

**CITY OF PLEASANTVILLE
DEPARTMENT OF PUBLIC WORKS**

**801 NORTH NEW STREET
PLEASANTVILLE, NJ 08232**

FACILITY ENERGY REPORT

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I. HISTORIC ENERGY CONSUMPTION/COST

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

Electric Utility Provider:	Atlantic City Electric
Electric Utility Rate Structure:	Monthly General Service (MGS)
Third Party Supplier:	Liberty Power

Natural Gas Utility Provider:	South Jersey Natural Gas
Utility Rate Structure:	General Service Gas (GSG)
Third Party Supplier:	None

The electric usage profile represents the actual electrical usage for the facility. 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 within each facility report shows the actual natural gas energy usage for the facility. 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.

Table 1
Electricity Billing Data

ELECTRIC USAGE SUMMARY			
Utility Provider: Atlantic City Electric Rate: MGS Meter No: Account # 0232 5299 9992 0780 2649 9992 0780 2649 9984 Third Party Utility Provider: Liberty Power TPS Meter / Acct No: N/A			
MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
Mar-10	7,717	28.5	\$1,263
Apr-10	6,460	28.5	\$1,099
May-10	6,244	28.8	\$1,030
Jun-10	6,917	29.2	\$1,163
Jul-10	7,206	26.7	\$1,234
Aug-10	8,181	27.6	\$1,376
Sep-10	7,661	27.1	\$1,302
Oct-10	6,543	27.4	\$1,116
Nov-10	5,499	23.0	\$924
Dec-10	8,145	26.3	\$1,353
Jan-11	10,590	30.2	\$1,811
Feb-11	7,631	26.6	\$1,336
Totals	88,794	30.2 Max	\$15,006
AVERAGE DEMAND 27.5 KW average AVERAGE RATE \$0.169 \$/kWh			

Figure 1
Electricity Usage Profile

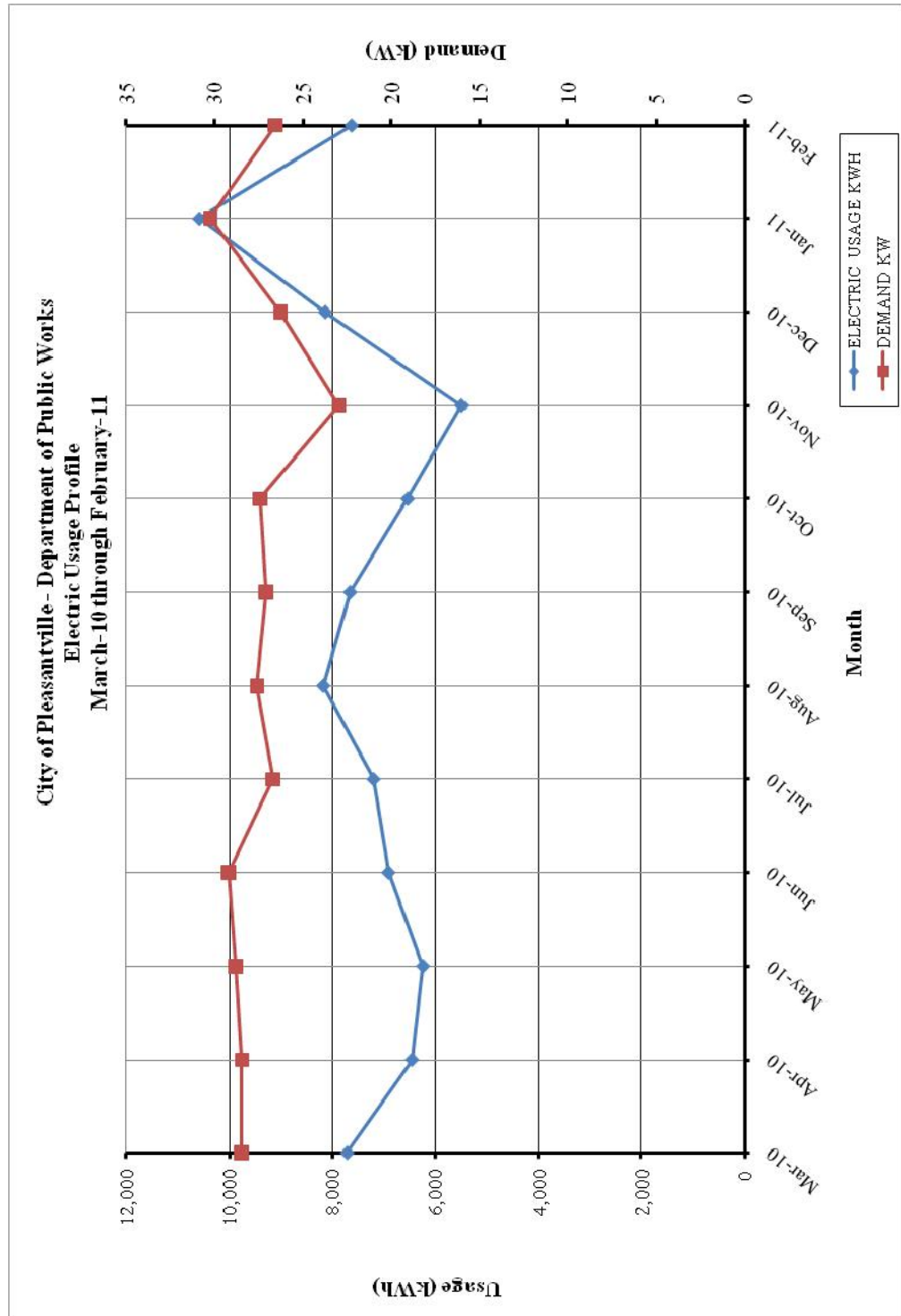
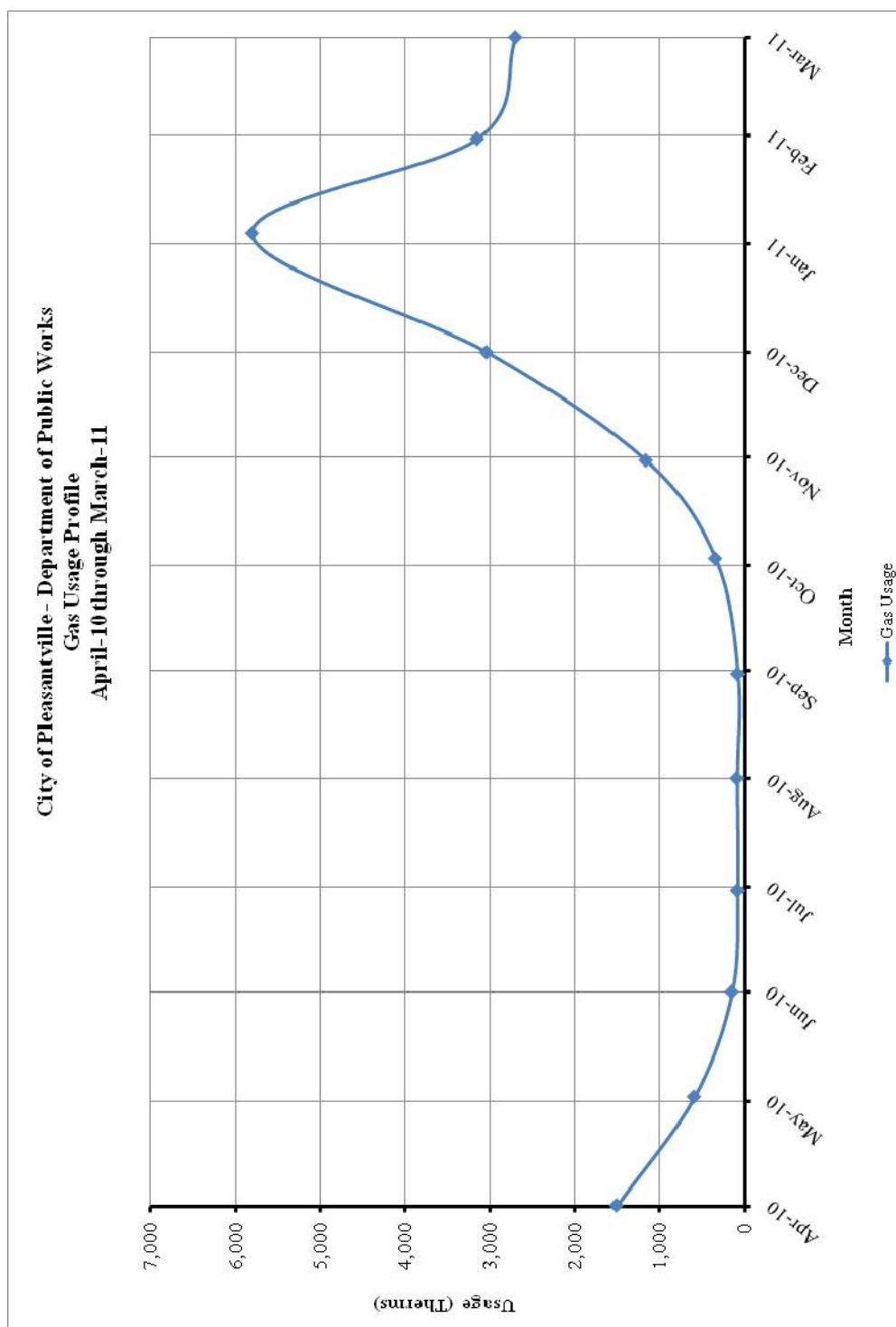


Table 4
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider: South Jersey Gas Rate: GSG Meter No: Point of Delivery ID: 10438014200 Third Party Utility Provider: N/A TPS Meter No: N/A		
MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
Mar-11	2,697.00	\$3,592.48
Feb-11	3,147.00	\$4,187.92
Jan-11	5,802.00	\$7,701.01
Dec-10	3,036.00	\$4,041.04
Nov-10	1,158.00	\$1,556.07
Oct-10	338.00	\$471.05
Sep-10	74.00	\$121.72
Aug-10	83.00	\$133.63
Jul-10	77.00	\$125.69
Jun-10	142.00	\$211.70
May-10	591.00	\$805.82
Apr-10	1,504.00	\$2,013.90
TOTALS	18,649.00	\$24,962.05
AVERAGE RATE:	\$1.34	\$/THERM

Figure 2
Natural Gas Usage Profile



II. FACILITY DESCRIPTION

The Department of Public Works is located at 801 North New Street in Pleasantville New Jersey. The facility is approximately 8,640 SF, built in 1960. The facility is comprised of three separate buildings; DPW office and garage, vehicle storage garage, and the sewage garage building. Each building includes a large garage for maintenance and service of vehicles. The DPW office and garage includes administration offices and break rooms for employees.

