



LOCAL GOVERNMENT ENERGY AUDIT PROGRAM: ENERGY AUDIT REPORT

PREPARED FOR:

**CAPE MAY COUNTY LIBRARIES
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CAPE MAY COURT HOUSE, NJ 08210
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COUNTY ADMINISTRATOR**

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REPORT ISSUANCE: FINAL, OCTOBER 8, 2010

PROJECT NO: 9C10037

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I. EXECUTIVE SUMMARY

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

Cape May County:

Cape May City Library
110 Ocean Street
Cape May, NJ 08204

Library Main Branch
30 Mechanic Street
Cape May Court House, NJ 08210

Wildwood Crest Library
6301 Ocean Avenue
Wildwood Crest, NJ 08260

County Contact Person: AnnMarie McMahon,
Facility Contact Person: Deb Poillon

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:

Building	Utility Costs			Total
	Electricity	Natural Gas	Fuel Oil	
05 - Cape May City Library	\$8,447	\$4,156	-	\$12,603
21 - Main Library Branch	\$103,777	\$260	-	\$104,037
41 - Wildwood Crest Library	\$9,322	-	\$5,172	\$14,494

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 $\pm 20\%$. 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
	CAPE MAY CITY LIBRARY				
ECM #5-1	AHU Replacement to High Eff. Heat Pump	\$22,000	\$1,506	14.6	2.7%
ECM #5-2	Electric to Natural Gas DHW Heater	\$2,150	\$228	9.4	59.1%
ECM #5-3	High Efficiency Condensing Boiler	\$27,571	\$416	66.3	-62.3%
ECM #5-4	Lighting Upgrade	\$311	\$1,019	0.3	4814.8%
ECM #5-5	Lighting Occupancy Controls	\$1,365	\$621	2.2	582.4%
	MAIN LIBRARY BRANCH				
ECM #21-1	High-Eff. Split System Heat Pump	\$43,592	\$4,026	10.8	38.5%
ECM #21-2	Replace AHUs	\$60,445	\$1,326	45.6	-67.1%
ECM #21-3	HVAC Split System Replacement	\$6,304	\$515	12.2	22.5%
ECM #21-4	Premium Efficient Pump Motor	\$1,838	\$21	86.7	-79.2%
ECM #21-5	Lighting Upgrade	\$1,200	\$223	5.4	178.2%
ECM #21-6	Lighting Occupancy Controls	\$3,025	\$267	11.3	32.4%
	WILDWOOD CREST LIBRARY				
ECM #41-1	New DHW Heater Natural Gas	\$2,300	\$243	9.5	58.5%
ECM #41-2	New DHW Heater Oil Fired	\$2,100	\$202	10.4	44.3%
ECM #41-3	New DHW Heater Electric	\$1,950	\$87	22.4	-33.1%
ECM #41-4	High Efficiency Natural Gas Fired Boiler	\$17,100	\$1,390	12.3	103.2%
ECM #41-5	Constant Volume to VAV Conversion	\$13,470	\$1,377	9.8	104.4%
ECM #41-6	Lighting Retrofit	\$5,972	\$282	21.1	-29.1%
ECM #41-7	Occupancy Lighting Controls	\$1,095	\$62	17.6	-14.9%

RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST	ANNUAL SAVINGS	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
REM #41-1	25 kW Roof PV	\$229,770	\$16,125	14.2	75.4%

Notes: A. Cost takes into consideration applicable NJ Smart Start™ 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)	FUEL OIL (GALLONS)
	CAPE MAY CITY LIBRARY				
ECM #5-1	AHU Replacement to High Eff. Heat Pump	0.0	-16312.0	2758.0	-
ECM #5-2	Electric to Natural Gas DHW Heater	0.0	1993.0	-64.0	-
ECM #5-3	High Efficiency Condensing Boiler	0.0	0.0	276.0	-
ECM #5-4	Lighting Upgrade	2.3	6250.0	0.0	-
ECM #5-5	Lighting Occupancy Controls	1.0	3812.0	0.0	-
	MAIN LIBRARY BRANCH				
ECM #21-1	High-Eff. Split System Heat Pump	10.4	34705.2	-	-
ECM #21-2	Replace AHUs	1.4	11431.1	-	-
ECM #21-3	HVAC Split System Replacement	1.4	4443.5	-	-
ECM #21-4	Premium Efficient Pump Motor	0.0	183.0	-	-
ECM #21-5	Lighting Upgrade	1.0	1578.0	-	-
ECM #21-6	Lighting Occupancy Controls	7.4	1896.7	-	-
	WILDWOOD CREST LIBRARY				
ECM #41-1	New DHW Heater Natural Gas	0.0	1984.0	-60.0	0
ECM #41-2	New DHW Heater Oil Fired	0.0	1984.0	0.0	(57)
ECM #41-3	New DHW Heater Electric	0.0	525.0	0.0	0
ECM #41-4	High Efficiency Natural Gas Fired Boiler	0.0	0.0	-2694.0	2357
ECM #41-5	Constant Volume to VAV Conversion	0.0	2420.0	0.0	441
ECM #41-6	Lighting Retrofit	0.8	1711.6	0.0	0
ECM #41-7	Occupancy Lighting Controls	0.1	376.4	0.0	0

RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	DESCRIPTION	ELECTRIC DEMAND (KW)	ANNUAL UTILITY REDUCTION		
			ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)	FUEL OIL (GALLONS)
REM #41-1	25 kW Roof PV	25.0	31310.0	0.0	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 #05-2:** Electric to Natural Gas DHW heater
- **ECM #05-4:** Lighting Upgrade
- **ECM #05-5:** Lighting Occupancy Controls
- **ECM #21-5:** Lighting Upgrade
- **ECM #41-1:** New DHW Heater Natural Gas
- **ECM #41-5:** Constant Volume to VAV Conversion

It should be noted that prior to pursuing ECM #41-1 natural gas service availability to the building needs to be verified. If natural gas service is available for the building ECM#41-4 replacing the existing oil fired boiler with a natural gas fired boiler should be strongly considered given the increase in efficiency benefits of a gas fired boiler.

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.

Renewable Energy Measures (REMs) were also reviewed for implementation at the Libraries. CEG utilized a roof mounted solar array to house a PV system at the Wildwood Crest Library. The recommended 25 kW PV system will produce approximately 31,310 kWh of electricity

annually and will reduce the library's electrical consumption from the grid by 55%. The system's calculated simple payback of 14.2 years is past the standard 10 year simple payback threshold; however, with alternative funding this payback could be lessened. CEG recommends the Owner review all funding options before deciding to not implement this renewable energy measure.

Overall, the Libraries appear to be operating at a high efficiency level compared to other libraries in the region. With the implementation of the above recommended measures the Cape May County Libraries will realize further energy savings at its facilities.

II. INTRODUCTION

The comprehensive energy audit covers 51,600 square feet of Cape May County Library facilities, which includes Cape May City Library, Library Main Branch, and Wildwood Crest Library.

Ref. #	Facility Name	Area (Sqft)	Address
5	Cape May City Library	4,300	Ocean & Hughes Avenue
21	Library Main Branch	42,900	30 Mechanic Street
41	Wildwood Crest Library	4,400	6301 Ocean Avenue Wildwood Crest

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/ft²/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:

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

$$\text{Simple Lifetime Savings} = (\text{Yearly Savings} \times \text{ECM Lifetime})$$

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

$$\text{Lifetime Maintenance Savings} = (\text{Yearly Maintenance Savings} \times \text{ECM Lifetime})$$

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

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

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

IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage / Tariffs

The energy usage for the facilities 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 for each of the Library Facilities. The following table shows the utility providers that serve the facilities.

Building	Utility Provider			
	Electricity	Natural Gas	Fuel Oil	Propane
05 - Cape May City Library	ACE	SJG	-	-
21 - Main Library Branch	ACE	SJG	-	-
41 - Wildwood Crest Library	ACE	SJG	Grace	-

Notes:

- 1) ACE - Atlantic City Electric
- 2) SJG - South Jersey Gas

The electric usage profile represents the actual electrical usage for each of the facilities. 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 each of the facilities where natural gas is provided. 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 oil usage profile shows the actual oil consumption for each the facilities where oil is provided. The oil provider measures consumption in gallons. One Gallon of #2 oil is equivalent to 140,000 BTUs of energy.

The overall cost for utilities is calculated by dividing the total cost by the total usage. Based on the utility history provided, the average cost for utilities at each of the facilities is as follows:

Building	Average Utility Costs			
	Electricity \$/kWh	Natural Gas \$/therm	Fuel Oil \$/gal	Propane \$/gal
05 - Cape May City Library	\$0.163	\$1.510	-	-
21 - Main Library Branch	\$0.141	\$9.560	-	-
41 - Wildwood Crest Library	\$0.165	-	\$2.190	-

**Table 3
Electricity Billing Data**

Table 3A: #5 – Cape May City Library

ELECTRIC USAGE SUMMARY			
Utility Provider: Atlantic Electric			
Rate: MGS			
Meter No: 6408790			
Customer ID No: 1245 3099 9992			
Third Party Utility			
TPS Meter / Acct No:			
MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
Jan-09	5,609	14.0	\$618
Feb-09	4,979	13.2	\$739
Mar-09	5,021	13.4	\$746
Apr-09	3,268	13.0	\$510
May-09	3,387	12.4	\$532
Jun-09	2,916	19.8	\$507
Jul-09	4,638	21.3	\$913
Aug-09	5,100	21.2	\$1,003
Sep-09	5,772	22.2	\$1,163
Oct-09	3,642	15.2	\$557
Nov-09	2,211	17.7	\$378
Dec-09	5,179	14.4	\$781
Totals	51,722	22.2 Max	\$8,447
AVERAGE DEMAND		16.5 KW average	
AVERAGE RATE		\$0.163 \$/kWh	

Table 3B: #21 – Main Library Branch

ELECTRIC USAGE SUMMARY			
Utility Provider: Atlantic Electric			
Rate: AGS			
Meter No: 79967488			
Customer ID No: 0036 3989 9933 , 103 7077393			
Third Party Utility Pepco (Oct-09)			
TPS Meter / Acct No:			
MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
Jan-09	52,500	108.0	\$6,980
Feb-09	59,100	138.0	\$7,711
Mar-09	62,500	148.8	\$6,941
Apr-09	63,300	174.0	\$8,493
May-09	64,500	159.0	\$9,143
Jun-09	69,300	162.0	\$11,295
Jul-09	72,000	180.0	\$11,686
Aug-09	76,500	168.0	\$12,295
Sep-09	63,000	153.0	\$9,774
Oct-09	56,100	144.0	\$7,061
Nov-09	57,300	129.0	\$7,134
Dec-09	38,629	0.0	\$5,263
Totals	734,729	180.0 Max	\$103,777
AVERAGE DEMAND		138.7 KW average	
AVERAGE RATE		\$0.141 \$/kWh	

Table 3C: #41 – Wildwood Crest Library

ELECTRIC USAGE SUMMARY			
Utility Provider: Atlantic Electric			
Rate: MGS			
Meter No: 79967488			
Customer ID No: 0364 0659 9997			
Third Party Utility			
TPS Meter / Acct No:			
MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
Jan-09	5,179	14.4	\$576
Feb-09	4,695	13.5	\$698
Mar-09	4,867	14.6	\$741
Apr-09	4,181	18.5	\$668
May-09	4,085	19.6	\$667
Jun-09	4,051	19.8	\$684
Jul-09	5,313	23.0	\$1,045
Aug-09	5,690	25.1	\$1,119
Sep-09	6,108	28.6	\$1,201
Oct-09	4,599	21.2	\$595
Nov-09	3,915	16.0	\$661
Dec-09	3,857	17.2	\$669
Totals	56,540	28.6 Max	\$9,322
AVERAGE DEMAND		19.3 KW average	
AVERAGE RATE		\$0.165 \$/kWh	

**Figure 1
Electricity Usage Profile**

Figure 1A

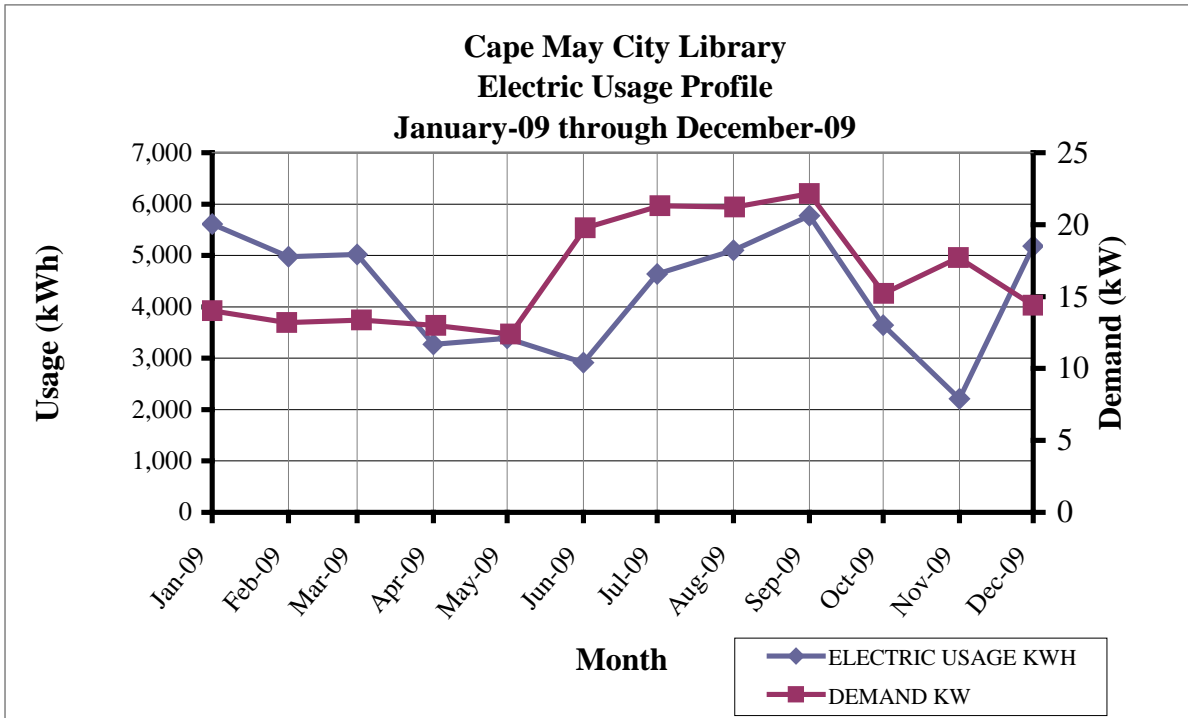


Figure 1B

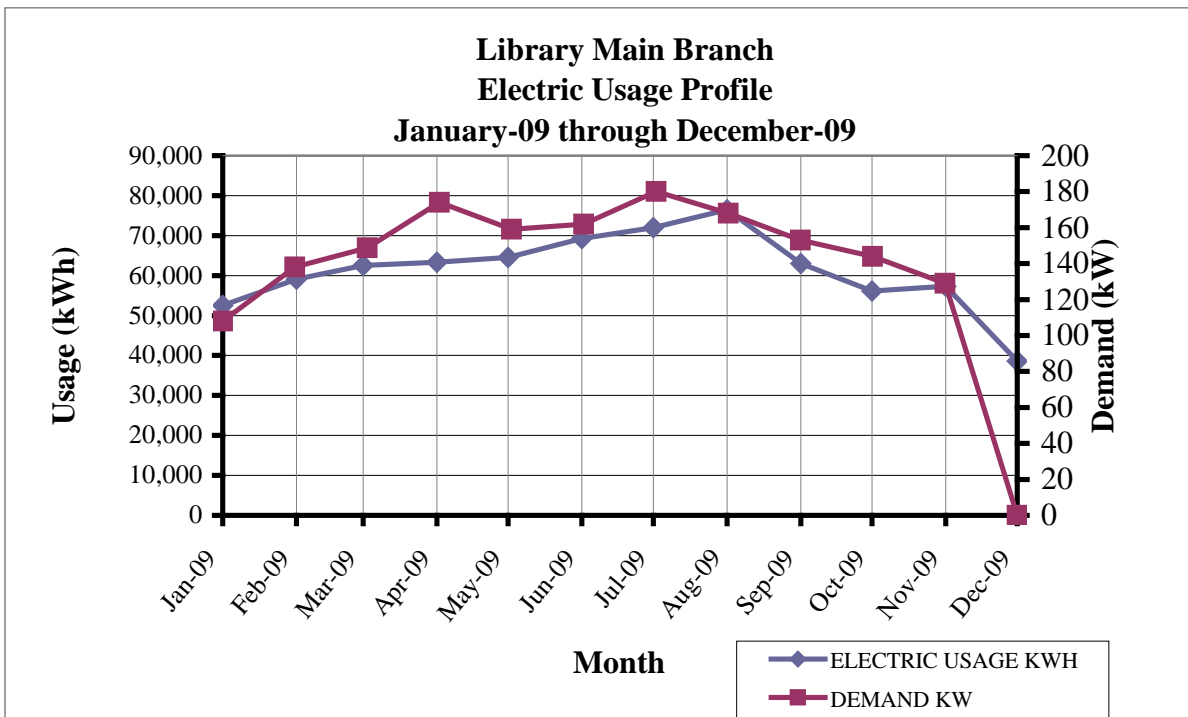
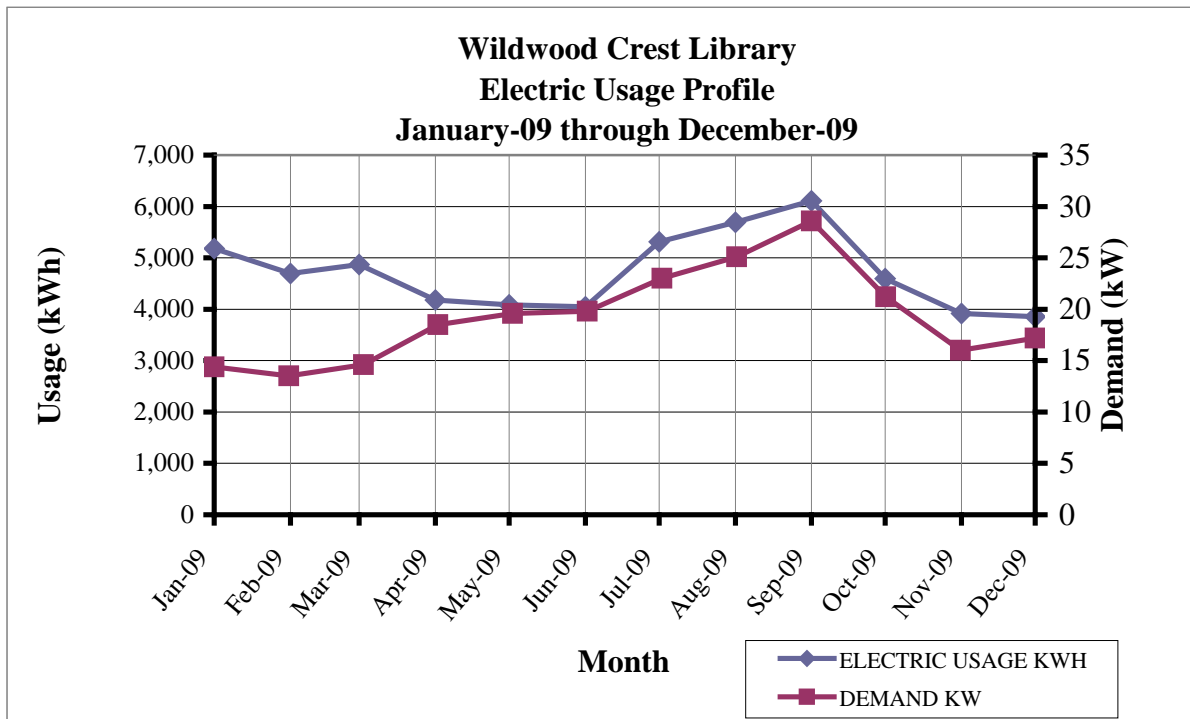


Figure 1C



**Table 4
Natural Gas Billing Data**

Table 4A: #5 – Cape May City Library

NATURAL GAS USAGE SUMMARY		
Utility Provider: SJ Natural Gas		
Rate: General Service Gas		
Meter No: 4297505		
Point of Delivery ID: 4 19 52 0003 1 7		
Third Party Utility Provider:		
TPS Meter No:		
MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
Jan-09	583.34	\$771.93
Feb-09	630.92	\$959.30
Mar-09	577.92	\$882.12
Apr-09	395.90	\$608.70
May-09	233.46	\$369.81
Jun-09	0.00	\$18.73
Jul-09	0.00	\$18.73
Aug-09	0.00	\$17.48
Sep-09	0.00	\$19.97
Oct-09	1.02	\$19.47
Nov-09	138.38	\$196.51
Dec-09	197.18	\$273.70
TOTALS	2,758.12	\$4,156.45
AVERAGE RATE:	\$1.51	\$/THERM

Table 4B: #21 – Main Library Branch

NATURAL GAS USAGE SUMMARY		
Utility Provider: SJ Natural Gas		
Rate: General Service Gas		
Meter No: 4297505		
Point of Delivery ID: 4 09 54 0111 1 6 / 5		
Third Party Utility Provider:		
TPS Meter No:		
MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
Jan-09	1.04	\$19.64
Feb-09	3.10	\$24.60
Mar-09	1.03	\$19.62
Apr-09	2.07	\$43.30
May-09	3.11	\$3.78
Jun-09	1.04	\$19.65
Jul-09	5.16	\$25.85
Aug-09	2.05	\$23.04
Sep-09	3.07	\$20.07
Oct-09	1.03	\$40.10
Nov-09	1.39	\$16.35
Dec-09	3.08	\$3.88
TOTALS	27.17	\$259.88
AVERAGE RATE:	\$9.56	\$/THERM

Figure 2
Natural Gas Usage Profile

Figure 2A

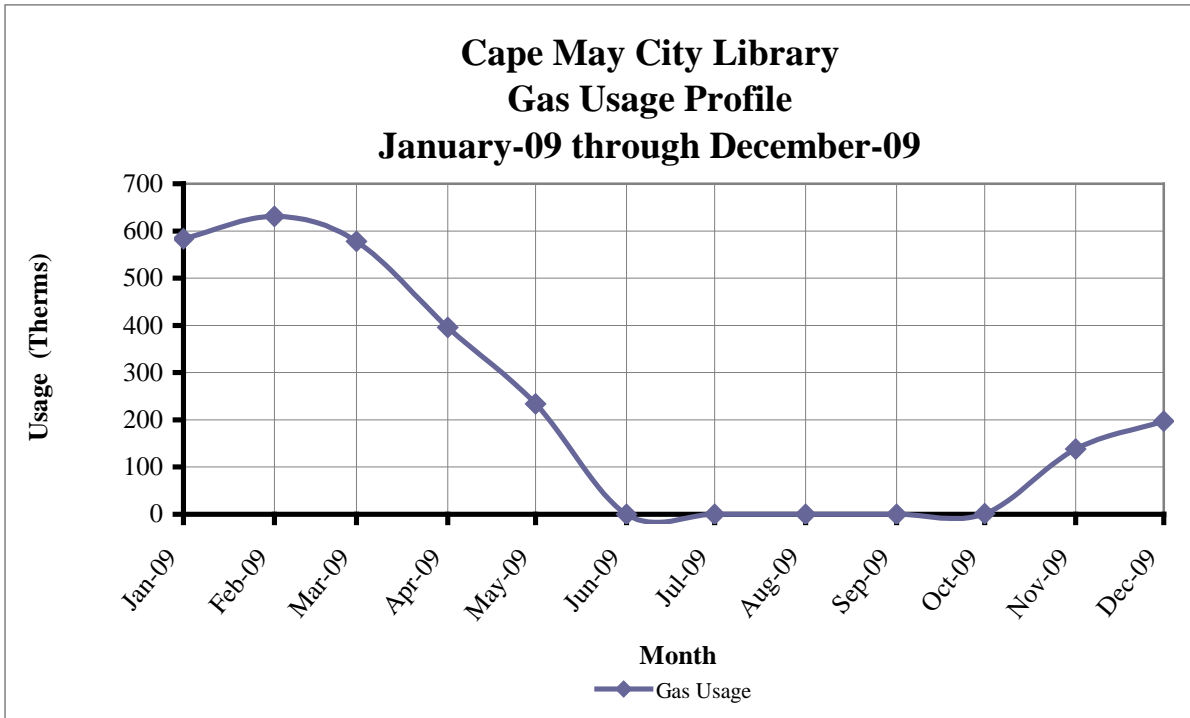
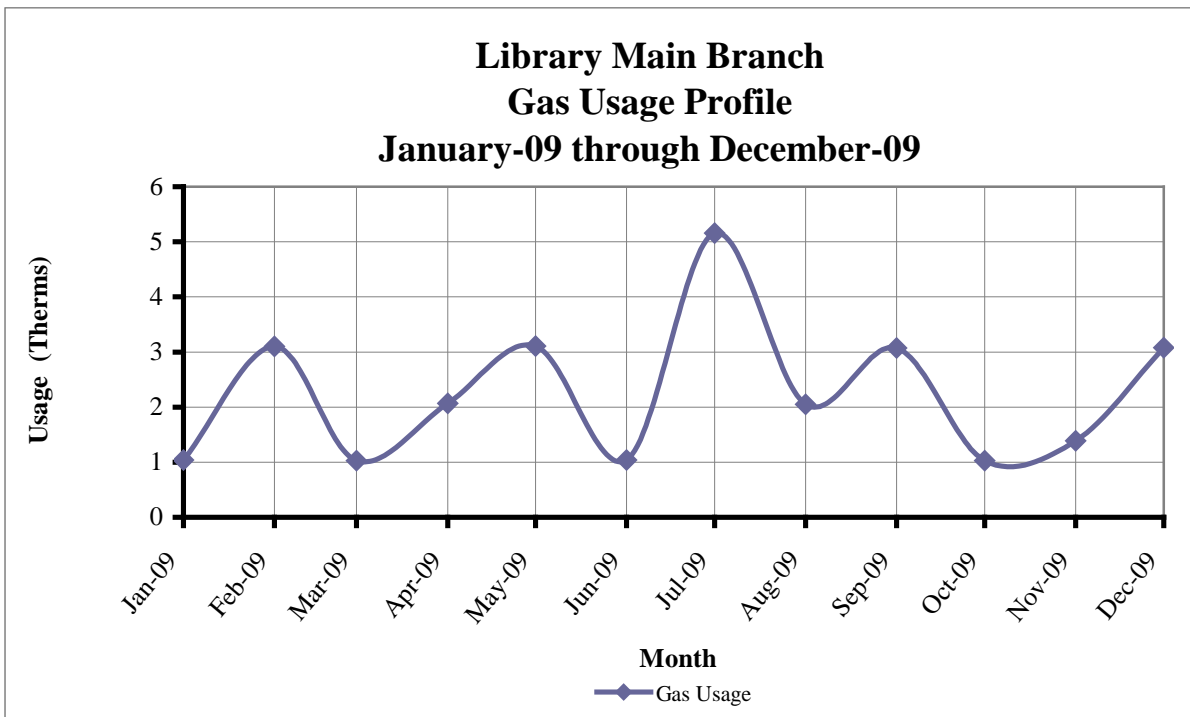


