TOWNSHIP OF KEARNY
POLICE AND WATER DEPARTMENTS
ENERGY ASSESSMENT

for

NEW JERSEY
BUREAU OF PUBLIC UTILITIES

CHA PROJECT NO. 20711

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1.0 INTRODUCTION & BACKGROUND

This report summarizes the energy audit for the Police and Water Departments, located in Kearny, NJ. The 46,000 square foot, two story facility has no basement or attic. The Police and Juvenile sections occupy a majority of the building. The Water Department consists of a small office and larger garage areas.

New Jersey's Clean Energy Program, funded by the New Jersey Board of Public Utilities, supports energy efficiency and sustainability for Municipal and Local Government Energy Audits. Through the support of a utility trust fund, New Jersey is able to assist state and local authorities in reducing energy consumptions while increasing comfort.

2.0 EXECUTIVE SUMMARY

This report details the results of the energy audit for the Police and Water Departments, located in Kearny, NJ, consisting of a 46,000 square foot, two story facility. The Police and Juvenile sections occupy a majority of the building. The Water Department consists of a small office and larger garage areas. The following areas were evaluated for energy conservation measures:

- Electric heater replacement
- Lighting replacements with occupancy sensors
- Premium efficiency motors
- Insulation upgrades
- Garage heating
- Window AC upgrade
- Rooftop unit replacement

Various potential Energy Conservation Measures (ECMs) were identified for the above categories. Measures which are recommended for implementation have a payback of 10 years or less. This threshold is considered a viable return on investment. Potential annual savings of $10,600 for the recommended ECMs may be realized with a payback of 5.1 years.

The ECMs identified in this report will allow for the building to reduce its energy usage and if pursued has the opportunity to qualify for the New Jersey SmartStart Buildings Program. A summary of the costs, savings, and paybacks for the recommended ECMs follows:

ECM-1 Replace Electric Heaters

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
34,000	13.5	24,910	(950)	3,800	1.8	NA	8.9	NA

* There is no incentive available through the New Jersey Smart Start Program for this ECM

ECM-5 Install Premium Efficiency Motor

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
900	0.1	500	0	100	3.0	100	9.0	8.0

*Incentive is based on the New Jersey Smart Start Premium Motors Application.

ECM-9 Lighting Replacements with Occupancy Sensors

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
19,200	9.4	41,920	0	6,700	4.2	3,300	2.9	2.4

* Incentives based on New Jersey Smart Start Prescriptive Lighting Measures.

3.0 EXISTING CONDITIONS

3.1 Building General

This report summarizes the energy audit for the Police and Water Departments, a 46,000 square foot building. The building is a two story facility that has no basement or attic. The Police and Juvenile sections occupy a majority of the occupied areas. The police station has a dedicated garage with a repair shop. The Water Department consists of a small office and large garage areas.

The building was initially a manufacturing facility and converted to its current use. The first floor of the Police Department houses a dispatch center, offices, holding cells, mechanical rooms, and large garage. The second floor is smaller and consists of investigation offices. The Juvenile section consists of a large office room and a meeting room. The Water Department consists of offices and garages.

The outside walls of the Police Department are constructed of concrete block and finished with stucco on the outside; interior areas are insulated and finished with sheetrock. The perimeter walls of the Water Department are not insulated. The roof is flat, covered with stone ballast or tar paper, and insulated over the occupied spaces. The windows are newer double pane.

The Police Department operates 24 hours per day year round, and is occupied by about 40 staff members. The Water Department, occupied by about six staff members, operates five days per week, 9 hours per day and closed on weekends.

3.2 Utility Usage

The building uses electricity, natural gas, municipal water, and is connected to the municipal sewage system. Water usage was not available; however, the building is not charged for water use.

Electricity and natural gas are purchased from the Public Service Electric and Gas Company (PSE&G). For 2008, the facility consumed a total of 566,000 kWh of electricity at an annual cost of about $85,600. The annual natural gas usage for the building was about 9,400 therms at a cost of $14,300.

Electricity is a large portion of the utility charges, and has an average blended rate of $0.15 per kWh. The electricity usage trend shows a higher consumption during the summer cooling months due to air conditioning. The majority of natural gas is used for heating the building, as indicated by higher usage during winter months. The average blended rate for natural gas was $1.52 per therm.

Utility data is provided in Appendix A.

As noted, electricity and natural gas commodity supply and delivery is presently purchased from PSE&G. The delivery component will always be the responsibility of the utility that connects the facility to the power grid or gas line; however, the supply can be purchased from a third party. The electricity or natural gas commodity supply entity will require submission of one to three years of past energy bills. Contract terms can vary among suppliers. A list of approved electrical and natural gas energy commodity suppliers can be found in Appendix A.

3.3 HVAC Systems

The heating for the building is provided by four Aerco high efficiency condensing boilers each rated at 1000 MBH input and 930 MBH output. The boilers supply the heating hot water to air handlers, first

floor's perimeter baseboard heaters, unit heaters, and cabinet heaters. The air handler located in the mechanical room serves five zones. The unit is equipped with individual zone dampers and timer operations. In addition to the overhead heating, the second floor is equipped with perimeter electric baseboard heaters that are independent of the air system and are used as supplementary heating.

The large garage in the Police section is heated with hot water unit heaters. There are four unit heaters; however, typically only two are required. The garage has pieces of large ductwork that were used for ventilation, however, it was disconnected and ventilation is provided by opening the garage doors.

The Police Department section is cooled with various rooftop air handlers. The first floor record supervisor's office is cooled with a rooftop air handler, previously used for the computer room. The traffic, gym, and locker rooms are cooled with dedicated window AC units. A ductless split system is used to cool the dispatch room.

The Water Department office areas use a roof mounted air handler for heating and cooling. The air handler uses natural gas for heating and electricity for cooling. Additionally, offices use baseboard perimeter hot water heaters. The heating of the garages is provided by two air handlers and two unit heaters. The air handlers operate on hot water supplied from the Police section of the building. One of garage air handlers also supplies heating for the lunch area and restrooms.

3.4 Domestic Hot Water Systems

Domestic hot water is produced in a 25 gallon Bradford White gas fired hot water heater rated at 78,000 Btu/hr output.

3.5 Lighting/Electrical Systems

The lighting system within the building is manually controlled by individual switches in the spaces. The lighting within most of the Police Department is mandated to be on 24/7 due to safety concerns, although some of the office areas can be switched on and off. In the Water Department side of the building, the lighting is turned on and off by occupants. The office section of the Water Department is occupied about 40 hours a week; the garage area is occupied approximately 50 hours. Most of the lighting within the whole building is fluorescent and has been upgraded to 32 or 17 watt T-8 lamps. The lights in the Water Department garage area, however, is fluorescent using 8'-F96T12 96 watt lamps. There are also some locations where older T12 fluorescent fixtures utilizing 34 watt lamps are still in use. Some incandescent bulbs still remain in use within the building; however, many have been upgraded to more efficient compact fluorescent bulbs. Exit signs within the Police garage and main entrance were old inefficient exit signs; however, the majority within the building has been upgraded to LED technology.

The building's exterior lighting consists of a mixture of metal halide and high pressure sodium fixtures that are controlled by timers.

3.6 Control Systems

Heating and cooling systems are equipped with more than 15 nonprogrammable and programmable thermostats. The e lectric heaters have dedicated manual thermostats. The police department area is maintained between 68 and 70°F. The water department is set to 68°F during occupied hours and setback when unoccupied; and the garage is maintained at 64°F.

4.0 ENERGY CONSERVATION MEASURES

4.1 ECM-1 Replace Electric Heaters

The Juvenile section has a baseboard electric heating system. This ECM proposes to replace the electric baseboard heaters with hot water fin tube heaters to be served by the existing gas fired boilers. This measure will reduce utility costs because it is less expensive to produce heat with natural gas than electricity.