Occupancy Profile

The typical hours of operation for the DPW facility is Monday through Thursday between 7:30 am and 4:00 pm, totaling 70 hours per week. The occupancy varies during the day. The DPW facility employs 90 people, however it is estimated that 10 – 15 people are on site on a typical basis.

Building Envelope

The DPW Offices and Garage building construction is steel framing with sheet metal siding. The roof is constructed of standing metal seam sheathing. The walls and roof are insulated with batt insulation blankets approximately R-13 on the walls and R-19 to R-30 below the roof deck. The vehicle wash bay and sewage garage include insulated ceilings with attic space above the ceiling. Insulation consists of laid in batt insulation with approximate insulation value of R-10 to R-30. The roof for all buildings is standing metal seam roofs. Each of the three buildings includes garage bays with large garage doors for vehicle storage and service. The garage doors are typically kept closed. The service doors also have small windows pre-manufactured within the door. It was noted that the sewage garage had a section of ceiling and insulation removed where significant heat is escaping the thermal envelope of the building.

HVAC Systems

Heat for the DPW facility garages is provided by multiple gas fired unit heaters. Gas fired unit heaters within the DPW building garage are made by Modine and in fair condition. The vehicle wash bay and sewage garage utilizes unit heaters made by Trane in fair condition depending on the age of the equipment.

The DPW offices utilize a central gas fired boiler for heat. The boiler made by Weil McLain is located within a mechanical closet. The boiler is in fair condition. Heat is provided to the offices by three zone circulation pumps. One of the pumps appears to be in-operable. There is no piping insulation on the hot water boiler system, however the boiler is located within the office space interior and therefore heat radiated from the piping is not lost from the system. The offices within the DPW building utilize fin-tube radiators for heat.

Air conditioning is only provided within the office spaces throughout the DPW facility buildings. Air conditioning systems are comprised of packaged window style AC unit. The AC units range in size and condition. The majority of these units are older and in fair or poor condition.

Exhaust System

Air is exhausted from the toilet rooms through cabinet style exhaust fans. The toilet room exhaust fans are controlled by the light switch. The garage bays utilize large side wall exhaust fans for ventilation in the summer months. In some areas these exhaust fans are inoperable due to age and condition of the equipment.

HVAC System Controls

The heat and cooling systems throughout the DPW facilities are controlled by “stand alone” thermostats. The window style AC units have built in controls. The unit heaters and zone pumps on the boiler system utilize standard non-programmable thermostats. The temperature setting throughout the majority of the spaces is 70°F. The heat settings remain constant in order to allow for easy starting of the diesel engines and ensure vehicles containing water do not freeze.

Domestic Hot Water

Domestic hot water for the restrooms is provided by one tank type gas fired HWH made by Pacemaker that serves the DPW offices. Another tank type electric hot water heater is utilized for the bathroom within the sewage garage office. There is no insulation on the domestic hot water piping within the sewage garage office. Both hot water heaters are in fair to poor condition.

Lighting

Lighting throughout the DPW offices as well as the vehicle wash bay and sewage garage is comprised of T-12 fluorescent fixtures with magnetic ballasts. The DPW office building garage consists of a combination of T-12 fluorescent fixtures and large metal halide fixtures. Several small storage rooms including the mechanical closets utilize incandescent bulbs. All lighting is controlled by manual wall switches. Refer to the Investment Grade lighting Audit Appendix for a detailed list of the lighting throughout the facility and estimated operating hours per space.

III. 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.

IV. ENERGY CONSERVATION MEASURES

Energy Conservation Measures are developed specifically for this facility. The energy savings and calculations are highly dependent on the information received from the site survey and interviews with operations personnel. The assumptions and calculations should be reviewed by the owner to ensure accurate representation of this facility. The following ECMs were analyzed:

Table 1
ECM Financial Summary

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST ^A	ANNUAL SAVINGS ^B	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
ECM #1	Lighting Upgrade	\$9,345	\$2,434	3.8	290.7%
ECM #2	Lighting Controls	\$447	\$242	1.8	712.1%
ECM #3	Condensing Boiler Upgrade	\$10,608	\$867	12.2	104.3%
ECM #4	Hot Water Pipe Insulation	\$301	\$158	1.9	687.4%
ECM #5	Programmable Thermostats in Garage & Offices	\$4,800	\$10,197	0.5	3086.6%
ECM #6	Window AC Unit Upgrades	\$7,719	\$354	21.8	-31.2%
ECM #7	Condensing Unit Heaters Upgrade	\$108,000	\$1,390	77.7	-80.7%
ECM #8	Infrared Unit Heaters Upgrade	\$9,200	\$1,668	5.5	172.0%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST	ANNUAL SAVINGS	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
REM #1	15.52 KW Solar Roof System	\$91,066	\$9,375	9.7	54.4%
Notes: A. Cost takes into consideration applicable NJ Smart Start™ incentives.					
B. Savings takes into consideration applicable maintenance savings.					

Table 2
ECM Energy Summary

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
ECM #1	Lighting Upgrade	5.3	1758.0	0.0
ECM #2	Lighting Controls	0.6	1431.0	0.0
ECM #3	Condensing Boiler Upgrade	0.0	0.0	647.0
ECM #4	Hot Water Pipe Insulation	0.0	933.0	0.0
ECM #5	Programmable Thermostats in Garage & Offices	0.0	0.0	6701.0
ECM #6	Window AC Unit Upgrades	1.7	2095.0	0.0
ECM #7	Condensing Unit Heaters Upgrade	0.0	0.0	1038.0
ECM #8	Infrared Unit Heaters Upgrade	0.0	0.0	1245.0
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	15.52 KW Solar Roof System	15.5	16904.0	0.0

ECM #1: Lighting Upgrade

Description:

There are still a large amount of T-12 fixtures throughout the Department of Public Works. Improved fluorescent lamps and ballasts are available as direct replacements for the existing lamps and ballasts. A simple retrofit of the existing fixture can provide substantial savings. For example, a conventional drop-ceiling lay in fixture with four, 4-foot lamps (34 Watt lamps with magnetic ballast) has a total wattage of 144 Watts per fixture. By using T-8 lamps and electronic ballasts, the total wattage would be reduced to 86 Watts. The light levels would increase by about 15% and the light quality would increase by 35%.

Some of the remaining interior lighting at the Pleasantville Department of Public Works is provided with fluorescent fixtures with older generation, 700 series 32W T8 lamps and electronic ballasts. Although 700 series T8 lamps are considered fairly efficient, further energy savings can be achieved by replacing the existing T8 lamps with new generation, 800 series 28W T8 lamps without compromising light output. CEG recommends, re-lamping all of the fixtures with 28W T8 lamps.

This ECM includes retrofitting each of the existing T-12 fluorescent lamp and magnetic ballast fixtures with T-8 lamps and high-power electronic ballasts. High efficiency electronic ballasts reduce overall wattage while maintaining the existing lumen levels of the various rooms. This ECM also includes re-lamping of the existing fluorescent fixtures with 800 series, 28W T8 lamps. Additionally, the retrofit of all older fluorescent fixtures with T8 or T5 fluorescent fixtures with electronic ballasts in the building would prove to be more energy efficient. The new, energy efficient T8 fixtures will provide adequate lighting and will save on electrical costs due to better performance of the lamp and ballasts. This ECM also includes maintenance savings through the reduced number of lamps replaced per year. The expected lamp life of a T8 lamp is approximately 30,000 burn-hours, in comparison to the existing T12 lamps which is approximately 20,000 burn-hours. The facility will need approximately 33% less lamps replaced per year for each one for one fixture replaced.

The ECM also includes replacement of any incandescent lamps with compact fluorescent lamps. Compact fluorescent lamps (CFL's) were designed 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 60-Watt incandescent lamp, an 18-Watt CFL for a 75-Watt incandescent lamp, and a 26-Watt CFL for a 100-Watt incandescent lamp. The CFL is also available for a number of "brightness colors" that is indicated by the Kelvin rating. A 2700K CFL is the "warmest" color available and is closest in color to the incandescent lamp. CFL's are also available in 3000K, 3500K, and 4100K. The 4100K would be the "brightest" or "coolest" output. A CFL can be chosen to screw right into your existing fixtures, or hardwired into your existing fixtures. Where the existing fixture is controlled by a dimmer switch, the CFL bulb must be compatible with a dimmer switch. In some

locations the bulb replacement will need to be tested to make sure the larger base of the CFL will fit into the existing fixture. The energy usage of an incandescent compared to a compact fluorescent approximately 3 to 4 times greater. In addition to the energy savings, compact fluorescent fixtures burn-hours are 8 to 15 times longer than incandescent fixtures ranging from 6,000 to 15,000 burn-hours compared to incandescent fixtures ranging from 750 to 1000 burn-hours. However, the maintenance savings due to reduced lamp replacement is offset by the higher cost of the CFL's compared to the incandescent lamps.