Figure 2B

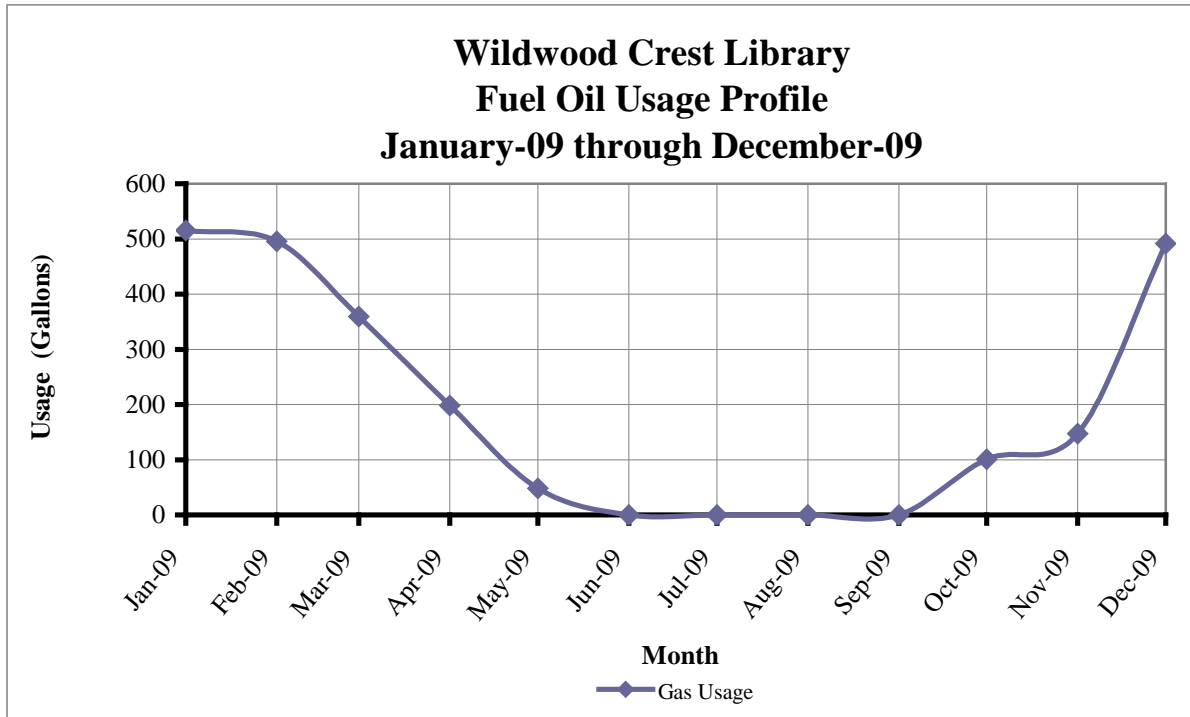


**Table 5
Fuel Oil Billing Data**

Table 5: #41 – Wildwood Crest Library

FUEL OIL USAGE SUMMARY		
Utility Provider: Grace Oil		
Rate:		
Meter No:		
Point of Delivery ID:		
Third Party Utility Provider:		
TPS Meter No:		
MONTH OF USE	CONSUMPTION (GALLONS)	TOTAL BILL
Jan-09	515.10	\$1,134.88
Feb-09	495.60	\$1,027.41
Mar-09	359.60	\$636.23
Apr-09	198.40	\$396.60
May-09	48.10	\$44.96
Jun-09	0.00	\$0.00
Jul-09	0.00	\$0.00
Aug-09	0.00	\$0.00
Sep-09	0.00	\$0.00
Oct-09	101.00	\$257.83
Nov-09	147.40	\$412.57
Dec-09	491.70	\$1,261.38
TOTALS	2,356.90	\$5,171.86
AVERAGE RATE:	\$2.19	\$/GALLON

**Figure 3
Fuel Oil 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:

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

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

**Table 6
Facility Energy Use Index (EUI) Calculation**

Table 6A #5- Cape May City Library

ENERGY USE INTENSITY CALCULATION						
ENERGY TYPE	BUILDING USE			SITE ENERGY kBtu	SITE-SOURCE RATIO	SOURCE ENERGY kBtu
	kWh	Therms	Gallons			
ELECTRIC	51722.0			176,579	3.340	589,774
NATURAL GAS		2758.1		275,812	1.047	288,775
FUEL OIL			0.0	0	1.010	0
PROPANE			0.0	0	1.010	0
TOTAL				452,391		878,549
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
BUILDING AREA	4,300		SQUARE FEET			
BUILDING SITE EUI	105.21		kBtu/SF/YR			
BUILDING SOURCE EUI	204.31		kBtu/SF/YR			

Table 6B #21- Main Library Branch

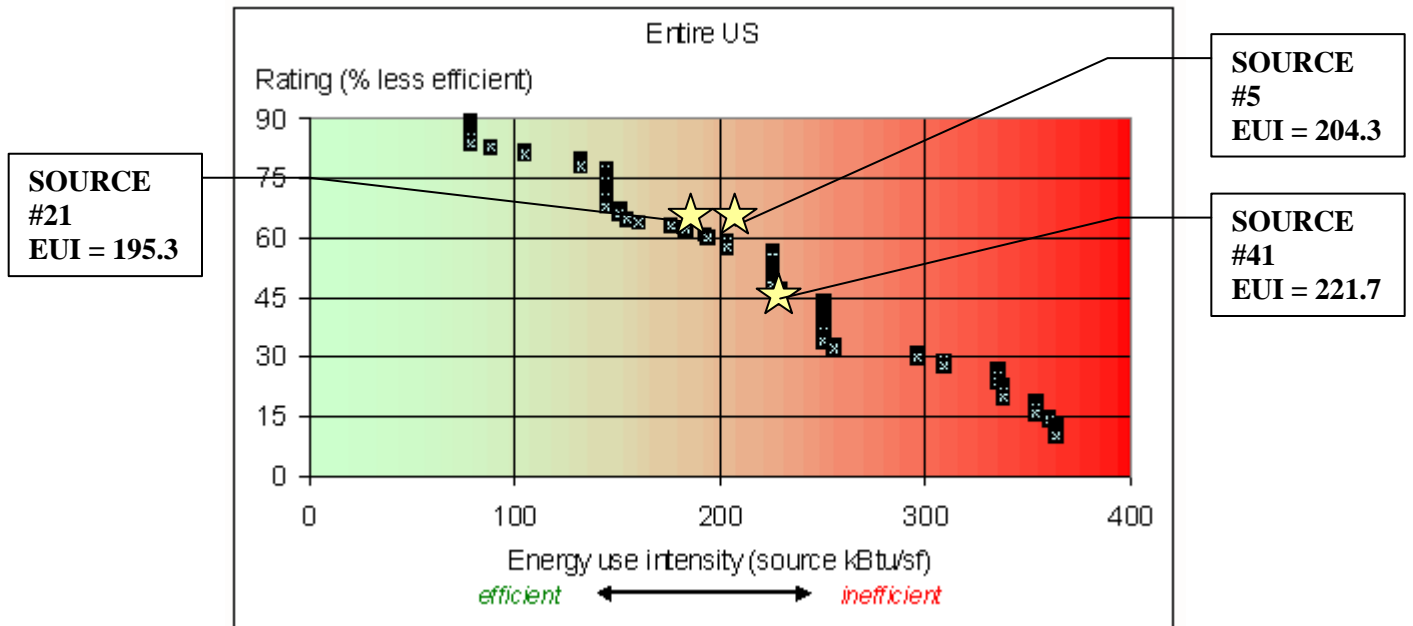
ENERGY USE INTENSITY CALCULATION						
ENERGY TYPE	BUILDING USE			SITE ENERGY kBtu	SITE-SOURCE RATIO	SOURCE ENERGY kBtu
	kWh	Therms	Gallons			
ELECTRIC	734,729.0			2,508,365	3.340	8,377,938
NATURAL GAS		27.2		2,717	1.047	2,845
FUEL OIL			0.0	0	1.010	0
PROPANE			0.0	0	1.010	0
TOTAL				2,511,082		8,380,783
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
BUILDING AREA	42,900		SQUARE FEET			
BUILDING SITE EUI	58.53		kBtu/SF/YR			
BUILDING SOURCE EUI	195.36		kBtu/SF/YR			

Table 6C #41- Wildwood Crest Library

ENERGY USE INTENSITY CALCULATION						
ENERGY TYPE	BUILDING USE			SITE ENERGY	SITE-SOURCE RATIO	SOURCE ENERGY
	kWh	Therms	Gallons	kBtu		kBtu
ELECTRIC	56540.0			193,028	3.340	644,712
NATURAL GAS		0.0		0	1.047	0
FUEL OIL			2356.9	327,609	1.010	330,885
PROPANE			0.0	0	1.010	0
TOTAL				520,637		975,597
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
BUILDING AREA	4,400 SQUARE FEET					
BUILDING SITE EUI	118.33 kBtu/SF/YR					
BUILDING SOURCE EUI	221.73 kBtu/SF/YR					

Figure 3 below depicts a national EUI grading for the source use of Library Buildings.

Figure 3
Source Energy Use Intensity Distributions: Library



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: capemaylibrary
 Password: lgeaceg2010
 Security Question: What city were you born in?
 Security Answer: "Cape May"

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 7
ENERGY STAR Performance Rating

ENERGY STAR PERFORMANCE RATING		
Facility Description	Energy Performance Rating	National Average
05 Cape May City Library	N/A	N/A
21 Main Library Branch	N/A	N/A
41 Wildwood Crest Library	N/A	N/A

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

The Library Facilities all fall under the “other” category which is not applicable for Energy Performance Rating. See the **Statement of Energy Performance Appendix** for the detailed energy summary.

V. FACILITY DESCRIPTION

This audit report includes three of the Cape May County Library buildings which are the #5 Cape May City Library, #21 Main Library Branch, and #41 Wildwood Crest Library.

Individual buildings are discussed in the following section of the report.

#05 - Cape May City Library

The 4,300 SF Cape May City Library Building is a one story facility comprised of restrooms, conference room, storage room, mechanical room, employee break room, and book stack area. The typical hours of operation for this facility are between 9:00 am and 5:00 pm Monday, Wednesday, & Friday, 9:00 AM and 8:00 PM Tuesday and Thursday, and 9:00 AM and 4:00 PM Saturday. Exterior walls have a stucco overlay construction with insulation typical of the time period. The amount of insulation within the wall is unknown. The windows throughout the facility are in good condition and appear to be well maintained. Typical windows throughout the facility are double pane, ¼” clear glass with vinyl frames. Blinds are utilized through the facility per occupant comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer. The roof is a standing seam corrugated metal roof. The building was built according to county record in the early 1900’s with various renovations that occurred to change the interior and exterior portions of the building.

HVAC Systems

The main library area is conditioned by one ceiling hung constant volume indoor air handling unit for cooling only. Heating is provided via four ceiling hung Modine hot water unit heaters for the main stack area, the remaining areas are heated via electric strip baseboard.

The indoor air handler is attached to two outdoor air cooled condensing units rated at 60,000 Btu/Hr each. The outdoor units are made by Carrier subsidiary company, BDP, and approximately 1990 vintage.

Heating hot water is supplied to the building via one (1) natural gas fired boiler. The boiler is a Weil McLain model PFG-8-PIN rated at 427,000 Btu/hr input and net output rate of 346,000 Btu/hr. Hot water is circulated via two zone pumps rated at 1/12 & 1/25 horsepower.

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 unit heaters and baseboard are controlled by local thermostats mounted adjacent to the unit. The air handler is controlled by a wall mount Honeywell Thermostat with set point control capability.

Domestic Hot Water

Domestic hot water for the restrooms and office lounge is provided by a 12 gallon Bradford White electric hot water heater, capacity of 1500 Watts. The domestic hot water is circulated throughout the building by a hot water re-circ pump. The circulation pump is controlled by an aqua stat. The domestic hot water piping insulation appeared to be in good condition.

Lighting

Typical lighting throughout building is fluorescent tube lay-in fixtures with T-8 lamps and electronic ballasts. Additional accent lighting is provided by decorative ceiling hung and wall mount fixtures with 60 watt incandescent medium base screw in bulbs.

#21 - Library Main Branch

Facility Description

The 42,900 SF Main Library Building at the Court House Complex is a two story facility with a basement. The first and second floor is comprised of restrooms, storage room, electrical room, reading area, book stack area and a second floor computer room. The basement is comprised of restrooms, locker rooms, storage room, kitchen and offices. The typical summer hours of operation for this facility are Monday through Friday 8:30 AM – 4:30 PM, Saturday 9 AM – 4:30 PM. The typical winter hours of operation for this facility are Monday through Friday 8:30 AM – 9 PM, Saturday 9 AM – 4:30 PM and Sunday 1pm – 5 pm. Exterior walls are block with face brick construction with minimum insulation typical of the time period. The amount of insulation within the wall is unknown. The windows throughout the facility are in good condition and appear to be well maintained. Typical windows throughout the facility are double pane, ¼” clear glass with vinyl frames. Blinds are utilized through the facility per occupant comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer. The majority of the roof is standard shingle roof with A-frame style truss system below. The building was built in 1971.

HVAC Systems

A central boiler plant provides hot water for heating to the Court House and to the Library. There are two (2) Bryan Boilers model RV800-W-FDGO with 8,000 MBH natural gas/ 57.1 #2 oil input. The boilers are ten (10) years old, in good condition and have twenty (20) years of ASHRAE expected useful service life remaining. The boilers have a Gordon Piatt model 5.12-1-GO-50 burner with 8,000 MBH natural gas/ 57.1 #2 oil input. The burners are ten (10) years old, in good condition and have eleven (11) years of ASHRAE expected useful service life remaining.

There are two (2) primary hot water loop circulation pumps are PACO model MPE-7741 and are rated at 400 GPM @ 75 Feet of Head. The pumps appear ten (10) years old, in fair condition and have ten (10) years of ASHRAE expected useful service life remaining.

The Library secondary loop pump is a Bell and Gossett model 1515 base mounted end suction pump with a 5 hp motor and rated at 130 GPM @ 88 feet of head. The pump is five (5) years old, in good condition and have fifteen (15) years of ASHRAE expected useful service life remaining.

There is another Library secondary loop pump. It is a PACO model 16-20959-130101-1682 in-line pump with a 5 hp motor and rated at 130 GPM @ 88 feet of head. The pump is ten (10) years old, in good condition and is at the end of its ASHRAE expected useful service life.

There are four (4) Trane unit heaters model UHSA060 serving the Emergency Generator room. They have 60 MBH hot water input, are sixteen (16) years old, are in fair condition and have four (4) years of ASHRAE expected useful service life remaining.

Cooling for the Library is provided by two (2) York model YCAL0060, 60 Ton nominal air cooled liquid chiller. They are ten (10) years old, in fair condition and have ten (10) years of ASHRAE expected useful service life remaining. The chilled water is circulated a PACO base mounted pump with a 3 hp motor. The pump is ten (10) years old, in good condition and has ten (10) years of ASHRAE expected useful service life remaining.

There is a Trane 20 Ton nominal air cooled condensing unit serving the Library. It is sixteen years old, in fair condition and is one year past its ASHRAE expected useful service life.

There are three Trane indoor modular air handling units size 17, 12 and 8 serving the library. They have nominal cooling capacities of 20 Ton, 15 Ton and 10 Ton respectively. The units are fifteen (15) years old, in fair condition and are at the end of their ASHRAE expected useful service life.

There is a Rheem air handling unit model RHGE-075 serving the second floor with 8 tons of refrigerant direct expansion nominal cooling capacity. The unit is six (6) years old, in fair condition and has nine (9) years of ASHRAE expected useful service life remaining.

There is one (1) Trane split heat pump system model TRW018 with a 1.5 ton nominal cooling capacity. There is one (1) Trane split heat pump system model TRW024 with a 2 ton nominal cooling capacity. There is one (1) Trane split heat pump system model TRW042 with a 3.5 ton nominal cooling capacity. There is one (1) Trane split heat pump system model TRW048 with a 4 ton nominal cooling capacity. These units are sixteen (16) years old, in fair condition and are one (1) year past their ASHRAE expected useful service life.

There are two (2) Trane split heat pump systems model TRW060 with a 5 ton nominal cooling capacity. These units are seventeen (17) years old, in fair condition and are two (2) year past their ASHRAE expected useful service life.

There is one (1) Trane split system condensing unit model 2TTB2030 with a 2 1/2 ton nominal cooling capacity. The unit is seven (7) years old, in fair condition and has eight (8) years of ASHRAE expected useful service life remaining.

There is one (1) Sanyo split heat pump system model CH2472 with a 2 ton nominal cooling capacity. The units are two (2) years old, in good condition and have thirteen (13) years of ASHRAE expected useful service life remaining.

There are two (2) Sanyo ductless mini split air conditioning system models KHS2472 indoor / KS1822 outdoor with a 1.5 ton nominal cooling capacity. The units are fifteen (15) years old, in fair condition and are at the end of their ASHRAE expected useful service life.

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 HVAC systems within the facility are controlled via a standalone Johnson Metasys control panel with Johnson Thermostats located for each zone.

Domestic Hot Water

Domestic hot water for the restrooms and kitchen is provided by an 80 gallon Bradford White model MII80-9-3-CF-09 electric water heater, capacity of 9000 Watts. The water heater is seventeen (17) years old, in fair condition and is five (5) years past its expected useful service life. The domestic hot water is circulated throughout the building by a fractional horse power hot water re-circ pump. The circulation pump is controlled by an aqua stat. The domestic hot water piping insulation appeared to be in good condition. Due to its location and great difficulty in achieving adequate combustion venting, it is recommended this water heater be replaced “in-kind” in the near future as a maintenance project since there would be no energy savings.

Lighting

Typical lighting throughout building is fluorescent tube lay-in fixtures with T-8 lamps and electronic ballasts. There was a small amount T12 fixtures with magnetic ballasts located in the mechanical spaces and storage rooms. Incandescent lamps were located in closets throughout the facility.

#41 - Wildwood Crest Library

The 4,400 SF Wildwood Crest Library Building is a one story facility comprised of restrooms, garage, storage room, mechanical room, solarium, computer room, and book stack area. The typical hours of operation for this facility are between 9:00 am and 5:00 pm Monday, Tuesday, Thursday, & Friday, 9:00 AM and 8:00 PM Wednesday, and 9:00 AM and 1:00 PM Saturday. The hours change slightly in the summer time to being open till 8 PM on Monday in addition to Wednesday. Exterior walls are brick construction with minimum insulation typical of the time period. The amount of insulation within the wall is unknown. The windows throughout the facility are in good condition and appear to be well maintained. Typical windows throughout the facility are double pane, ¼” clear glass with vinyl frames. Blinds are utilized through the facility

per occupant comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer. The majority of the roof is standard shingle roof with A-frame style truss system below. The building was built in 1970.

HVAC Systems

The main library area is conditioned by one ceiling mounted Carrier constant volume indoor air handling unit with hot water reheat coils located in the supply ductwork. The system is currently separated into four heating zones each with a dedicated zone thermostat.

The solarium is conditioned only by two Mr. Slim Mitsubishi direct expansion cooling wall mounted cassettes. Each of the units is rated for 1.5 tons of cooling. At the time of survey one of the units was down for repair. Each unit is controlled of a dedicated wireless thermostat with set point control capability.

Heating hot water is supplied to the building via one (1) #2 fuel oil fired boiler. The boiler is a Columbia Emerald Boiler model EM-125 rated at 175,000 Btu/hr input and net output rate of 129,000 Btu/hr. Hot water is circulated via one ¼ horsepower pump.

Entrance doorways are heated via electric cabinet heaters.

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 HVAC systems within the facility are controlled via a standalone Johnson Metasys control panel with Johnson Thermostats located for each zone.

Domestic Hot Water

Domestic hot water for the restrooms and office lounge is provided by a 30 gallon Bradford White electric hot water heater, capacity of 4500 Watts. The domestic hot water is circulated throughout the building by a hot water re-circ pump. The circulation pump is controlled by an aqua stat. The domestic hot water piping insulation appeared to be in good condition.

Lighting

Typical lighting throughout building is fluorescent tube lay-in fixtures with T-8 lamps and electronic ballasts. Storage rooms, restrooms and closets lit with a mixture of incandescent lamps and compact fluorescent lamps. The building perimeter is has wall mounted outdoor flood lamps located on the corners of the building.

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

Cape May City Library:

ECM #5-1: High-Efficiency Split System Heat Pump

Description:

The Cape May City Library has a separate cooling and heating system which are controlled independent of one another. Cooling is provided by a direct expansion ceiling hung air handler with wall mounted thermostat controls. The heating is provided by four ceiling hung hot water unit heaters with thermostats mounted on the unit. Hot water is supplied by a 19 year old natural gas fired Weil McLain boiler that is rated at 81% efficient.

Considering the two systems could potentially fight one another and the age of the existing cooling system CEG recommends the installation of an air to air heat pump system to heat and cool the library. This ECM would replace the existing 10 ton cooling only unit with a 10 ton Carrier split system heat pump rated at 11.0 EER and 3.3 COP. **The owner should consult a professional engineer prior to proceeding with this ECM to ensure adequate electrical system capacity and verify current heating and cooling loads to insure proper sizing of the unit.**

Energy Savings Calculations:

Utility Costs	
Electric Cost, \$/kWh	\$0.163
Gas Cost, \$/therm	\$1.510

Cooling Energy Savings Calculations

$$EnergySavings = \frac{[CoolingTons \times 12,000 Btu / ton]}{[1000W / kW]} \times \left(\frac{1}{EER_{OLD}} - \frac{1}{EER_{NEW}} \right) \times Hrs.ofCooling$$

Cooling Savings			
	Existing	Proposed	Savings
EER	8.5	11.0	
Tons	10	10	
Cooling Hours	1,100	1,100	
Electric, kWh	15,529	12,000	3,529
Savings Cost	\$2,531.29	\$1,956.00	\$575.29

Heating Energy Savings Calculations

$$\text{Heating Load mmBtu} = \text{Gas Bill Usage (therms)} * \frac{100,000 \text{ Btu}}{\text{therm}} * \text{Boiler Efficiency} * \frac{\text{mmBtu}}{1 \times 10^6 \text{ Btu}}$$

$$\text{Heating Electric Usage kWh} = \frac{\text{Heating Load (mmBtu)} * \frac{1 \times 10^6 \text{ Btu}}{\text{mmBtu}}}{\frac{3.3 \text{ kWh Heat Out}}{1 \text{ kWh In}} * \frac{3,412 \text{ Btu}}{\text{kWh}}}$$

Heating Savings			
	Existing	Proposed	Savings
Gas Usage, therms	2758		
Boiler Efficiency	81%		
Heating Load mmBtu's	223.4		
Heat Pump COP		3.3	
Electric kWh of Heat		19,841	
Heating Costs	\$4,164.58	\$3,234.03	\$930.55

Energy Savings Summary:

ECM #5-1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$22,000
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$22,000
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,506
Total Yearly Savings (\$/Yr):	\$1,506
Estimated ECM Lifetime (Yr):	15
Simple Payback	14.6
Simple Lifetime ROI	2.7%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$22,588
Internal Rate of Return (IRR)	0%
Net Present Value (NPV)	(\$4,023.26)

ECM #5-2: Electric to Natural Gas DHW Heater

Description:

The Cape May City Library has one 12 gallon electric hot water heater to supply the entire facility. The boiler is located in the mechanical space adjacent to the gas connection for the heating boiler. The current heater although only a year old still has associated losses with storing water during non use and since the usage in the library is intermittent due to its swings in occupancy the installation of a tankless system would remove the cost of keeping storage water at temperature during non use times.

This ECM will replace the existing 12 gallon electric with a tankless Rinnai R75LSe natural gas fired unit 83% efficient. This will require additional gas piping and flue venting to accommodate the new heater. **The owner should consult a professional engineer prior to proceeding with this ECM to have any necessary gas piping/flue venting designed to supply this water heater and verify the existing system can accommodate the increased loading.**

Energy Savings Calculations:

Calculation Constants	
Hours per Tank Empty	8
Days Occupied per Week	6
Electric Cost, \$/kWh	\$0.16
Natural Gas Cost, \$/therm	\$1.51

$$R\text{-Value} = 10.0 \text{ h-F-ft}^2/\text{Btu}$$

$$\text{Water Temp} = 120 \text{ F}$$

$$\text{Air Temp} = 65 \text{ F}$$

$$\text{Tank Losses (Btu/h)} = \frac{\text{Surface Area of Tank} \times (\text{Storage Water Temperature} - \text{Air Temperature})}{\text{Tank R-Value}}$$

$$\text{Losses Electric Usage (kWh)} = \frac{\text{Tank Losses (Btu/h)}}{3,412 \frac{\text{Btu}}{\text{kWh}}} \times 24 \text{ Hrs} \times 365 \text{ Days}$$

$$\text{Hot Water Usage} \left(\frac{\text{gal}}{\text{day}} \right) = \frac{\text{Occupied Hours per day}}{\text{Hours per tank empty}} \times \text{Tank Size (gal)}$$

$$\text{Heating Usage (Btu)} = \text{Hot Water Usage} \times 8.34 \frac{\text{Btu}}{\text{gal}} \times (120 \text{ F} - 50 \text{ F}) \times 52 \frac{\text{Weeks}}{\text{year}} \times \text{Occupied Days per week}$$

Existing Domestic Hot Water Usage:

Total Usage (Btu) = Losses Usage + Heating Usage

$$\text{Electric Usage (kWh)} = \frac{\text{Total Usage (Btu)}}{\% \text{ Eff.} \times 3,412 \frac{\text{Btu}}{\text{kWh}}}$$

Proposed Domestic Hot Water Usage:

$$\text{Natural Gas Usage (therms)} = \frac{\text{Heating Usage (Btu)}}{\% \text{ Eff.} \times 100,000 \frac{\text{Btu}}{\text{therm}}}$$

Energy Savings Summary:

ECM #5-2 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$2,450
NJ Smart Start Equipment Incentive (\$):	\$300
Net Installation Cost (\$):	\$2,150
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$228
Total Yearly Savings (\$/Yr):	\$228
Estimated ECM Lifetime (Yr):	15
Simple Payback	9.4
Simple Lifetime ROI	59.1%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$3,420
Internal Rate of Return (IRR)	6%
Net Present Value (NPV)	\$571.85

ECM #5-3: Condensing Boiler Installation

Description:

The existing cast iron boilers are used as the primary source of heat for the library to four unit heaters hung from the ceiling in the main space. The existing boiler is over half of its life expectancy of a typical cast iron boiler, however the equipment appears to be maintained in fair operating condition. Even for boilers that are close to the end of its life it is difficult to predict the point at which the boiler becomes inoperable. With the increased efficiency of the condensing boilers, the savings can be substantial.