Implementation of this ECM will result in elimination of about 13.5 kW of electrical demand and 24,900 kWh of electrical energy consumption per year. In place of this the boilers would utilize on an annual basis about 940 therms of natural gas to produce hot water for perimeter heating purposes. This will result in annual savings of $3,800.

In addition to installing new fin tube hot water heaters in place of the old electric heating units, a new circulation pump, temperature controls and heating hot water supply and return piping would be necessary to implement this measure.

Fin tube heaters have an expected life of 25 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 622,750 kWh and (23,500) therms, totaling $95,000.

The implementation cost and savings related to this ECM are presented in Appendix B and summarized below:

ECM-1 Replace Electric Heaters

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
34,000	13.5	24,910	(950)	3,800	1.8	NA	8.9	NA

* There is no incentive available through the New Jersey Smart Start Program for this ECM

This measure is recommended.

4.2 ECM-2 Increase Wall Insulation

The outside walls of the Water Department office section of the building are not insulated. Adding insulation to the exterior walls of this space will decrease the annual heating and cooling loads. This measure will require constructing an insulated wall along the interior perimeter of existing outside walls. The wall assembly shall consist of furring, 2-1/2" fiberglass insulation and gypsum board.

To determine the heat losses and heat gains, a base case block load was developed that calculated losses for all occurring temperatures, according to bin weather data. The amount of heat conduction through walls is proportional to overall heat transfer coefficient, surface area and the temperature difference between the conditioned space and its surroundings. The base case model takes the amount of heat transfer through the walls, which is then applied to the annual heating and cooling hours.

The same process was utilized when modeling the proposed conditions; however, the heat transfer coefficient was adjusted to reflect added insulation. The difference in heat loss between the base case and the model is, therefore, the energy savings from increased insulation.

Insulation has an expected life of 24 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 4,320 kWh and 3,360 therms, totaling $4,800.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized as below:

ECM-2 Increase Wall Insulation

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
4,800	0	180	140	200	0.0	NA	20.8	NA

* There is no incentive available through the New Jersey Smart Start Program for this ECM

This measure is not recommended.

4.3 ECM-3 Install Infrared Garage Heaters

The garages in the Water Department utilize big air handlers supplied with hot water for heating purposes. The hot water circulated through these units is controlled based on the manually selected setpoint. This measure evaluated energy savings that can be achieved by replacing this heating system with gas fired infrared heaters.

The proposed infrared heaters have lower efficiency than the existing boilers; however, infrared heaters are more effective at distributing heat than the existing air handlers and therefore result in thermal energy savings. For calculation purposes, a separate block load calculation was used for the garages. It was determined that the existing garage area requires approximately 3,300 therms of energy to meet the yearly heating load. Additional savings can be expected from the decreased electric energy use since the existing air handlers are powered with larger electric fans. Repeating the energy consumption calculation with the proposed values of thermal energy, distribution effectiveness, and difference in electric energy consumptions between the existing and proposed models yielded an annual natural gas and electricity savings.

To implement this measure, some natural gas piping, flue piping, and electrical modifications will be necessary. Additionally, new flue stacks would be installed for the infrared heaters. To calculate the budgetary cost, two infrared heaters were used as outlined in the cost estimate. The quantity, size, and capacity of the heaters were used for estimate purposes.

Infrared heaters have an expected life of 18 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 203,040 kWh and 10,980 therms, totaling $45,000.

The implementation cost and savings related to this ECM are presented in Appendix D and summarized as follows:

ECM-3 Install Infrared Garage Heaters

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total	ROI			
$	kW	kWh	Therms	$		$	Years	Years
34,600	1.0	11,280	610	2,500	0.3	NA	13.9	NA

* There is no incentive available through the New Jersey Smart Start Program for this ECM.

This measure is not recommended.

4.4 ECM-4 Replace AC Units

The cooling for locker, traffic, and exercise rooms is provided by window type AC units. On average, the units provide 14,000 Btus of cooling at an energy efficiency ratio (EER) of about 7.0 and are operated only when the space is occupied. This ECM assessed replacing the window AC units with a ductless split system to provide cooling for the applicable spaces. Split system units have a much higher EER value than window units and are programmable so that they only operate when desired.

For the calculations, the existing electrical energy consumption was determined by computing the wattage for each unit by using the established EER value, and multiplying it by the total operating hours per year. The same process was then used to calculate the energy consumption of the proposed split system units, except an EER of 14.4 was used. Since the units are programmable, cycling was taken into account when determining the annual operating hours. The difference between the existing and proposed models is the energy savings.

To implement this measure, each room would require a wall mounted cooling unit and dedicated condensing unit.

Split system AC units have an expected life of 15 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 27,900 kWh, totaling $4,500.

The implementation cost and savings related to this ECM are presented in Appendix E and summarized below:

ECM-4 Replace AC Units

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total	ROI			
$	kW	kWh	Therms	$		$	Years	Years
12,200	0	1,860	0	300	(0.6)	NA	>25	NA

* There is no incentive available through the New Jersey Smart Start Program for this ECM.

This measure is not recommended.

4.5 ECM-5 Install Premium Efficiency Motors

The air handler located in the mechanical room on the ground level serves the second floor, utilizing an older 7.5 HP motor to power the fan. Currently, the available premium motors have higher efficiencies. This measure evaluated the energy savings by replacing the motor with a new, premium efficiency motor.

The energy savings were calculated by applying the motor operating hours to the existing and proposed motor efficiencies. Since the motor in question is within an AHU responsible for providing HVAC to the police department year round, 40% of the total annual hours were taken as the operating hours to account for cycling.

Premium motors have an expected life of 18 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 9,000 kWh, totaling $1,800.

The implementation cost and savings related to this ECM are presented in Appendix F and summarized below:

ECM-5 Install Premium Efficiency Motor

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
900	0.1	500	0	100	3.0	100	9.0	8.0

*Incentive is based on the New Jersey Smart Start Premium Motors Application.

This measure is recommended.

4.6 ECM-6 Rooftop Unit Replacement

The existing rooftop condensers are over 19 years' old and nearing their useful life expectancy. The cooling energy efficiency of the condensers has decreased over the years. This measure proposes to replace the existing two 15 ton packaged air cooled compressor and condenser units with new high efficiency units. The original energy efficiency ratio (9.0 EER) of the existing unit was downgraded to approximately 7.0 EER due to age and condition; the proposed unit is approximately 11.5 EER at maximum load and 14.5 at partial load.

Rooftop units have an expected life of 15 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 160,500 kWh, totaling $24,000.

The implementation cost and savings related to this ECM are presented in Appendix G and summarized below:

ECM-6 Rooftop Unit Replacement

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
38,400	0	10,700	0	1,600	(0.4)	1,100	24.0	23.3

*Incentive is based on the New Jersey Smart Start Electric Unitary HVAC Measures.

This measure is not recommended.

4.7 ECM-7 Lighting Replacements

The building contains more than 100 fluorescent fixtures with inefficient T-12 lamps. Each fixture is equipped with either two – 8' lamps, two or four - 4' lamps, or two – 2' u-tube lamps. There are many locations where the older T-12 technology has been replaced with newer more efficient T-8 fixtures. There are also about 20 inefficient incandescent bulbs still in use. Overall energy consumption can be reduced by retrofitting the existing T-12 fixtures with more efficient T-8 fluorescent lamps, and replacing incandescent bulbs with compact fluorescent bulbs.

To compute the annual savings for this ECM, the energy consumption of the lighting fixtures was established, and it was determined to be 171,310 kWh per year. To calculate the annual energy consumption utilizing replacement lamps and bulbs, the proposed fixture power requirement was used with the same annual hours of operation. The difference between the existing and proposed annual energy consumption was the energy savings. Calculations are provided in Appendix H.

Existing lamps and ballasts of each fixture would be replaced with electronic ballasts T-8 fluorescent lamps, the length and quantity varies based on application. Incandescent bulbs would also be replaced with compact fluorescent bulbs. This ECM will provide annual savings of 34,050 kWh and $6,700.