Energy Savings Calculations:

The **Investment Grade Lighting Audit Appendix** outlines the hours of operation, proposed retrofits, costs, savings, and payback periods for each set of fixtures in the each building.

Rebates and Incentives:

From the **NJ Smart Start Incentive Appendix**, the retrofit of a T-12 fixture to a T-5 or T-8 fixture or the retrofit of existing 32 watt T-8 system to reduced wattage (28w/25w 4') warrants the following incentive: \$10 per fixture.

$$\text{SmartStart}^{\circledR} \text{ Incentive} = (\# \text{ of } 1-4 \text{ lamp fixtures} \times \$10)$$

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$10,195
NJ Smart Start Equipment Incentive (\$):	\$850
Net Installation Cost (\$):	\$9,345
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$2,434
Total Yearly Savings (\$/Yr):	\$2,434
Estimated ECM Lifetime (Yr):	15
Simple Payback	3.8
Simple Lifetime ROI	290.7%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$36,510
Internal Rate of Return (IRR)	25%
Net Present Value (NPV)	\$19,711.93

ECM #2: Lighting Controls Upgrade – Occupancy Sensors

Description:

Some of the lights in the Pleasantville Department of Public Works are 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.

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

- Occupancy Sensors for Lighting Control 20% - 28% energy savings.

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 20% of the total light energy controlled by occupancy sensors and daylight sensors (The majority of the savings is expected to be after school hours when rooms are left with lights on)

This ECM includes installation of ceiling or switch mount sensors for individual offices, classrooms, large bathrooms, and libraries. 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:

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

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

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

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

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

$$\text{Smart Start® Incentive} = (\# \text{ of wall mount} \times \$20) + (\# \text{ of ceiling mount} \times \$35)$$

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$552
NJ Smart Start Equipment Incentive (\$):	\$105
Net Installation Cost (\$):	\$447
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$242
Total Yearly Savings (\$/Yr):	\$242
Estimated ECM Lifetime (Yr):	15
Simple Payback	1.8
Simple Lifetime ROI	712.1%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$3,630
Internal Rate of Return (IRR)	54%
Net Present Value (NPV)	\$2,441.98

ECM #3: Condensing Boiler Installation

Description:

The Public Works office building is heated via fin tube radiation that is supplied by a Cast Iron Boiler rated at 175,000 Btu/hr. The boiler is natural gas fired and is approximately 30 years old. The expected efficiency rating for the boiler is 70%.

Standard (non-condensing) boilers provide lower than nominal efficiency compared to condensing boilers. Standard boilers suffer further efficiency losses at part load operating conditions mainly due to limitations in the reduction of the flue gas temperature. Current average combustion efficiency of the boiler is estimated to be 70% due to standard non-condensing boiler technology, limited turn down ratio, cycling losses and outdated design and controls. A new condensing boiler 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.

This ECM is based on the replacement of the one (1) boiler with a condensing hot water boiler to provide the building with heating throughout the year. The annual average operating efficiency of the proposed boiler set is expected to be 90%, which gives the heating system a 20% increase in efficiency. This ECM is based on variable supply water temperature adjusted based on outdoor temperature.

This ECM includes installation of one (1) new condensing gas fired boiler to replace the (1) existing hot water boiler. The basis for this ECM is Munchkin 199M high efficiency condensing hot water boiler or equivalent. The new boiler shall be setup and programmed to be the primary source of heating for the building during entire year. The owner is recommended to retain a professional engineer to confirm equipment sizing and finalize design.

Energy Savings Calculations:

Currently there are multiple unit heaters, and domestic hot water boiler on the building gas meter. The boilers' gas usage is not separately metered. Therefore, annual energy consumption of the boilers has to be estimated. The gas usage for the unit heaters and domestic boilers were estimated based on their size and operating characteristics.

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

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

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

Energy savings calculations are summarized in the table below:

CONDENSING BOILER CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Existing Hot Water Boiler	New Condensing Boiler	-
Existing Nat Gas (Therms)	2,913	-	-
Boiler Efficiency (%)	70%	90%	20%
Nat Gas Heat Value (BTU/Therm)	100,000	100,000	-
Equivalent Building Heat Usage (MMBTUs)	204	204	-
Ave. Gas Cost (\$/Therm)	1.34	1.34	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Natural Gas Usage (Therms)	2,913	2,266	647
Energy Cost (\$)	\$3,904	\$3,036	\$867
COMMENTS:			

From the **New Jersey Smart Start[®] Program Incentives Appendix**, installation of a high efficiency hot water boiler falls under the category “Gas Heating” and warrants an incentive based on efficiency at or above 84% for this type of equipment.

GAS FIRED BOILER REBATE SUMMARY					
UNIT DESCRIPTION	UNIT EFFICIENCY	REBATE \$/MBH	PROPOSED CAPACITY, MBH	NUMBER OF UNITS	TOTAL REBATE, \$
< 300 MBH	85% AFUE for Hot Water boilers	\$2.00	199	1	\$398
>1500 - ≤ 4000 MBH	84% AFUE for Hot Water boilers	\$1	0	0	\$0
>1500 - ≤ 4000 MBH	84% AFUE for Hot Water boilers	\$1	0	0	\$0
TOTAL					\$398

Maintenance savings associated with this ECM is estimated to be minimal.

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$11,006
NJ Smart Start Equipment Incentive (\$):	\$398
Net Installation Cost (\$):	\$10,608
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$867
Total Yearly Savings (\$/Yr):	\$867
Estimated ECM Lifetime (Yr):	25
Simple Payback	12.2
Simple Lifetime ROI	104.3%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$21,675
Internal Rate of Return (IRR)	6%
Net Present Value (NPV)	\$4,489.20

ECM #4: Valve Blanket and Pipe Insulation

Description:

The domestic hot water in the loft supplies hot water to the facility for the bathrooms. The piping remains heated at approximately 120°F continuously during this period (approximately 6 months). Un-insulated piping has significant heat losses due to the exposure of the steel piping to the surrounding air. Insulated piping has a heat loss which is a small fraction of the heat loss from un-insulated piping. It was noted that the piping on the domestic hot water heater was missing insulation.

Based on the site survey approximately 5 feet of ¾” steel pipe and 10 feet of ½” steel pipe were not insulated. This ECM includes installation of insulation of all un-insulated piping within the loft.

Energy Savings Calculations:

Heat Loss for un-insulated steel piping is based on ASHRAE 2009 Fundamentals – “Insulation for Mechanical Systems”

Bare Steel Piping Heat Loss ¾” pipe: 59 BTU/HR per Linear FT

Bare Steel Piping Heat Loss ½” pipe: 47 BTU/HR per Linear FT

$$\text{Heat Loss } \frac{\text{BTU}}{\text{HR}} \text{ per Linear FT} = \frac{1}{R - \text{Value}} \times \text{Pipe Dia (FT)} \times 3.14 \times (\text{Pipe Temp (°F)} - \text{Ambient Temp (°F)})$$

$$\text{Heat Loss } \frac{\text{BTU}}{\text{HR}} = \text{Heat Loss } \frac{\text{BTU}}{\text{HR}} \text{ per Linear FT} \times \text{Length of Uninsulated Pipe}$$

$$\text{Energy Use, Therms} = \frac{\text{Heat Loss } \frac{\text{BTU}}{\text{HR}} \times \text{Operating Hrs}}{\text{Heating System Eff. (\%)} \times \text{Fuel Heat Value } \frac{\text{BTU}}{\text{Therm}}}$$

$$\text{Heating Energy Cost Savings} = \text{Energy Use, Therms} \times \text{Cost of Nat Gas } \left(\frac{\$}{\text{Therm}} \right)$$

VALVE BLANKET INSULATION CALCULATIONS					
ECM INPUTS	EXISTING	EXISTING	PROPOSED	PROPOSED	SAVINGS
ECM INPUTS	Bare Pipe	Bare Pipe	Insulation Blanket	Insulation Blanket	
Length of Un-Insulated Pipe Including Valves	5	10	5	10	
Pipe Diameter (In)	0.75	0.5	0.75	0.5	
Blanket Insulation R-value	0	0	6	6	6
Temperature Difference Pipe to Ambient (°F)	100	100	100	100	
Pipe Heat Loss (BTU/Hr per FT)	59	47	3	2	101
Heat Loss (BTU/Hr)	295	470	16	22	727
Heating System Operating Hrs	4380	4380	4380	4380	
Energy Loss (kBtus)	1,292	2,059	72	96	3,184
Heating System Eff (%)	100%	100%	100%	100%	
Fuel Heat Value (BTU/kWh)	3,412	3,412	3,412	3,412	
Electric Cost (\$/kWh)	0.17	0.17	0.17	0.17	
ENERGY SAVINGS CALCULATIONS					
ECM RESULTS	EXISTING	EXISTING	PROPOSED	PROPOSED	SAVINGS
Electric Usage (kWh)	379	603	21	28	933
Energy Cost (\$)	64	102	4	5	158
COMMENTS:	Bare Pipe Heat Loss value is based on ASHRAE 2009 Fundamentals "Insulation for Mechanical Systems"				

There is no maintenance savings due to implementation of this ECM.