New condensing boilers could substantially improve the operating efficiency of the heating system of the building. Condensing boiler's peak efficiency tops out at 99% depending on return water temperature. Due to the operating conditions of the building, the annual average operating efficiency of the proposed condensing boiler is expected to be 90%. The existing boiler's efficiency is approximately 81%, which makes the condensing boilers a 9% increase in efficiency. This ECM is based on variable supply water temperature adjusted based on outdoor temperature.

This ECM includes installation of one condensing gas fired boilers to replace the existing cast iron boiler. The basis for this ECM is Lochinvar Knight Series condensing boiler; model number KBN-399. The boiler installation is based on a one for one replacement based on output capacity of the existing boiler.

Energy Savings Calculations:

Existing Heating Natural Gas: 2,758 Therms

$$\text{Bldg Heat Required} = \text{Existing Nat Gas (Therms)} \times \text{Heating Eff.}(\%) \times \text{Fuel Heat Value} \left(\frac{\text{BTU}}{\text{Therm}} \right)$$

$$\text{Proposed Heating Gas Usage} = \frac{\text{Bldg Heat Required (BTU)}}{\text{Heating Eff.}(\%) \times \text{Fuel Heat Value} \left(\frac{\text{BTU}}{\text{Therm}} \right)}$$

$$\text{Energy Cost} = \text{Heating Gas Usage(Therms)} \times \text{Ave Fuel Cost} \left(\frac{\$}{\text{Therm}} \right)$$

CONDENSING BOILER CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Existing Cast Iron Boilers	New Condensing Boilers	
Existing Nat Gas (Therms)	2,758	0	
Boiler Efficiency (%)	81%	90%	9%
Nat Gas Heat Value (BTU/Therm)	100,000	100,000	
Equivalent Building Heat Usage (MMBTUs)	223	223	
Gas Cost (\$/Therm)	1.51	1.51	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Natural Gas Usage (Therms)	2,758	2,482	276
Energy Cost (\$)	\$4,165	\$3,748	\$416
COMMENTS:			

Installation cost of the new condensing boiler, demolition, flue piping, boiler water piping modifications, gas piping modifications, electric, etc. is estimated to be \$28,269.

From the **NJ Smart Start Appendix**, the installation of new condensing boilers warrants the following incentive: \$1.75 per MBH x 399 MBH = \$698

Energy Savings Summary:

ECM #5-3 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$28,269
NJ Smart Start Equipment Incentive (\$):	\$698
Net Installation Cost (\$):	\$27,571
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$416
Total Yearly Savings (\$/Yr):	\$416
Estimated ECM Lifetime (Yr):	25
Simple Payback	66.3
Simple Lifetime ROI	-62.3%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$10,400
Internal Rate of Return (IRR)	-6%
Net Present Value (NPV)	(\$20,327.13)

ECM #5-4: LIGHTING UPGRADES

Description:

Compact fluorescent lamps (CFL's) were created to be direct replacements for the standard incandescent lamps which are common to table lamps, spot lights, hi-hats, bathroom vanity lighting, etc. The light output of the CFL has been designed to resemble the incandescent lamp. The color rendering index (CRI) of the CFL is much higher than standard fluorescent lighting, and therefore provides a much "truer" light. The CFL is available in a myriad of shapes and sizes depending on the specific application. Typical replacements are: a 13-Watt CFL for a 40-Watt incandescent lamp, a 15-Watt CFL for a 60-Watt incandescent lamp, an 18-Watt CFL for a 75-Watt incandescent lamp, and a 23-Watt CFL for a 100-Watt incandescent lamp.

This ECM shall replace all incandescent lamps with their compact fluorescent equivalents.

Energy Savings Calculations:

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

Energy Savings Summary:

ECM #5-4 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$311
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$311
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,019
Total Yearly Savings (\$/Yr):	\$1,019
Estimated ECM Lifetime (Yr):	15
Simple Payback	0.3
Simple Lifetime ROI	4822.0%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$15,283
Internal Rate of Return (IRR)	328%
Net Present Value (NPV)	\$11,852.47

ECM #5-5: Lighting Occupancy 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.

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 10% of the total light energy controlled by occupancy sensors (savings vary depending on space type and conditions surveyed in the field).

This ECM includes replacement of standard wall switches with wall mount switch sensors and/or ceiling/wall mounted sensors to control lighting for the office, restrooms, storage areas, and meeting room. Sensors shall be manufactured by Sensorswitch, Watt Stopper or equivalent.

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 the applicable percent savings for each area that includes lighting controls.

Energy Savings Calculations:

$$\text{Energy Savings} = (10\% \times \text{Occupancy Sensored Light Energy (kWh/Yr)})$$

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

Installation cost per dual-technology sensors (Basis: Sensor switch or equivalent) are as follows:

Wall Mounted Sensor = \$160/unit including material and labor.
 2 Pole Power Pack w/Dual Tech. Occupancy Sensor = \$225/unit including material and labor.

See the **Investment Grade Lighting Audit Appendix** for details.

From the **NJ Smart Start[®] Program Incentives Appendix**, the installation of a lighting control device warrants the following incentive:

Occupancy Sensor Wall Mounted (existing facility only) = \$20 per sensor.

Occupancy Sensor Remote Mounted (existing facility only) = \$35 per sensor

$$\begin{aligned} \text{Smart Start}^{\circledR} \text{ Incentive} &= (\# \text{ of wall mount} \times \$ 20) + (\# \text{ of ceiling mount} \times 35) \\ &= (2 \times \$35) + (2 \times \$20) = \$110 \end{aligned}$$

Energy Savings Summary:

ECM #5-5 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$1,475
NJ Smart Start Equipment Incentive (\$):	\$110
Net Installation Cost (\$):	\$1,365
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$621
Total Yearly Savings (\$/Yr):	\$621
Estimated ECM Lifetime (Yr):	15
Simple Payback	2.2
Simple Lifetime ROI	582.8%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$9,320
Internal Rate of Return (IRR)	45%
Net Present Value (NPV)	\$6,052.76

*Main Library Branch:***ECM #21-1: High-Efficiency Split System Heat Pump****Description:**

The Main Library Branch has six (6) split systems heat pumps. All of these units have surpassed their useful life of 15 years making them prime targets for replacement. The units are range from 1-1/2 ton to 5 ton in capacity. The units are manufactured by Trane, model series TWR. These units have a cooling Energy Efficiency Rating (SEER) of 10 and a Heating Seasonal Performance Factor (HSPF) of 8.1. Due to the age and wear, the estimated cooling efficiencies are 9.5 SEER and 7.6 HSPF today.

This energy conservation measure would replace the split system air-to-air heat pump system with a more efficient split system air-to-air heat pump. The new units will provide heating and cooling capacities typical to that of the existing equipment. The NJ State Energy Code (ASHRAE 90.1-2004) mandates a minimum energy efficiency of 12.0 SEER for units of this type. To qualify for the rebate incentive, the minimum efficiencies are 14.0 SEER and 7.8 HSPF and this baseline will be utilized in selecting the new equipment. The new air-to-air heat pump shall be a Trane model 4TWA4060 air-cooled, heat pump condensing unit with matching Trane 4TEC3F60 series air-handling unit or equivalent. The unit will be provided with low-ambient controls to -20°F operation in heating mode and an automatic change-over, programmable thermostat. Calculations for the 5 ton unit follow and the results for all six units are in the table below.

Energy Savings Calculations:Given Information

Estimated Cooling Load:	Nominal 5 Tons, 60 MBH
Full-Load Cooling Hours:	3,198 hours per year (June through September)
Estimated Heating Load:	60 MBH (17.58 kW)
Full-Load Heating Hours:	5,169 hours per year (November through March)
Total Full-Load Hours:	8,367 hours per year
Cost of Electricity:	\$0.116 / kWh

Existing Equipment

Cooling Efficiency:	9.5 SEER (Estimate based on age.)
Heating Efficiency:	7.6 HSPF (Electric heat)

New Equipment

Cooling Efficiency:	14.0 EER
Heating Efficiency:	8.1 HSPF

Cooling Energy Savings Calculations

$$\text{Energy Savings} = \frac{[\text{Cooling Tons} \times 12,000 \text{ Btu/ton}]}{[1000 \text{ W/kW}]} \times \left(\frac{1}{\text{SEER}_{\text{OLD}}} - \frac{1}{\text{SEER}_{\text{NEW}}} \right) \times \text{Hrs. of Cooling}$$

$$\text{Energy Savings} = \frac{[5 \text{ Tons} \times 12,000 \text{ Btu/ton}]}{[1000 \text{ W/kW}]} \times \left(\frac{1}{9.5} - \frac{1}{14} \right) \times 3198 = \underline{6,492.2 \text{ kWh per year}}$$

Heating Energy Savings Calculations

$$\text{Base Heating Use} = \text{Heating Load} \times \text{Heating Hours} = 17.58 \text{ kW} \times 5,169 = \underline{90,871 \text{ kWh per year}}$$

$$\text{Energy Savings} = \text{Base Heating Use} \times \left(\frac{1}{\text{HSPF}_{\text{OLD}}} - \frac{1}{\text{HSPF}_{\text{NEW}}} \right) = \underline{738 \text{ kWh per year}}$$

$$\begin{aligned} \text{Total Energy Savings} &= \text{Cooling Energy Savings} + \text{Heating Energy Savings} \\ &= 6,492.2 + 738.1 \text{ kWh} = \underline{7,230.3 \text{ kWh per year}} \end{aligned}$$

$$\text{Energy Cost Savings} = 7,230.3 \text{ kWh} \times \$0.116 / \text{kWh} = \underline{\$839 \text{ per year}}$$

$$\text{Estimated Demand Savings} = \text{kWh Saved} / \text{Hrs at Load} = 7,230.3 \text{ kWh} / 8,367 \text{ hrs} = \underline{.03 \text{ kW}}$$

NJ Smart Start[®] Program Incentives are calculated as follows:

From the **New Jersey Smart Start[®] Program Incentives Appendix**, the replacement of an air-to-air heat pump system totaling less than 5.4 cooling tons with efficiency greater than 14 SEER, warrants an incentive of \$92 per cooling ton.

$$\text{Smart Start[®] Equipment Incentive} = (5 \text{ Tons} \times \$92 \text{ per ton}) = \underline{\$460}$$

Maintenance savings could not be calculated due to the fact that there is not adequate data to baseline the existing expenditures.

The installed cost of a 5 ton heat pump is \$8,879 less the \$460 incentive for a net installed cost of \$8,439.

$$\text{Simple payback} = \$8,439 / \$839/\text{yr.} = 10.1 \text{ years}$$

The results for all six units are in the table below.

Calculation results

				COOLING					
TAG	MANUF.	QTY.	MODEL #	COOLING CAPACITY (TONS)	CURRENT SEER	NEW SEER	ENERGY SAVINGS (KWH)	DEMAND SAVINGS (KW)	COOLING COSTS SAVINGS
HP-1	Trane	1	-	5.0	9.5	14	6,492.2	2.03	\$753
HP-2	Trane	1	-	4.0	9.5	14	5,193.7	1.62	\$602
HP-3	Trane	1	-	5.0	9.5	14	6,492.2	2.03	\$753
HP-4	Trane	1	-	3.5	9.5	14	4,544.5	1.42	\$527
HP-5	Trane	1	-	5.0	9.5	14	6,492.2	2.03	\$753
HP-6	Trane	1	-	1.5	9.5	14	1,947.7	0.61	\$226
TOTAL				24.0			31,162.5	9.74	\$3,615

				HEATING					
TAG	MANUF.	QTY.	MODEL #	HEATING CAPACITY (KW)	CURRENT HSPF	NEW HSPF	ENERGY SAVINGS (KWH)	DEMAND SAVINGS (KW)	HEATING COSTS SAVINGS
HP-1	Trane	1	-	17.58	7.60	8.10	738.1	0.14	\$86
HP-2	Trane	1	-	14.06	7.60	8.10	590.4	0.11	\$68
HP-3	Trane	1	-	17.58	7.60	8.10	738.1	0.14	\$86
HP-4	Trane	1	-	12.31	7.60	8.10	516.6	0.10	\$60
HP-5	Trane	1	-	17.58	7.60	8.10	738.1	0.14	\$86
HP-6	Trane	1	-	5.27	7.60	8.10	221.4	0.04	\$26
TOTAL				84.38			3,542.7	0.69	\$411

TAG	MANUF.	QTY.	MODEL #	TOTAL ENERGY SAVINGS	TOTAL INSTALLED COSTS	INCENTIVES	NET INSTALLED COST	SIMPLE PAYBACK
HP-1	Trane	1	-	\$839	\$8,879	\$460	\$8,419	10.0
HP-2	Trane	1	-	\$671	\$7,552	\$368	\$7,184	10.7
HP-3	Trane	1	-	\$839	\$8,879	\$460	\$8,419	10.0
HP-4	Trane	1	-	\$587	\$6,437	\$322	\$6,115	10.4
HP-5	Trane	1	-	\$839	\$8,879	\$460	\$8,419	10.0
HP-6	Trane	1	-	\$252	\$5,174	\$138	\$5,036	20.0
TOTAL				\$4,026	\$45,800	\$2,208	\$43,592	10.8

Energy Savings Summary:

ECM #21-1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$45,800
NJ Smart Start Equipment Incentive (\$):	\$2,208
Net Installation Cost (\$):	\$43,592
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$4,026
Total Yearly Savings (\$/Yr):	\$4,026
Estimated ECM Lifetime (Yr):	15
Simple Payback	10.8
Simple Lifetime ROI	38.5%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$60,390
Internal Rate of Return (IRR)	4%
Net Present Value (NPV)	\$4,470.13

ECM #21-2: Indoor Air handling Unit Replacement

Description:

Three (3) indoor air handling units with chilled water and hot water heating coils have surpassed their expected service life of fifteen (15) years as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook. These units appear to be 1995 vintage, and are excellent candidates for replacement. Due to escalating owning and maintenance costs, these units should be replaced. Each of these units contains a chilled water cooling section and a hot water heating section. Savings can be yielded from year round operation. The units range from 4000 CFM (cubic feet per minute) to 8,500 CFM capacity.

This energy conservation measure would replace air handling units with fan motors equal to or greater than 1 HP with new air handling units having NEMA Premium® Efficient Motors. NEMA Premium® is the most efficient motor designation in the marketplace today. The Trane M-series or equivalents were utilized as a basis of design. Because many units operate 40-80 hours per week, even small increases in efficiency can yield substantial energy and dollar savings.

Energy Savings Calculations:

Existing: AHU-1 serving the Library, has a fan motor with the following characteristics:

Existing Motor Efficiency = 78%
 Existing motor HP = 15 HP
 Annual Hours of Operations = 8,367
 1 HP = 0.746 Watt
 Load Factor = 75%
 Cost of electricity = \$0.116 / kWh

Existing AHU Motor Operating Cost =
 $\{0.746 \text{ Watt/HP} \times \text{Motor HP} \times \text{Load Factor} \times \text{Hours of Operation} \times \text{Cost of Electricity}\} \div \text{Motor Efficiency}$
 $= [0.746 \times 15 \times 0.75 \times 8,367 \times 0.116] \div 0.866 = \$9,406 / \text{Year}$

New AHU with NEMA Premium Motor Efficiency = 92.4%

New AHU with NEMA Premium Efficiency Motor Operating Cost =
 $\{0.746 \times 15 \times 0.75 \times 8,367 \times 0.116\} \div 0.924 = \$8,816 / \text{Year}$

Savings = \$9,406 - \$8,816 = \$590 / Year

Installed Cost of a 8500 CFM AHU with a 15 HP NEMA Premium® Efficiency Motor = \$27,250

The SmartStart Building® incentive of 15hp x \$115/motor is \$115
 Net installed Cost = \$27,250 - \$115 = \$27,135.

Simple Payback = $\$27,135 / \$590 = 46$ Years
 kWh saved = $\$590 / \$0.116/\text{kWh} = 5,086.2$ kWh
 kW saved = $5,086.2 \text{ kWh} / 8,367 \text{ hrs./yr.} = 0.608$ kW

Existing: AHU-2 serving the Library, has a fan motor with the following characteristics:

Existing Motor Efficiency = 78%
 Existing motor HP = 10 HP
 Annual Hours of Operations = 8,367
 1 HP = 0.746 Watt
 Load Factor = 75%
 Cost of electricity = $\$0.116 / \text{kWh}$

Existing AHU Motor Operating Cost =
 $\{0.746 \text{ Watt/HP} \times \text{Motor HP} \times \text{Load Factor} \times \text{Hours of Operation} \times \text{Cost of Electricity}\} \div \text{Motor Efficiency}$
 $= [0.746 \times 10 \times 0.75 \times 8,367 \times 0.116] \div 0.857 = \$6,336 / \text{Year}$

New AHU with NEMA Premium Motor Efficiency = 92.4%

New AHU with NEMA Premium Efficiency Motor Operating Cost =
 $\{0.746 \times 10 \times 0.75 \times 8,367 \times 0.116\} \div 0.917 = \$5,922 / \text{Year}$

Savings = $\$6,336 - \$5,922 = \$414 / \text{Year}$

Installed Cost of a 6000 CFM AHU with a 10 HP NEMA Premium® Efficiency Motor =
 $\$19,750$

The SmartStart Building® incentive of 15hp x \$115/motor is \$115

Net installed Cost = $\$19,750 - \$100 = \$19,650$.

Simple Payback = $\$19,650 / \$414 = 47.5$ Years
 kWh saved = $\$414 / \$0.116/\text{kWh} = 3,569$ kWh
 kW saved = $3,569 \text{ kWh} / 8,367 \text{ hrs./yr.} = 0.427$ kW

Existing: AHU-3 serving the Library, has a fan motor with the following characteristics:

Existing Motor Efficiency = 78%
 Existing motor HP = 7.5 HP
 Annual Hours of Operations = 8,367
 1 HP = 0.746 Watt
 Load Factor = 75%
 Cost of electricity = $\$0.116 / \text{kWh}$

Existing AHU Motor Operating Cost =
 $\{0.746 \text{ Watt/HP} \times \text{Motor HP} \times \text{Load Factor} \times \text{Hours of Operation} \times \text{Cost of Electricity}\} \div \text{Motor Efficiency}$

$$= [0.746 \times 7.5 \times 0.75 \times 8,367 \times 0.116] \div 0.855 = \$4,757 / \text{Year}$$

New AHU with NEMA Premium Motor Efficiency = 91.7%

$$\text{New AHU with NEMA Premium Efficiency Motor Operating Cost} = \{0.746 \times 7.5 \times 0.75 \times 8,367 \times 0.166\} \div 0.917 = \$4,435 / \text{Year}$$

$$\text{Savings} = \$4,757 - \$4,435 = \underline{\$322 / \text{Year}}$$

Installed Cost of a 4000 CFM AHU with a 7.5 HP NEMA Premium® Efficiency Motor = \$13,750.

The SmartStart Building® incentive of 7.5hp x \$115/motor is \$90

Net installed Cost = \$13,750 - \$90 = \$13,660.

$$\text{Simple Payback} = \$13,660 / \$322 = 42.4 \text{ Years}$$

$$\text{kWh saved} = \$322 / \$0.116/\text{kWh} = \underline{2,775.9 \text{ kWh}}$$

$$\text{kW saved} = 2,775.9 \text{ kWh} / 8,367 \text{ hrs./yr.} = \underline{0.332 \text{ kW}}$$

Calculation summary:

Unit	CFM	Energy Savings	Energy Saved (KWh)	Energy Demand Saved (KW)
AHU-1	8,500	\$590	5,086.2	0.61
AHU-2	6,000	\$414	3,569.0	0.43
AHU-3	4,000	\$322	2,775.9	0.33
ECM TOTAL		\$1,326	11,431.1	1.4

Energy Savings Summary:

ECM #21-2 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$60,750
NJ Smart Start Equipment Incentive (\$):	\$305
Net Installation Cost (\$):	\$60,445
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,326
Total Yearly Savings (\$/Yr):	\$1,326
Estimated ECM Lifetime (Yr):	15
Simple Payback	45.6
Simple Lifetime ROI	-67.1%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$19,890
Internal Rate of Return (IRR)	-11%
Net Present Value (NPV)	(\$44,615.30)

ECM #21-3: HVAC Split System Replacement

Description:

The Main Library Branch has two (2) Sanyo split system units. These units are 1.5 tons each. These units have exceeded their ASHRAE service life expectancy of 15 years making them prime targets for replacement. These units have a Seasonal Energy Efficiency Rating (SEER) of 9.5. Due to the age and wear, the estimated cooling efficiencies are 9.0 SEER today.

This ECM includes the replacement of the two (2) 1.5 ton split system condensing unit and DX cooling coil. This ECM would replace the existing rooftop condenser with a high-efficiency Trane Model XL15i or equal with an efficiency of SEER=15.

Cooling Season Full Load Cooling Hrs. = 3,198 hrs/yr.
Average Cost of Electricity = \$0.116/kWh

Total Rated Cooling Capacity = 1.5 Tons
Existing System Efficiency = 9.5 SEER
Proposed System Efficiency = 15 SEER

Energy Savings Calculations:

Cooling Savings Calculation:

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

$$\begin{aligned} \text{Energy Savings} &= \frac{2 \text{ units} \times 1.5 \text{ (Tons)} \times 12,000 \left(\frac{\text{Btu}}{\text{Ton hr}} \right)}{1000 \left(\frac{\text{Wh}}{\text{kWh}} \right)} \times \left(\frac{1}{9.5 \left(\frac{\text{Btu}}{\text{W}} \right)} - \frac{1}{15 \left(\frac{\text{Btu}}{\text{W}} \right)} \right) \times 3198 \text{ hours} \\ &= 4,443.5 \text{ kWh} \end{aligned}$$

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

$$\text{Demand Savings} = \frac{4,443.5 \text{ (kWh)}}{3198 \text{ Hrs.}} = 1.39 \text{ KW}$$

$$\text{Cooling Cost Savings} = 4,443.5 \text{ (kWh)} \times 0.116 \left(\frac{\$}{\text{kWh}} \right) = \$515$$

Installation cost for two (2) 1.5 ton split system is estimated at \$6,580. Note that this estimate includes the demolition of the existing units.

From the NJ Smart Start® Program appendix, the rooftop unit replacement falls under the category “Central DX AC Systems” and warrants an incentive based on efficiency (SEER) at a certain cooling tonnage. The program incentives are calculated as follows:

$$\begin{aligned} \text{Smart Start}^\circledast \text{ Incentive} &= (\text{Cooling Tons} \times \$/\text{Ton Incentive}) \\ &= 2\text{units} \times (1.5\text{Tons} \times \$92/\text{Ton}) = \$276 \end{aligned}$$

Energy Savings Summary:

ECM #21-3 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$6,580
NJ Smart Start Equipment Incentive (\$):	\$276
Net Installation Cost (\$):	\$6,304
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$515
Total Yearly Savings (\$/Yr):	\$515
Estimated ECM Lifetime (Yr):	15
Simple Payback	12.2
Simple Lifetime ROI	22.5%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$7,725
Internal Rate of Return (IRR)	3%
Net Present Value (NPV)	(\$155.96)

ECM #21-4: Install NEMA Premium Efficient Pump Motor

Description:

Replacing the old system PACO 5hp in-line pump motor with new efficient motor is a simple change that can provide substantial savings.

Existing electric motors equal to or greater than one horsepower ranged from 78 to 93% efficient. 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 40-80 hours per week, even small increases in efficiency can yield substantial energy and dollar savings.

This energy conservation measure would replace all motors equal to or greater than 1 HP with NEMA Premium® Efficient Motors. NEMA Premium® is the most efficient motor designation in the marketplace today. Using MotorMaster+, Version 4, the energy & cost savings were calculated for the fan/pump motors in this facility that are greater than or equal to 1 HP.

Energy Savings Calculations:

Existing: A 5 HP system circulation pump Motor with the following characteristics:

Existing Motor Efficiency = 88.5%
 Annual Hours of Operations = 5,169
 1 HP = 0.746 Watt
 Load Factor = 75%
 Cost of electricity = \$0.116 / kWh

Existing 5HP Motor Operating Cost =
 $\{0.746 \text{ Watt/HP} \times \text{Motor HP} \times \text{Load Factor} \times \text{Hours of Operation} \times \text{Cost of Electricity}\} \div \text{Motor Efficiency}$
 $= [0.746 \times 5 \times 0.75 \times 5,169 \times 0.116] \div 0.885 = \$1895 / \text{Year}$

New NEMA Premium Motor Efficiency = 89.5%

New NEMA Premium Efficiency Motor Operating Cost =
 $\{0.746 \times 5 \times 0.75 \times 5,169 \times 0.116\} \div 0.895 = \$1874 / \text{Year}$

Savings = \$1895 - \$1874 = \$21 / Year

Installed Cost of a 5 HP NEMA Premium® Efficiency Motor = \$1,898 minus the SmartStart Building® incentive of 5hp x \$60/motor is \$1,838.

Simple Payback = \$1,838 / \$21 = 87.5 Years

kWh saved = \$21.2 / \$0.116/kWh = 183.0 kWh

kW saved = 183.0 kWh / 5,169 hrs./yr. =0.04 kW

NEMA Premium Efficient Motor Replacement						
Equipment Tag	Motor HP	Existing Efficiency	NEMA Premium Efficiency	kW Savings	kWh Savings	Cost Savings
PACO	5	88.5%	89.5%	0.04	182.6	21.2
Total Savings				0.0	182.6	21.2

This ECM is not recommended based on the financial analysis. It is recommended that this motor remain in service and be maintained as needed.