The lighting retrofits have an expected life of 15 years, according to the manufacturers, and total energy savings over the life of the project are estimated at 510,750 kWh and $85,500.

The implementation cost and savings related to this ECM are presented in Appendix H and summarized below:

ECM-7 Lighting Replacements

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
16,700	9.4	34,050	0	5,700	4.1	2,800	2.9	2.4

* Incentives based on New Jersey Smart Start Prescriptive Lighting Measures.

This measure is not recommended in lieu of ECM-9.

4.8 ECM-8 Install Occupancy Sensors

Lighting fixtures throughout the building are manually switched on and off, and are operational with occupancy. The lighting within most of the spaces in the building remains on with occupancy. The operating time of many of the building's interior lighting fixtures can be reduced by installing occupancy sensors in the applicable locations. Occupancy sensors were not considered for many areas, such as spaces within the police department, because of safety concerns or low use.

Applying the same process used in the calculation of ECM-7, the existing baseline energy consumption for each fixture was determined. Typical traffic patterns for each space were then taken into account to approximate the actual occupancy hours per day. It was established that the annual energy consumption of the lighting fixtures can be reduced by 9,490 kWh.

Approximately 17 occupancy sensors and some standard electrical work are required for this measure.

Lighting controls have an expected life of 15 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 142,350 kWh, and $18,000.

The implementation cost and savings related to this ECM are presented in Appendix I and summarized below:

ECM-8 Install Occupancy Sensors

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
2,500	0.0	9,490	0	1,200	6.2	500	2.1	1.7

* Incentives based on New Jersey Smart Start Prescriptive Lighting Measures.

This measure is not recommended in lieu of ECM-9.

4.9 ECM-9 Lighting Replacements with Occupancy Sensors

This measure is a combination of ECMs 7 and 8 to allow for maximum energy and demand reduction. Due to interactive effects, the energy and cost savings for occupancy sensors and lighting upgrades are not cumulative.

The lighting retrofits and controls have an expected lifetime of 15 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 628,800 kWh, and $100,500.

The implementation cost and savings related to this ECM are presented in Appendix J and summarized below:

ECM-9 Lighting Replacements with Occupancy Sensors

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
19,200	9.4	41,920	0	6,700	4.2	3,300	2.9	2.4

* Incentives based on New Jersey Smart Start Prescriptive Lighting Measures.

This measure is recommended.

5.0 PROJECT INCENTIVES

5.1 Incentives Overview

5.1.1 New Jersey Pay For Performance and Smart Start Programs

The building will be eligible for incentives from the New Jersey Office of Clean Energy. The most significant incentives will be from the New Jersey Pay for Performance (P4P) Program. The P4P program is designed for qualified energy conservation projects in facilities whose demand in any of the preceding 12 months exceeds 200 kW. Facilities that meet this criterion must also achieve a minimum performance target of 15% by using the EPA Portfolio Manager benchmarking tool before and after construction. Incentives for this program are in three parts. Incentive #1 energy reduction plan pays $0.05 per square foot to a maximum of $25,000 or 50% of facility annual energy cost paid after approval of application. Incentive #2 is paid after installation of recommended measures; base incentives deliver $0.11/kWh and $1.10/therm not to exceed 30% of total project cost. Incentive #3 post-construction benchmarking is paid after acceptance of a report proving energy savings over one year utilizing the EPA Portfolio Manager benchmarking tool. Incentive #3 base incentives deliver $0.07/ kWh and $0.70/therm not to exceed 20% of total project cost. Combining incentives #2 and #3 will provide a total of $0.18/ kWh and $1.8/therm not to exceed 50% of total project cost. Additional incentives for #2 and #3 are increased by $0.005/kWh and $0.05/therm for each percentage increase above minimum performance target calculated with the EPA Portfolio Manager benchmarking tool not to exceed 50% of total project cost.

A new incentive structure is in place for projects exceeding 20% in energy savings, which doubles incentives #2 and #3 for a total of $0.36/kWh and $3.60/therm. For Incentive #1, the maximum incentive has been raised to 80% of project costs, or $2 million per gas account and $2 million per electric account. The 200 kW/month average minimum has been waived for buildings owned by local governments or municipalities and non-profit organizations. This new incentive structure has been extended to December 31, 2010.

Specific incentives for energy conservation measures were calculated on an individual basis utilizing the 2009 New Jersey Smart Start incentive program. This program provides incentives dependent upon mechanical and electrical equipment. If applicable, incentives from this program are reflected in the ECM summaries and attached appendices. If the building qualifies and enters into the New Jersey Pay for Performance Program, all energy savings will be included in the total building energy usage and savings to be applied towards the Pay for Performance incentive. A project is not applicable for incentives in both programs.

5.1.2 PSE&G Small Business Direct Install Program

PSE&G has a new Small Business Direct Install Program, and the following information was obtained from the current PSE&G customer service website. Small business and not-for-profit customers residing in the municipalities noted in the following listing, which includes Kearny, may be eligible to participate in the PSE&G Direct Install Program.

Bayonne	Gloucester City	**Kearny**	Orange	Plainfield
Camden	Guttenberg	Mt. Holly	Passaic	Roselle
Carteret	Hillside	New Brunswick	Paterson	Trenton
East Orange	Irvington	Newark	Pemberton	Union City
Elizabeth	Jersey City	North Bergen	Perth Amboy	West New York

PSE&G is offering this program to customers designated by the State of New Jersey as having "Urban Enterprise Zones". Program guidelines require that customers be a PSE&G customer of record with a separately metered PSE&G electric or gas account; must have a qualifying energy usage profile - an average electric demand of 200 kW or less, or 40,300 kWh or less per month (the kW limit is waived for municipalities); and have a satisfactory payment history with PSE&G. Customers who lease their business are eligible for program participation; however, landlord permission is required.

As part of the PSE&G Direct Install Program, participants can obtain a free on-site energy audit of electrical equipment, proposal based on the audit with recommended energy efficiency measures; and installation of energy-saving equipment. PSE&G pays 100% of the cost to install the recommended energy efficiency measures. The customer is required to repay 20% of the total cost interest free, over two years as part of their PSE&G bill. The measures eligible for participation in this program are subject to approval by PSE&G.

Eligible energy efficiency equipment upgrades include:

- Lighting retrofits including sensors and controls
- Refrigeration, motors, and HVAC
- Site-specific custom projects

5.2 Building Incentives

The Police and Water Departments building is eligible for several incentives available under New Jersey Smart Start Programs. The total amount of all qualified incentives is about $4,500 and includes installing premium motors, new rooftop units and upgrades to the lighting system.

When calculating the total incentive for the New Jersey Pay For Performance program, all energy conservation measures are applicable since the amount received is based on building-wide energy improvements. While the building's overall energy requirement is decreased, the load on major utilities is increased by the replacement of electric heating units with hot water fin tube heaters that increase the load on the gas fired boiler. Therefore, the overall energy reduction for the building, as it pertains to the incentive program, does not reach the 15% minimum, and is not eligible for Incentives #2 and #3 as previously discussed. See Appendix K for calculations.

Under PSE&G's direct install program, the police and water departments building is potentially eligible to receive $144,100, and would be required to repay $28,800. Incentives cannot be accepted under multiple programs.

6.0 ALTERNATIVE ENERGY SCREENING EVALUATION

6.1 Geothermal

Geothermal heat pumps (GHP) transfer heat between the constant temperature of the earth and the building to maintain the building's interior space conditions. Below the surface of the earth throughout New Jersey the temperature remains in the low 50°F range throughout the year. This stable temperature provides a source for heat in the winter and a means to reject excess heat in the summer. With GHP systems, water is circulated between the building and the piping buried in the ground. The ground heat exchanger in a GHP system is made up of a closed or open loop pipe system. Most common is the closed loop in which high density polyethylene pipe is buried horizontally at 4-6 feet deep or vertically at 100 to 400 feet deep. These pipes are filled with an environmentally friendly antifreeze/water solution that acts as a heat exchanger. In the summer, the water picks up heat from the building and moves it to the ground. In the winter the system reverses and fluid picks up heat from the ground and moves it to the building. Heat pumps make collection and transfer of this heat to and from the building possible.