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$301
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$301
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$158
Total Yearly Savings (\$/Yr):	\$158
Estimated ECM Lifetime (Yr):	15
Simple Payback	1.9
Simple Lifetime ROI	687.4%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$2,370
Internal Rate of Return (IRR)	52%
Net Present Value (NPV)	\$1,585.19

ECM #5: Programmable Thermostats for Garage & Office

Description:

The Department of Public Works utilizes natural gas unit heaters throughout the garage area to keep the vehicles warm. The system is controlled with mechanical thermostats remotely located on ground level of the garage. The DPW offices utilize a central gas fired boiler that supplies fin-tube radiators for heat. The boiler system utilizes non-programmable thermostats for heating. Currently, there is no night setback for the unit heaters in the garage or the boiler system for the offices.

Energy consumption of the unit heaters and boiler can be reduced by installing programmable thermostats. Programmable thermostats customized for unit heaters and boilers are available to utilize time-of-day schedules for occupied and unoccupied times and set-backs.

This energy conservation measure will install programmable thermostats to control the natural gas unit heaters and boiler. The recommended thermostat set points for heating are as follows:

Occupied Heating (Garage)	=	65°F
Unoccupied Heating (Garage)	=	55°F
Occupied Heating (Offices)	=	70°F
Unoccupied Heating (Offices)	=	60°F

Energy Savings Calculations:

Energy savings calculations are derived based on heating degree days.

Total heating capacity is calculated with the equation below.

$$\text{Heating Capacity, } \frac{\text{BTU}}{\text{Hr}} = \text{Total baseboard heater length, ft} \times \text{Heat Density, } \frac{\text{BTU}}{\text{ft}}$$

$$\text{Heating Energy Used} = \frac{\text{Heating Capacity}}{\Delta T \times \text{Eff} \times V} (\text{HDD}_{65^{\circ}\text{F}} \times \text{NonSetback Hrs} + \text{HDD}_{60^{\circ}\text{F}} \times \text{Setback Hrs})$$

Where:

HDD = number of Heating Degree Days as Specified Base Temperature

ΔT = Design temperature difference, °F

Eff = Efficiency of Energy Utilization

V = Heating value of fuel, BTU/kWh (100,000 Btu = 1 Therm)

Estimated total cost of heating = Energy Consumption (Therm) x Cost of Gas (\$/Therm)

Energy savings calculations are summarized in the table below.

PROGRAMMABLE THERMOSTATS for GARAGE UNIT HEATERS & BOILER					
ECM INPUTS	EXISTING	EXISTING	PROPOSED	PROPOSED	SAVINGS
ECM INPUTS	Standard non-programmable (Unit Heaters)	Standard non-programmable (Boiler)	Programmable Thermostats (Unit Heaters)	Programmable Thermostats (Boiler)	
Total Heating Capacity, BTU/Hr	1,200,000	175,000	1,200,000	175,000	
Heating Efficiency (Gas)	80%	75%	80%	75%	
Heating Degree Days (65°F)	4,886	4,886	4,886	4,886	
Heating Degree Days (55°F)	2,882	2,882	2,882	2,882	
Hours of setback	0	0	12	8	
Natural Gas Cost (\$/Therm)	\$1.350	\$1.350	\$1.350	\$1.350	
ENERGY SAVINGS CALCULATIONS					
ECM RESULTS	EXISTING	EXISTING	PROPOSED	PROPOSED	SAVINGS
Heating Energy, Therms (non setback)	27,061	4,209	7,981	1,655	
Heating Energy, Therms (setback)	0	0	13,530	1,403	
Heating Energy Consumption, Therms	27,061	4,209	21,511	3,058	6,701
Gas Energy Cost (\$)	\$36,532	\$5,683	\$29,040	\$4,129	\$9,046
COMMENTS:	HDDs estimated based on Atlantic City, NJ.				

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$4,800
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$4,800
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$10,197
Total Yearly Savings (\$/Yr):	\$10,197
Estimated ECM Lifetime (Yr):	15
Simple Payback	0.5
Simple Lifetime ROI	3086.6%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$152,955
Internal Rate of Return (IRR)	212%
Net Present Value (NPV)	\$116,931.12

ECM #6: Window A/C Upgrade

Description:

Air-conditioning is provided to the building via residential-style window air-conditioning units. The existing window air-conditioning units are inefficient with an estimated energy efficiency ratio ranging from 8.0 EER (10 SEER est.) to 9.0 EER (11 SEER est.). Some of the existing window air-conditioning units appears to be approximately 15-plus years of age and is past their service life as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook. The estimated service life for a window air-conditioning unit is 10 years. Additionally there are areas where these window units have been insufficiently meeting load requirements.

This energy conservation measure would replace the window-air conditioning units past their service life. There are eight (8) units throughout three buildings serving the office areas in each building. This ECM includes one-for-one replacement of the older air conditioning units with new higher efficiency systems. It is recommended to fully evaluate the capacity needed for all new systems prior to moving forward with this ECM. A summary of the unit replacements for this ECM can be found in the table below:

IMPLEMENTATION SUMMARY					
ECM INPUTS	SERVICE FOR	NUMBER OF UNITS	COOLING CAPACITY, BTU/HR	TOTAL CAPACITY, TONS	REPLACE UNIT WITH
Window AC-1	Front Desk	1	18,000	1.5	Friedrich SS18M30
Window AC-2	Robert's Office	1	6,000	0.5	Friedrich XQ06M10
Window AC-3	Private Office	1	6,000	0.5	Friedrich XQ06M10
Window AC-4	Break Room	1	6,000	0.5	Friedrich XQ06M10
Window AC-5	Break Room	1	12,000	1.0	Friedrich SS12M10
Window AC-6	Shop Office	1	9,000	0.8	Friedrich SS10M10
Window AC-7	Garage Office	1	6,000	0.5	Friedrich XQ06M10
Window AC-8	Sewage Office	1	12,000	1.0	Friedrich SS12M10
Total		8	75,000	6.3	

Some unit sizes are estimated. See Major Equipment List Appendix.

The manufacturer used as the basis for design is Friedrich. This ECM includes replacement of window style air conditioning unit. All units are one for one style replacements with matching capacity of the new units to the old units.

Energy Savings Calculations:

Cooling Energy Savings:

Energy consumption of the air conditioners at the cooling mode is calculated with the equation below:

$$\text{Energy Savings, kWh} = \text{Cooling Capacity, } \frac{\text{BTU}}{\text{Hr}} \times \left(\frac{1}{\text{EER}_{\text{Old}}} - \frac{1}{\text{EER}_{\text{New}}} \right) \times \frac{\text{Operation Hours}}{1000 \frac{\text{W}}{\text{kWh}}}$$

$$\text{Demand Savings, kW} = \frac{\text{Energy Savings (kWh)}}{\text{Hours of Cooling}}$$

$$\text{Cooling Cost Savings} = \text{Energy Savings, kWh} \times \text{Cost of Electricity} \left(\frac{\$}{\text{kWh}} \right)$$

ENERGY SAVINGS CALCULATIONS							
ECM INPUTS	COOLING CAPACITY, BTU/Hr	ANNUAL COOLING HOURS	EXISTING UNITS (S)EER	SPLIT UNITS (S)EER	# OF UNITS	ENERGY SAVINGS kWh	DEMAND SAVINGS kW
Window AC-1	18,000	1,200	8.5 EER	11.5 EER	1	522	0.4
Window AC-2	6,000	1,200	9.7 EER	11.5 EER	1	142	0.1
Window AC-3	6,000	1,200	9.0 EER	11.5 EER	1	200	0.2
Window AC-4	6,000	1,200	9.0 EER	11.5 EER	1	200	0.2
Window AC-5	12,000	1,200	8.5 EER	11.5 EER	1	408	0.3
Window AC-6	9,000	1,200	9.5 EER	11.5 EER	1	173	0.1
Window AC-7	6,000	1,200	9.8 EER	11.5 EER	1	135	0.1
Window AC-8	12,000	1,200	9.0 EER	12 EER	1	314	0.3
Total					8	2,095	1.7

Project Cost, Incentives and Maintenance Savings

From the NJ Smart Start[®] Program appendix, the replacement of window AC units and unitary systems with high efficiency AC systems falls under the category “Unitary HVAC Split System” and warrants an incentive based on efficiency (EER/SEER). The program incentives are calculated as follows:

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

PACKAGED TERMINAL UNITS REBATE SUMMARY				
UNIT DESCRIPTION	UNIT EFFICIENCY	REBATE \$/TON	PROPOSED CAPACITY TONS	TOTAL REBATE \$
< 9,000 BTUH	12.0 EER	65	2.0	\$130
≥ 9,000 to 12,000 BTUH	11.0 EER	65	2.8	\$179
> 12,000 BTUH	10.0 EER	65	1.5	\$98
TOTAL			6.25	\$406

Summary of cost, savings and payback for this ECM is below.

COST & SAVINGS SUMMARY							
ECM INPUTS	INSTALLED COST	# OF UNITS	TOTAL COST	REBATES	NET COST	ENERGY SAVING	PAY BACK YEARS
Window AC-1	\$1,650	1	\$1,650	\$98	\$1,553	\$88	17.6
Window AC-2	\$803	1	\$803	\$33	\$770	\$24	32.0
Window AC-3	\$803	1	\$803	\$33	\$770	\$34	22.8
Window AC-4	\$803	1	\$803	\$33	\$770	\$34	22.8
Window AC-5	\$1,109	1	\$1,109	\$65	\$1,044	\$69	15.1
Window AC-6	\$1,049	1	\$1,049	\$49	\$1,000	\$29	34.3
Window AC-7	\$803	1	\$803	\$33	\$770	\$23	33.8
Window AC-8	\$1,109	1	\$1,109	\$65	\$1,044	\$53	19.6
Total		8	\$8,126	\$406	\$7,719	\$354	21.8

There is no significant maintenance savings due to implementation of this ECM.