Energy Savings Summary:

ECM #21-4 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$1,898
NJ Smart Start Equipment Incentive (\$):	\$60
Net Installation Cost (\$):	\$1,838
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$21
Total Yearly Savings (\$/Yr):	\$21
Estimated ECM Lifetime (Yr):	18
Simple Payback	86.7
Simple Lifetime ROI	-79.2%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$382
Internal Rate of Return (IRR)	-13%
Net Present Value (NPV)	(\$1,546.43)

ECM #21-5: LIGHTING UPGRADES

Description:

New fluorescent lamps and ballasts are available as direct replacements for the existing lamps and ballasts. A simple change from the old to the new can provide substantial savings. A typical drop-ceiling lay in fixture with four, 4-foot lamps (40 Watt lamps) has a total wattage of about 188 Watts. By retrofitting with new lamps, reflector and electronic ballasts the total wattage would be reduced to 91 Watts per fixture and the space light levels and light quality would increase by about 15% and 35%, respectively.

Compact fluorescent lamps (CFL's) were created to be direct replacements for the standard incandescent lamps which are common to table lamps, spot lights, hi-hats, bathroom vanity lighting, etc. The light output of the CFL has been designed to resemble the incandescent lamp. The color rendering index (CRI) of the CFL is much higher than standard fluorescent lighting, and therefore provides a much "truer" light. The CFL is available in a myriad of shapes and sizes depending on the specific application. Typical replacements are: a 13-Watt CFL for a 40-Watt incandescent lamp, a 15-Watt CFL for a 60-Watt incandescent lamp, an 18-Watt CFL for a 75-Watt incandescent lamp, and a 23-Watt CFL for a 100-Watt incandescent lamp.

This ECM shall replace all remaining T12 fixtures throughout the facility with new T8 fixtures. In addition, this ECM also replaces all incandescent lamps with their compact fluorescent equivalents.

Energy Savings Calculations:

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

Energy Savings Summary:

ECM #21-5 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$1,200
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$1,200
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$223
Total Yearly Savings (\$/Yr):	\$223
Estimated ECM Lifetime (Yr):	15
Simple Payback	5.4
Simple Lifetime ROI	178.2%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$3,338
Internal Rate of Return (IRR)	17%
Net Present Value (NPV)	\$1,456.91

ECM #21-6: Lighting Occupancy 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.

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 10% of the total light energy controlled by occupancy sensors (savings vary depending on space type and conditions surveyed in the field).

This ECM includes replacement of standard wall switches with wall mount switch sensors and/or ceiling/wall mounted sensors to control lighting for the office, restrooms, storage areas, and meeting room. Sensors shall be manufactured by Sensorswitch, Watt Stopper or equivalent.

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 the applicable percent savings for each area that includes lighting controls.

Energy Savings Calculations:

$$\text{Energy Savings} = (10\% \times \text{Occupancy Sensored Light Energy (kWh/Yr)})$$

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

Installation cost per dual-technology sensors (Basis: Sensor switch or equivalent) are as follows:

Wall Mounted Sensor = \$160/unit including material and labor.
 2 Pole Power Pack w/Dual Tech. Occupancy Sensor = \$225/unit including material and labor.

See the **Investment Grade Lighting Audit Appendix** for details.

From the **NJ Smart Start® Program Incentives Appendix**, the installation of a lighting control device warrants the following incentive:

Occupancy Sensor Wall Mounted (existing facility only) = \$20 per sensor.

Occupancy Sensor Remote Mounted (existing facility only) = \$35 per sensor

$$\begin{aligned} \text{Smart Start}^\circledast \text{ Incentive} &= (\# \text{ of wall mount} \times \$ 20) + (\# \text{ of ceiling mount} \times 35) \\ &= (4 \times \$35) + (10 \times \$20) = \$340 \end{aligned}$$

Energy Savings Summary:

ECM #21-6 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$3,365
NJ Smart Start Equipment Incentive (\$):	\$340
Net Installation Cost (\$):	\$3,025
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$267
Total Yearly Savings (\$/Yr):	\$267
Estimated ECM Lifetime (Yr):	15
Simple Payback	11.3
Simple Lifetime ROI	32.4%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	\$4,005
Internal Rate of Return (IRR)	4%
Net Present Value (NPV)	\$162.43

*Wildwood Crest Library:***ECM #41-1, 2, 3: New Domestic Hot Water Heater****Description:**

The Wildwood Crest's existing electric hot water heater is located in a small mechanical room on the side of the building. The heater appears to be past its useful life and could be replaced with a much more efficient tank-less hot water heating system. Electric water heating, although 100% efficient (100% of Btu's from electricity transferred into heating the water), is generally more expensive due to the high cost of electricity.

Currently it is unclear whether natural gas is available to the building so three options were evaluated for this ECM, one being a tank-less Rinnai R75LSe natural gas fired unit 83% efficient, two being a oil fired 30 gallon Bradford & White RF-30-6 unit 79% efficient, and third a tank-less electric Bradford & White EFT 24 kW unit. **The owner should consult a professional engineer prior to proceeding with this ECM to have any necessary gas piping/flue venting designed to supply this water heater and verify the existing system can accommodate the increased loading.**

Energy Savings Calculations:

Calculation Constants	
Hours per Tank Empty	24
Days Occupied per Week	6
Electric Cost, \$/kWh	\$0.17
Natural Gas Cost, \$/therm	\$1.40
Fuel Oil Cost, \$/Gallon	\$2.19

$$R\text{-Value} = 8.0 \text{ h-F-ft}^2/\text{Btu}$$

$$\text{Water Temp} = 120 \text{ F}$$

$$\text{Air Temp} = 65 \text{ F}$$

$$\text{Tank Losses (Btu / h)} = \frac{\text{Surface Area of Tank} \times (\text{Storage Water Temperature} - \text{Air Temperature})}{\text{Tank R - Value}}$$

$$\text{Losses Electric Usage (kWh)} = \frac{\text{Tank Losses (Btu / h)}}{3,412 \frac{\text{Btu}}{\text{kWh}}} \times 24 \text{ Hrs} \times 365 \text{ Days}$$

$$\text{Hot Water Usage} \left(\frac{\text{gal}}{\text{day}} \right) = \frac{\text{Occupied Hours per day}}{\text{Hours per tank empty}} \times \text{Tank Size (gal)}$$

$$\text{Heating Usage (Btu)} = \text{Hot Water Usage} \times 8.34 \frac{\text{Btu}}{\text{gal}} \times (120 F - 50 F) \times 52 \frac{\text{Weeks}}{\text{year}} \times \text{Occupied Days per week}$$

Existing Domestic Hot Water Usage:

$$\text{Total Usage (Btu)} = \text{Losses Usage} + \text{Heating Usage}$$

$$\text{Electric Usage (kWh)} = \frac{\text{Total Usage (Btu)}}{\% \text{ Eff.} \times 3,412 \frac{\text{Btu}}{\text{kWh}}}$$

Proposed Domestic Hot Water Usage:

$$\text{Natural Gas Usage (therms)} = \frac{\text{Heating Usage (Btu)}}{\% \text{ Eff.} \times 100,000 \frac{\text{Btu}}{\text{therm}}}$$

$$\text{R-Value} = 11.0 \text{ h-F-ft}^2/\text{Btu}$$

$$\text{Fuel Usage (gallons)} = \frac{\text{Total Usage (Btu)}}{\% \text{ Eff.} \times 139,000 \frac{\text{Btu}}{\text{gallon}}}$$

$$\text{Electric Usage (kWh)} = \frac{\text{Heating Usage (Btu)}}{\% \text{ Eff.} \times 3,412 \frac{\text{Btu}}{\text{kWh}}}$$

Energy Savings Summary:

ECM #41-1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$2,600
NJ Smart Start Equipment Incentive (\$):	\$300
Net Installation Cost (\$):	\$2,300
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$243
Total Yearly Savings (\$/Yr):	\$243
Estimated ECM Lifetime (Yr):	15
Simple Payback	9.5
Simple Lifetime ROI	58.5%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$3,645
Internal Rate of Return (IRR)	6%
Net Present Value (NPV)	\$600.92

ECM #41-2 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$2,100
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$2,100
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$202
Total Yearly Savings (\$/Yr):	\$202
Estimated ECM Lifetime (Yr):	15
Simple Payback	10.4
Simple Lifetime ROI	44.3%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$3,030
Internal Rate of Return (IRR)	5%
Net Present Value (NPV)	\$311.46

ECM #41-3 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$1,950
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$1,950
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$87
Total Yearly Savings (\$/Yr):	\$87
Estimated ECM Lifetime (Yr):	15
Simple Payback	22.4
Simple Lifetime ROI	-33.1%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$1,305
Internal Rate of Return (IRR)	-5%
Net Present Value (NPV)	(\$911.40)

ECM #41-4: High Efficiency Gas Fired Boiler

Description:

The existing Oil Fired Columbia Boiler is approximately 74% efficient; a new condensing type boiler that is natural gas fired could achieve efficiencies up to and greater than 90%, thus greatly reducing the cost to heat the building.

This ECM would install one Lochinvar KBN-210 boiler with on board controls and heating water circulating pump. The boiler would also require natural gas piping if available to be brought to the building as well as removing the existing boiler and fuel oil piping. **The owner should consult a professional engineer prior to proceeding with this ECM to have any necessary gas piping/flue venting designed to supply this water heater and verify the existing system can accommodate the increased loading.**

Energy Savings Calculations:

Existing Heating Fuel Oil Used: From Bills 2,357 gallons

$$Bldg \text{ Heat Required} = \text{Existing Heating Fuel (FuelUnits)} \times \text{Heating Eff.}(\%) \times \text{Fuel HeatValue} \left(\frac{BTU}{gallon} \right)$$

$$\text{Proposed Heating Gas Usage} = \frac{Bldg \text{ Heat Required (BTU)}}{\text{Heating Eff.}(\%) \times \text{Fuel Heat Value} \left(\frac{BTU}{Therm} \right)}$$

$$\text{Energy Cost} = \text{Heating Gas Usage(Therms)} \times \text{Ave Fuel Cost} \left(\frac{\$}{Therm} \right)$$

HIGH EFFICIENCY GAS BOILER CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Existing Cast Iron Boilers	New Condensing Boilers	
Fuel Oil Usage (Gallons)	2,357	0	
Natural Gas Usage (Therms)	0	2,694	
Boiler Efficiency (%)	74%	90%	16%
Fuel Heat Value (BTU/Fuel Unit)	139,000	100,000	
Equivalent Building Heat Usage (MMBTUs)	242	242	
Fuel Oil Cost (\$/Gallon)	2.19	2.19	
Natural Gas Cost (\$/Therm)	1.40	1.40	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Fuel Oil Usage (Gallons)	2,357	0	2,357
Natural Gas Usage (Therms)	0	2,694	-2,694
Energy Cost (\$)	\$5,162	\$3,771	\$1,390
COMMENTS:	Proposed Boiler is a Lochinvar Knight KBN-210		

Energy Savings Summary:

ECM #41-4 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$17,100
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$17,100
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,390
Total Yearly Savings (\$/Yr):	\$1,390
Estimated ECM Lifetime (Yr):	25
Simple Payback	12.3
Simple Lifetime ROI	103.2%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$34,750
Internal Rate of Return (IRR)	6%
Net Present Value (NPV)	\$7,104.28

ECM #41-5: Convert Constant Volume to VAV

Description:

The air system serving the library currently is a constant volume air system with hot water reheat boxes. A constant volume system provides a fixed amount of conditioned air flow to the space it serves consistently throughout the occupied hours of the day. This type of system is much more energy intensive than a variable air volume system which alters the airflow to the spaces based on the load in the space, which in turn reduces the amount of air needed to be conditioned by the air handler.

This ECM would alter the existing air system terminal box controls to modulate based on space temperature by modulating box dampers. A variable speed drive shall be installed on the supply fan to AHU-1 that will modulate based on static pressure as the box dampers open and close.

Energy Savings Calculations:

Calculation Parameters	
Electric Cost, \$/kWh	\$0.1700
Heating Fuel Cost, \$/gal	\$2.1900
Degree Days at 65F Base	
HDD	5169
CDD	1354
Cooling Efficiency, kW/ton	1.14
Heating Boiler Efficiency	74%
Operating Days Per Week	6
Operating Hours Per Day	10
Degree Day Adjustment Factor	0.356

AHU-1						
Zone	Service Area	Supply	Cooling Coil		Heating Coil	
		CFM	Lvg Air	Ent Air	Lvg Air	Ent Air
1	Childrens Book Area	1,000	55	65	95	65
2	Front Stack Area	1,000	55	65	95	65
3	Rear Stack Area	1,000	55	65	95	65
4	Computer/Circulation Des	1,000	55	65	95	65

Existing Calculations:

$$Cooling, \text{ ton-hr} = \Delta T * 1.08 * CFM * CDD * Adj \text{ Factor} * \frac{\text{ton-hr}}{12,000 \text{ Btu}}$$

$$Cooling \text{ Usage kWh} = Cooling \text{ ton-hr} * Cooling \text{ Efficiency} \frac{\text{kW}}{\text{ton}}$$

$$\text{Heating Usage, mmBtu} = \Delta T * 1.08 * CFM * HDD * \text{Adj Factor} * \frac{\text{mmBtu}}{1 \times 10^6 \text{ Btu}}$$

$$\text{Heating Fuel Usage} = \frac{\text{Heating Usage (mmBtu)}}{\text{Heating Eff.}(\%) * \text{Fuel Heat Value} \left(\frac{\text{mmBTU}}{\text{Fuel Unit}} \right)}$$

$$\text{Fan Usage kWh} = \frac{HP * 0.746 * \text{Hours of Operation} * LF(0.9)}{\text{Motor Efficiency}(0.9)}$$

Proposed Calculations:

$$\text{Cooling, ton-hr} = \Delta T * 1.08 * CFM * \% \text{ Load} * \% \text{ Hours at Load} * CDD * \text{Adj Factor} * \frac{\text{ton-hr}}{12,000 \text{ Btu}}$$

$$\text{Cooling Usage kWh} = \text{Cooling ton-hr} * \text{Cooling Efficiency} \frac{\text{kW}}{\text{ton}}$$

$$\text{Heating Usage, mmBtu} = \Delta T * 1.08 * CFM * \% \text{ Load} * \% \text{ Hours at Load} * HDD * \text{Adj Factor} * \frac{\text{mmBtu}}{1 \times 10^6 \text{ Btu}}$$

$$\text{Heating Fuel Usage} = \frac{\text{Heating Usage (mmBtu)}}{\text{Heating Eff.}(\%) * \text{Fuel Heat Value} \left(\frac{\text{mmBTU}}{\text{Fuel Unit}} \right)}$$

$$\text{Fan Usage kWh} = \frac{HP * 0.746 * \text{Hours of Operation} * (\% \text{ Load})^3}{\text{Motor Efficiency}(0.9)}$$

Energy Savings Summary:

ECM #41-5 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$13,470
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$13,470
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,377
Total Yearly Savings (\$/Yr):	\$1,377
Estimated ECM Lifetime (Yr):	20
Simple Payback	9.8
Simple Lifetime ROI	104.4%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$27,531
Internal Rate of Return (IRR)	8%
Net Present Value (NPV)	\$7,009.44

ECM #41-6: LIGHTING UPGRADES

Description:

New fluorescent lamps and ballasts are available as direct replacements for the existing lamps and ballasts. A simple change from the old to the new can provide substantial savings. A typical drop-ceiling lay in fixture with four, 4-foot lamps (40 Watt lamps) has a total wattage of about 188 Watts. By retrofitting with new lamps, reflector and electronic ballasts the total wattage would be reduced to 91 Watts per fixture and the space light levels and light quality would increase by about 15% and 35%, respectively.

Compact fluorescent lamps (CFL's) were created to be direct replacements for the standard incandescent lamps which are common to table lamps, spot lights, hi-hats, bathroom vanity lighting, etc. The light output of the CFL has been designed to resemble the incandescent lamp. The color rendering index (CRI) of the CFL is much higher than standard fluorescent lighting, and therefore provides a much "truer" light. The CFL is available in a myriad of shapes and sizes depending on the specific application. Typical replacements are: a 13-Watt CFL for a 40-Watt incandescent lamp, a 15-Watt CFL for a 60-Watt incandescent lamp, an 18-Watt CFL for a 75-Watt incandescent lamp, and a 23-Watt CFL for a 100-Watt incandescent lamp.

This ECM shall replace all remaining T12 fixtures throughout the facility with new T8 fixtures, as well as de-lamping some of the 4-lamp T8 fixtures to 3-lamp T8 fixtures. In addition, this ECM also replaces all incandescent lamps with their compact fluorescent equivalents.

Energy Savings Calculations:

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

NJ Smart Start[®] Program Incentives are calculated as follows:

From Appendix B, the replacement of a T-12 fixture to a T-5 or T-8 fixture warrants the following incentive: T-5 or T-8 (1-4 lamp) = \$10 per fixture.

$$\text{Smart Start}^{\text{®}} \text{ Incentive} = (\# \text{ of } 1 - 4 \text{ lamp fixtures} \times \$10)$$

$$\text{Smart Start}^{\text{®}} \text{ Incentive} = (4 \times \$10) = \$40$$

Energy Savings Summary:

ECM #41-6 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$6,012
NJ Smart Start Equipment Incentive (\$):	\$40
Net Installation Cost (\$):	\$5,972
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$282
Total Yearly Savings (\$/Yr):	\$282
Estimated ECM Lifetime (Yr):	15
Simple Payback	21.1
Simple Lifetime ROI	-29.1%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	\$4,236
Internal Rate of Return (IRR)	-4%
Net Present Value (NPV)	(\$2,599.99)

ECM #41-7: Lighting Occupancy 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.

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 10% of the total light energy controlled by occupancy sensors (savings vary depending on space type and conditions surveyed in the field).

This ECM includes replacement of standard wall switches with wall mount switch sensors and/or ceiling/wall mounted sensors to control lighting for the garage, restrooms, storage areas, and computer room. Sensors shall be manufactured by Sensorswitch, Watt Stopper or equivalent.

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 the applicable percent savings for each area that includes lighting controls.

Energy Savings Calculations:

$$\text{Energy Savings} = (10\% \times \text{Occupancy Sensored Light Energy (kWh/Yr)})$$

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

Installation cost per dual-technology sensors (Basis: Sensor switch or equivalent) are as follows:

Wall Mounted Sensor =	\$160/unit including material and labor.
2 Pole Power Pack w/Dual Tech. Occupancy Sensor =	\$225/unit including material and labor.

See the **Investment Grade Lighting Audit Appendix** for details.

From the **NJ Smart Start® Program Incentives Appendix**, the installation of a lighting control device warrants the following incentive:

Occupancy Sensor Wall Mounted (existing facility only) = \$20 per sensor.
Occupancy Sensor Remote Mounted (existing facility only) = \$35 per sensor

$$\begin{aligned} \text{Smart Start}^{\circledR} \text{ Incentive} &= (\# \text{ of wall mount} \times \$ 20) + (\# \text{ of ceiling mount} \times \$ 35) \\ &= (3 \times \$ 35) + (1 \times \$ 20) = \$ 125 \end{aligned}$$

Energy Savings Summary:

ECM #41-7 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$1,220
NJ Smart Start Equipment Incentive (\$):	\$125
Net Installation Cost (\$):	\$1,095
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$62
Total Yearly Savings (\$/Yr):	\$62
Estimated ECM Lifetime (Yr):	15
Simple Payback	17.6
Simple Lifetime ROI	-14.9%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$932
Internal Rate of Return (IRR)	-2%
Net Present Value (NPV)	(\$353.53)

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 existing roof area of each building being audited for the purposes of determining a potential for a roof mounted photovoltaic system. The only building that had a substantial amount of open area for a roof mounted system was the Wildwood Crest Library. The other two library branches had minimal roof space available or too much shading to make solar cost effective. A roof area of 1800 S.F. can be utilized at the Wildwood Crest Library for a PV system. A depiction of the area utilized is shown in **Renewable / Distributed Energy Measures Calculation Appendix**. Using this square footage it was determined that a system size of 25.53 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 31,310 KWh annually, reducing the overall utility bill by approximately 55.38% 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 library 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 8
Financial Summary – Photovoltaic System**

FINANCIAL SUMMARY - PHOTOVOLTAIC SYSTEM			
PAYMENT TYPE	SIMPLE PAYBACK	SIMPLE ROI	INTERNAL RATE OF RETURN
Direct Purchase	14.2 Years	75.4%	4.9%

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

Given the large amount of capital required by the library to invest in a solar system through a Direct Purchase CEG does not recommend the library pursue this route. It would be more advantageous for the library to solicit Power Purchase Agreement (PPA) Providers who will own, operate, and maintain the system for a period of 15 years. During this time the PPA Provider would sell all of the electric generated by Solar Arrays to the library at a reduced rate compared to their existing electric rate.

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 though the average wind speed may be adequate. The library does not have adequate land space to install a wind turbine on its property. Therefore, wind energy is not a viable option to implement.

IX. CARBON FOOTPRINT IMPACT

CEG was tasked with developing a baseline and revised Carbon footprint based on collected utility data and the recommended energy conservation measures. The “baseline” carbon footprint will indicate the current state of the Cape May City, Main Branch, and Wildwood Crest Libraries energy usage as it pertains to carbon production and the “revised” carbon footprint will calculate the estimated future decrease in carbon production based on the implementation of the recommended energy conservation and renewable measures.

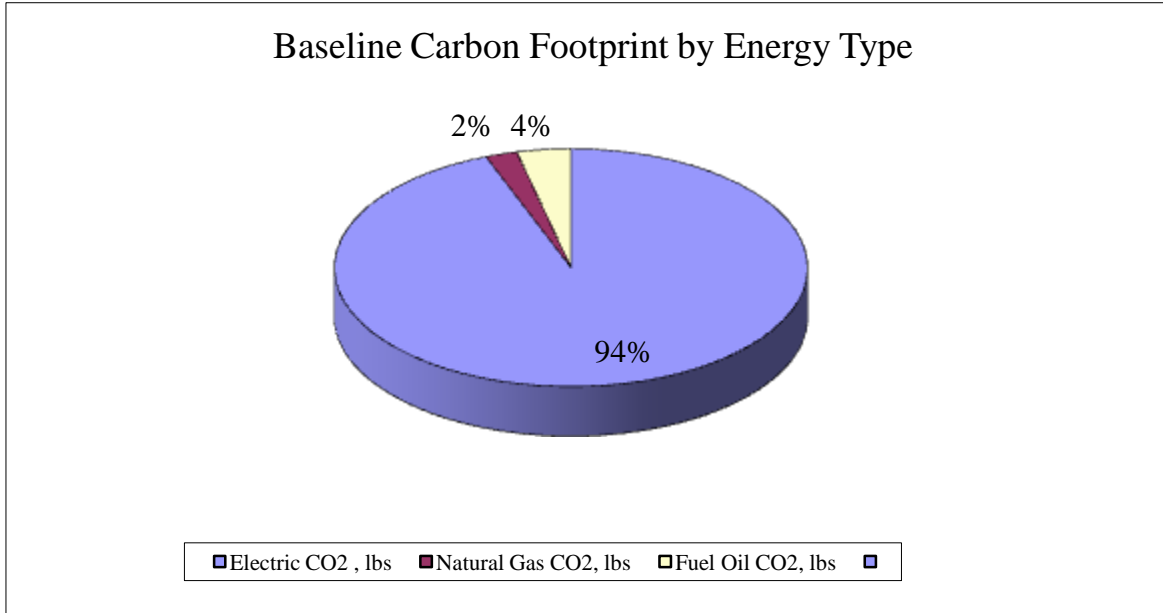
The Carbon Emissions were calculated based on emissions factor data published by the U.S. Environmental Protection Agency (EPA). These factors show equivalent pounds (or metric tons) of Carbon Dioxide per unit of fuel usage. The following table of factors was used to calculate the baseline and revised Carbon Footprints. It should be noted that the Main Library Branch footprint does not include the required natural gas usage associated with the hot water provided by the Court House boiler plant.

Table 8
EPA Emissions Factors

Energy Type	Emissions Factor	
Electricity	1.583	lbs CO ₂ / kWh
Natural Gas	11.023	lbs CO ₂ / therm
Fuel Oil	22.200	lbs CO ₂ / gallon
Propane	13.440	lbs CO ₂ / gallon

Baseline Carbon Footprint

No.	Building/Source	Electric CO ₂ Emissions, lbs	Natural Gas CO ₂ , lbs	Fuel Oil CO ₂ , lbs	Total CO ₂ Emissions, lbs
5	Cape May City Library	81,871.7	30,402.8	0.0	112,274.6
21	Main Library Branch	1,163,016.5	299.8	0.0	1,163,316.4
41	Wildwood Crest Library	89,498.2	0.0	52,323.2	141,821.4
	TOTAL CARBON FOOTPRINT	1,334,386.5	30,702.7	52,323.2	1,417,412.4



Energy Conservation Measures Carbon Reduction

No.	Building/Source	Electric CO2 Emissions, lbs	Natural Gas CO2, lbs	Fuel Oil CO2, lbs	Total CO2 Emissions, lbs
CAPE MAY CITY LIBRARY					
ECM #5-1	AHU Replacement to High Eff. Heat Pump	(25,820.6)	30,401.7	0.0	4,581.2
ECM #5-2	Electric to Natural Gas DHW Heater	3,154.8	(705.5)	0.0	2,449.3
ECM #5-3	High Efficiency Condensing Boiler	0.0	3,042.4	0.0	3,042.4
ECM #5-4	Lighting Upgrade	9,893.2	0.0	0.0	9,893.2
ECM #5-5	Lighting Occupancy Controls	6,034.1	0.0	0.0	6,034.1
MAIN LIBRARY BRANCH					
ECM #21-1	High-Eff. Split System Heat Pump	54,935.5	0.0	0.0	54,935.5
ECM #21-2	Replace AHUs	18,094.5	0.0	0.0	18,094.5
ECM #21-3	HVAC Split System Replacement	7,033.7	0.0	0.0	7,033.7
ECM #21-4	Premium Efficient Pump Motor	289.7	0.0	0.0	289.7
ECM #21-5	Lighting Upgrade	2,497.8	0.0	0.0	2,497.8
ECM #21-6	Lighting Occupancy Controls	3,002.3	0.0	0.0	3,002.3
WILDWOOD CREST LIBRARY					
ECM #41-1	New DHW Heater Natural Gas	3,140.5	(661.4)	0.0	2,479.1
ECM #41-2	New DHW Heater Oil Fired	3,140.5	0.0	(1,265.4)	1,875.1
ECM #41-3	New DHW Heater Electric	831.0	0.0	0.0	831.0
ECM #41-4	High Efficiency Natural Gas Fired Boiler	0.0	(29,696.3)	52,325.4	22,629.1
ECM #41-5	Constant Volume to VAV Conversion	3,830.7	0.0	9,790.2	13,620.9
ECM #41-6	Lighting Retrofit	2,709.3	0.0	0.0	2,709.3
ECM #41-7	Occupancy Lighting Controls	595.8	0.0	0.0	595.8
TOTAL CARBON REDUCTION		93,362.9	2,381.0	60,850.2	156,594.1
TOTAL RECOMMENDED		28,551.1	(1,366.9)	9,790.2	36,974.4

Revised Carbon Footprint –Recommended Options

No.	Building/Source	Electric CO2 Emissions, lbs	Natural Gas CO2, lbs	Fuel Oil CO2, lbs	Total CO2 Emissions, lbs
5	Cape May City Library	62,789.6	31,108.3	0.0	93,898.0
21	Main Library Branch	1,163,016.5	299.8	0.0	1,163,316.4
41	Wildwood Crest Library	82,527.1	661.4	42,533.0	125,721.4
	TOTAL CARBON FOOTPRINT	1,308,333.2	32,069.5	42,533.0	1,382,935.8

X. 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. Refer to The Electric and Natural Gas Usage Profiles included within this report to reference the respective electricity and natural gas usage load profiles.