The building uses a wide variety of heating and cooling equipment to meet the HVAC requirements. With exception to the hydronic heating system, the remaining equipment is not compatible with a geothermal energy source. Therefore, to take advantage of a GHP system, the existing mechanical equipment would have to be removed or overhauled; and either a low temperature closed loop water source heat pump system or a water to water heat pump system would have to be installed to realize the benefit of the consistent temperature of the ground. Therefore, this measure is not recommended due to the extent of HVAC system renovation needed for implementation.

This measure is not recommended due to the extent of HVAC system renovation needed for implementation.

6.2 Solar

6.2.1 Photovoltaic Rooftop Solar Power Generation

The police and water department building was evaluated for the potential to install rooftop photovoltaic (PV) solar panels for power generation. Present technology incorporates the use of solar cell arrays that produce direct current (DC) electricity. This DC current is converted to alternating current (AC) with the use of an electrical device known as an inverter. The building's roof has sufficient room to install a large solar cell array. A structural analysis would be required to determine if the roof framing could support a cell array.

The PVWATTS solar power generation model was utilized to calculate PV power generation. The New Jersey Clean Power Estimator provided by the New Jersey Clean Energy Program is presently being updated; therefore, the site recommended use of the PVWATT solar grid analyzer version 1. The closest city available in the model is Newark, New Jersey and a fixed tilt array type was utilized to calculate energy production. The PVWATT solar power generation model is provided in Appendix L.

The State of New Jersey incentives for non-residential PV applications is $1.00/watt up to 50 kW of installed PV array. Federal tax credits are also available for renewable energy projects up to 30% of installation cost. Municipalities do not pay federal taxes; therefore, would not be able to utilize the federal tax credit incentive.

Installation of (PV) arrays in the state New Jersey will allow the owner to participate in the New Jersey solar renewable energy certificates program (SREC). This is a program that has been set up to allow entities with large amounts of environmentally unfriendly emissions to purchase credits from zero emission (PV) solar-producers. An alternative compliance penalty (ACP) is paid for by the high emission producers and is set each year on a declining scale of 3% per year. One SREC credit is equivalent to 1000 kilowatt hours of PV electrical production; these credits can be traded for period of 15 years from the date of installation. The cost of the ACP penalty for 2009 is $700; this is the amount that must be paid per SERC by the high emission producers. The expected dollar amount that will be paid to the PV producer for 2009 is expected to be $600/SREC credit. Payments that will be received from the PV producer will change from year to year dependent upon supply and demand. Renewable Energy Consultants is a third party SREC broker that has been approved by the New Jersey Clean Energy Program. As stated above there is no definitive way to calculate an exact price that will be received by the PV producer per SREC over the next 15 years. Renewable Energy Consultants estimated an average of $487/ SERC per year and this number was utilized in the cash flow for this report.

The building had a maximum electricity demand of 124.2 kW and a minimum of 79.2 kW, in 2008. The monthly average over the observed 12 month period was 93.8 kW. The existing load justifies the use of the maximum incentive cap of 50 kW of installed PV solar array. The system costs for PV installations were derived from the most recent NYSERDA (New York State Energy Research and Development Agency) estimates of total cost of system installation. It should be noted that the cost of installation is currently $10 per watt or $10,000 per kW of installed system. This has increased in the past few years due to the rise in national demand for PV power generator systems. Other cost considerations will also need to be considered. PV panels have an approximate 20 year life span; however, the inverter device that converts DC electricity to AC has a life span of 10 to 12 years and will need to be replaced multiple times during the useful life of the PV system.

The implementation cost and savings related to this ECM are presented in Appendix L and summarized below:

Photovoltaic (PV) Rooftop Solar Power Generation – 50 kW System

Budgetary Cost	Annual Utility Savings				Total Savings	New Jersey Renewable Energy Incentive*	New Jersey Renewable SREC**	Payback (without incentive)	Payback (with incentives)
	Electricity		Natural Gas	Total					
$	kW	kWh	Therms	$	$	$	$	Years	Years
500,000	0	59,150	0	8,900	8,900	50,000	28,800	>25	11.9

*Incentive based on New Jersey Renewable Energy Program for non-residential applications of $1.00 per Watt of installed capacity
** Estimated Solar Renewable Energy Certificate Program (SREC) for 15 years at $487/1000 kWh

While this measure is currently not recommended, future increases in the cost of electricity may make the payback period more attractive.

6.2.2 Solar Thermal Hot Water Plant

Active solar thermal systems use solar collectors to gather the sun's energy to heat water, another fluid, or air. An absorber in the collector converts the sun's energy into heat. The heat is then transferred by circulating water, antifreeze, or sometimes air to another location for immediate use or storage for later utilization. Applications for active solar thermal energy include providing hot water, heating swimming pools, space heating, and preheating air in residential and commercial buildings.

A standard solar hot water system is typically composed of solar collectors, heat storage vessel, piping, circulators, and controls. Systems are typically integrated to work alongside a conventional heating system that provides heat when solar resources are not sufficient. The solar collectors are usually placed on the roof of the building, oriented south, and tilted around the site's latitude, to maximize the amount of radiation collected on a yearly basis.

Several options exist for using active solar thermal systems for space heating. The most common method involves using glazed collectors to heat a liquid held in a storage tank (similar to an active solar hot water system). The most practical system would transfer the heat from the panels to thermal storage tanks and transfer solar produced thermal energy to use for domestic hot water production. Domestic hot water is presently produced by a natural gas fired water heater and, therefore, this measure would not save site electricity.

Currently, an incentive is not available for installation of thermal solar systems. A Federal tax credit of 30% of installation cost for the thermal applications is available; however, the Township of Kearny does not pay Federal taxes and, therefore, would not benefit from this program.

The implementation cost and savings related to this ECM are presented in Appendix M and summarized below:

Solar Thermal Domestic Hot Water Plant

Budgetary Cost	Annual Utility Savings				Total Savings	New Jersey Renewable Energy Incentive	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$	$	$	Years	Years
27,100	0	0	100	200	200	NA	>25	NA

* No incentive is available in New Jersey at this time.

This measure is not recommended.

6.3 Wind

Small wind turbines use a horizontal axis propeller, or rotor, to capture the kinetic energy of the wind and convert it into rotary motion to drive a generator which usually is designed specifically for the wind turbine. The rotor consists of two or three blades, usually made from wood or fiberglass. These materials give the turbine the needed strength and flexibility, and have the added advantage of not interfering with television signals. The structural backbone of the wind turbine is the mainframe, and includes the slip-rings that connect the wind turbine, which rotates as it points into changing wind directions, and the fixed tower wiring. The tail aligns the rotor into the wind.

To avoid turbulence and capture greater wind energy, turbines are mounted on towers. Turbines should be mounted at least 30 feet above any structure or natural feature within 300 feet of the installation. Smaller turbines can utilize shorter towers. For example, a 250-watt turbine may be mounted on a 30-50 foot tower, while a 10 kW turbine will usually need a tower of 80-120 feet. Tower designs include tubular or latticed, guyed or self-supporting. Wind turbine manufacturers also provide towers.

The New Jersey Clean Energy Program for small wind installations has designated numerous pre-approved wind turbines for installation in the State of New Jersey. Incentives for wind turbine installations are based on kilowatt hours saved in the first year. Systems sized under 16,000 kWh per year

of production will receive a $3.20 per kWh incentive. Systems producing over 16,000 kWh will receive $51,200 for the first 16,000 kWh of production with an additional $0.50 per kWh up to a maximum cap of 750,000 kWh per year. Federal tax credits are also available for renewable energy projects up to 30% of installation cost for systems less than 100 kW. However, as noted previously, municipalities do not pay federal taxes and is, therefore, not eligible for the tax credit incentive.