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$8,125
NJ Smart Start Equipment Incentive (\$):	\$406
Net Installation Cost (\$):	\$7,719
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$354
Total Yearly Savings (\$/Yr):	\$354
Estimated ECM Lifetime (Yr):	15
Simple Payback	21.8
Simple Lifetime ROI	-31.2%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	\$5,310
Internal Rate of Return (IRR)	-4%
Net Present Value (NPV)	(\$3,493.17)

ECM #7: CONDENSING UNIT HEATERS**Description:**

The Pleasantville Department of Public Works Garages (8640 SF) have three garages with twelve (12) gas fired unit heaters in total, mounted from the ceiling steel structure. These unit heaters are approaching their ASHRAE service life and are rated at approximately 75,000 Btuh output each. These units are used to keep the garages at 65°F in the wintertime.

This ECM would upgrade the public works garages by installing more efficient gas-fired, condensing unit heaters rated at 91% thermal efficiency. Unit heaters with power venting, separated combustion and secondary condensing heat exchangers are the most efficient unit heaters on the market. The installation will require installation of venting and unit combustion air piping, and proper condensate drains.

Energy Savings Calculations:

CONDENSING UNIT HEATER CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Existing Unit Heaters	New Condensing Unit Heaters	-
Existing Nat Gas (Therms)	9,338	-	-
Efficiency (%)	80%	90%	10%
Nat Gas Heat Value (BTU/Therm)	100,000	100,000	-
Equivalent Building Heat Usage (MMBTUs)	747	747	-
Ave. Gas Cost (\$/Therm)	1.34	1.34	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Natural Gas Usage (Therms)	9,338	8,300	1,038
Energy Cost (\$)	\$12,513	\$11,123	\$1,390
COMMENTS:			

NJ Smart Start[®] Program Incentives are not currently available for this ECM.

Energy Savings Summary:

ECM #7 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$108,000
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$108,000
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,390
Total Yearly Savings (\$/Yr):	\$1,390
Estimated ECM Lifetime (Yr):	15
Simple Payback	77.7
Simple Lifetime ROI	-80.7%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$20,850
Internal Rate of Return (IRR)	-16%
Net Present Value (NPV)	(\$91,406.27)

ECM #8: Infra-Red Radiant Unit Heater in DPW Office Garage**Description:**

The Pleasantville Department of Public Works Garages (8640 SF) has a single garage containing four (4) gas fired unit heaters in total, mounted from the ceiling steel structure. These unit heaters are approaching their ASHRAE service life and are rated at approximately 150,000 Btuh output each. These units are used to keep the garages at 65°F in the wintertime.

This ECM would upgrade the public works garage by installing more efficient gas-fired, infrared tube heaters rated at 100% thermal efficiency. When compared to convective heating systems, Infrared heaters provide more efficient heating in large areas and warehouses because they only heat people and objects (not air). The installation will require installation of venting and unit combustion air piping. Basis of design for replacement of the existing unit heaters with infrared tube heating is the Sterling SL150 infrared heater or equivalent.

Energy Savings Calculations:

INFRA-RED RADIANT UNIT HEATER CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Existing Unit Heaters	New Condensing Unit Heaters	-
Existing Nat Gas (Therms)	6,225	-	-
Efficiency (%)	80%	100%	20%
Nat Gas Heat Value (BTU/Therm)	100,000	100,000	-
Equivalent Building Heat Usage (MMBTUs)	498	498	-
Ave. Gas Cost (\$/Therm)	1.34	1.34	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Natural Gas Usage (Therms)	6,225	4,980	1,245
Energy Cost (\$)	\$8,342	\$6,673	\$1,668
COMMENTS:			

The cost of removing the four (4) existing units, vent and combustion air piping, four (4) Reznor VR Gas Infrared Unit heaters (150,000 Btuh output each) or equal and controls is estimated to be \$9,200.

NJ Smart Start[®] Program Incentives are not currently available for this ECM.

Energy Savings Summary:

ECM #8 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$9,200
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$9,200
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,668
Total Yearly Savings (\$/Yr):	\$1,668
Estimated ECM Lifetime (Yr):	15
Simple Payback	5.5
Simple Lifetime ROI	172.0%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$25,020
Internal Rate of Return (IRR)	16%
Net Present Value (NPV)	\$10,712.48

REM #1: 15.52 kW Rooftop Solar Array

Description:

The DPW has approximately 1,275 square-foot of available roof space that can accommodate a 15.52 kilowatt solar array, assuming the existing roof structure is capable of supporting an array. The array will produce approximately 16,904 kilowatt-hours annually that will reduce the overall electric usage of the facility by 19%.

It should be noted that while a solar system was proposed on the DPW, Atlantic Electric has currently closed this section of the grid to new applications for renewable energy development, and any applications for this type of development would be rejected by the utility company to be interconnected with the grid.

Energy Savings Calculations:

See **Renewable / Distributed Energy Measures Calculations Appendix** for detailed financial summary and proposed solar layout areas.

Energy Savings Summary:

REM #1 - ENERGY SAVINGS SUMMARY	
System Size (KW _{DC}):	15.52
Electric Generation (KWH/Yr):	16,904
Installation Cost (\$):	\$91,066
SREC Revenue (\$/Yr):	\$6,518
Energy Savings (\$/Yr):	\$2,857
Total Yearly Savings (\$/Yr):	\$9,375
ECM Analysis Period (Yr):	15
Simple Payback (Yrs):	9.7
Analysis Period Electric Savings (\$):	\$53,133
Analysis Period SREC Revenue (\$):	\$94,425
Net Present Value (NPV)	\$7,654.91

V. ADDITIONAL RECOMMENDATIONS

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

- A. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
- B. Maintain all weather stripping on windows and doors.
- C. Clean all light fixtures to maximize light output.
- D. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.
- E. Investigate the installation of Prop fans in garage bays to de-stratify heat rise.
- F. Patch existing ceiling opening located in Sewage Garage Bay to reduce heat loss.

APPENDIX A

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

City of Pleasantville - Department of Public Works

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	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Saving * 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)	(\$)	(\$)
ECM #1	Lighting Upgrade	\$8,156	\$2,039	\$850	\$9,345	\$2,434	\$0	\$2,434	15	\$36,510	\$0	290.7%	3.8	25.15%	\$19,711.93
ECM #2	Lighting Controls	\$442	\$110	\$105	\$447	\$242	\$0	\$242	15	\$3,630	\$0	712.1%	1.8	54.06%	\$2,441.98
ECM #3	Condensing Boiler Upgrade	\$4,696	\$6,310	\$398	\$10,608	\$867	\$0	\$867	25	\$21,675	\$0	104.3%	12.2	6.47%	\$4,489.20
ECM #4	Hot Water Pipe Insulation	\$107	\$194	\$0	\$301	\$158	\$0	\$158	15	\$2,370	\$0	687.4%	1.9	52.40%	\$1,585.19
ECM #5	Programmable Thermostats in Garage & Offices	\$3,840	\$960	\$0	\$4,800	\$10,197	\$0	\$10,197	15	\$152,955	\$0	3086.6%	0.5	212.44%	\$116,931.12
ECM #6	Window AC Unit Upgrades	\$6,500	\$1,625	\$406	\$7,719	\$354	\$0	\$354	15	\$5,310	\$0	-31.2%	21.8	-4.35%	(\$3,493.17)
ECM #7	Condensing Unit Heaters Upgrade	\$86,400	\$21,600	\$0	\$108,000	\$1,390	\$0	\$1,390	15	\$20,850	\$0	-80.7%	77.7	-15.85%	(\$91,406.27)
ECM #8	Infrared Unit Heaters Upgrade	\$7,360	\$1,840	\$0	\$9,200	\$1,668	\$0	\$1,668	15	\$25,020	\$0	172.0%	5.5	16.23%	\$10,712.48
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	15.52 KW Solar Roof System	\$54,640	\$36,426	\$0	\$91,066	\$2,857	\$6,518	\$9,375	15	\$140,625	\$97,770	54.4%	9.7	6.00%	\$20,852.14

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* .