Electricity:

The Electric Usage Profile is a combination of electric cooling and domestic water which creates a fairly steady year-long electric load. Only the Library Main Branch is currently receiving Third Party Supplier (TPS) electric supply service.

The historical usage profile is beneficial and will allow for more competitive energy prices when shopping for alternative suppliers mainly due to the relatively steady year-long load profile. Third Party Supplier (TPS) electric commodity contracts that offer's a firm, fixed price for 100% of the facilities electric requirements and are lower than the Atlantic City Electric's BGS-FP default rate are recommended.

Natural Gas:

The Natural Gas Usage Profile demonstrates a very typical natural gas (heat load) profile. A base-load shaping (flat) will secure more competitive energy prices when procuring through an alternative energy source.

This load profile will yield less favorable natural gas pricing when shopping for alternative suppliers. This is because the higher winter month consumption will yield higher pricing which will not be offset by similar summer month consumption. Nymex commodity pricing is generally higher in the winter months of November – March and lower in the summer months of April – October. Obtaining a flat load profile, (usage is similar each month), will yield optimum natural gas pricing when shopping for alternative suppliers. Third Party Supplier (TPS) natural gas commodity contracts that offer a firm, fixed price for 100% of the facilities natural gas requirements are recommended.

Tariff Analysis:

Electricity:

The library facilities receive electric distribution service through Atlantic City Electric (AECO) on rate schedule's MGS (Monthly General Service) and AGS (Annual General Service). Only one (1) facility is currently contracted with a Third Party Supplier (TPS) to provide electric

commodity service. For electric supply (generation) service, the client has a choice to either use AECO's default service rate BGS-FP or contract with a Third Party Supplier (TPS) to supply electric.

Each year since 2002, the four New Jersey Electric Distribution Companies (EDCs) - Public Service Gas & Electric Company (PSE&G), Atlantic City Electric Company (ACE), Jersey Central Power & Light Company (JCP&L), and Rockland Electric Company (RECO) - have procured several billion dollars of electric supply to serve their Basic Generation Service (BGS) customers through a statewide auction process held in February.

BGS refers to the service of customers who are not served by a third party supplier or competitive retailer. This service is sometimes known as Standard Offer Service, Default Service, or Provider of Last Resort Service.

The Auction Process has consisted of two auctions that are held concurrently, one for larger customers on an hourly price plan (BGS-CIEP) and one for smaller commercial and residential customers on a fixed-price plan (BGS-FP). This facility's rate structure is based on the fixed-price plan (BGS-FP).

The current BGS-FP average price to compare for AECO's MGS rate schedule is \$0.1159/kWh and for AECO's AGS rate schedule \$0.1144/kWh. Based upon the current third party supplier electric rate for the Main Branch facility under agreement at \$0.09485/kWh contracted with Pepco Energy Services, this facility is currently experiencing a savings over the BGS-FP default rate with AECO.

The utility, AECO will continue to be responsible for maintaining the existing network of wires, pipes and poles that make up the delivery system, which will serve all consumers, regardless of whom they choose to purchase their electricity from. AECO's delivery service rate includes the following charges: Customer Service Charge, Distribution Charge, Market Transition, Transition Bond Charge, Non Utility Generation Charge, Societal Benefits Charge (SBC), Infrastructure Investment Charge, System Control Charge, Regulatory Assets Recovery Charge, and Regional Greenhouse Gas Initiative Charge.

Natural Gas & Fuel Oil:

Two (2) facilities currently receive natural gas distribution service through South Jersey Gas (SJG) on rate schedule GSG (General Service Gas). These sites are currently receiving natural gas commodity supply from the utility, SJG on Basic Gas Supply Service (BGSS). The Wildwood Crest Library is currently heated by #2 fuel oil.

SJG provides basic gas supply service (BGSS) to customers who choose not to shop from a Third Party Supplier (TPS) for natural gas commodity. The option is essential to protect the reliability of service to consumers as well as protecting consumers if a third party supplier defaults or fails to provide commodity service. Please refer to the link below for a recap of monthly natural gas BGSS charges from SJG.

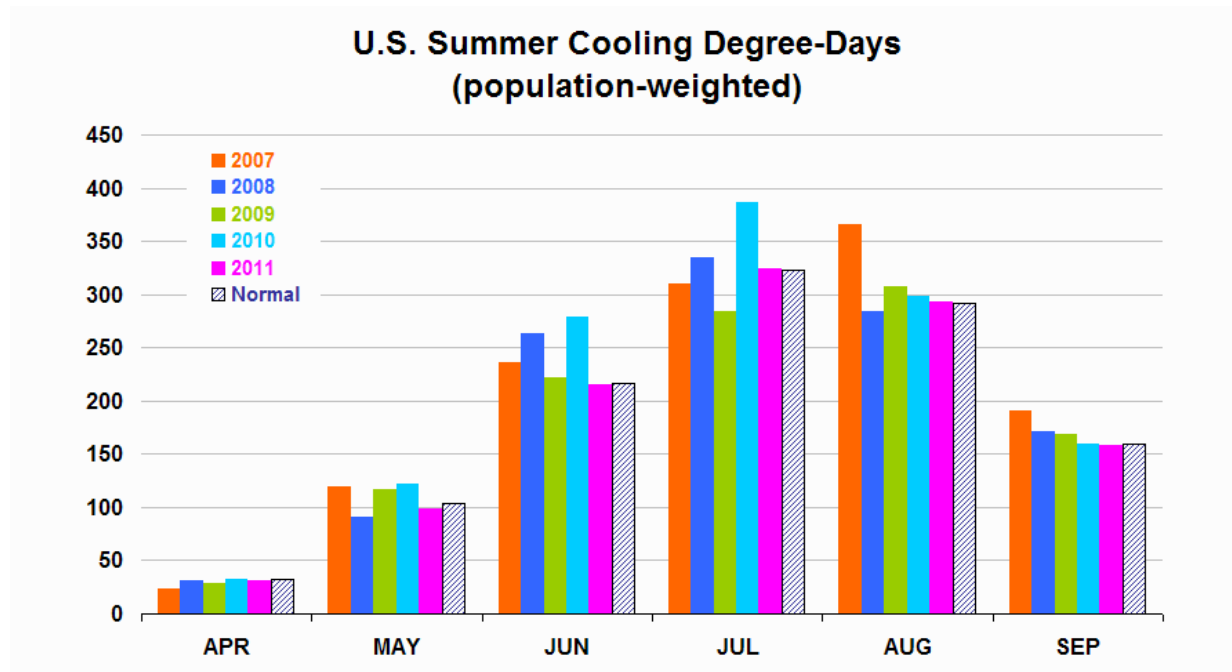
<http://www.southjerseygas.com/108/tariff/bgssrates.pdf>

The utility, SJG is responsible for maintaining the existing network of underground pipes that make up the delivery system, which will serve all consumers, regardless of whom they choose to purchase their natural gas from. SJG’s delivery service rates includes the following charges: Customer Service Charge, Delivery Charge, Line Loss, and Applicable Riders that include: Societal Benefits Charge (SBC), Balancing Service Clause, Temperature Adjustment Clause, Conservation Incentive Program and Energy Efficient Tracker.

Electric and Fossil Fuel Commodities Market Overview:

Current electricity and natural gas market pricing has remained relatively stable over the last year. Commodity pricing in 2008 marked historical highs in both natural gas and electricity commodity. Commodity pricing commencing spring of 2009 continuing through 2010, has decreased dramatically over 2008 historic highs and continues to be favorable for locking in long term (2-5 year) contracts with 3rd Party Supplier’s for both natural gas and electricity supply requirements.

It is important to note that both natural gas and electric commodity market prices are moved by supply and demand, political conditions, market technicals and trader sentiment. This market is continuously changing Energy commodity pricing is also correlated to weather forecasts. Because weather forecasts are dependable only in the short-term, prolonged temperature extremes can really cause extreme price swings.



Data source: National Oceanic and Atmospheric Administration, National Weather Service
http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/cdus/degree_days/



Source: Short-Term Energy Outlook, August 2010

Short Term Energy Outlook - US Energy Information Administration (8/10/2010):

U.S. Natural Gas Prices. *The Henry Hub spot price averaged \$4.63 per MMBtu in July, \$0.17 per MMBtu lower than the average spot price in June.). The forecast price for the second half of 2010 averages \$4.66 per MMBtu, about the same as last month's Outlook. A small decline in U.S. production and increased consumption are projected to lead to higher prices in 2011, when the projected Henry Hub spot price averages \$4.98 per MMBtu.*

Uncertainty over future natural gas prices is lower this year compared with last year at this time. Natural gas futures for October 2010 delivery for the 5-day period ending August 5 averaged \$4.74 per MMBtu, and the average implied volatility over the same period was 51 percent. This produced lower and upper bounds for the 95-percent confidence interval of \$3.26 and \$6.89 per MMBtu, respectively. At this time last year the natural gas October 2009 futures contract averaged \$4.16 per MMBtu and implied volatility averaged 80 percent. The corresponding lower and upper limits of the 95-percent confidence interval were \$2.32 and \$7.47 per MMBtu.

Crude Oil and Liquid Fuels Overview. *EIA's view of the world oil market is largely unchanged from last month's Outlook. EIA expects world oil prices will rise slowly as world oil demand increases because of projected global economic growth, slower growth in non-OPEC oil supply, and continued production restraint by members of the Organization of the Petroleum Exporting Countries (OPEC). A gradual reduction in global oil inventories expected over the forecast period also should lend support to firming oil prices.*

Crude Oil Prices. *WTI crude oil spot prices averaged \$76.32 per barrel in July 2010 or about \$1 per barrel above the prior month's average, and close to the \$77 per barrel projected in last month's Outlook. EIA projects WTI prices will average about \$80 per barrel over the second half of this year and rise to \$85 by the end of next year.*

Energy price forecasts are highly uncertain, as history has shown ([Energy Price Volatility and Forecast Uncertainty](#)). WTI futures for October 2010 delivery for the 5-day period ending August 5 averaged \$82 per barrel, and implied volatility averaged 30 percent.

U.S. Electricity Consumption. *Temperatures during this year's summer season continue to be well above normal in sharp contrast to the mild summer of 2009. Weather has been particularly hot in the Northeast during June and July. Total cooling degree-days during the last 2 months were 54 percent higher than normal in the Mid-Atlantic region and 73 percent higher than normal in New England ([U.S. Summer Cooling Degree Days](#)). EIA projects that total consumption of electricity will grow by 4 percent during 2010. Growth*

is expected to slow to a rate of 0.4 percent in 2011 as summer temperatures are assumed to return to more normal levels.

U.S. Electricity Retail Prices. *EIA estimates that residential retail electricity prices during the first half of 2010 were about the same as in the first half of 2009. However, rising fuel costs for natural gas and coal are likely to push up retail prices later this year, causing prices over the entire year to grow by about 0.6 percent. Increased fuel costs are expected to push residential prices higher by about 2.9 percent during 2011.*

Recommendations:

1. CEG recommends an aggregated approach for 3rd party commodity supply procurement strategies for both electric and natural gas supply service. Currently some facilities are procuring electric supply from a TPS, however by aggregating all sites in the county for electricity and natural gas procurement, the County could see a significant reduction in energy supply costs. Energy commodities are among the most volatile of all commodities, however at this point and time, energy is extremely competitive. Cape May County could realize up to a 20% reduction in energy supply costs for both electricity and natural gas, if it were to aggregate usage and take advantage of these current market prices quickly, before energy increases.

The below recommendations presented by CEG are based on current information provided by the county for its utility usage, any savings presented with these recommendations are estimates only based on that information. It is recommended that further analysis and review of more recent utility data and any current 3rd party supply contracts be performed prior to performing any of the presented recommendations.

Overall, after review of the utility consumption, billing, and current commodity pricing outlook, CEG recommends that the Library Facilities in conjunction with the Bridge Commission, County Facilities, Technical High School and Special Services School utilize the advisement of 3rd party unbiased Energy Consulting Firm experienced in the aggregation of facilities and procurement of retail natural gas and electricity commodity. The Energy Consulting Firm should incorporate a rational, defensible strategy for purchasing commodity in volatile markets based upon the following:

- Budgets that reflect sound market intelligence
 - An understanding of historical prices and trends
 - Awareness of seasonal opportunities (e.g. shoulder months)
 - Negotiation of fair contractual terms
 - An aggressive, market based price
2. CEG recommends that the county schedule a meeting with the current natural gas utility provider to review the facilities current rate tariff's and site locations in an effort to Master Bill contiguous properties for natural gas distribution service. This meeting would

provide insight regarding opportunities that are currently available to reduce individual metered customer service charges.

3. CEG recommends that the County consider utilizing a third party utility billing-auditing service to further analyze historical utility invoices such as water, sewer, electric and natural gas for incorrect billings and rate tariff optimization services. This service could provide refunds on potential over billings experienced by the County.
4. CEG recommends that the County explore Demand Response Programs that may be available in aggregate for its facilities. Demand response is the action of end users lowering their demand for electric (reducing consumption) in order to help balance supply and demand on the electric grid and ensure stability. The greatest need for demand response typically occurs during times of peak electricity demand, between the hours of 11 am and 6 pm, when extra strain is placed on the grid from situations such as increased air conditioning use on hot days or downed power lines resulting from a storm. Significant incentives are available for clients enrolled in demand response programs. It is strongly recommended that the County utilize an experienced 3rd party unbiased energy consulting firm prior to initiating any demand response programs. This is recommended due to the potential conflicts with existing and/or future electric supply service agreements and transparency created by the evaluation of current programs and incentives available.

XI. 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 pay 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 show 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.

The following table provides an outline of the potential applicability of the available funding options to each energy conservation measure proposed in the report. This table should be used as a guideline only and further review of these program funds should be verified with their respective administrators.

ECM No.	Description	I	II	III	IV	V
		ESIP	Municipal Bonds	PPA	Pay for Performance	Direct Install
	CAPE MAY CITY LIBRARY					
ECM #5-1	AHU Replacement to High Eff. Heat Pump	X	X			
ECM #5-2	Electric to Natural Gas DHW Heater	X	X			X
ECM #5-3	High Efficiency Condensing Boiler	X	X			
ECM #5-4	Lighting Upgrade	X	X			X
ECM #5-5	Lighting Occupancy Controls	X	X			X
	MAIN LIBRARY BRANCH					
ECM #21-1	High-Eff. Split System Heat Pump	X	X			
ECM #21-2	Replace AHUs	X	X			
ECM #21-3	HVAC Split System Replacement	X	X			
ECM #21-4	Premium Efficient Pump Motor	X	X			
ECM #21-5	Lighting Upgrade	X	X			X
ECM #21-6	Lighting Occupancy Controls	X	X			
	WILDWOOD CREST LIBRARY					
ECM #41-1	New DHW Heater Natural Gas	X	X			X
ECM #41-2	New DHW Heater Oil Fired	X	X			
ECM #41-3	New DHW Heater Electric	X	X			
ECM #41-4	High Efficiency Natural Gas Fired Boiler	X	X			
ECM #41-5	Constant Volume to VAV Conversion	X	X			X
ECM #41-6	Lighting Retrofit	X	X			
ECM #41-7	Occupancy Lighting Controls	X	X			
REM #41-1	25 kW Roof PV		X	X		

XII. 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. Ensure air filter changes are performed regularly to decrease overall system power usage and maintain better IAQ.
- E. Confirm occupied/unoccupied temperature setbacks are being utilized where applicable.

XIII. ENERGY AUDIT ASSUMPTIONS

The assumptions utilized in this energy audit include but are not limited to following:

- A. Cost Estimates noted within this report are based on industry accepted costing data such as RS MeansTM Cost Data, contractor pricing and engineering estimates. All cost estimates for this level of auditing are +/- 20%. Prevailing wage rates for the specified region has been utilized to calculate installation costs. The cost estimates indicated within this audit should be utilized by the owner for prioritizing further project development post the energy audit. Project development would include investment grade auditing and detailed engineering.
- B. Energy savings noted within this audit are calculated utilizing industry standard procedures and accepted engineering assumptions. For this level of auditing, energy savings are not guaranteed.
- C. Information gathering for each facility is strongly based on interviews with operations personnel. Information dependent on verbal feedback is used for calculation assumptions including but not limited to the following:
 - a. operating hours
 - b. equipment type
 - c. control strategies
 - d. scheduling
- D. Information contained within the major equipment list is based on the existing owner documentation where available (drawings, O&M manuals, etc.). If existing owner documentation is not available, catalog information is utilized to populate the required information.
- E. Equipment incentives and energy credits are based on current pricing and status of rebate programs. Rebate availability is dependent on the individual program funding and applicability.
- F. Equipment (HVAC, Plumbing, Electrical, & Lighting) noted within an ECM recommendation is strictly noted as a **basis for calculation** of energy savings. The owner should use this equipment information as a benchmark when pursuing further investment grade project development and detailed engineering for specific energy conservation measures.

Utility bill annual averages are utilized for calculation of all energy costs unless otherwise noted. Accuracy of the utility energy usage and costs are based on the information provided. Utility information including usage and costs is estimated where incomplete data is provided.

ECM COST & SAVINGS BREAKDOWN
CONCORD ENGINEERING GROUP

Capy May County Libraries

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	OF (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)	(\$)	(\$)
CAPE MAY CITY LIBRARY																
ECM #5-1	AHU Replacement to High Eff. Heat Pump	\$8,500	\$13,500	\$0	\$22,000	\$1,506	\$0	\$1,506	15	\$22,588	\$0	2.7%	14.6	0.33%		(\$4,023.26)
ECM #5-2	Electric to Natural Gas DHW Heater	\$1,100	\$1,350	\$300	\$2,150	\$228	\$0	\$228	15	\$3,420	\$0	59.1%	9.4	6.46%		\$571.85
ECM #5-3	High Efficiency Condensing Boiler	\$12,078	\$16,191	\$698	\$27,571	\$416	\$0	\$416	25	\$10,400	\$0	-62.3%	66.3	-6.42%		(\$20,327.13)
ECM #5-4	Lighting Upgrade	\$311	\$0	\$0	\$311	\$1,019	\$0	\$1,019	15	\$15,285	\$0	4814.8%	0.3	327.65%		\$11,853.76
ECM #5-5	Lighting Occupancy Controls	\$1,475	\$0	\$110	\$1,365	\$621	\$0	\$621	15	\$9,315	\$0	582.4%	2.2	45.33%		\$6,048.46
MAIN LIBRARY BRANCH																
ECM #21-1	High-Eff. Split System Heat Pump	\$45,800	\$0	\$2,208	\$43,592	\$4,026	\$0	\$4,026	15	\$60,390	\$0	38.5%	10.8	4.38%		\$4,470.13
ECM #21-2	Replace AHUs	\$60,750	\$0	\$305	\$60,445	\$1,326	\$0	\$1,326	15	\$19,890	\$0	-67.1%	45.6	-11.49%		(\$44,615.30)
ECM #21-3	HVAC Split System Replacement	\$6,580	\$0	\$276	\$6,304	\$515	\$0	\$515	15	\$7,725	\$0	22.5%	12.2	2.66%		(\$155.96)
ECM #21-4	Premium Efficient Pump Motor	\$1,898	\$0	\$60	\$1,838	\$21	\$0	\$21	18	\$382	\$0	-79.2%	86.7	-13.00%		(\$1,546.43)
ECM #21-5	Lighting Upgrade	\$500	\$700	\$0	\$1,200	\$223	\$0	\$223	15	\$3,338	\$0	178.2%	5.4	16.72%		\$1,456.91
ECM #21-6	Lighting Occupancy Controls	\$3,365	\$0	\$340	\$3,025	\$267	\$0	\$267	15	\$4,005	\$0	32.4%	11.3	3.73%		\$162.43
WILDWOOD CREST LIBRARY																
ECM #41-1	New DHW Heater Natural Gas	\$1,100	\$1,500	\$300	\$2,300	\$243	\$0	\$243	15	\$3,645	\$0	58.5%	9.5	6.40%		\$600.92
ECM #41-2	New DHW Heater Oil Fired	\$800	\$1,300	\$0	\$2,100	\$202	\$0	\$202	15	\$3,030	\$0	44.3%	10.4	4.98%		\$311.46
ECM #41-3	New DHW Heater Electric	\$950	\$1,000	\$0	\$1,950	\$87	\$0	\$87	15	\$1,305	\$0	-33.1%	22.4	-4.65%		(\$911.40)
ECM #41-4	High Efficiency Natural Gas Fired Boiler	\$7,600	\$9,500	\$0	\$17,100	\$1,390	\$0	\$1,390	25	\$34,750	\$0	103.2%	12.3	6.41%		\$7,104.28
ECM #41-5	Constant Volume to VAV Conversion	\$4,800	\$8,670	\$0	\$13,470	\$1,377	\$0	\$1,377	20	\$27,531	\$0	104.4%	9.8	8.04%		\$7,009.44
ECM #41-6	Lighting Retrofit	\$6,012	\$0	\$40	\$5,972	\$282	\$0	\$282	15	\$4,236	\$0	-29.1%	21.1	-4.01%		(\$2,599.99)
ECM #41-7	Occupancy Lighting Controls	\$1,220	\$0	\$125	\$1,095	\$62	\$0	\$62	15	\$932	\$0	-14.9%	17.6	-1.95%		(\$353.53)
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY																
REM #41-1	25 kW Roof PV	\$229,770	\$0	\$0	\$229,770	\$5,166	\$10,959	\$16,125	25	\$403,125	\$273,975	75.4%	14.2	4.89%		\$51,017.01

- 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.



Concord Engineering Group, Inc.

520 BURNT MILL ROAD
VOORHEES, NEW JERSEY 08043
PHONE: (856) 427-0200
FAX: (856) 427-6508

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

Prescriptive Lighting

Retro fit of T12 to T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$10 per fixture (1-4 lamps)
Replacement of T12 with new T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$25 per fixture (1-2 lamps) \$30 per fixture (3-4 lamps)
Replacement of incandescent with screw-in PAR 38 or PAR 30 (CFL) bulb	\$7 per bulb
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

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

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%



STATEMENT OF ENERGY PERFORMANCE

01.05 Cape May City Library

Building ID: 2405224
For 12-month Period Ending: November 30, 2009¹
Date SEP becomes ineligible: N/A

Date SEP Generated: September 02, 2010

Facility
 01.05 Cape May City Library
 110 Ocean Street
 Cape May, NJ 08204

Facility Owner
 Cape May County
 4 Moore Road
 Cape May Court House, NJ 08210

Primary Contact for this Facility
 AnnMarie McMahon
 4 Moore Road
 Cape May Court House, NJ 08210

Year Built: 1920
Gross Floor Area (ft²): 4,300

Energy Performance Rating² (1-100) N/A

Site Energy Use Summary³

Electricity - Grid Purchase(kBtu)	173,544
Natural Gas (kBtu) ⁴	279,863
Total Energy (kBtu)	453,407

Energy Intensity⁵

Site (kBtu/ft ² /yr)	105
Source (kBtu/ft ² /yr)	203

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	41
---	----

Electric Distribution Utility

Pepco - Atlantic City Electric Co

National Average Comparison

National Average Site EUI	104
National Average Source EUI	246
% Difference from National Average Source EUI	-17%
Building Type	Library

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 Standards⁶ 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 South Burnt Mill Road
 Voorhees, NJ 08043

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) or a Registered Architect (RA) 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 or RA 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	<input checked="" type="checkbox"/>
Building Name	01.05 Cape May City Library	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		<input type="checkbox"/>
Type	Library	Is this an accurate description of the space in question?		<input type="checkbox"/>
Location	110 Ocean Street, Cape May, NJ 08204	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		<input type="checkbox"/>
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		<input type="checkbox"/>
Cape May City Library (Other)				
CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	<input checked="" type="checkbox"/>
Gross Floor Area	4,300 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.		<input type="checkbox"/>
Number of PCs	10(Optional)	Is this the number of personal computers in the space?		<input type="checkbox"/>
Weekly operating hours	53Hours(Optional)	Is this the total number of hours per week that the 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.		<input type="checkbox"/>
Workers on Main Shift	6(Optional)	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.		<input type="checkbox"/>

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Pepco - Atlantic City Electric Co

Fuel Type: Electricity		
Meter: Electric (kWh (thousand Watt-hours)) Space(s): Entire Facility Generation Method: Grid Purchase		
Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
11/01/2009	11/30/2009	2,211.00
10/01/2009	10/31/2009	3,642.00
09/01/2009	09/30/2009	5,772.00
08/01/2009	08/31/2009	5,100.00
07/01/2009	07/31/2009	4,638.00
06/01/2009	06/30/2009	2,916.00
05/01/2009	05/31/2009	3,387.00
04/01/2009	04/30/2009	3,268.00
03/01/2009	03/31/2009	5,021.00
02/01/2009	02/28/2009	4,979.00
01/01/2009	01/31/2009	5,609.00
Electric Consumption (kWh (thousand Watt-hours))		46,543.00
Electric Consumption (kBtu (thousand Btu))		158,804.72
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		158,804.72
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		<input type="checkbox"/>
Fuel Type: Natural Gas		
Meter: Gas (therms) Space(s): Entire Facility		
Start Date	End Date	Energy Use (therms)
11/01/2009	11/30/2009	138.38
10/01/2009	10/31/2009	1.02
09/01/2009	09/30/2009	0.00
08/01/2009	08/31/2009	0.00
07/01/2009	07/31/2009	0.00
06/01/2009	06/30/2009	0.00
05/01/2009	05/31/2009	233.46
04/01/2009	04/30/2009	395.90
03/01/2009	03/31/2009	577.92
02/01/2009	02/28/2009	630.92
01/01/2009	01/31/2009	583.34

Gas Consumption (therms)	2,560.94
Gas Consumption (kBtu (thousand Btu))	256,094.00
Total Natural Gas Consumption (kBtu (thousand Btu))	256,094.00
Is this the total Natural Gas consumption at this building including all Natural Gas meters?	<input type="checkbox"/>

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.	<input type="checkbox"/>

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.	<input type="checkbox"/>

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same PE or RA 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
01.05 Cape May City Library
110 Ocean Street
Cape May, NJ 08204

Facility Owner
Cape May County
4 Moore Road
Cape May Court House, NJ 08210

Primary Contact for this Facility
AnnMarie McMahon
4 Moore Road
Cape May Court House, NJ 08210

General Information

01.05 Cape May City Library	
Gross Floor Area Excluding Parking: (ft ²)	4,300
Year Built	1920
For 12-month Evaluation Period Ending Date:	November 30, 2009

Facility Space Use Summary

Cape May City Library	
Space Type	Other - Library
Gross Floor Area(ft ²)	4,300
Number of PCs ^o	10
Weekly operating hours ^o	53
Workers on Main Shift ^o	6

Energy Performance Comparison

Performance Metrics	Evaluation Periods		Comparisons		
	Current (Ending Date 11/30/2009)	Baseline (Ending Date 11/30/2009)	Rating of 75	Target	National Average
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft ²)	105	105	0	N/A	104
Source (kBtu/ft ²)	203	203	0	N/A	246
Energy Cost					
\$/year	\$ 10,672.75	\$ 10,672.75	N/A	N/A	\$ 10,526.99
\$/ft ² /year	\$ 2.48	\$ 2.48	N/A	N/A	\$ 2.45
Greenhouse Gas Emissions					
MtCO ₂ e/year	41	41	0	N/A	40
kgCO ₂ e/ft ² /year	10	10	0	N/A	10

More than 50% of your building is defined as Library. This building is currently ineligible for a rating. Please note the National Average column represents the CBECS national average data for Library. This building uses X% less energy per square foot than the CBECS national average for Library.