The most important part of any small wind generation project is the mean annual wind speed at the height of which the turbine will be installed. In the Kearny area, the map indicates a mean annual wind speed of 10 miles per hour. For the police and water department building, there are site restrictions. Parking lots, trees and surrounding structures would greatly affect a tower location.

A wind speed map and aerial site photo are included in Appendix N.

This measure is not recommended due to the low mean annual wind speed and site restrictions.

6.4 Combined Heat and Power Generation (CHP)

Combined heat and power, cogeneration, is self-production of electricity on-site with beneficial recovery of the heat byproduct from the electrical generator. Common CHP equipment includes reciprocating engine-driven, micro turbines, steam turbines, and fuel cells. Typical CHP customers include industrial, commercial, institutional, educational institutions, and multifamily residential facilities. CHP systems that are commercially viable at the present time are sized approximately 50 kW and above, with numerous options in blocks grouped around 300 kW, 800 kW, 1,200 kW and larger. Typically, CHP systems are used to produce a portion of the electricity needed by a facility some or all of the time, with the balance of electric needs satisfied by purchase from the grid.

Any proposed CHP project will need to consider many factors, such as existing system load, use of thermal energy produced, system size, natural gas fuel availability, and proposed plant location. The police and water department building has sufficient need for electrical generation and the ability to use most of the thermal byproduct during the winter, thermal usage during the summer months is low. Thermal energy produced by the CHP plant in the warmer months will be wasted. An absorption chiller could be installed to utilize the heat to produce chilled water; however, there is no chilled water distribution system in the building. The most viable selection for a CHP plant at this location would be a reciprocating engine natural gas-fired unit. Purchasing this system and performing modifications to the existing HVAC and electrical systems would greatly outweigh the savings over the life of the equipment.

This measure is not recommended.

6.5 Biomass Power Generation

Biomass power generation is a process in which waste organic materials are used to produce electricity or thermal energy. These materials would otherwise be sent to the landfill or expelled to the atmosphere. To participate in NJCEP's Customer On-Site Renewable Energy program, participants must install an on-site sustainable biomass or fuel cell energy generation system. Incentives for bio-power installations are available to support up to 1MW-dc of rated capacity.

*Class I organic residues are eligible for funding through the NJCEP CORE program. Class I wastes include the following renewable supply of organic material:

- Wood wastes not adulterated with chemicals, glues or adhesives
- Agricultural residues (corn stover, rice hulls or nut shells, manures, poultry litter, horse manure, etc) and/or methane gases from landfills
- Food wastes
- Municipal tree trimming and grass clipping wastes
- Paper and cardboard wastes
- Non adulterated construction wood wastes, pallets

The NJDEP evaluates biomass resources not identified in the RPS.

Examples of eligible facilities for a CORE incentive include:

- Digestion of sewage sludge
- Landfill gas facilities
- Combustion of wood wastes to steam turbine
- Gasification of wood wastes to reciprocating engine
- Gasification or pyrolysis of bio-solid wastes to generation equipment

* from NJOCE Website

This measure is not recommended because of noise issues, and potential zoning issues. Additionally, the police and water department building does not have a steady biomass waste stream to fuel the power generation system.

6.5 Demand Response Curtailment

Presently, electricity is delivered by PSE&G, which receives the electricity from regional power grid RFC. PSE&G is the regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia including the State of New Jersey.

Utility Curtailment is an agreement with the PSE&G regional transmission organization and an approved Curtailment Service Provider (CSP) to shed electrical load by either turning major equipment off or energizing all or part of a facility utilizing an emergency generator; therefore, reducing the electrical demand on the utility grid. This program is to benefit the utility company during high demand periods and PSE&G offers incentives to the CSP to participate in this program. Enrolling in the program will require program participants to drop electrical load or turn on emergency generators during high electrical demand conditions or during emergencies. Part of the program also will require that program participants reduce their required load or run emergency generators with notice to test the system.

A PSE&G pre-approved CSP will require a minimum of 100 kW of load reduction to participate in any curtailment program. The town of Kearny police and water department building exceeded 100 kW only three months in 2008 and had a monthly average electricity demand of 93.8.

This measure is not recommended because the facility does not have adequate load to meet the required minimum load reduction throughout the year.

7.0 EPA PORTFOLIO MANAGER

The United State Environmental Protection Agency (EPA) is a federal agency in charge of regulating environment waste and policy in the United States. The EPA has released the EPA Portfolio Manager for public use. The program is designed to allow property owners and managers to share, compare and improve upon their facility's energy consumption. Inputting such parameters as electricity, heating fuel, building characteristics and location into the website based program generates a naturalized energy rating score out of 100. Once an account is registered, monthly utility data can be entered to track the savings progress and retrieve an updated energy rating score on a monthly basis.

The police and water department building is considered a low energy consumer per the Portfolio Manager with a Site Energy Usage Index (EUI) of 62 kBTU/ft^2/year. The EUI can still be improved upon by addressing wasted energy from electric heating, lack of insulation, inefficient motors and rooftop units, inefficient lighting systems, etc. By implementing the measures discussed in this report, it is expected that the EUI can be reduced to approximately 56 kBTU/ft^2/year; the national average for this building type is 78 kBTU/ft^2/year. The EPA Portfolio Manager did not generate an energy rating score for this building because the building type (Fire Station/Police Station) is not eligible for an energy star rating.

A full EPA Energy Star Portfolio Manager Report is located in Appendix O.

The user name and password for the police and water department building's EPA Portfolio Manager Account has been provided to Gerry Kerr of the Township of Kearny.

8.0 CONCLUSIONS & RECOMMENDATIONS

The energy audit conducted by CHA at the Police and Water Departments in Kearny, New Jersey identified a potential ECM for lighting upgrades with occupancy sensors, electric heater replacement, and premium efficiency motors. Potential annual saving of $10,600 may be realized for the recommended ECM, with a summary of the cost, savings, and payback as follows:

ECM-1 Replace Electric Heaters

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
34,000	13.5	24,910	(950)	3,800	1.8	NA	8.9	NA

* There is no incentive available through the New Jersey Smart Start Program for this ECM

ECM-5 Install Premium Efficiency Motor

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
900	0.1	500	0	100	3.0	100	9.0	8.0

*Incentive is based on the New Jersey Smart Start Premium Motors Application.

ECM-9 Lighting Replacements with Occupancy Sensors

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
19,200	9.4	41,920	0	6,700	4.2	3,300	2.9	2.4

* Incentives based on New Jersey Smart Start Prescriptive Lighting Measures.

