876	$796	$27,033	$42,113	($337,701)
6	$0	76,850	$16,352	$792	$26,897	$42,458	($295,244)
7	$0	76,465	$16,842	$788	$26,763	$42,818	($252,426)
8	$0	76,083	$17,348	$784	$26,629	$43,193	($209,233)
9	$0	75,703	$17,868	$780	$26,496	$43,584	($165,649)
10	$0	75,324	$18,404	$776	$26,363	$43,992	($121,657)
11	$0	74,947	$18,956	$772	$26,232	$44,416	($77,241)
12	$0	74,573	$19,525	$768	$26,100	$44,857	($32,384)
13	$0	74,200	$20,111	$764	$25,970	$45,316	$12,932
14	$0	73,829	$20,714	$760	$25,840	$45,794	$58,726
15	$0	73,460	$21,335	$757	$25,711	$46,290	$105,016
16	$0	73,092	$21,975	$753	$25,582	$46,805	$151,821
17	$0	72,727	$22,635	$749	$25,454	$47,340	$199,161
18	$0	72,363	$23,314	$745	$25,327	$47,896	$247,056
19	$0	72,002	$24,013	$742	$25,201	$48,472	$295,528
20	$0	71,642	$24,734	$738	$25,075	$49,070	$344,598
21	$1	71,283	$25,476	$734	$24,949	$49,690	$394,289
22	$2	70,927	$26,240	$731	$24,824	$50,334	$444,623
23	$3	70,572	$27,027	$727	$24,700	$51,000	$495,623
24	$4	70,219	$27,838	$723	$24,577	$51,691	$547,314
25	$5	69,868	$28,673	$720	$24,454	$52,407	$599,722
Totals:		1,856,209	$514,265	$15,897	$649,673	$1,148,042	$631,366
				Net Present Value (NPV)		**$599,747**	
				Internal Rate of Return (IRR)		**6.4%**	

Building	Roof Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW_{DC}	Total Annual kWh	Panel Weight (33 lbs)	W/SQFT
80 Hamilton St	5950	Sunpower SPR230	298	20.0	5,960	68.54	78,800	9,834	11.50



.= Proposed PV Layout

Notes:
1. Estimated kWH based on the National Renewable Energy Laboratory PVWatts Version 1 Calculator Program.