Notes:

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



STATEMENT OF ENERGY PERFORMANCE

01.21 Library Main Branch

Building ID: 2405227
For 12-month Period Ending: December 31, 2009¹
Date SEP becomes ineligible: N/A

Date SEP Generated: September 02, 2010

Facility

01.21 Library Main Branch
 30 Mechanic Street
 Cape May Court House, NJ 08210

Facility Owner

Cape May County
 4 Moore Road
 Cape May Court House, NJ 08210

Primary Contact for this Facility

AnnMarie McMahon
 4 Moore Road
 Cape May Court House, NJ 08210

Year Built: 1971
Gross Floor Area (ft²): 42,900

Energy Performance Rating² (1-100) N/A

Site Energy Use Summary³

Electricity - Grid Purchase(kBtu)	3,040,669
Natural Gas (kBtu) ⁴	2,717
Total Energy (kBtu)	3,043,386

Energy Intensity⁵

Site (kBtu/ft ² /yr)	71
Source (kBtu/ft ² /yr)	237

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	463
---	-----

Electric Distribution Utility

Pepco - Atlantic City Electric Co

National Average Comparison

National Average Site EUI	104
National Average Source EUI	246
% Difference from National Average Source EUI	-4%
Building Type	Library

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 Standards⁶ 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 South Burnt Mill Road
 Voorhees, NJ 08043

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) or a Registered Architect (RA) 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 or RA 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	<input checked="" type="checkbox"/>
Building Name	01.21 Library Main Branch	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		<input type="checkbox"/>
Type	Library	Is this an accurate description of the space in question?		<input type="checkbox"/>
Location	30 Mechanic Street, Cape May Court House, NJ 08210	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		<input type="checkbox"/>
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		<input type="checkbox"/>
Library Main Branch (Other)				
CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	<input checked="" type="checkbox"/>
Gross Floor Area	42,900 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.		<input type="checkbox"/>
Number of PCs	20(Optional)	Is this the number of personal computers in the space?		<input type="checkbox"/>
Weekly operating hours	60Hours(Optional)	Is this the total number of hours per week that the 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.		<input type="checkbox"/>
Workers on Main Shift	20(Optional)	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.		<input type="checkbox"/>

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Pepco - Atlantic City Electric Co

Fuel Type: Electricity		
Meter: Electric (kWh (thousand Watt-hours)) Space(s): Entire Facility Generation Method: Grid Purchase		
Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/01/2009	12/31/2009	81,669.00
11/01/2009	11/30/2009	114,600.00
10/01/2009	10/31/2009	112,200.00
09/01/2009	09/30/2009	63,000.00
08/01/2009	08/31/2009	76,500.00
07/01/2009	07/31/2009	72,000.00
06/01/2009	06/30/2009	69,300.00
05/01/2009	05/31/2009	64,500.00
04/01/2009	04/30/2009	63,300.00
03/01/2009	03/31/2009	62,500.00
02/01/2009	02/28/2009	59,100.00
01/01/2009	01/31/2009	52,500.00
Electric Consumption (kWh (thousand Watt-hours))		891,169.00
Electric Consumption (kBtu (thousand Btu))		3,040,668.63
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		3,040,668.63
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		<input type="checkbox"/>
Fuel Type: Natural Gas		
Meter: Gas (therms) Space(s): Entire Facility		
Start Date	End Date	Energy Use (therms)
12/01/2009	12/31/2009	3.08
11/01/2009	11/30/2009	1.39
10/01/2009	10/31/2009	1.03
09/01/2009	09/30/2009	3.07
08/01/2009	08/31/2009	2.05
07/01/2009	07/31/2009	5.16
06/01/2009	06/30/2009	1.04
05/01/2009	05/31/2009	3.11
04/01/2009	04/30/2009	2.07
03/01/2009	03/31/2009	1.03

02/01/2009	02/28/2009	3.10
01/01/2009	01/31/2009	1.04
Gas Consumption (therms)		27.17
Gas Consumption (kBtu (thousand Btu))		2,717.00
Total Natural Gas Consumption (kBtu (thousand Btu))		2,717.00
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		<input type="checkbox"/>

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.	<input type="checkbox"/>

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.	<input type="checkbox"/>

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same PE or RA 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

01.21 Library Main Branch
30 Mechanic Street
Cape May Court House, NJ 08210

Facility Owner

Cape May County
4 Moore Road
Cape May Court House, NJ 08210

Primary Contact for this Facility

AnnMarie McMahon
4 Moore Road
Cape May Court House, NJ 08210

General Information

01.21 Library Main Branch	
Gross Floor Area Excluding Parking: (ft ²)	42,900
Year Built	1971
For 12-month Evaluation Period Ending Date:	December 31, 2009

Facility Space Use Summary

Library Main Branch	
Space Type	Other - Library
Gross Floor Area(ft ²)	42,900
Number of PCs ^o	20
Weekly operating hours ^o	60
Workers on Main Shift ^o	20

Energy Performance Comparison

Performance Metrics	Evaluation Periods		Comparisons		
	Current (Ending Date 12/31/2009)	Baseline (Ending Date 12/31/2009)	Rating of 75	Target	National Average
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft ²)	71	71	0	N/A	104
Source (kBtu/ft ²)	237	237	0	N/A	246
Energy Cost					
\$/year	\$ 104,035.88	\$ 104,035.88	N/A	N/A	\$ 152,519.47
\$/ft ² /year	\$ 2.43	\$ 2.43	N/A	N/A	\$ 3.56
Greenhouse Gas Emissions					
MtCO ₂ e/year	463	463	0	N/A	679
kgCO ₂ e/ft ² /year	11	11	0	N/A	16

More than 50% of your building is defined as Library. This building is currently ineligible for a rating. Please note the National Average column represents the CBECS national average data for Library. This building uses X% less energy per square foot than the CBECS national average for Library.

Notes:

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



STATEMENT OF ENERGY PERFORMANCE

01.41 Wildwood Crest Library

Building ID: 2405230
For 12-month Period Ending: December 31, 2009¹
Date SEP becomes ineligible: N/A

Date SEP Generated: September 02, 2010

Facility
 01.41 Wildwood Crest Library
 6301 Ocean Avenue
 Wildwood Crest, NJ 08260

Facility Owner
 Cape May County
 4 Moore Road
 Cape May Court House, NJ 08210

Primary Contact for this Facility
 AnnMarie McMahon
 4 Moore Road
 Cape May Court House, NJ 08210

Year Built: 1976
Gross Floor Area (ft²): 4,400

Energy Performance Rating² (1-100) N/A

Site Energy Use Summary³

Electricity - Grid Purchase(kBtu)	148,548
Fuel Oil (No. 2) (kBtu)	326,880
Natural Gas - (kBtu) ⁴	0
Total Energy (kBtu)	475,428

Energy Intensity⁵

Site (kBtu/ft ² /yr)	108
Source (kBtu/ft ² /yr)	188

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	47
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Electric Distribution Utility

Pepeco - Atlantic City Electric Co

National Average Comparison

National Average Site EUI	104
National Average Source EUI	246
% Difference from National Average Source EUI	-24%
Building Type	Library

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 Standards⁶ 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 South Burnt Mill Road
 Voorhees, NJ 08043

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) or a Registered Architect (RA) 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 or RA 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	<input checked="" type="checkbox"/>
Building Name	01.41 Wildwood Crest Library	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		<input type="checkbox"/>
Type	Library	Is this an accurate description of the space in question?		<input type="checkbox"/>
Location	6301 Ocean Avenue, Wildwood Crest, NJ 08260	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		<input type="checkbox"/>
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		<input type="checkbox"/>
Wildwood Crest Library (Other)				
CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	<input checked="" type="checkbox"/>
Gross Floor Area	4,400 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.		<input type="checkbox"/>
Number of PCs	5(Optional)	Is this the number of personal computers in the space?		<input type="checkbox"/>
Weekly operating hours	50Hours(Optional)	Is this the total number of hours per week that the 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.		<input type="checkbox"/>
Workers on Main Shift	3(Optional)	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.		<input type="checkbox"/>

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Pepco - Atlantic City Electric Co

Fuel Type: Electricity		
Meter: Electric (kWh (thousand Watt-hours)) Space(s): Entire Facility Generation Method: Grid Purchase		
Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/01/2009	12/31/2009	3,857.00
11/01/2009	11/30/2009	3,915.00
10/01/2009	10/31/2009	4,599.00
09/01/2009	09/30/2009	6,108.00
08/01/2009	08/31/2009	5,690.00
07/01/2009	07/31/2009	5,313.00
06/01/2009	06/30/2009	0.00
05/01/2009	05/31/2009	0.00
04/01/2009	04/30/2009	4,181.00
03/01/2009	03/31/2009	0.00
02/01/2009	02/28/2009	4,695.00
01/01/2009	01/31/2009	5,179.00
Electric Consumption (kWh (thousand Watt-hours))		43,537.00
Electric Consumption (kBtu (thousand Btu))		148,548.24
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		148,548.24
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		<input type="checkbox"/>
Fuel Type: Fuel Oil (No. 2)		
Meter: Oil (Gallons) Space(s): Entire Facility		
Start Date	End Date	Energy Use (Gallons)
12/01/2009	12/31/2009	491.70
11/01/2009	11/30/2009	147.40
10/01/2009	10/31/2009	101.00
09/01/2009	09/30/2009	0.00
08/01/2009	08/31/2009	0.00
07/01/2009	07/31/2009	0.00
06/01/2009	06/30/2009	0.00
05/01/2009	05/31/2009	48.10
04/01/2009	04/30/2009	198.40
03/01/2009	03/31/2009	359.60

02/01/2009	02/28/2009	495.60
01/01/2009	01/31/2009	515.10
Oil Consumption (Gallons)		2,356.90
Oil Consumption (kBtu (thousand Btu))		326,879.64
Total Fuel Oil (No. 2) Consumption (kBtu (thousand Btu))		326,879.64
Is this the total Fuel Oil (No. 2) consumption at this building including all Fuel Oil (No. 2) meters?		<input type="checkbox"/>

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.	<input type="checkbox"/>

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.	<input type="checkbox"/>

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same PE or RA 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
01.41 Wildwood Crest Library
6301 Ocean Avenue
Wildwood Crest, NJ 08260

Facility Owner
Cape May County
4 Moore Road
Cape May Court House, NJ 08210

Primary Contact for this Facility
AnnMarie McMahon
4 Moore Road
Cape May Court House, NJ 08210

General Information

01.41 Wildwood Crest Library	
Gross Floor Area Excluding Parking: (ft ²)	4,400
Year Built	1976
For 12-month Evaluation Period Ending Date:	December 31, 2009

Facility Space Use Summary

Wildwood Crest Library	
Space Type	Other - Library
Gross Floor Area(ft ²)	4,400
Number of PCs ^o	5
Weekly operating hours ^o	50
Workers on Main Shift ^o	3

Energy Performance Comparison

Performance Metrics	Evaluation Periods		Comparisons		
	Current (Ending Date 12/31/2009)	Baseline (Ending Date 12/31/2009)	Rating of 75	Target	National Average
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft ²)	108	108	0	N/A	104
Source (kBtu/ft ²)	188	188	0	N/A	246
Energy Cost					
\$/year	\$ 12,403.86	\$ 12,403.86	N/A	N/A	\$ 11,938.93
\$/ft ² /year	\$ 2.82	\$ 2.82	N/A	N/A	\$ 2.71
Greenhouse Gas Emissions					
MtCO ₂ e/year	47	47	0	N/A	45
kgCO ₂ e/ft ² /year	11	11	0	N/A	11

More than 50% of your building is defined as Library. This building is currently ineligible for a rating. Please note the National Average column represents the CBECS national average data for Library. This building uses X% less energy per square foot than the CBECS national average for Library.

Notes:

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

Cape May - City Library

Boilers

Tag	Boiler-1		
Unit Type	Hot Water - Cast Iron		
Qty	1		
Location	Mech Room		
Area Served	Whole Bldg		
Manufacturer	Weil McLain		
Model #	PFG-8-PIN		
Serial #	5		
Input Capacity (MBH)	427		
Rated Output Capacity (MBH)	346		
Approx. Efficiency %	81%		
Fuel	Nat Gas		
Approx Age	19		
Ashrae Service Life	30		
Remaining Life	11		
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Cape May - City Library

Pumps

Tag	HWP-1	HWP-2	
Unit Type	Pipe Mounted - Inline	Pipe Mounted - Inline	
Qty	1	1	
Location	Mech Room	Mech Room	
Area Served	Hot Water Loop	Hot Water Loop	
Manufacturer	Bell & Gossett	Taco	
Model #	-	-	
Serial #	-	-	
Horse Power	1/12 HP	1/25 HP	
Flow	-	-	
Motor Info	-	-	
Electrical Power	115V, 1PH	115V, 1PH	
RPM	1725	1725	
Motor Efficiency %	-	-	
Approx Age	10	10	
Ashrae Service Life	20	20	
Remaining Life	10	10	
Comments	Constant speed	Constant speed	

MAJOR EQUIPMENT LIST

Concord Engineering Group

Cape May - Wildwood Crest Library

Domestic Hot Water Heaters

Tag	HWH-1		
Unit Type	Electric HWH		
Qty	1		
Location	Mech Room		
Area Served	Domestic Hot Water		
Manufacturer	Bradford & White		
Model #	M112UT6SS-1NAL		
Serial #	FA11518285		
Size (Gallons)	12		
Input Capacity (MBH/KW)	1500		
Recovery (Gal/Hr)	7		
Efficiency %	100%		
Fuel	Electric		
Approx Age	1		
Ashrae Service Life	12		
Remaining Life	11		
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group
Cape May - Wildwood Crest Library

Rooftop / AC Units

Tag	CU-1	AHU-1	
Unit Type	Split System Condensing Unit	Split System Air Handler	
Qty	2	1	
Location	Outside	Inside	
Area Served	Library	Library	
Manufacturer	BDP Company	BDP Company	
Model #	565BB060	517AYX120000MAAS	
Serial #	2188A08735	303871-4	
Cooling Type	DX	Constant Volume Single Zone	
Cooling Capacity (Tons)	5	5	
Cooling Efficiency (SEER/EER)	-	-	
Heating Type	-	-	
Heating Input (MBH)	-	-	
Efficiency	-	-	
Fuel	-	-	
Approx Age	12	12	
Ashrae Service Life	15	15	
Remaining Life	3	3	
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Cape May - City Library

Unit Heaters

Tag	UH-1-4		
Unit Type	Hot Water Unit Heater		
Qty	4		
Location	Library		
Area Served	Hallways		
Manufacturer	Modine		
Model #	H563801		
Serial #	5080594		
Heating Type	Hot Water		
Heating Capacity (MBH)	-		
CFM	-		
RPM/HP	-		
GPM	-		
Approx Age	10		
Ashrae Service Life	20		
Remaining Life	10		
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group
Cape May County - Library Main Branch

Rooftop / AC Units

Tag	HP-6	HP-3, 5	CU-2
Unit Type	Split System Heat Pump	Split System Heat Pump	Outdoor AC Unit
Qty	1	2	1
Location	Outside	Outside	Outside
Area Served	Library	Library	Library
Manufacturer	Trane	Trane	Trane
Model #	TWR018C100A1	TWR060C 100A1	2TTB2030A1000AA
Serial #	H40297353	H35237435	3152P3L4F
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1 1/2 Tons	5 Tons	2 1/2 Tons
Cooling Efficiency (SEER/EER)	10 SEER	10 SEER	12 SEER
Heating Type	Heat Pump	Heat Pump	N/A
Heating Input (MBH)	18 MBH	60 MBH	N/A
Efficiency	8.1 HSPF	8.10 HSPF	N/A
Fuel	R-22	R-22	R-22
Approx Age	16	17	7
ASHRAE Service Life	15	15	15
Remaining Life	(1)	(2)	8
Comments	AHU-9	AHU-6	-

Rooftop / AC Units

Tag	HP-1	HP-4	HP-2
Unit Type	Split System Heat Pump	Split System Heat Pump	Split System Heat Pump
Qty	1	1	1
Location	Outside	Outside	Outside
Area Served	Library	Library	Library
Manufacturer	Trane	Trane	Trane
Model #	TWR024C100A1	TWR042C100A1	TWR048C100A1
Serial #	J01298155	J01299146	J02210505
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	2	3.5	4
Cooling Efficiency (SEER/EER)	10 SEER	10 SEER	10 SEER
Heating Type	Heat Pump	Heat Pump	Heat Pump
Heating Input (MBH)	24 MBH	42 MBH	48 MBH
Efficiency	8.1 HSPF	8.1 HSPF	8.1 HSPF
Fuel	R-22	R-22	R-22
Approx Age	16	16	16
ASHRAE Service Life	15	15	15
Remaining Life	(1)	(1)	(1)
Comments	-	-	-

Rooftop / AC Units

Tag	-	AHU-1	AHU-2
Unit Type	Split System Heat Pump	Modular Climate Changer	Modular Climate Changer
Qty	1	1	1
Location	Outside	Basement	Basement
Area Served	Library	Library	Library
Manufacturer	Sanyo	Trane	Trane
Model #	CH2472	MCCA017CAE0BAA0 A0000000	MCCA012GAF0BBC0 00EOCCA00BAA0000
Serial #	122584	K94A00991	K94A02680
Cooling Type	DX, R-410A	Chilled Water	Chilled Water
Cooling Capacity (Tons)	2	20	15
Cooling Efficiency (SEER/EER)	17 SEER	-	-
Heating Type	Heat Pump	HW	HW
Heating Input (MBH)	29 MBH	?	
Efficiency	8.5 HSPF	-	-
Fuel	R410A	Electric	HW
Approx Age	2	15	15
ASHRAE Service Life	15	15	15
Remaining Life	13	0	0
Comments	Indoor: M/N KHS2472, S/N 0127684	15 hp	10 hp

Rooftop / AC Units

Tag	AHU-3	AHU-16	-
Unit Type	Modular Climate Changer	Cooling only Commercial Air	Ductless Mini Split air conditioner
Qty	1	1	2
Location	Basement	2nd Floor Server Room	-
Area Served	Library	2nd Floor Server Room	-
Manufacturer	Trane	Rheem	Sanyo
Model #	MCCA008	RHGE-075ZL	KS1822
Serial #	K94A04030	140F190405152	189354
Cooling Type	Chilled Water	DX, R-22	DX, R-22
Cooling Capacity (Tons)	10	7.5	1.5
Cooling Efficiency (SEER/EER)	-	9.5 EER	9.5
Heating Type	HW	N/A	N/A
Heating Input (MBH)	-	N/A	N/A
Efficiency	-	N/A	N/A
Fuel	HW	N/A	N/A
Approx Age	15	6	15
ASHRAE Service Life	15	15	15
Remaining Life	0	9	0
Comments	7.5 hp	208/230-3-60	-

Rooftop / AC Units

Tag	CU-1	-	-
Unit Type	Outdoor AC Unit	-	-
Qty	1	-	-
Location	Outside	-	-
Area Served	Library	-	-
Manufacturer	Trane	-	-
Model #	RAUCC20GBJI3BHI	-	-
Serial #	J94B80446	-	-
Cooling Type	DX, R-22	-	-
Cooling Capacity (Tons)	20 Tons	-	-
Cooling Efficiency (SEER/EER)	10.9 EER	-	-
Heating Type	N/A	-	-
Heating Input (MBH)	N/A	-	-
Efficiency	N/A	-	-
Fuel	R-22	-	-
Approx Age	16	-	-
ASHRAE Service Life	20	-	-
Remaining Life	(1)	-	-
Comments	200/230-3-60	-	-

MAJOR EQUIPMENT LIST

Concord Engineering Group

Cape May County - Library Main Branch

Boilers

Tag	-	B-1	B-2
Unit Type	Forced Draft Water Boiler	Boiler Burner	Boiler Burner
Qty	2	1	1
Location	Central Boiler Plant	Central Boiler Plant	Central Boiler Plant
Area Served	Library/ Court House	Library/ Court House	Library/ Court House
Manufacturer	Bryan Boilers	Gordon Piatt	Gordon Piatt
Model #	RV800-W-FDG0 000819	S.12-1-G0-50	S.12-1-G0-50
Serial #	86336 / 86337	-	-
Input Capacity (MBH) / (GPH)	7,805	8000 / 57.1	8000 / 57.1
Rated Output Capacity (MBH)	6,400	-	-
Approx. Efficiency %	82%	86%	84%
Fuel	Natural Gas / #2 oil	Natural gas / #2 oil	Natural gas / #2 oil
Approx Age	10	10	10
ASHRAE Service Life	24	20	20
Remaining Life	14	10	10
Comments	NB45769 / NB45770	-	-

MAJOR EQUIPMENT LIST

Concord Engineering Group

Cape May County - Library Main Branch

Chiller

Tag	-	-	-
Unit Type	Air Cooled Liquid Chiller	Air Cooled Liquid Chiller	-
Qty	1	1	-
Location	Outside	Outside	-
Area Served	Library	Library	-
Manufacturer	York	York	-
Model #	YCAL0060SC17	YCAL0060SC17	-
Serial #	RHJM9690AA	RHJM96300AA	-
Refrigerant	R-22	R-22	-
Cooling Capacity (Tons)	60	60	-
Cooling Efficiency (KW/Ton)	1.4	1.4	-
Volts / Phase / Hz	200/3/60	200/3/60	-
Fuel	Electric	Electric	-
Chilled Water GPM / ΔT	-	-	-
Condenser Water GPM / ΔT	-	-	-
Approx Age	10	10	-
ASHRAE Service Life	20	20	-
Remaining Life	10	10	-
Comments	8.0 EER at 45°F _{FLWT}	8.0 EER at 45°F _{FLWT}	-

MAJOR EQUIPMENT LIST

Concord Engineering Group

Cape May County - Library Main Branch

Pumps

Tag	P-3	P-4	-
Unit Type	Base Mounted - End Suction Pump	Base Mounted - End Suction Pump	Base Mounted - End Suction Pump
Qty	1	1	1
Location	Central Boiler Plant	Central Boiler Plant	Library Bsmt
Area Served	Library / Court House HW Loop	Library / Court House HW Loop	HW Loop
Manufacturer	PACO	PACO	Bell & Gossett
Model #	MPE-7441	MPE-7441	1510 2BC BF 9.26
Serial #	10-30955-13001-1762	10-30955-13001-1762	C011423-01 L50
Horse Power	10	10	5
Flow	400 GPM @ 75 FT/HD	400 GPM @ 75 FT/HD	130 GPM @ 88 FT/HD
Motor Info	Baldor JMM3313T	Baldor JMM3313T	WEG
Electrical Power	230/460V	230/460V	208-230/460
RPM	1755	1755	1765
Motor Efficiency %	85.5%	85.5%	88%
Approx Age	10	10	-
ASHRAE Service Life	20	20	-
Remaining Life	10	10	-
Comments	-	-	-

Pumps

Tag	-	-	-
Unit Type	Base Mounted	In-Line	-
Qty	1	1	-
Location	Library Bsmt	Library Bsmt	-
Area Served	Library	Library	-
Manufacturer	PACO	PACO	-
Model #	-	16-20959-130101-1682	-
Serial #	-	MPE-7617	-
Horse Power	3	5	-
Flow	-	130 GPM @ 88 FT/D	-
Motor Info	Marathon Cat H123 M/N 1VC182TTDR7026DJ L	Baldor Super E, 184JM Frame	-
Electrical Power	208-230/460V	208-230/460V	-
RPM	1730	1730	-
Motor Efficiency %	81.5%	88.5%	-
Approx Age	10	10	-
ASHRAE Service Life	20	10	-
Remaining Life	10	0	-
Comments	-	-	-