APPENDIX A

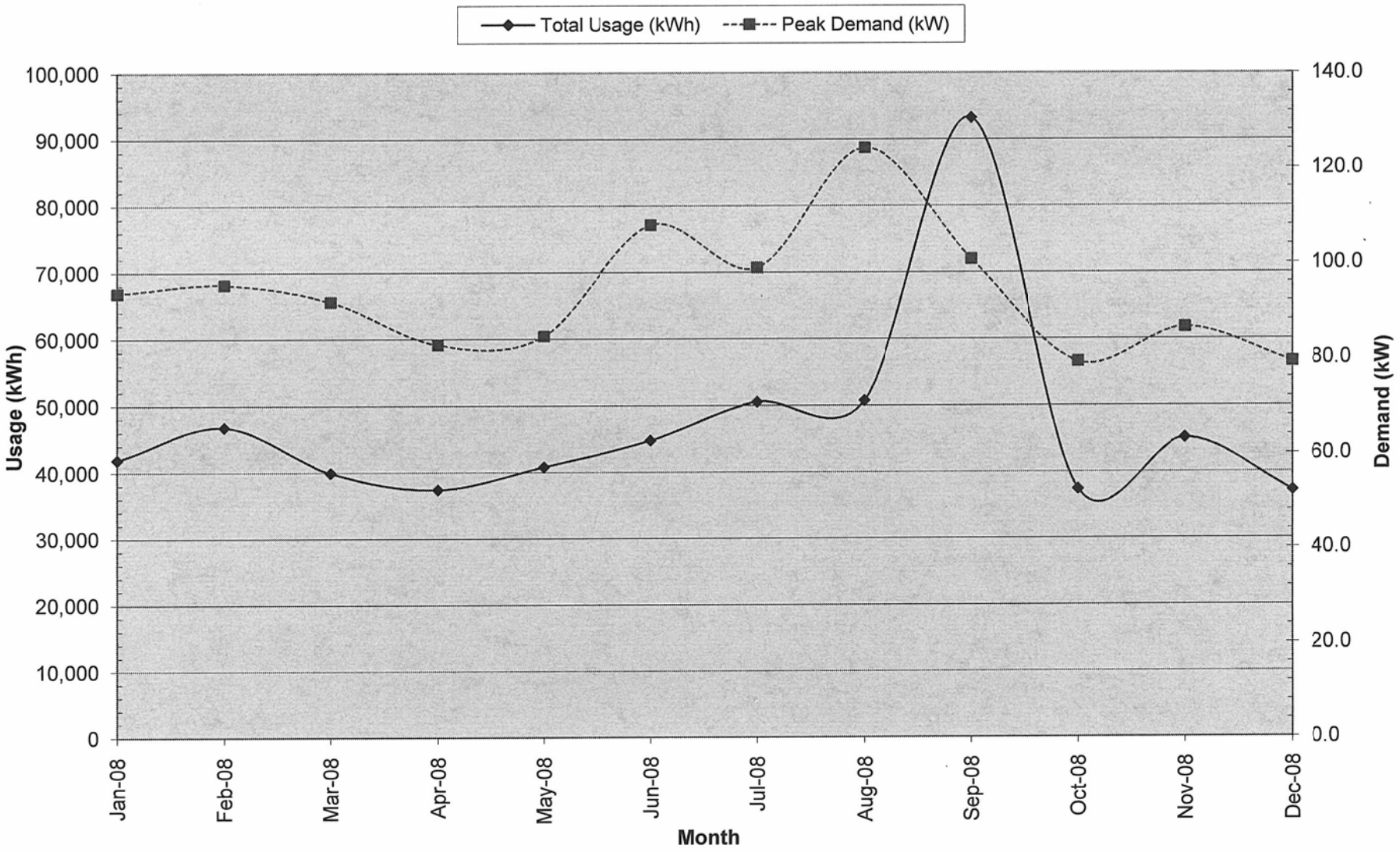
Utility Usage Analysis

New Jersey BPU Energy Audit Program
CHA Project No.: 20711
Town of Kearny
PSE&G - Electric Service

Police Dept - 237 Laurel Ave
Account No.: 11 901 447 00
Meter No.: 226004307

			Charges			Unit Costs		
Month	Consumption (kWh)	Demand (kW)	Total ($)	Demand ($)	Consumption ($)	Blended Rate ($/kWh)	Consumption ($/kWh)	Demand ($/kW)
January-08	41,940	93.6	$5,124.07	$592.00	$4,532.07	0.1222	0.1081	6.32
February-08	46,800	95.4	$5,812.75	$599.50	$5,213.25	0.1242	0.1114	6.28
March-08	39,960	91.8	$4,926.94	$585.48	$4,341.46	0.1233	0.1086	6.38
April-08	37,440	82.8	$4,552.93	$550.43	$4,002.50	0.1216	0.1069	6.65
May-08	40,860	84.6	$5,079.14	$581.79	$4,497.35	0.1243	0.1101	6.88
June-08	44,820	108.0	$8,140.64	$1,808.08	$6,332.56	0.1816	0.1413	16.74
July-08	50,580	99.0	$8,967.41	$1,707.99	$7,259.42	0.1773	0.1435	17.25
August-08	50,760	124.2	$9,599.46	$1,988.24	$7,611.22	0.1891	0.1499	16.01
September-08	93,240	100.8	$17,112.88	$3,456.02	$13,656.86	0.1835	0.1465	34.29
October-08	37,440	79.2	$5,223.76	$919.99	$4,303.77	0.1395	0.1150	11.62
November-08	45,180	86.4	$6,036.28	$948.03	$5,088.25	0.1336	0.1126	10.97
December-08	37,260	79.2	$5,067.89	$919.99	$4,147.90	0.1360	0.1113	11.62
Most Recent Yr	566,280	124.2	$85,644.15	$14,657.54	$70,986.61	0.1512	0.1254	13.03

Electric Usage - Town of Kearny Police Department



Utility Data - Kearny Police(rev-0).xls
Electricity Chart

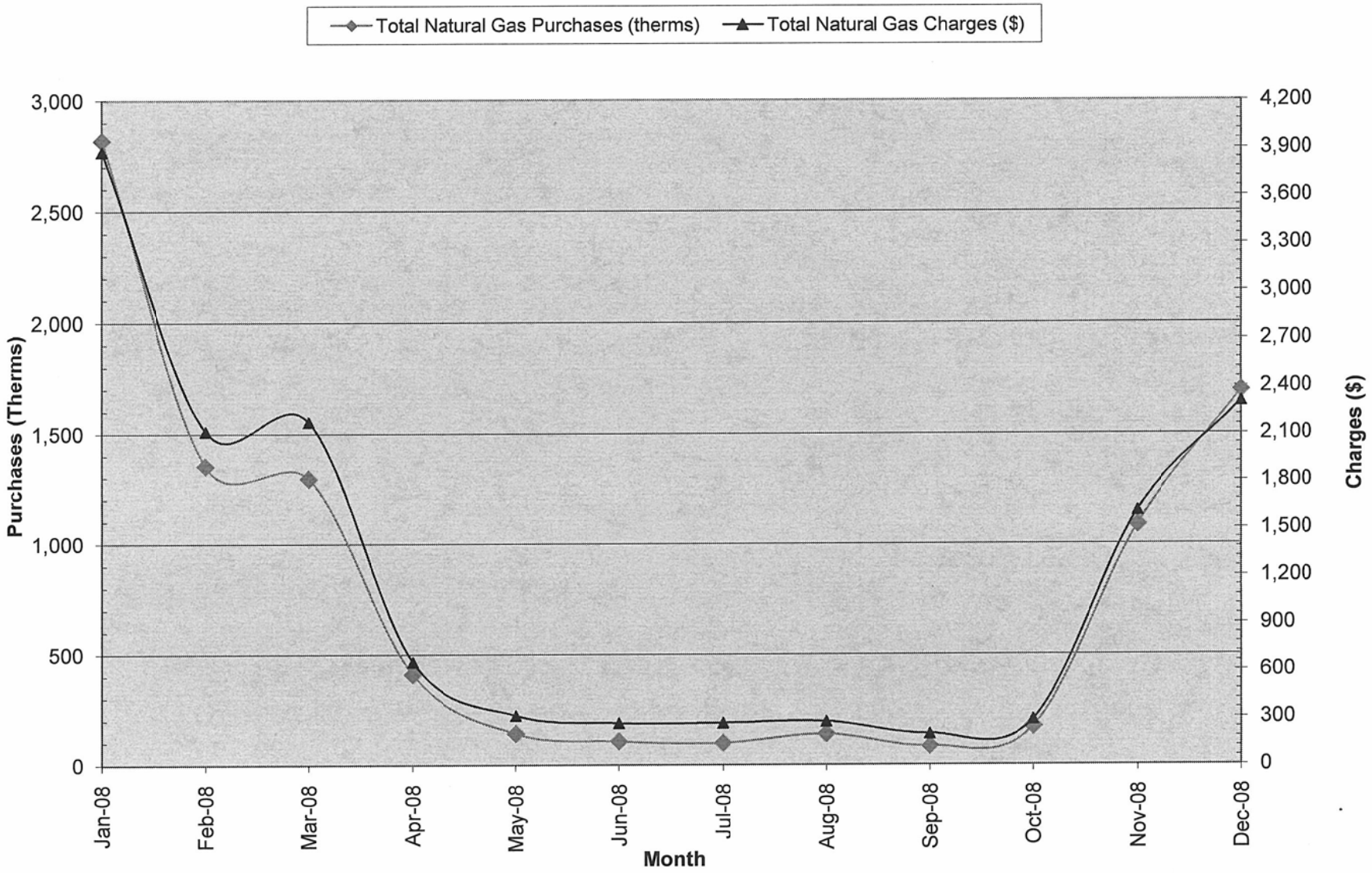
New Jersey BPU Energy Audit Program
CHA Project No.: 20711
Town of Kearny
PSE&G - Natural Gas Service