APPENDIX B



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 15, 2011:

Electric Chillers

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

Energy Efficiency must comply with ASHRAE 90.1-2007

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 - \$92 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 90.1-2007

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%

Ground Source Heat Pumps

Closed Loop	\$450 per ton, EER $\geq$ 16 \$600 per ton, EER $\geq$ 18 \$750 per ton, EER $\geq$ 20
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Energy Efficiency must comply with ASHRAE 90.1-2007

Variable Frequency Drives

Variable Air Volume	\$65 - \$155 per hp
Chilled-Water Pumps	\$60 per VFD rated hp
Compressors	\$5,250 to \$12,500 per drive
Cooling Towers $\geq$ 10 hp	\$60 per VFD rated hp

Natural Gas Water Heating

Gas Water Heaters $\leq$ 50 gallons, 0.67 energy factor or better	\$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 (1-4 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 Including Parking Lot	\$25 per fixture
T-5 and T-8 High Bay Fixtures	\$16 - \$200 per fixture
HID $\geq$ 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	\$50 per fixture
HID $\geq$ 100w Replacement with new HID $\geq$ 100w	\$70 per fixture

Prescriptive Lighting - LED

LED New Exit Sign Fixture	
Existing Facility < 75 kw	\$20 per fixture
Existing Facility > 75 kw	\$10 per fixture
LED Display Case Lighting	\$30 per display case
LED Shelf-Mtd. Display & Task Lights	\$15 per linear foot
LED Portable Desk Lamp	\$20 per fixture
LED Wall-wash Lights	\$30 per fixture
LED Recessed Down Lights	\$35 per fixture
LED Outdoor Pole/Arm-Mounted Area and Roadway Luminaries	\$175 per fixture
LED Outdoor Pole/Arm-Mounted Decorative Luminaries	\$175 per fixture
LED Outdoor Wall-Mounted Area Luminaries	\$100 per fixture
LED Parking Garage Luminaries	\$100 per fixture
LED Track or Mono-Point Directional Lighting Fixtures	\$50 per fixture
LED High-Bay and Low-Bay Fixtures for Commercial & Industrial Bldgs.	\$150 per fixture
LED High-Bay-Aisle Lighting	\$150 per fixture
LED Bollard Fixtures	\$50 per fixture
LED Linear Panels (2x2 Troffers only)	\$100 per fixture
LED Fuel Pump Canopy	\$100 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- 2007 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%

APPENDIX C



STATEMENT OF ENERGY PERFORMANCE

Pleasantville - Public Works

Building ID: 2706290
For 12-month Period Ending: February 28, 2011¹
Date SEP becomes ineligible: N/A

Date SEP Generated: May 17, 2011

Facility
Pleasantville - Public Works
801 N New Street
Pleasantville, NJ 08232

Facility Owner
City of Pleasantville
18 North First Street
Pleasantville, NJ 08232

Primary Contact for this Facility
Marvin Hopkins
18 North First Street
Pleasantville, NJ 08232

Year Built: 1960
Gross Floor Area (ft²): 8,640

Energy Performance Rating² (1-100) N/A

Site Energy Use Summary³

Electricity - Grid Purchase(kBtu)	302,965
Natural Gas (kBtu) ⁴	1,743,257
Total Energy (kBtu)	2,046,222

Energy Intensity⁵

Site (kBtu/ft ² /yr)	237
Source (kBtu/ft ² /yr)	328

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	136
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Electric Distribution Utility

Atlantic City Electric Co [Pepco Holdings Inc]

National Average Comparison

National Average Site EUI	77
National Average Source EUI	150
% Difference from National Average Source EUI	119%
Building Type	Service (Vehicle Repair/Service, Postal Service)

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. Values represent energy intensity, annualized to a 12-month period.
5. 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.

APPENDIX D

MAJOR EQUIPMENT LIST

Concord Engineering Group

Pleasantville - Department of Public Works

AC Units

Tag	AC-	AC-	AC-
Unit Type	Window AC Unit	Window AC Unit	Window AC Unit
Qty	1	1	1
Location	DPW Office Front Desk	DPW Office Robert's Office	DPW Office Private Office
Area Served	DPW Office Front Desk	DPW Office Robert's Office	DPW Office Private Office
Manufacturer	Whirlpool	GE	Fedders
Model #	N/A	N/A	N/A
Serial #	N/A	N/A	N/A
Cooling Type	DX	DX	DX
Cooling Capacity (Tons)	1.5 Tons (Est)	1/2 Ton	1/2 Ton (Est)
Cooling Efficiency (SEER/EER)	8.0 - 9.0 EER (Est)	9.7 EER	9.0 EER (Est)
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	N/A	N/A	N/A
Approx Age	Unknown	Unknown	Unknown
ASHRAE Service Life	15	15	15
Remaining Life	N/A	N/A	N/A
Comments	Old / Poor Condition 120V plug and cord, Dedicated 20A receptacle	120V plug and cord. Air leakage around opening	120V plug and cord. Energy Star Rated

AC Units

Tag	AC-	AC-	AC-
Unit Type	Window AC Unit	Portable AC Unit	Window AC Unit
Qty	2	1	1
Location	DPW Office Breakroom	DPW Office Shop Room (office)	DPW Office Garage Office
Area Served	DPW Office Breakroom	DPW Office Shop Room (office)	DPW Office Garage Office
Manufacturer	Carrier / GE	Maytag	GE
Model #	N/A	M6P09S2A	N/A
Serial #	N/A	DS 967736 095W	N/A
Cooling Type	DX	DX	DX
Cooling Capacity (Tons)	1/2 Ton (Est) / 1 Ton (Est)	3/4 Ton	1/2 Ton (Est)
Cooling Efficiency (SEER/EER)	8.0 - 9.0 EER (Est)	9.5 EER	9.8 EER
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	N/A	N/A	N/A
Approx Age	Unknown	Unknown	Unknown
ASHRAE Service Life	15	15	15
Remaining Life	N/A	N/A	N/A
Comments	Window units deemed insufficient, 120V plug and cord	120V plug and cord	120V plug and cord

AC Units

Tag	AC-
Unit Type	Window AC Unit
Qty	1
Location	Sewage Office
Area Served	Sewage Office
Manufacturer	GE
Model #	N/A
Serial #	N/A
Cooling Type	DX
Cooling Capacity (Tons)	1 Ton (Est)
Cooling Efficiency (SEER/EER)	9.0 (Est)
Heating Type	N/A
Heating Input (MBH)	N/A
Efficiency	N/A
Fuel	N/A
Approx Age	Unknown
ASHRAE Service Life	15
Remaining Life	N/A
Comments	120V plug and cord

MAJOR EQUIPMENT LIST

Concord Engineering Group

Pleasantville - Department of Public Works

Boilers

Tag	Boiler 1
Unit Type	Cast Iron
Qty	1
Location	DPW Office Mech Closet
Area Served	DPW Office
Manufacturer	Weil Mclain
Model #	N/A
Serial #	N/A
Input Capacity (MBH)	175
Rated Output Capacity (MBH)	140 (Est)
Approx. Efficiency %	75%
Fuel	Nat Gas
Year	1982
ASHRAE Service Life	20
Remaining Life	(9)
Comments	Supply water temp 180°F. 3 Zone pumps installed.

MAJOR EQUIPMENT LIST

Concord Engineering Group

Pleasantville - Department of Public Works

Unit Heaters

Tag	UH-	UH-	UH-
Unit Type	Indirect Fired Unit Heater	Indirect Fired Unit Heater	Indirect Fired Unit Heater
Qty	4	4	4
Location	DPW Office Garage	Vehical Wash Bay	Sewage Department Garage
Area Served	DPW Office Garage	Vehical Wash Bay	Sewage Department Garage
Manufacturer	Modine	Trane	Trane
Model #	DD 150AA0111	GPNC007AEB1000E	GPNC007AAA1000E
Serial #	380011010304-6078	A85F07251	A88G07317
Input Capacity (MBH)	150	75	75
Rated Output Capacity (MBH)	120	60	60
Approx. Efficiency %	80%	80%	80%
Fuel	Nat Gas	Nat Gas	Nat Gas
Year	Unknown	Unknown	Unknown
ASHRAE Service Life	20	20	20
Remaining Life	N/A	N/A	N/A
Comments	115V, 2.6 Amps, 3.5 - 6"WC, Non programmable Thermostat	115V, 1.3 Amps, 3.5 - 5"WC, Non programmable Thermostat, room required to stay warm for water trucks	115V, 1.3 A, 3.5 - 5"WC

MAJOR EQUIPMENT LIST

Concord Engineering Group

Pleasantville - Department of Public Works

Domestic Water Heaters

Tag	HWH-1	HWH-2
Unit Type	Tank Type	Tank Type
Qty	1	1
Location	DPW Office Mechanical Closet	Sewage Building Mechanical Closet
Area Served	Bathroom	Bathroom
Manufacturer	Pacemaker	A.O. Smith
Model #	RP30B-34	ECJF15910
Serial #	0283104063	MF94-0039901-910
Size (Gallons)	30	15
Input Capacity (MBH/KW)	40	1.5 KW
Recovery (Gal/Hr)	N/A	N/A
Efficiency %	N/A	N/A
Fuel	Nat Gas	Electric
Approx Age	Unknown	Unknown
ASHRAE Service Life	10	10
Remaining Life	N/A	N/A
Comments	Fair Condition, Pipe Insulation in good condition, 5 - 7" WC	120V power, HW supply piping un-insulated (apprx. 15 feet)