MAJOR EQUIPMENT LIST

Concord Engineering Group

Cape May County - Library Main Branch

Domestic Water Heaters

Tag	-	-	-
Unit Type	Tank Water Heater	-	-
Qty	1	-	-
Location	Basement	-	-
Area Served	Library	-	-
Manufacturer	Bradford-White Corp.	-	-
Model #	MII80-9-3-CF-09	-	-
Serial #	KL-01-0173	-	-
Size (Gallons)	80	-	-
Input Capacity (MBH/KW)	9 KW	-	-
Recovery (Gal/Hr)	37	-	-
Efficiency %	98%	-	-
Fuel	Electric	-	-
Approx Age	17	-	-
Service Life	12	-	-
Remaining Life	(5)	-	-
Comments	-	-	-

MAJOR EQUIPMENT LIST

Concord Engineering Group

Cape May - Library Main Branch

Unit Heaters

Tag	UH-1-4	-	-
Unit Type	Unit Heater	-	-
Qty	1	-	-
Location	Generator Room	-	-
Area Served	Generator Room	-	-
Manufacturer	Trane	-	-
Model #	UHSA060S8DAAC	-	-
Serial #	A94B33213	-	-
Heating Type	Hot Water	-	-
Heating Capacity (MBH)	60	-	-
CFM	900	-	-
RPM/HP	1000/ (1/20 HP)	-	-
GPM	4.4	-	-
Approx Age	16	-	-
ASHRAE Service Life	20	-	-
Remaining Life	4	-	-
Comments	-	-	-

MAJOR EQUIPMENT LIST

Concord Engineering Group

Cape May - Wildwood Crest Library

Boilers

Tag	Boiler-1		
Unit Type	Hot Water - Cast Iron		
Qty	1		
Location	Mech Room		
Area Served	Whole Bldg		
Manufacturer	Columbia Emerald		
Model #	EM-125		
Serial #	30245		
Input Capacity (MBH)	175		
Rated Output Capacity (MBH)	129		
Approx. Efficiency %	74%		
Fuel	Oil		
Approx Age	?		
Ashrae Service Life	30		
Remaining Life	?		
Comments	I=B=R Rating (70% Eff), Burner - PowerFlame M/N: WCR3-G-20		

MAJOR EQUIPMENT LIST

Concord Engineering Group

Cape May - Wildwood Crest Library

Rooftop / AC Units

Tag	AHU-1	CU-1	AC-1,2
Unit Type	Constant Volume Reheat	Air Cooled Condenser	Mini Split
Qty	1	1	2
Location	Ceiling Hung in Storage Room	Outside	Indoor/Outdoor
Area Served	Library	AC-1	Sunroom
Manufacturer	Carrier	Carrier	Mitsubishi
Model #	40RM-016-8611HC	38AKS016-C521	PU18EK1
Serial #	2104F34887	2704F44021	41D00520B
Cooling Type	DX	DX	DX
Cooling Capacity (Tons)	15	15	2
Cooling Efficiency (SEER/EER)	N/A	10.5 EER	10.6 EER
Heating Type	HW Reheat Boxes	N/A	-
Heating Input (MBH)	N/A	N/A	-
Efficiency	N/A	N/A	-
Fuel	N/A	Electric	-
Approx Age	6	6	6
Ashrae Service Life	15	15	15
Remaining Life	9	9	9
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Cape May - Wildwood Crest Library

Domestic Hot Water Heaters

Tag	HWH-1		
Unit Type	Electric HWH		
Qty	1		
Location	Mech Room		
Area Served	Domestic Hot Water		
Manufacturer	Bradford & White		
Model #	MI30R6DS13		
Serial #	Z53611161		
Size (Gallons)	30		
Input Capacity (MBH/KW)	4500		
Recovery (Gal/Hr)	20		
Efficiency %	100%		
Fuel	Electric		
Approx Age	10		
Ashrae Service Life	12		
Remaining Life	2		
Comments			

Investment Grade Lighting Audit

CEG Job #: 9P10037
 Project: Cape May County
 Address: Address
 Address
 Building SF: 4,300

Cape May City Library

KWH COST: \$0.163

ECM #5-4: Lighting Upgrade - 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	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback
7	Boiler Room	1400	2	1	1-Lamp Compacy Fluourescent	23	0.05	64.4	\$10.50	2	0	No Change	23	0.05	64.4	\$10.50	\$0.00	\$0.00	0.00	0	\$0.00	0.00
26	Office/Break Room	2756	2	2	2-Lamp, T8, U-Lamp, Electronic Ballast, Recessed Mounted, Prismatic Lens	73	0.15	402.4	\$65.59	2	0	No Change	73	0.15	402.376	\$65.59	\$0.00	\$0.00	0.00	0	\$0.00	0.00
8	Office/Break Room	2756	1	3	3-Lamp Incandescent Decorative Lamp	180	0.18	496.1	\$80.86	1	3	(3) 18 W CFL Lamp	54	0.05	148.824	\$24.26	\$17.25	\$17.25	0.13	347.256	\$56.60	0.30
26	Vestibule	2756	2	2	2-Lamp, T8, U-Lamp, Electronic Ballast, Recessed Mounted, Prismatic Lens	73	0.15	402.4	\$65.59	2	0	No Change	73	0.15	402.376	\$65.59	\$0.00	\$0.00	0.00	0	\$0.00	0.00
8	Main Room	2756	17	3	3-Lamp Incandescent Decorative Lamp	180	3.06	8,433.4	\$1,374.64	17	3	(3) 18 W CFL Lamp	54	0.92	2530.008	\$412.39	\$17.25	\$293.25	2.14	5903.352	\$962.25	0.30
26	Main Room	2756	56	2	2-Lamp, T8, U-Lamp, Electronic Ballast, Recessed Mounted, Prismatic Lens	73	4.09	11,266.5	\$1,836.44	56	0	No Change	73	4.09	11266.53	\$1,836.44	\$0.00	\$0.00	0.00	0	\$0.00	0.00
33	Rear Entrance Hall	2756	1	4	4-Lamp T8 2x4 Recessed Prismatic	108	0.11	297.6	\$48.52	1	0	No Change	108	0.11	297.648	\$48.52	\$0.00	\$0.00	0.00	0	\$0.00	0.00
33	Men's Restroom	2756	1	4	4-Lamp T8 2x4 Recessed Prismatic	108	0.11	297.6	\$48.52	1	0	No Change	108	0.11	297.648	\$48.52	\$0.00	\$0.00	0.00	0	\$0.00	0.00
33	Women's Restroom	2756	1	4	4-Lamp T8 2x4 Recessed Prismatic	108	0.11	297.6	\$48.52	1	0	No Change	108	0.11	297.648	\$48.52	\$0.00	\$0.00	0.00	0	\$0.00	0.00
26	Retroom Lobby	2756	2	2	2-Lamp, T8, U-Lamp, Electronic Ballast, Recessed Mounted, Prismatic Lens	73	0.15	402.4	\$65.59	2	0	No Change	73	0.15	402.376	\$65.59	\$0.00	\$0.00	0.00	0	\$0.00	0.00
26	Meeting Room	2756	6	2	2-Lamp, T8, U-Lamp, Electronic Ballast, Recessed Mounted,	73	0.44	1,207.1	\$196.76	6	0	No Change	73	0.44	1207.128	\$196.76	\$0.00	\$0.00	0.00	0	\$0.00	0.00
26	Storage Room	1400	3	2	2-Lamp, T8, U-Lamp, Electronic Ballast, Recessed Mounted, Prismatic Lens	73	0.22	306.6	\$49.98	3	0	No Change	73	0.22	306.6	\$49.98	\$0.00	\$0.00	0.00	0	\$0.00	0.00
Totals			94	31			8.79	23,874.2	\$3,891.49	94	6			6.525	17623.56	\$2,872.64		\$310.50	2.27	6250.6	\$1,018.85	0.30

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 #: 9P10037

Project: Cape May County

Address: Address

Address

Building SF: 4300

Cape May City Library

KWH COST: \$0.163

ECM #5-5: Lighting Controls

EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS										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	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback		
7	Boiler Room	1400	1	1	1-Lamp Compacy Fluorescent	23	0.02	32.2	\$5.25	1	1	Dual Technology Occupancy Sensor	23	0.02	10%	28.98	\$4.72	\$160.00	\$160.00	0.00	3.22	\$0.52	304.84		
26	Office/Break Room	2756	2	2	2-Lamp, T8, U-Lamp, Electronic Ballast, Recessed Mounted, Prismatic Lens	73	0.15	402.4	\$65.59	2	2	Dual Technology Occupancy Sensor	73	0.15	10%	362.1384	\$59.03	\$160.00	\$160.00	0.00	40.2376	\$6.56	24.39		
8	Office/Break Room	2756	2	3	3-Lamp Incandescent Decorative Lamp	180	0.36	992.2	\$161.72	2	3		180	0.36	10%	892.944	\$145.55	\$75.00	\$0.00	0.00	99.216	\$16.17	0.00		
26	Vestibule	2756	1	2	2-Lamp, T8, U-Lamp, Electronic Ballast, Recessed Mounted, Prismatic Lens	73	0.07	201.2	\$32.79	0	2	None	73	0.00	0%	0	\$0.00	\$0.00	\$0.00	0.07	201.188	\$32.79	0.00		
8	Main Room	2756	4	3	3-Lamp Incandescent Decorative Lamp	180	0.72	1,984.3	\$323.44	0	3		180	0.00	0%	0	\$0.00	\$0.00	\$0.00	0.72	1984.32	\$323.44	0.00		
26	Main Room	2756	1	2	2-Lamp, T8, U-Lamp, Electronic Ballast, Recessed Mounted, Prismatic Lens	73	0.07	201.2	\$32.79	0	2		73	0.00	0%	0	\$0.00	\$0.00	\$0.00	0.07	201.188	\$32.79	0.00		
33	Rear Entrance Hall	2756	1	4	4-Lamp T8 2x4 Recessed Prismatic	108	0.11	297.6	\$48.52	0	4		108	0.00	0%	0	\$0.00	\$0.00	\$0.00	0.11	297.648	\$48.52	0.00		
33	Men's Restroom	2756	1	4	4-Lamp T8 2x4 Recessed Prismatic	108	0.11	297.6	\$48.52	1	4		Dual Technology Occupancy Sensor	108	0.11	10%	267.8832	\$43.66	\$225.00	\$225.00	0.00	29.7648	\$4.85	46.38	
33	Women's Restroom	2756	1	4	4-Lamp T8 2x4 Recessed Prismatic	108	0.11	297.6	\$48.52	1	4	Dual Technology Occupancy Sensor	108	0.11	10%	267.8832	\$43.66	\$225.00	\$225.00	0.00	29.7648	\$4.85	46.38		
26	Retroom Lobby	2756	1	2	2-Lamp, T8, U-Lamp, Electronic Ballast, Recessed Mounted, Prismatic Lens	73	0.07	201.2	\$32.79	1	2	Dual Technology Occupancy Sensor	73	0.07	10%	181.0692	\$29.51	\$225.00	\$225.00	0.00	20.1188	\$3.28	68.61		
26	Meeting Room	2756	17	2	2-Lamp, T8, U-Lamp, Electronic Ballast, Recessed Mounted,	73	1.24	3,420.2	\$557.49	17	2	Dual Technology Occupancy Sensor	73	1.24	10%	3078.176	\$501.74	\$160.00	\$320.00	0.00	342.0196	\$55.75	5.74		
26	Storage Room	2756	28	2	2-Lamp, T8, U-Lamp, Electronic Ballast, Recessed Mounted, Prismatic Lens	73	2.04	5,633.3	\$918.22	28	2	Dual Technology Occupancy Sensor	73	2.04	10%	5069.938	\$826.40	\$160.00	\$160.00	0.00	563.3264	\$91.82	1.74		
Totals			60	31			5.08	13,961.0	\$2,275.65	53	31			4.103		10149.01	\$1,654.29		\$1,475.00	0.97	3812.0	\$621.36	2.37		

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

Investment Grade Lighting Audit

CEG Job #: 9C10037

Project: Main Library Branch

Main Library Branch

KWH COST: \$0.141

Address:

Cape May Court House, NJ

Building SF: 42,900

ECM #21-5: Lighting Upgrade - 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	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback
221.11	B - Stair	8760	3	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.17	1,524.2	\$214.92	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.22	B - Hall	2470	4	2	2x2, 2 U-Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	73	0.29	721.2	\$101.69	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
9	B - Janitor	1000	1	1	100w A19 Lamp	100	0.10	100.0	\$14.10	1	1	(1) 26w CFL Lamp	26	0.03	26	\$3.67	\$20.00	\$20.00	0.07	74	\$10.43	1.92
127.21	B - Hall	2470	3	2	2x2, 2 ULamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.23	578.0	\$81.50	3	3	3 Lamp, 17w T8, Elect. Ballast; retrofit	47	0.14	348.27	\$49.11	\$100.00	\$300.00	0.09	229.71	\$32.39	9.26
242.212	B-Hall	2470	2	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	104	0.21	513.8	\$72.44	2	2	Remove 2 Lamps - Provide New Ballast, 95% Alum. Reflector	58	0.12	286.52	\$40.40	\$100.00	\$200.00	0.09	227.24	\$32.04	6.24
227.22	B-Technical Services	2470	28	2	2x2, 2 U-Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	73	2.04	5,048.7	\$711.86	28	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.22	B - Office	2470	5	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.52	1,284.4	\$181.10	5	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.22	B - Office	2470	1	2	2x2, 2 U-Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	73	0.07	180.3	\$25.42	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.22	B - Office	2470	6	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.62	1,541.3	\$217.32	6	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.22	B - Office	2470	3	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.31	770.6	\$108.66	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.22	B - AV Tech Services	2470	15	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	1.56	3,853.2	\$543.30	15	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.11	B - Mech Rm	1000	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.06	58.0	\$8.18	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.11	Stair	2470	3	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.17	429.8	\$60.60	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
4	Stair	2470	4	1	7 Watt Med CFL Lamp	7	0.03	69.2	\$9.75	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.22	Childrens Library	2470	22	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	2.29	5,651.4	\$796.84	22	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.22	Conference Room	2470	6	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.62	1,541.3	\$217.32	6	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Men's Restroom	2470	3	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.17	429.8	\$60.60	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.11	Men's Restroom	2470	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.12	286.5	\$40.40	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00

Investment Grade Lighting Audit

242.22	Mens Lobby	2470	1	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.10	256.9	\$36.22	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
3	Mens Lobby	2470	1	1	60w A19 Lamp	60	0.06	148.2	\$20.90	1	1	(1) 13w CFL Lamp	13	0.01	32.11	\$4.53	\$20.00	\$20.00	0.05	116.09	\$16.37	1.22
242.22	Emp Lounge	2470	8	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.83	2,055.0	\$289.76	8	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Emp Lounge	2470	3	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.17	429.8	\$60.60	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Emerg Mgt Hall	2470	14	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.81	2,005.6	\$282.80	14	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
222.22	Communications	2470	6	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	58	0.35	859.6	\$121.20	6	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
222.2	Communications	2470	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Indirect	58	0.12	286.5	\$40.40	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	Restroom	2470	1	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	104	0.10	256.9	\$36.22	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	Server Room	2470	3	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	104	0.31	770.6	\$108.66	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.22	OEM Deputy	2470	6	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.62	1,541.3	\$217.32	6	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.22	Communications	2470	4	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.42	1,027.5	\$144.88	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	Elec Room	1000	2	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	104	0.21	208.0	\$29.33	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
804	Mech Rm	1000	8	1	Recessed Down Light, (1) 26w CFL Lamp	26	0.21	208.0	\$29.33	8	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
804	Fire Pump Room	1000	1	1	Recessed Down Light, (1) 26w CFL Lamp	26	0.03	26.0	\$3.67	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.11	Fire Pump Room	1000	5	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.29	290.0	\$40.89	5	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.22	Operations	2470	22	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	2.29	5,651.4	\$796.84	22	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Operations	2470	1	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.06	143.3	\$20.20	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	Directors Office	2470	6	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	104	0.62	1,541.3	\$217.32	6	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	Closet	2470	1	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	104	0.10	256.9	\$36.22	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.22	Admin Office	2470	4	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.42	1,027.5	\$144.88	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Hall	2470	2	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.12	286.5	\$40.40	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
121.14	Closet	2470	2	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	78	0.16	385.3	\$54.33	2	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.12	286.52	\$40.40	\$100.00	\$200.00	0.04	98.8	\$13.93	14.36

Investment Grade Lighting Audit

227.21	Hall	2470	4	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.23	573.0	\$80.80	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
3	Jan Closet	1000	1	1	60w A19 Lamp	60	0.06	60.0	\$8.46	1	1	(1) 13w CFL Lamp	13	0.01	13	\$1.83	\$20.00	\$20.00	0.05	47	\$6.63	3.02
221.11	Stair	8760	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.12	1,016.2	\$143.28	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Entrance	2470	3	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.17	429.8	\$60.60	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.22	Library	2470	106	2	2x2, 2 U-Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	73	7.74	19,112.9	\$2,694.91	106	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.22	Library	2470	5	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.52	1,284.4	\$181.10	5	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	Womens Restroom	2470	3	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	104	0.31	770.6	\$108.66	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.11	Womens Restroom	2470	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.12	286.5	\$40.40	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	Mens Restroom	2470	3	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	104	0.31	770.6	\$108.66	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.11	Mens Restroom	2470	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.12	286.5	\$40.40	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
3	Jan. Closet	1000	1	1	60w A19 Lamp	60	0.06	60.0	\$8.46	1	1	(1) 13w CFL Lamp	13	0.01	13	\$1.83	\$20.00	\$20.00	0.05	47	\$6.63	3.02
227.22	Office	2470	23	2	2x2, 2 U-Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	73	1.68	4,147.1	\$584.75	23	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.14	Storage Room	1000	10	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	58	0.58	580.0	\$81.78	10	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.11	Mail Room	2470	3	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.17	429.8	\$60.60	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.22	Office	2470	6	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.62	1,541.3	\$217.32	6	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.22	Childrens Library	2470	55	2	2x2, 2 U-Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	73	4.02	9,917.1	\$1,398.30	55	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.22	Office	2470	2	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.21	513.8	\$72.44	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Storage Closet	1000	1	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.06	58.0	\$8.18	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
222.22	Library Desk	2470	1	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	58	0.06	143.3	\$20.20	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.22	3rd Floor Section 1	2470	78	2	2x2, 2 U-Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	73	5.69	14,064.2	\$1,983.05	78	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	3rd Floor Section 1	2470	10	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.58	1,432.6	\$202.00	10	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.22	3rd Floor Section 1	2470	8	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.83	2,055.0	\$289.76	8	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00

Investment Grade Lighting Audit

242.22	Server Room	2470	4	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.42	1,027.5	\$144.88	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.22	Office	2470	4	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.42	1,027.5	\$144.88	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.22	3rd Floor Section 2	2470	112	2	2x2, 2 U-Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	73	8.18	20,194.7	\$2,847.46	112	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.11	3F - Mens Restroom	2470	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.23	573.0	\$80.80	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.25	3F - Mens Restroom	2470	3	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Acrylic Lens	30	0.09	222.3	\$31.34	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.11	3F - Womens Restroom	2470	4	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Parabolic Lens	156	0.62	1,541.3	\$217.32	4	3	3 Lamp, 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.34	849.68	\$119.80	\$100.00	\$400.00	0.28	691.6	\$97.52	4.10
211.25	3F - Womens Restroom	2470	3	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Acrylic Lens	30	0.09	222.3	\$31.34	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
3	Janitor	1000	1	1	60w A19 Lamp	60	0.06	60.0	\$8.46	1	1	(1) 13w CFL Lamp	13	0.01	13	\$1.83	\$20.00	\$20.00	0.05	47	\$6.63	3.02
227.21	Stairwell	8760	10	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.58	5,080.8	\$716.39	10	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.34	Generator Room	1000	8	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.46	464.0	\$65.42	8	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00

CEG Job #: 9C10037
 Project: Main Library Branch
 Address: 0
 Cape May Court House, NJ
 Building SF: 97,903

Main Library Branch

KWH COST: \$0.141

ECM #21-6: Lighting Controls

EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS										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. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback
221.11	B - Stair	8760	3	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.17	1524.24	\$214.92	3	0	No Change	58	0.03	0%	1524.24	\$214.92	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.22	B - Hall	2470	4	2	2x2, 2 U-Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	73	0.29	721.24	\$101.69	4	0	No Change	73	0.06	0%	721.24	\$101.69	\$0.00	\$0.00	0.00	0	\$0.00	0.00
9	B - Janitor	1000	1	1	100w A19 Lamp	100	0.10	100	\$14.10	1	0	No Change	100	0.02	0%	100	\$14.10	\$0.00	\$0.00	0.00	0	\$0.00	0.00
127.21	B - Hall	2470	3	2	2x2, 2 ULamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.23	577.98	\$81.50	3	0	No Change	78	0.05	0%	577.98	\$81.50	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.212	B-Hall	2470	2	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	104	0.21	513.76	\$72.44	2	0	No Change	104	0.04	0%	513.76	\$72.44	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.22	B-Technical Services	2470	28	2	2x2, 2 U-Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	73	2.04	5048.68	\$711.86	28	0	No Change	73	0.41	0%	5048.68	\$711.86	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.22	B - Office	2470	5	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.52	1284.4	\$181.10	5	1	Dual Technology Occupancy Sensor (Sensorswitch or equal)	104	0.10	0%	1284.4	\$181.10	\$160.00	\$160.00	0.42	0	\$0.00	0.00
227.22	B - Office	2470	1	2	2x2, 2 U-Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	73	0.07	180.31	\$25.42	1	1	Dual Technology Occupancy Sensor (Sensorswitch or equal)	73	0.01	0%	180.31	\$25.42	\$160.00	\$160.00	0.06	0	\$0.00	0.00
242.22	B - Office	2470	6	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.62	1541.28	\$217.32	6	1	Dual Technology Occupancy Sensor (Sensorswitch or equal)	104	0.12	0%	1541.28	\$217.32	\$160.00	\$160.00	0.50	0	\$0.00	0.00
242.22	B - Office	2470	3	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.31	770.64	\$108.66	3	1	Dual Technology Occupancy Sensor (Sensorswitch or equal)	104	0.06	0%	770.64	\$108.66	\$160.00	\$160.00	0.25	0	\$0.00	0.00
242.22	B - AV Tech Services	2470	15	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	1.56	3853.2	\$543.30	15	0	No Change	104	0.31	0%	3853.2	\$543.30	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.11	B - Mech Rm	1000	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.06	58	\$8.18	1	0	No Change	58	0.01	0%	58	\$8.18	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.11	Stair	2470	3	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.17	429.78	\$60.60	3	0	No Change	58	0.03	0%	429.78	\$60.60	\$0.00	\$0.00	0.00	0	\$0.00	0.00
4	Stair	2470	4	1	7 Watt Med CFL Lamp	7	0.03	69.16	\$9.75	4	0	No Change	7	0.01	0%	69.16	\$9.75	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.22	Childrens Library	2470	22	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	2.29	5651.36	\$796.84	22	0	No Change	104	0.46	0%	5651.36	\$796.84	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.22	Conference Room	2470	6	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.62	1541.28	\$217.32	6	1	Dual Technology Occupancy Sensor (Sensorswitch or equal)	104	0.12	10%	1387.152	\$195.59	\$160.00	\$160.00	0.50	154.128	\$21.73	7.36

227.21	Men's Restroom	2470	3	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.17	429.78	\$60.60	3	1	Remote Ceiling Mount Occupancy Sensor (Sensorswitch or equal)	58	0.03	10%	386.802	\$54.54	\$225.00	\$225.00	0.14	42.978	\$6.06	37.13
221.11	Men's Restroom	2470	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.12	286.52	\$40.40	2	0	Remote Ceiling Mount Occupancy Sensor (Sensorswitch or equal)	58	0.02	10%	257.868	\$36.36	\$225.00	\$0.00	0.09	28.652	\$4.04	0.00
242.22	Mens Lobby	2470	1	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.10	256.88	\$36.22	1	1	Remote Ceiling Mount Occupancy Sensor (Sensorswitch or equal)	104	0.02	10%	231.192	\$32.60	\$225.00	\$225.00	0.08	25.688	\$3.62	62.12
3	Mens Lobby	2470	1	1	60w A19 Lamp	60	0.06	148.2	\$20.90	1	0	No Change	60	0.01	0%	148.2	\$20.90	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.22	Emp Lounge	2470	8	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.83	2055.04	\$289.76	8	1	Remote Ceiling Mount Occupancy Sensor (Sensorswitch or equal)	104	0.17	10%	1849.536	\$260.78	\$225.00	\$225.00	0.67	205.504	\$28.98	7.77
227.21	Emp Lounge	2470	3	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.17	429.78	\$60.60	3	0		58	0.03	10%	386.802	\$54.54	\$160.00	\$0.00	0.14	42.978	\$6.06	0.00
227.21	Emerg Mgt Hall	2470	14	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.81	2005.64	\$282.80	14	0	No Change	58	0.16	0%	2005.64	\$282.80	\$0.00	\$0.00	0.00	0	\$0.00	0.00
222.22	Communications	2470	6	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	58	0.35	859.56	\$121.20	6	0	No Change	58	0.07	0%	859.56	\$121.20	\$0.00	\$0.00	0.00	0	\$0.00	0.00
222.2	Communications	2470	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Indirect	58	0.12	286.52	\$40.40	2	0	No Change	58	0.02	0%	286.52	\$40.40	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	Restroom	2470	1	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	104	0.10	256.88	\$36.22	1	1	Dual Technology Occupancy Sensor (Sensorswitch or equal)	104	0.02	10%	231.192	\$32.60	\$160.00	\$160.00	0.08	25.688	\$3.62	44.17
242.21	Server Room	2470	3	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	104	0.31	770.64	\$108.66	3	1	Dual Technology Occupancy Sensor (Sensorswitch or equal)	104	0.06	10%	693.576	\$97.79	\$160.00	\$160.00	0.25	77.064	\$10.87	14.72
242.22	OEM Deputy	2470	6	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.62	1541.28	\$217.32	6	1	Dual Technology Occupancy Sensor (Sensorswitch or equal)	104	0.12	10%	1387.152	\$195.59	\$160.00	\$160.00	0.50	154.128	\$21.73	7.36
242.22	Communications	2470	4	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.42	1027.52	\$144.88	4	0	No Change	104	0.08	0%	1027.52	\$144.88	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	Elec Room	1000	2	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	104	0.21	208	\$29.33	2	0	No Change	104	0.04	0%	208	\$29.33	\$0.00	\$0.00	0.00	0	\$0.00	0.00
804	Mech Rm	1000	8	1	Recessed Down Light, (1) 26w CFL Lamp	26	0.21	208	\$29.33	8	0	No Change	26	0.04	0%	208	\$29.33	\$0.00	\$0.00	0.00	0	\$0.00	0.00
804	Fire Pump Room	1000	1	1	Recessed Down Light, (1) 26w CFL Lamp	26	0.03	26	\$3.67	1	0	No Change	26	0.01	0%	26	\$3.67	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.11	Fire Pump Room	1000	5	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.29	290	\$40.89	5	0	No Change	58	0.06	0%	290	\$40.89	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.22	Operations	2470	22	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	2.29	5651.36	\$796.84	22	0	No Change	104	0.46	0%	5651.36	\$796.84	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Operations	2470	1	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.06	143.26	\$20.20	1	0	No Change	58	0.01	0%	143.26	\$20.20	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	Directors Office	2470	6	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	104	0.62	1541.28	\$217.32	6	1	Dual Technology Occupancy Sensor (Sensorswitch or equal)	104	0.12	10%	1387.152	\$195.59	\$160.00	\$160.00	0.50	154.128	\$21.73	7.36