Police Dept - 237 Laurel Ave
Account No.: 11 901 447 00
Meter No.: 298001405

Month	Therms	Charges ($)	($/Therm)
January-08	2,820	3,878.13	1.375
February-08	1,353	2,116.32	1.564
March-08	1,296	2,175.78	1.679
April-08	411	653.28	1.590
May-08	143	313.17	2.190
June-08	107	264.73	2.481
July-08	99	265.64	2.675
August-08	139	274.43	1.968
September-08	85	196.43	2.310
October-08	173	286.48	1.654
November-08	1,086	1,608.98	1.482
December-08	1,697	2,304.55	1.358

Most Recent Yr	9,410	14,338	1.524

Natural Gas Usage - Town of Kearny Police Department



Utility Data - Kearny Police(rev-0).xls
Natural Gas Chart

ELECTRIC MARKETERS LIST

The following is a listing of marketers/suppliers/brokers that have been licensed by the NJ Board of Public Utilities to sell electricity to residential, small commercial and industrial customers served by the Public Service Electric and Gas Company distribution system. **This listing is provided for informational purposes only and PSE&G makes no representations or warranties as to the competencies of the entities listed herein or to the completeness of this listing.**

American Powernet Management
867 Berkshire Blvd, Suite 101
Wyomissing, PA 19610
www.americanpowernet.com

BOC Energy Services
575 Mountain Avenue
Murray Hill, NJ 07974
www.boc-gases.com

Commerce Energy Inc.
535 Route 38, Suite 138
Cherry Hill, NJ 08002
(888) 817-8572 or
(858) 910-8099
www.commerceenergy.com

ConEdison Solutions
701 Westchester Avenue
Suite 201 West
White Plains, NY 10604
(800) 316-8011
www.ConEdSolutions.com

Constellation NewEnergy, Inc.
1199 Route 22 East
Mountainside, NJ 07092
908 228-5100
www.newenergy.com

Credit Suisse (USA), Inc.
700 College Road East
Princeton, NJ 08450
www.creditsuisse.com

Direct Energy Services, LLC
One Gateway Center, Suite 2600
Newark, NJ 07102
(973) 799-8568
www.directenergy.com

FirstEnergy Solutions
395 Ghent Road Suite 407
Akron, OH 44333
(800) 977-0500
www.fes.com

Gerdau Ameristeel Energy Co.
North Crossman Road
Sayreville, NJ 08872

Gexa Energy LLC New Jersey
20 Greenway Plaza, Suite 600
Houston, TX 77046
(866) 304-GEXA
Beth.miller@gexaenergy.com

Glacial Energy of New Jersey
2602 McKinney Avenue, Suite 220
Dallas, TX 75204
www.glacialenergy.com

Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095
www.hess.com

Integrys Energy Services, Inc
99 Wood Avenue, Suite 802
Iselin, NJ 08830
www.integrysenergy.com

Liberty Power Delaware, LLC
1901 W Cypress Road, Suite 600
Fort Lauderdale, FL 33309
(866) Power-99
(866) 769-3799
www.libertypowercorp.com

Liberty Power Holdings, LLC
1901 W Cypress Creek Road, Suite 600
Fort Lauderdale, FL 33309
(866) Power-99
(866) 769-3799
www.libertypowercorp.com

Pepco Energy Services, Inc.
d/b/a Power Choice
23 S. Kinderkamack Rd Ste D
Montvale, NJ 07645
(800) 363-7499
www.pepco-services.com

PPL EnergyPlus, LLC
Energy Marketing Center
Two North Ninth Street
Allentown, PA 18101
1-866-505-8825
http://www.pplenergyplus.com/

Sempra Energy Solutions
The Mac-Cali Building
581 Main Street, 8th Floor
Woodbridge, NJ 07095
(877) 273-6772
www.SempraSolutions.com

South Jersey Energy Company
1 South Jersey Plaza, Route 54
Folsom, NJ 08037
(800) 756-3749
www.sjindustries.com

Strategic Energy, LLC
6 East Main Street, Suite 6E
Ramsey, NJ 07446
(888) 925-9115
www.sel.com

Suez Energy Resources NA
333 Thornall Street FL6
Edison, NJ 08818
866.999.8374(toll free)
www.suezenergyresources.com

UGI Energy Services, Inc.
d/b/a POWERMARK
1 Meridian Blvd. Suite 2C01
Wyomissing, PA 19610
(800) 427-8545
www.ugienergyservices.com

Jan 14, 2009

GAS MARKETERS LIST

The following is a listing of marketers/suppliers/brokers that have been licensed by the NJ Board of Public Utilities to sell natural gas to residential, small commercial and industrial customers served by the Public Service Electric and Gas Company distribution system. **This listing is provided for informational purposes only and PSE&G makes no representations or warranties as to the competencies of the entities listed herein or to the completeness of this listing.**

Gateway Energy Services
44 Whispering Pines Lane
Lakewood, NJ 08701
(800) 805-8586
www.gesc.com

Metro Energy Group, LLC
14 Washington Place
Hackensack, NJ 07601
www.metroenergy.com

RPL Holdings, Inc
601 Carlson Pkwy
Minnetonka, MN 55305

Great Eastern Energy
3044 Coney Island Ave. PH
Brooklyn, NY 11235
888-651-4121
www.greateasterngas.com

Metromedia Energy, Inc.
6 Industrial Way
Eatontown, NJ 07724
(800) 828-9427
www.metromediaenergy.com

South Jersey Energy Company
One South Jersey Plaza, Rte 54
Folsom, NJ 08037
(800) 756-3749
www.sjindustries.com/sje.htm

Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095
(800) 437-7872
www.hess.com

Mitchell- Supreme Fuel
(NATGASCO)
532 Freeman Street
Orange, NJ 07050
(800) 840-4GAS
www.mitchellsupreme.com

Sprague Energy Corp.
Two International Drive, Ste 200
Portsmouth, NH 03801
800-225-1560
www.spragueenergy.com

Hudson Energy Services, LLC
545 Route 17 South
Ridgewood, NJ 07450
(201) 251-2400
www.hudsonenergyservices.com

MxEnergy Inc.
P.O. Box 177
Annapolis Junction, MD 20701
800-375-1277
www.mxenergy.com

Stuyvesant Energy LLC
642 Southern Boulevard
Bronx, NY 10455
(718) 665-5700
www.stuyfuel.com

Intelligent Energy
7001 SW 24th Avenue
Gainesville, FL 32607
Sales: 1 877 I've Got Gas
(1 877 483-4684)
Customer Service:
1 800 927-9794
www.intelligentenergy.org

Pepco Energy Services, Inc.
23 S Kinderkamack Rd, Suite D
Montvale, NJ 07645
(800) 363-7499
www.pepco-services.com

Tiger Natural Gas, Inc.
1422 E. 71st Street, Suite J.
Tulsa, OK 74136
1-888-875-6122
www.tigernaturalgas.com