APPENDIX E

Investment Grade Lighting Audit

APPENDIX E
1 of 4

CEG Job #: 9C11005

Project: Pleasantville LGEA

801 N New Street

Pleasantville, NJ 08232

Bldg. Sq. Ft. 8,640

Public Works

KWH COST: **\$0.169**

ECM #1: 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			
142.11	Reception	2600	4	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	156	0.62	1,622.4	\$274.19	4	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.34	894.4	\$151.15	\$100.00	\$400.00	0.28	728	\$123.03	3.25			
121.16	Dept. Manager Office	2600	2	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Clear Acrylic Lens	78	0.16	405.6	\$68.55	2	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.12	301.6	\$50.97	\$80.00	\$160.00	0.04	104	\$17.58	9.10			
121.16	Hallway	2600	2	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Clear Acrylic Lens	78	0.16	405.6	\$68.55	2	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.12	301.6	\$50.97	\$80.00	\$160.00	0.04	104	\$17.58	9.10			
221.16		2600	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Acrylic Lens	58	0.06	150.8	\$25.49	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00			
142.11	Office	2600	1	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	156	0.16	405.6	\$68.55	1	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.09	223.6	\$37.79	\$100.00	\$100.00	0.07	182	\$30.76	3.25			
142.21	Locker Room	2600	6	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	2,433.6	\$411.28	6	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.52	1341.6	\$226.73	\$100.00	\$600.00	0.42	1092	\$184.55	3.25			
142.21	Bathroom	2600	1	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.16	405.6	\$68.55	1	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.09	223.6	\$37.79	\$100.00	\$100.00	0.07	182	\$30.76	3.25			
121.21	Hallway	2600	4	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.31	811.2	\$137.09	4	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.23	603.2	\$101.94	\$80.00	\$320.00	0.08	208	\$35.15	9.10			
610	Boiler Room	2600	1	2	1x1 Surface Mount, Prismatic Lens, (2) 60w A Lamp	120	0.12	312.0	\$52.73	1	2	13w CFL Lamps	26	0.03	67.6	\$11.42	\$25.00	\$25.00	0.09	244.4	\$41.30	0.61			
610	Bathroom	2600	2	2	1x1 Surface Mount, Prismatic Lens, (2) 60w A Lamp	120	0.24	624.0	\$105.46	2	2	13w CFL Lamps	26	0.05	135.2	\$22.85	\$25.00	\$50.00	0.19	488.8	\$82.61	0.61			
142.22	Office	2600	4	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Parabolic Lens	156	0.62	1,622.4	\$274.19	4	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.34	894.4	\$151.15	\$100.00	\$400.00	0.28	728	\$123.03	3.25			
613	2nd Floor Storage Area	2600	4	1	Industrial Fixture, 100w A19 Lamp	100	0.40	1,040.0	\$175.76	4	1	(1) 26w CFL Lamp	26	0.10	270.4	\$45.70	\$20.00	\$80.00	0.30	769.6	\$130.06	0.62			
769	Garage	2600	11	1	400w MH, Clear Lens	465	5.12	13,299.0	\$2,247.53	11	6	2x4 54w T5HO 6 Lamp w/Prismatic Lens	354	3.89	10124.4	\$1,711.02	\$240.00	\$2,640.00	1.22	3174.6	\$536.51	4.92			
128.34		2600	12	2	8' Channel, 2 Lamp, 75w T12, Mag. Ballast, Pendant Mnt., No Lens	142	1.70	4,430.4	\$748.74	12	4	(2) 8' Lamps to (4) 4' Lamps - 32w T8, Elect Ballast; retrofit	104	1.25	3244.8	\$548.37	\$100.00	\$1,200.00	0.46	1185.6	\$200.37	5.99			
725		2600	5	1	150w HPS Wallpack	188	0.94	2,444.0	\$413.04	5	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00			

Investment Grade Lighting Audit

APPENDIX E
2 of 4

ECM #1: 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			
221.34		2600	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.06	150.8	\$25.49	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00			
128.34	Shop Area	2600	4	2	8' Channel, 2 Lamp, 75w T12, Mag. Ballast, Pendant Mnt., No Lens	142	0.57	1,476.8	\$249.58	4	4	(2) 8' Lamps to (4) 4' Lamps - 32w T8, Elect Ballast; retrofit	104	0.42	1081.6	\$182.79	\$100.00	\$400.00	0.15	395.2	\$66.79	5.99			
128.34	Office Shop	2600	1	2	8' Channel, 2 Lamp, 75w T12, Mag. Ballast, Pendant Mnt., No Lens	142	0.14	369.2	\$62.39	1	4	(2) 8' Lamps to (4) 4' Lamps - 32w T8, Elect Ballast; retrofit	104	0.10	270.4	\$45.70	\$100.00	\$100.00	0.04	98.8	\$16.70	5.99			
221.34		2600	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.06	150.8	\$25.49	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00			
128.34	Garage 2	2600	20	2	8' Channel, 2 Lamp, 75w T12, Mag. Ballast, Pendant Mnt., No Lens	142	2.84	7,384.0	\$1,247.90	20	4	(2) 8' Lamps to (4) 4' Lamps - 32w T8, Elect Ballast; retrofit	104	2.08	5408	\$913.95	\$100.00	\$2,000.00	0.76	1976	\$333.94	5.99			
128.34	Sewer Dept Garage	2600	9	2	8' Channel, 2 Lamp, 75w T12, Mag. Ballast, Pendant Mnt., No Lens	142	1.28	3,322.8	\$561.55	9	4	(2) 8' Lamps to (4) 4' Lamps - 32w T8, Elect Ballast; retrofit	104	0.94	2433.6	\$411.28	\$100.00	\$900.00	0.34	889.2	\$150.27	5.99			
142.14	Sewer Dept Office	2600	4	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	156	0.62	1,622.4	\$274.19	4	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.34	894.4	\$151.15	\$100.00	\$400.00	0.28	728	\$123.03	3.25			
620	Sewer Dept Bathroom	2600	2	1	Ceiling Mnt. "Jelly Jar", (1) 75w A19 Lamp	60	0.12	312.0	\$52.73	2	1	(1) 18w CFL Lamp	18	0.04	93.6	\$15.82	\$20.00	\$40.00	0.08	218.4	\$36.91	1.08			
725	Outsider Sewer Dept	4800	4	1	150w HPS Wallpack	188	0.75	3,609.6	\$610.02	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00			
725	Outside Garage 2	4800	5	1	150w HPS Wallpack	188	0.94	4,512.0	\$762.53	5	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00			
738	Outside Front bldg.	4800	4	1	175w Mercury Vapor Area Light	210	0.84	4,032.0	\$681.41	4	1	100w HPS Wallpack	125	0.50	2400	\$405.60	\$130.00	\$520.00	0.34	1632	\$275.81	1.89			
	Totals		111	53				55,732	\$9,419	111	54			11.2	30,314	\$5,123		\$10,195	5.3	14,401	\$2,434	4.19			

CEG Job #:
Project: Pleasantville LGEA
Address: 801 N New Street
Pleasantville, NJ 08232
Building SF: 8,640

Public Works

KWH COST: \$0.169

FALSE

ECM #2: Lighting Controls

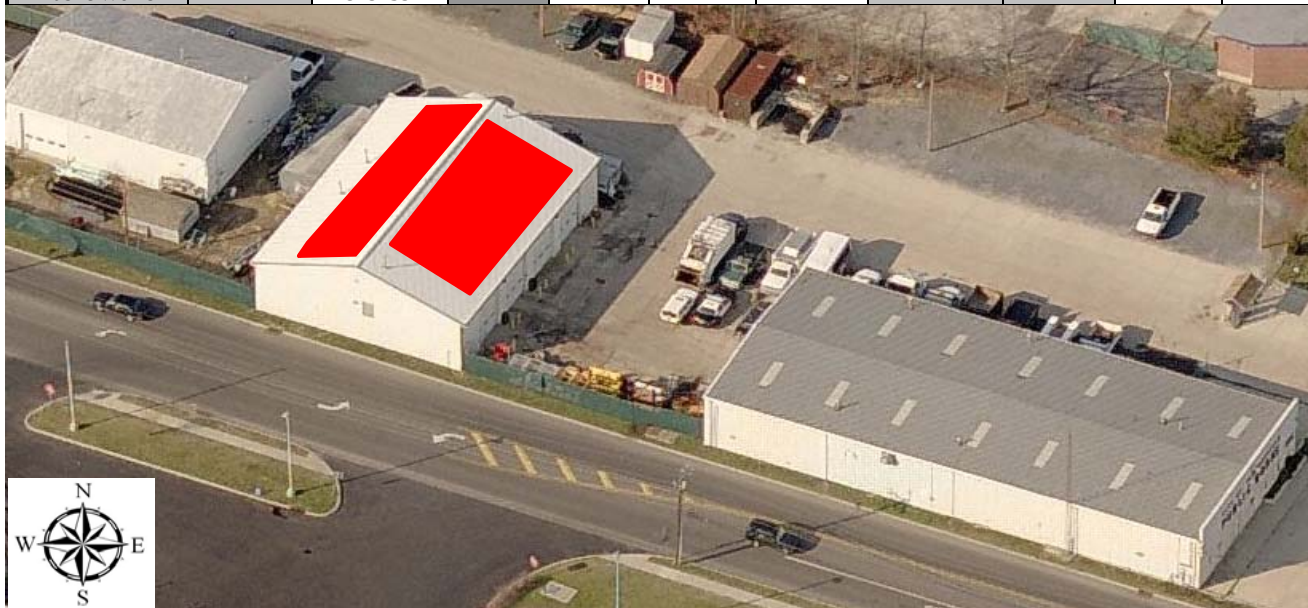
EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS										SAVINGS					
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback		
142.11	Reception	2600	4	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	156	0.62	1622.4	\$274.19	4	1	Dual Technology Occupancy Sensor - Remote Mnt.	156	0.50	20%	1297.92	\$219.35	\$300.00	\$300.00	0.12	324.48	\$54.84	5.47		
121.16	Dept. Manager Office	2600	2	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Clear Acrylic Lens	78	0.16	405.6	\$68.55	2	0	No Change	78	0.16	0%	405.6	\$68.55	\$300.00	\$0.00	0.00	0	\$0.00	0.00		
121.16	Hallway	2600	2	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Clear Acrylic Lens	78	0.16	405.6	\$68.55	2	0	No Change	78	0.16	0%	405.6	\$68.55	\$300.00	\$0.00	0.00	0	\$0.00	0.00		
221.16		2600	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Acrylic Lens	58	0.06	150.8	\$25.49	1	0	No Change	58	0.06	0%	150.8	\$25.49	\$300.00	\$0.00	0.00	0	\$0.00	0.00		
142.11	Office	2600	1	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	156	0.16	405.6	\$68.55	1	0	No Change	156	0.16	0%	405.6	\$68.55	\$300.00	\$0.00	0.00	0	\$0.00	0.00		
142.21	Locker Room	2600	6	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	2433.6	\$411.28	6	1	Dual Technology Occupancy Sensor - Remote Mnt.	156	0.75	20%	1946.88	\$329.02	\$0.00	\$0.00	0.19	486.72	\$82.26	0.00		
142.21	Bathroom	2600	1	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.16	405.6	\$68.55	1	0	No Change	156	0.16	0%	405.6	\$68.55	\$125.00	\$0.00	0.00	0	\$0.00	0.00		
121.21	Hallway	2600	4	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.31	811.2	\$137.09	4	0	No Change	78	0.31	0%	811.2	\$137.09	\$125.00	\$0.00	0.00	0	\$0.00	0.00		
610	Boiler Room	2600	1	2	1x1 Surface Mount, Prismatic Lens, (2) 60w A Lamp	120	0.12	312	\$52.73	1	0	No Change	120	0.12	0%	312	\$52.73	\$125.00	\$0.00	0.00	0	\$0.00	0.00		
610	Bathroom	2600	2	2	1x1 Surface Mount, Prismatic Lens, (2) 60w A Lamp	120	0.24	624	\$105.46	2	0	No Change	120	0.24	0%	624	\$105.46	\$300.00	\$0.00	0.00	0	\$0.00	0.00		
142.22	Office	2600	4	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Parabolic Lens	156	0.62	1622.4	\$274.19	4	1	Dual Technology Occupancy Sensor - Remote Mnt.	156	0.50	20%	1297.92	\$219.35	\$300.00	\$300.00	0.12	324.48	\$54.84	5.47		
613	2nd Floor Storage Area	2600	4	1	Industrial Fixture, 100w A19 Lamp	100	0.40	1040	\$175.76	4	0	No Change	100	0.40	0%	1040	\$175.76	\$300.00	\$0.00	0.00	0	\$0.00	0.00		
769	Garage	2600	11	1	400w MH, Clear Lens	465	5.12	13299	\$2,247.53	11	0	No Change	465	5.12	0%	13299	\$2,247.53	\$250.00	\$0.00	0.00	0	\$0.00	0.00		
128.34		2600	12	2	8' Channel, 2 Lamp, 75w T12, Mag. Ballast, Pendant Mnt., No Lens	142	1.70	4430.4	\$748.74	12	0	No Change	142	1.70	0%	4430.4	\$748.74	\$300.00	\$0.00	0.00	0	\$0.00	0.00		
725		2600	5	1	150w HPS Wallpack	188	0.94	2444	\$413.04	5	0	No Change	188	0.94	0%	2444	\$413.04	\$300.00	\$0.00	0.00	0	\$0.00	0.00		