242.21	Closet	2470	1	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	104	0.10	256.88	\$36.22	1	0	No Change	104	0.02	0%	256.88	\$36.22	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.22	Admin Office	2470	4	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.42	1027.52	\$144.88	4	1	Dual Technology Occupancy Sensor (Sensorswitch or equal)	104	0.08	10%	924.768	\$130.39	\$160.00	\$160.00	0.33	102.752	\$14.49	11.04
227.21	Hall	2470	2	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.12	286.52	\$40.40	2	0	No Change	58	0.02	0%	286.52	\$40.40	\$0.00	\$0.00	0.00	0	\$0.00	0.00
121.14	Closet	2470	2	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	78	0.16	385.32	\$54.33	2	0	No Change	78	0.03	0%	385.32	\$54.33	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Hall	2470	4	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.23	573.04	\$80.80	4	0	No Change	58	0.05	0%	573.04	\$80.80	\$0.00	\$0.00	0.00	0	\$0.00	0.00
3	Jan Closet	1000	1	1	60w A19 Lamp	60	0.06	60	\$8.46	1	0	No Change	60	0.01	0%	60	\$8.46	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.11	Stair	8760	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.12	1016.16	\$143.28	2	0	No Change	58	0.02	0%	1016.16	\$143.28	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Entrance	2470	3	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.17	429.78	\$60.60	3	0	No Change	58	0.03	0%	429.78	\$60.60	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.22	Library	2470	106	2	2x2, 2 U-Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	73	7.74	19112.86	\$2,694.91	106	0	No Change	73	1.55	0%	19112.86	\$2,694.91	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.22	Library	2470	5	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.52	1284.4	\$181.10	5	0	No Change	104	0.10	0%	1284.4	\$181.10	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	Womens Restroom	2470	3	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	104	0.31	770.64	\$108.66	3	1	Remote Ceiling Mount Occupancy Sensor (Sensorswitch or equal)	104	0.06	10%	693.576	\$97.79	\$225.00	\$225.00	0.25	77.064	\$10.87	20.71
221.11	Womens Restroom	2470	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.12	286.52	\$40.40	2	0		58	0.02	10%	257.868	\$36.36	\$225.00	\$0.00	0.09	28.652	\$4.04	0.00
242.21	Mens Restroom	2470	3	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	104	0.31	770.64	\$108.66	3	1	Remote Ceiling Mount Occupancy Sensor (Sensorswitch or equal)	104	0.06	10%	693.576	\$97.79	\$225.00	\$225.00	0.25	77.064	\$10.87	20.71
221.11	Mens Restroom	2470	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.12	286.52	\$40.40	2	0		58	0.02	10%	257.868	\$36.36	\$225.00	\$0.00	0.09	28.652	\$4.04	0.00
3	Jan. Closet	1000	1	1	60w A19 Lamp	60	0.06	60	\$8.46	1	0	No Change	60	0.01	0%	60	\$8.46	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.22	Office	2470	23	2	2x2, 2 U-Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	73	1.68	4147.13	\$584.75	23	1	Dual Technology Occupancy Sensor (Sensorswitch or equal)	73	0.34	10%	3732.417	\$526.27	\$160.00	\$160.00	1.34	414.713	\$58.47	2.74
221.14	Storage Room	1000	10	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	58	0.58	580	\$81.78	10	0	No Change	58	0.12	0%	580	\$81.78	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.11	Mail Room	2470	3	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.17	429.78	\$60.60	3	0	No Change	58	0.03	0%	429.78	\$60.60	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.22	Office	2470	6	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.62	1541.28	\$217.32	6	0	No Change	104	0.12	0%	1541.28	\$217.32	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.22	Childrens Library	2470	55	2	2x2, 2 U-Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	73	4.02	9917.05	\$1,398.30	55	0	No Change	73	0.80	0%	9917.05	\$1,398.30	\$0.00	\$0.00	0.00	0	\$0.00	0.00

242.22	Office	2470	2	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.21	513.76	\$72.44	2	1	Dual Technology Occupancy Sensor (Sensorswitch or equal)	104	0.04	10%	462.384	\$65.20	\$160.00	\$160.00	0.17	51.376	\$7.24	22.09	
227.21	Storage Closet	1000	1	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.06	58	\$8.18	1	0	No Change	58	0.01	0%	58	\$8.18	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
222.22	Library Desk	2470	1	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	58	0.06	143.26	\$20.20	1	0	No Change	58	0.01	0%	143.26	\$20.20	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
227.22	3rd Floor Section 1	2470	78	2	2x2, 2 U-Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	73	5.69	14064.18	\$1,983.05	78	0	No Change	73	1.14	0%	14064.18	\$1,983.05	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
227.21	3rd Floor Section 1	2470	10	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.58	1432.6	\$202.00	10	0	No Change	58	0.12	0%	1432.6	\$202.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
242.22	3rd Floor Section 1	2470	8	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.83	2055.04	\$289.76	8	0	No Change	104	0.17	0%	2055.04	\$289.76	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
242.22	Server Room	2470	4	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.42	1027.52	\$144.88	4	1	Dual Technology Occupancy Sensor (Sensorswitch or equal)	104	0.08	10%	924.768	\$130.39	\$160.00	\$160.00	0.33	102.752	\$14.49	11.04	
242.22	Office	2470	4	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.42	1027.52	\$144.88	4	1	Dual Technology Occupancy Sensor (Sensorswitch or equal)	104	0.08	10%	924.768	\$130.39	\$160.00	\$160.00	0.33	102.752	\$14.49	11.04	
227.22	3rd Floor Section 2	2470	112	2	2x2, 2 U-Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	73	8.18	20194.72	\$2,847.46	112	0	No Change	73	1.64	0%	20194.72	\$2,847.46	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
221.11	3F - Mens Restroom	2470	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	58	0.23	573.04	\$80.80	4	0	No Change	58	0.05	0%	573.04	\$80.80	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
211.25	3F - Mens Restroom	2470	3	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Acrylic Lens	30	0.09	222.3	\$31.34	3	0	No Change	30	0.02	0%	222.3	\$31.34	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
211.11	3F - Womens Restroom	2470	4	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Parabolic Lens	156	0.62	1541.28	\$217.32	4	0	No Change	156	0.12	0%	1541.28	\$217.32	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
211.25	3F - Womens Restroom	2470	3	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Acrylic Lens	30	0.09	222.3	\$31.34	3	0	No Change	30	0.02	0%	222.3	\$31.34	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
3	Janitor	1000	1	1	60w A19 Lamp	60	0.06	60	\$8.46	1	0	No Change	60	0.01	0%	60	\$8.46	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
227.21	Stairwell	8760	10	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.58	5080.8	\$716.39	10	0	No Change	58	0.12	0%	5080.8	\$716.39	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
221.34	Generator Room	1000	8	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.46	464	\$65.42	8	0	No Change	58	0.09	0%	464	\$65.42	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
TOTAL								53.4	134,189.8	\$18,921	697	19		0	10.7		132,293.1	\$18,653.33		\$3,365	7.37	1,896.7	\$267	12.58

Investment Grade Lighting Audit

CEG Job #: 9P10037

Project: Cape May County

Address: Address

Address

Building SF: 4,400

Wildwood Crest Library

KWH COST: \$0.165

ECM #41-6: Lighting Upgrade - 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	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback
12	Side Entrance Hall	2028	2	1	1-Lamp Compact Fluorescent	13	0.03	52.7	\$8.70	0	0	No Change	13	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
10	Side Entrance Hall	2028	1	1	1-Lamp Incandescents	40	0.04	81.1	\$13.38	1	0	18 W CFL Lamp	18	0.02	36.504	\$6.02	\$5.75	\$5.75	0.02	44.616	\$7.36	0.78
32	Men's Restroom	2028	2	2	2-Lamp T8 w/ magnetic ballast F017 2' Sidewall Wrap	28	0.06	113.6	\$18.74	0	2	No Change	28	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
17	Men's Restroom	2028	1	2	2-Lamp, Compact Fluorescent, Vanity Light	26	0.03	52.7	\$8.70	0	2	No Change	26	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
32	Women's Restroom	2028	2	2	2-Lamp T8 w/ magnetic ballast F017 2' Sidewall Wrap	28	0.06	113.6	\$18.74	0	2	No Change	28	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
17	Women's Restroom	2028	1	2	2-Lamp, Compact Fluorescent, Vanity Light	26	0.03	52.7	\$8.70	0	2	No Change	26	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
12	Hallway to Garage	2028	2	1	1-Lamp Compact Fluorescent	13	0.03	52.7	\$8.70	0	0	No Change	13	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
33	Childrens Book Area	2028	9	4	4-Lamp T8 2x4 Recessed Prismatic	108	0.97	1,971.2	\$325.25	9	3	2'x4' 3-Lamp 32W T-8 Prismatic Lens / Elect Ballast; Metalux M/N 2GC8	91	0.82	1660.932	\$274.05	\$140.00	\$1,260.00	0.15	310.284	\$51.20	24.61
33	Front Desk	2028	4	4	4-Lamp T8 2x4 Recessed Prismatic	108	0.43	876.1	\$144.56	4	3	2'x4' 3-Lamp 32W T-8 Prismatic Lens / Elect Ballast; Metalux M/N 2GC8	91	0.36	738.192	\$121.80	\$140.00	\$560.00	0.07	137.904	\$22.75	24.61
33	Main Entrance	2028	3	4	4-Lamp T8 2x4 Recessed Prismatic	108	0.32	657.1	\$108.42	3	3	2'x4' 3-Lamp 32W T-8 Prismatic Lens / Elect Ballast; Metalux M/N 2GC8	91	0.27	553.644	\$91.35	\$140.00	\$420.00	0.05	103.428	\$17.07	24.61
33	Book Shelf Area	2028	24	4	4-Lamp T8 2x4 Recessed Prismatic	108	2.59	5,256.6	\$867.34	24	3	2'x4' 3-Lamp 32W T-8 Prismatic Lens / Elect Ballast; Metalux M/N 2GC8	91	2.18	4429.152	\$730.81	\$140.00	\$3,360.00	0.41	827.424	\$136.52	24.61
19	Computer Room	2028	6	2	2-Lamp, T8, Electronic Ballast, Surface Mounted, Prismatic Lens	58	0.35	705.7	\$116.45	0	2	No Change	58	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
19	Garage	2028	2	2	2-Lamp, T8, Electronic Ballast, Surface Mounted, Prismatic Lens	58	0.12	235.2	\$38.82	0	2	No Change	58	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
1	Garage	2028	4	2	2-Lamp, T12, Magnetic Ballast, Surface Mounted, Prismatic Lens	80	0.32	649.0	\$107.08	4	2	1'X4' 2-Lamp 32W T-8 Prism Lens/Elect Ballast; Metalux M/N GC	55	0.22	446.16	\$73.62	\$100.00	\$400.00	0.10	202.8	\$33.46	11.95
12	Vestibule	2028	1	1	1-Lamp Compact Fluorescent	13	0.01	26.4	\$4.35	0	0	No Change	13	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
34	Mech/Storage Room	2028	2	1	1-Lamp 150 Watt Flood Light Med Base	150	0.30	608.4	\$100.39	0	1	No Change	150	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
20	Boiler Room	2028	1	1	1 Lamp Incandescents	60	0.06	121.7	\$20.08	1	1	18 W CFL Lamp	18	0.02	36.504	\$6.02	\$5.75	\$5.75	0.04	85.176	\$14.05	0.41
Totals			67	36			5.73	11,626.5	\$1,918.38	46	28			3.896	7901.088	\$1,303.68		\$6,011.50	0.84	1711.6	\$282.42	21.29

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 #: 9P10037

Project: Cape May County

Address: Address

Address

Building SF: 4400

Wildwood Crest Library

KWH COST: **\$0.165**

ECM #41-7: Lighting Controls

EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS										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	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback		
12	Side Entrance Hall	2028	2	1	1-Lamp Compact Fluorescent	13	0.03	52.7	\$8.70	0	0	None	13	0.00	0%	0	\$0.00	\$0.00	\$0.00	0.03	52.728	\$8.70	0.00		
10	Side Entrance Hall	2028	1	0	1-Lamp Incandescents	40	0.04	81.1	\$13.38	0	0	None	40	0.00	0%	0	\$0.00	\$0.00	\$0.00	0.04	81.12	\$13.38	0.00		
32	Men's Restroom	2028	2	2	2-Lamp T8 w/ magnetic ballast F017 2' Sidewall Wrap	0	0.00	0.0	\$0.00	2	2	Dual Technology Occupancy Sensor	0	0.00	10%	0	\$0.00	\$225.00	\$225.00	0.00	0	\$0.00	0.00		
17	Men's Restroom	2028	1	2	2-Lamp, Compact Fluorescent, Vanity Light	26	0.03	52.7	\$8.70	1	2		26	0.03	10%	47.4552	\$7.83	\$0.00	\$0.00	0.00	5.2728	\$0.87	0.00		
32	Women's Restroom	2028	2	2	2-Lamp T8 w/ magnetic ballast F017 2' Sidewall Wrap	0	0.00	0.0	\$0.00	2	2	Dual Technology Occupancy Sensor	0	0.00	10%	0	\$0.00	\$225.00	\$225.00	0.00	0	\$0.00	0.00		
17	Women's Restroom	2028	1	2	2-Lamp, Compact Fluorescent, Vanity Light	26	0.03	52.7	\$8.70	1	2		26	0.03	10%	47.4552	\$7.83	\$0.00	\$0.00	0.00	5.2728	\$0.87	0.00		
12	Hallway to Garage	2028	2	1	1-Lamp Compact Fluorescent	13	0.03	52.7	\$8.70	2	0	None	13	0.03	0%	52.728	\$8.70	\$0.00	\$0.00	0.00	0	\$0.00	0.00		
33	Childrens Book Area	2028	9	4	4-Lamp T8 2x4 Recessed Prismatic	108	0.97	1,971.2	\$325.25	9	4	None	108	0.97	0%	1971.216	\$325.25	\$0.00	\$0.00	0.00	0	\$0.00	0.00		
33	Front Desk	2028	4	4	4-Lamp T8 2x4 Recessed Prismatic	108	0.43	876.1	\$144.56	4	4	None	108	0.43	0%	876.096	\$144.56	\$0.00	\$0.00	0.00	0	\$0.00	0.00		
33	Main Entrance	2028	3	4	4-Lamp T8 2x4 Recessed Prismatic	108	0.32	657.1	\$108.42	3	4	None	108	0.32	0%	657.072	\$108.42	\$0.00	\$0.00	0.00	0	\$0.00	0.00		
33	Book Shelf Area	2028	24	4	4-Lamp T8 2x4 Recessed Prismatic	108	2.59	5,256.6	\$867.34	24	4	None	108	2.59	0%	5256.576	\$867.34	\$0.00	\$0.00	0.00	0	\$0.00	0.00		
19	Computer Room	2028	6	2	2-Lamp, T8, Electronic Ballast, Surface Mounted, Prismatic Lens	58	0.35	705.7	\$116.45	6	2	Dual Technology Occupancy Sensor	58	0.35	10%	635.1696	\$104.80	\$225.00	\$225.00	0.00	70.5744	\$11.64	19.32		
19	Garage	2028	2	2	2-Lamp, T8, Electronic Ballast, Surface Mounted, Prismatic Lens	58	0.12	235.2	\$38.82	2	2	Dual Technology Occupancy Sensor	58	0.12	10%	211.7232	\$34.93	\$225.00	\$225.00	0.00	23.5248	\$3.88	57.97		
1	Garage	2028	4	2	2-Lamp, T12, Magnetic Ballast, Surface Mounted, Prismatic Lens	80	0.32	649.0	\$107.08	4	2		80	0.32	10%	584.064	\$96.37	\$0.00	\$0.00	0.00	64.896	\$10.71	0.00		
12	Vestibule	2028	1	1	1-Lamp Compact Fluorescent	13	0.01	26.4	\$4.35	1	0	None	13	0.01	0%	26.364	\$4.35	\$0.00	\$0.00	0.00	0	\$0.00	0.00		
34	Mech/Storage Room	2028	2	1	1-Lamp 150 Watt Flood Light Med Base	150	0.30	608.4	\$100.39	2	1	Dual Technology Occupancy Sensor	150	0.30	10%	547.56	\$90.35	\$160.00	\$160.00	0.00	60.84	\$10.04	15.94		
20	Boiler Room	2028	1	1	1 Lamp Incandescents	60	0.06	121.7	\$20.08	1	0	Dual Technology Occupancy Sensor	60	0.06	10%	109.512	\$18.07	\$160.00	\$160.00	0.00	12.168	\$2.01	79.69		
Totals			67	35			5.62	11,399.4	\$1,880.90	64	31		5.56		11,023	\$1,818.79		\$1,220.00	0.07	376.4	\$62.11	19.64			

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 - Wildwood Crest Library										
Location: Wildwood, NJ										
Description: Photovoltaic System 95% Financing - 25 year										
Simple Payback Analysis										
		Photovoltaic System 95% Financing - 25 year								
Total Construction Cost	\$229,770									
Annual kWh Production	31,310									
Annual Energy Cost Reduction	\$5,166									
Annual SREC Revenue	\$10,959									
First Cost Premium	\$229,770									
Simple Payback:	14.25 Years									
Life Cycle Cost Analysis										
Analysis Period (years):	25						Financing %:			95%
Financing Term (mths):	300						Maintenance Escalation Rate:			3.0%
Average Energy Cost (\$/kWh):	\$0.165						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	\$11,489	0	0	0	\$0	0	0	(11,489)	0	
1	\$0	31,310	\$5,166	\$0	\$10,959	\$15,174	\$3,339	(\$2,389)	(\$13,877)	
2	\$0	31,153	\$5,321	\$0	\$10,904	\$14,933	\$3,581	(\$2,288)	(\$16,165)	
3	\$0	30,998	\$5,481	\$0	\$10,849	\$14,674	\$3,840	(\$2,183)	(\$18,349)	
4	\$0	30,843	\$5,645	\$0	\$10,795	\$14,396	\$4,117	(\$2,073)	(\$20,422)	
5	\$0	30,688	\$5,815	\$316	\$10,741	\$14,098	\$4,415	(\$2,274)	(\$22,696)	
6	\$0	30,535	\$5,989	\$315	\$10,687	\$13,779	\$4,734	(\$2,151)	(\$24,847)	
7	\$0	30,382	\$6,169	\$313	\$10,634	\$13,437	\$5,076	(\$2,024)	(\$26,871)	
8	\$0	30,230	\$6,354	\$311	\$10,581	\$13,070	\$5,443	(\$1,890)	(\$28,761)	
9	\$0	30,079	\$6,544	\$310	\$10,528	\$12,677	\$5,837	(\$1,751)	(\$30,512)	
10	\$0	29,929	\$6,741	\$308	\$10,475	\$12,255	\$6,258	(\$1,606)	(\$32,118)	
11	\$0	29,779	\$6,943	\$307	\$10,423	\$11,802	\$6,711	(\$1,454)	(\$33,572)	
12	\$0	29,630	\$7,151	\$305	\$10,371	\$11,317	\$7,196	(\$1,297)	(\$34,869)	
13	\$0	29,482	\$7,366	\$304	\$10,319	\$10,797	\$7,716	(\$1,132)	(\$36,001)	
14	\$0	29,335	\$7,587	\$302	\$10,267	\$10,239	\$8,274	(\$962)	(\$36,963)	
15	\$0	29,188	\$7,814	\$301	\$10,216	\$9,641	\$8,872	(\$784)	(\$37,746)	
16	\$0	29,042	\$8,049	\$299	\$10,165	\$9,000	\$9,513	(\$599)	(\$38,345)	
17	\$0	28,897	\$8,290	\$298	\$10,114	\$8,312	\$10,201	(\$407)	(\$38,752)	
18	\$0	28,752	\$8,539	\$296	\$10,063	\$7,575	\$10,939	(\$207)	(\$38,959)	
19	\$0	28,609	\$8,795	\$295	\$10,013	\$6,784	\$11,729	\$0	(\$38,959)	
20	\$0	28,466	\$9,059	\$293	\$9,963	\$5,936	\$12,577	\$215	(\$38,743)	
21	\$0	28,323	\$9,331	\$292	\$9,913	\$5,408	\$11,562	\$1,982	(\$36,762)	
22	\$0	28,182	\$9,611	\$290	\$9,864	\$4,370	\$9,515	\$5,299	(\$31,463)	
23	\$0	28,041	\$9,899	\$289	\$9,814	\$0	\$0	\$19,424	(\$12,038)	
24	\$0	27,901	\$10,196	\$287	\$9,765	\$0	\$0	\$19,674	\$7,635	
25	\$0	27,761	\$10,502	\$286	\$9,716	\$0	\$0	\$19,932	\$27,567	
Totals:	737,537	\$188,354	\$6,316	\$258,138	\$239,674	\$161,446	\$39,056	(\$13,667)	(\$652,586)	
Net Present Value (NPV)								(\$13,667)		
Internal Rate of Return (IRR)								2.9%		

Project Name: LGEA Solar PV Project - Wildwood Crest Library																																										
Location: Wildwood, NJ																																										
Description: Photovoltaic System - Direct Purchase																																										
Simple Payback Analysis																																										
	<table border="1"> <thead> <tr> <th colspan="7">Photovoltaic System - Direct Purchase</th> </tr> </thead> <tbody> <tr> <td>Total Construction Cost</td> <td colspan="6">\$229,770</td> </tr> <tr> <td>Annual kWh Production</td> <td colspan="6">31,310</td> </tr> <tr> <td>Annual Energy Cost Reduction</td> <td colspan="6">\$5,166</td> </tr> <tr> <td>Annual SREC Revenue</td> <td colspan="6">\$10,959</td> </tr> </tbody> </table>							Photovoltaic System - Direct Purchase							Total Construction Cost	\$229,770						Annual kWh Production	31,310						Annual Energy Cost Reduction	\$5,166						Annual SREC Revenue	\$10,959					
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Simple Payback:	14.25						Years																																			
Life Cycle Cost Analysis																																										
Analysis Period (years):	25			Financing %:	0%																																					
Financing Term (mths):	0			Maintenance Escalation Rate:	3.0%																																					
Average Energy Cost (\$/kWh)	\$0.165			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	\$229,770	0	0	0	\$0	(229,770)	0																																			
1	\$0	31,310	\$5,166	\$0	\$10,959	\$16,125	(\$213,645)																																			
2	\$0	31,153	\$5,321	\$0	\$10,904	\$16,225	(\$197,421)																																			
3	\$0	30,998	\$5,481	\$0	\$10,849	\$16,330	(\$181,091)																																			
4	\$0	30,843	\$5,645	\$0	\$10,795	\$16,440	(\$164,650)																																			
5	\$0	30,688	\$5,815	\$316	\$10,741	\$16,239	(\$148,411)																																			
6	\$0	30,535	\$5,989	\$315	\$10,687	\$16,362	(\$132,049)																																			
7	\$0	30,382	\$6,169	\$313	\$10,634	\$16,490	(\$115,560)																																			
8	\$0	30,230	\$6,354	\$311	\$10,581	\$16,623	(\$98,937)																																			
9	\$0	30,079	\$6,544	\$310	\$10,528	\$16,762	(\$82,174)																																			
10	\$0	29,929	\$6,741	\$308	\$10,475	\$16,908	(\$65,267)																																			
11	\$0	29,779	\$6,943	\$307	\$10,423	\$17,059	(\$48,208)																																			
12	\$0	29,630	\$7,151	\$305	\$10,371	\$17,217	(\$30,991)																																			
13	\$0	29,482	\$7,366	\$304	\$10,319	\$17,381	(\$13,611)																																			
14	\$0	29,335	\$7,587	\$302	\$10,267	\$17,552	\$3,941																																			
15	\$0	29,188	\$7,814	\$301	\$10,216	\$17,729	\$21,670																																			
16	\$0	29,042	\$8,049	\$299	\$10,165	\$17,914	\$39,585																																			
17	\$0	28,897	\$8,290	\$298	\$10,114	\$18,106	\$57,691																																			
18	\$0	28,752	\$8,539	\$296	\$10,063	\$18,306	\$75,997																																			
19	\$0	28,609	\$8,795	\$295	\$10,013	\$18,513	\$94,511																																			
20	\$0	28,466	\$9,059	\$293	\$9,963	\$18,729	\$113,239																																			
21	\$1	28,323	\$9,331	\$292	\$9,913	\$18,952	\$132,192																																			
22	\$2	28,182	\$9,611	\$290	\$9,864	\$19,184	\$151,375																																			
23	\$3	28,041	\$9,899	\$289	\$9,814	\$19,424	\$170,800																																			
24	\$4	27,901	\$10,196	\$287	\$9,765	\$19,674	\$190,473																																			
25	\$5	27,761	\$10,502	\$286	\$9,716	\$19,932	\$210,406																																			
Totals:		737,537	\$188,354	\$6,316	\$258,138	\$440,176	(\$230,134)																																			
Net Present Value (NPV)						\$210,431																																				
Internal Rate of Return (IRR)						5.5%																																				

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
Wildwood Crest	1800	Sunpower SPR230	111	14.7	1,632	25.53	31,310	3,663	15.64



 . = Proposed PV Layout

Notes:

1. Estimated kWh based on the National Renewable Energy Laboratory PVWatts Version 1 Calculator Program.