ECM #2: 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					
221.34		2600	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.06	150.8	\$25.49	1	0	No Change	58	0.06	0%	150.8	\$25.49	\$125.00	\$0.00	0.00	0	\$0.00	0.00					
128.34	Shop Area	2600	4	2	8' Channel, 2 Lamp, 75w T12, Mag. Ballast, Pendant Mnt., No Lens	142	0.57	1476.8	\$249.58	4	1	Dual Technology Occupancy Sensor - Remote Mnt.	142	0.45	20%	1181.44	\$199.66	\$125.00	\$125.00	0.11	295.36	\$49.92	2.50					
128.34	Office Shop	2600	1	2	8' Channel, 2 Lamp, 75w T12, Mag. Ballast, Pendant Mnt., No Lens	142	0.14	369.2	\$62.39	1	0	No Change	142	0.14	0%	369.2	\$62.39	\$0.00	\$0.00	0.00	0	\$0.00	0.00					
221.34		2600	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.06	150.8	\$25.49	1	0	No Change	58	0.06	0%	150.8	\$25.49	\$125.00	\$0.00	0.00	0	\$0.00	0.00					
128.34	Garage 2	2600	20	2	8' Channel, 2 Lamp, 75w T12, Mag. Ballast, Pendant Mnt., No Lens	142	2.84	7384	\$1,247.90	20	0	No Change	142	2.84	0%	7384	\$1,247.90	\$125.00	\$0.00	0.00	0	\$0.00	0.00					
128.34	Sewer Dept Garage	2600	9	2	8' Channel, 2 Lamp, 75w T12, Mag. Ballast, Pendant Mnt., No Lens	142	1.28	3322.8	\$561.55	9	0	No Change	142	1.28	0%	3322.8	\$561.55	\$126.00	\$0.00	0.00	0	\$0.00	0.00					
142.14	Sewer Dept Office	2600	4	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	156	0.62	1622.4	\$274.19	4	1	Dual Technology Occupancy Sensor - Remote Mnt.	156	0.50	20%	1297.92	\$219.35	\$127.00	\$127.00	0.12	324.48	\$54.84	2.32					
620	Sewer Dept Bathroom	2600	2	1	Ceiling Mnt. "Jelly Jar", (1) 75w A19 Lamp	60	0.12	312	\$52.73	2	0	No Change	60	0.12	0%	312	\$52.73	\$128.00	\$0.00	0.00	0	\$0.00	0.00					
725	Outsider Sewer Dept	4800	4	1	150w HPS Wallpack	188	0.75	3609.6	\$610.02	4	0	No Change	188	0.75	0%	3609.6	\$610.02	\$129.00	\$0.00	0.00	0	\$0.00	0.00					
725		4800	5	1	150w HPS Wallpack	188	0.94	4512	\$762.53	5	0	No Change	188	0.94	0%	4512	\$762.53	\$130.00	\$0.00	0.00	0	\$0.00	0.00					
738		4800	4	1	175w Mercury Vapor Area Light	210	0.84	4032	\$681.41	4	0	No Change	210	0.84	0%	4032	\$681.41	\$131.00	\$0.00	0.00	0	\$0.00	0.00					
	Totals		111	53			19.3	55,732.2	\$9,419	111	4			18.7			54,301.2	\$9,176.90	\$552	0.55	1,431	\$242	2.28					

APPENDIX F

Location Description	Area (Sq FT)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW _{DC}	Total Annual kWh	Total KW _{AC}	Panel Weight (41.9 lbs)	W/SQFT
Department of Public Works	1275	SHARP NU-U235F2	66	17.5	1,158	15.52	16,904	13	2,765	13.41



[Red Shaded Area] := Proposed PV Layout

Notes:

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

Project Name: LGEA Solar PV Project - Pleasantville Police Building									
Location: Pleasantville, NJ									
Description: Photovoltaic System 100% Financing - 15 year									
Simple Payback Analysis									
		Photovoltaic System 100% Financing - 15 year							
Total Construction Cost		\$91,066							
Annual kWh Production		16,904							
Annual Energy Cost Reduction		\$2,857							
Average Annual SREC Revenue		\$6,518							
Simple Payback:		9.71						Years	
Life Cycle Cost Analysis									
Analysis Period (years):		15				Financing %:		100%	
Discount Rate:		3%				Maintenance Escalation Rate:		3.0%	
Average Energy Cost (\$/kWh)		\$0.169				Energy Cost Escalation Rate:		3.0%	
Financing Rate:		6.00%				Average SREC Value (\$/kWh)		\$0.386	
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	\$0	0	0	0	\$0	0	0	0	0
1	\$0	16,904	\$2,857	\$0	\$9,297	\$5,359	\$3,863	\$2,932	\$2,932
2	\$0	16,819	\$2,942	\$0	\$9,251	\$5,121	\$4,101	\$2,972	\$5,904
3	\$0	16,735	\$3,031	\$0	\$8,368	\$4,868	\$4,354	\$2,177	\$8,081
4	\$0	16,652	\$3,122	\$0	\$7,493	\$4,599	\$4,622	\$1,393	\$9,474
5	\$0	16,568	\$3,215	\$171	\$7,456	\$4,314	\$4,908	\$1,279	\$10,753
6	\$0	16,486	\$3,312	\$170	\$7,419	\$4,011	\$5,210	\$1,339	\$12,092
7	\$0	16,403	\$3,411	\$169	\$6,561	\$3,690	\$5,532	\$582	\$12,674
8	\$0	16,321	\$3,513	\$168	\$6,528	\$3,349	\$5,873	\$652	\$13,326
9	\$0	16,240	\$3,619	\$167	\$5,684	\$2,987	\$6,235	(\$86)	\$13,240
10	\$0	16,158	\$3,727	\$166	\$5,655	\$2,602	\$6,620	(\$5)	\$13,235
11	\$0	16,078	\$3,839	\$166	\$4,823	\$2,194	\$7,028	(\$725)	\$12,510
12	\$0	15,997	\$3,954	\$165	\$4,799	\$1,760	\$7,461	(\$633)	\$11,877
13	\$0	15,917	\$4,073	\$164	\$3,979	\$1,300	\$7,921	(\$1,333)	\$10,544
14	\$0	15,838	\$4,195	\$163	\$3,959	\$812	\$8,410	(\$1,230)	\$9,314
15	\$0	15,758	\$4,321	\$162	\$3,152	\$293	\$8,929	(\$1,911)	\$7,403
Totals:		244,875	\$53,133	\$1,831	\$94,425	\$47,258	\$91,066	\$7,403	\$153,359
Net Present Value (NPV)							\$7,655		