Systrum Energy
877-SYSTRUM
(877-797-8786)
www.systrumenergy.com

Plymouth Rock Energy, LLC
165 Remsen Street
Brooklyn, NJ 11201
866-539-6450
www.plymouthrockenergy.com

UGI Energy Services, Inc.
d/b/a GASMARK
704 E. Main Street, Suite I
Moorestown, NJ 08057
856-273-9995
www.ugienergyservices.com

Macquarie Cook Energy, LLC
10100 Santa Monica Blvd, 18th Fl
Los Angeles, CA 90067

PPL EnergyPlus, LLC
Energy Marketing Center
Two North Ninth Street
Allentown, PA 18101
1-866-505-8825
www.pplenergyplus.com/natural+gas/

Woodruff Energy
73 Water Street
P.O. Box 777
Bridgeton, NJ 08302
(856) 455-1111
www.woodruffenergy.com

Apr 10, 2009

APPENDIX B

ECM-1 Replace Electric Heaters

Kearny NJ
CHA #20711
Building: Police & Water Department

ECM-1 Replace Electric Baseboard Heating Units

For Juvenal section replace electric heaters with hot fin tubes. Run new piping and connect to new hot water fin-tubes

EXISTING CONDITONS	Value	Units	Comments
Electric Cost	$0.125	/ kWh	
Annual Heating Hours / Year	1,845	Hours/yr	Based on assumed cycling
Avg W per Linear foot of existing electric unit	250	W / LF	(typical size for heating offices in this type of building)
Total Linear Feet of all electric units	54.0	LF	measured from site
Existing demand	13.5	kW	
Total annual electric usage	24,911	kWh/yr	
Total annual electric cost	$3,114	$/yr	

ECM CONDITONS	Value	Units	Comments
Fuel Cost	$ 1.52	$/Therm NG	Utility cost used in boiler replacement ECM
Annual Required MBTU Heating	85,021	Mbtu/yr	Annual electric consumption converted to MBH
Boiler Efficiency	90%		Efficiency of new boiler
Total annual Mbtu required (Natural Gas)	94,468	Mbtu/yr	Total Mbtu/yr to produce required Mbtu/yr for heat load
Required Fuel (Natural Gas)	945	Therms/yr	Converts Mbtu/yr to Therms of Natural Gas

ANNUAL SAVINGS		
Annual Electric Usage Savings	24,911	kWh/yr
Annual Electric Cost Savings	$5,225	$/yr
Annual Fuel Cost	-$1,436	$/yr
Annual Utility Cost Savings	$3,789	$/yr

2,111

Balance Point	60	deg F

OAT Bin Temp F	Hr of Occupancy Annually	Heating Hrs at Temp below setpoint	Assumed % of time of operation	Assumed hrs of Operation
102.5	0	0	0%	0
97.5	3	0	0%	0
92.5	34	0	0%	0
87.5	131	0	0%	0
82.5	500	0	0%	0
77.5	620	0	0%	0
72.5	664	0	0%	0
67.5	854	0	0%	0
62.5	927	0	0%	0
57.5	600	600	8%	50
52.5	610	610	17%	102
47.5	611	611	25%	153
42.5	656	656	33%	219
37.5	1,023	1023	42%	426
32.5	734	734	50%	367
27.5	334	334	58%	195
22.5	252	252	67%	168
17.5	125	125	75%	94
12.5	47	47	83%	39
7.5	22	22	92%	20
2.5	13	13	100%	13
-2.5	0	0	100%	0
-7.5	0	0	100%	0
Total	8,760	5,027	37%	1845

Kearny NJ
CHA #20711
Building: Police & Water Department

ECM-1 Replace Electric Baseboard Heating Units

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Demo Electric Heaters	8	ls		$ 250		$ -	$ 2,420	$ -	$ 2,420	
Hot Water Fin-Tubes	54	lf	$ 40	$ 22		$ 2,117	$ 1,437	$ -	$ 3,554	
Supply & Balance Valves	8	ea	$ 208	$ 370		$ 1,631	$ 3,582	$ -	$ 5,212	
Supply and Return Piping	300	lf	$ 3.9	$ 7.4		$ 1,138	$ 2,668	$ -	$ 3,806	
Insulation	300	lf	$ 2.9	$ 6.1		$ 861	$ 2,196	$ -	$ 3,058	
Pump	1	ea	$ 295	$ 79		$ 289	$ 95	$ -	$ 384	
Specialties	8	ea	$ 370	$ 44		$ 2,901	$ 426	$ -	$ 3,327	
Thermostats	4	ea	$ 100	$ 47		$ 392	$ 227	$ -	$ 619	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 22,381	Subtotal
$ 4,476	20% Contingency
$ 4,029	Contractor 15% O&P
$ 3,089	10% Engineering
$ 33,974	**Total**

APPENDIX C

ECM-2 Increase Wall Insulation

Kearny NJ
CHA #20711
Building: Police & Water Department

ECM-2 Increase Wall Insulation

Increase wall insulation for two outside wall in WD office section

Total Existing Wall Area	810	sf	
Existing U-value	0.14	Btu/hr/(sf*F)	(WD wall)
Proposed U-value	0.04	Btu/hr/(sf*F)	
Heating Efficiency	90%		
Cooling Efficiency	1.20	kW/ton	

Existing Cooling

Max. North Wall Cooling Load	1,800	Btu/hr
Max. East Wall Cooling Load	2,034	Btu/hr
Max. South Wall Cooling Load	1,335	Btu/hr
Max. West Wall Cooling Load	1,224	Btu/hr

Existing Heating

Existing Heating Load Temp Diff	54	F
Existing Max. Wall Heating Load	11,273	Btu/hr

Proposed Cooling

Max. North Wall Cooling Load	485	Btu/hr
Max. East Wall Cooling Load	548	Btu/hr
Max. South Wall Cooling Load	359	Btu/hr
Max. West Wall Cooling Load	330	Btu/hr

Proposed Heating

Proposed Max. Heating Load	3,035	Btu/hr

Occupied Cooling Setpoint	74	F	Occupied Heating Setpoint	68	F
Unoccupied Cooling Setpoint	80	F	Unoccupied Heating Setpoint	60	F
Existing Cooling Total	242	kWh/yr	Existing Heating Total	16,650,013	Btu/yr
Proposed Cooling Total	65	kWh/yr	Proposed Heating Total	4,482,696	Btu/yr
Savings	177	kWh/yr	Savings	12,167,317	Btu/yr
			Input	135	therms

				Occupied				Unoccupied							
Avg Cutdoor Air Temp. Bins *F	Existing Equipment Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Existing Heat Gain	Proposed Heat Gain	Existing Heat Loss	Proposed Heat Loss	Existing Heat Gain	Proposed Heat Gain	Existing Heat Loss	Proposed Heat Loss	Existing Cooling Load	Existing Heating Load	Proposed Cooling Load	Proposed Heating Load
				(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(kWh/yr)	(Btu/yr)	(kWh/yr)	(Btu/yr)
97.5	3	3	0	6,392	1,721	-	-	6,392	1,721	-	-	2	-	1	-
92.5	34	34	0	5,032	1,355	-	-	4,566	1,229	-	-	17	-	5	-
87.5	131	131	0	3,672	989	-	-	2,740	738	-	-	48	-	13	-
82.5	500	500	0	2,312	622	-	-	913	246	-	-	116	-	31	-
77.5	620	620	0	952	256	-	-	-	-	-	-	59	-	16	-
72.5	664	664	0	-	-	-	-	-	-	-	-	-	-	-	-
67.5	854	854	0	-	-	58	16	-	-	-	-	-	49,410	-	13,303
62.5	927	927	0	-	-	636	171	-	-	-	-	-	589,969	-	158,838
57.5	600	600	0	-	-	1,215	327	-	-	289	78	-	729,000	-	196,269
52.5	610	610	0	-	-	1,794	483	-	-	868	234	-	1,094,079	-	294,560
47.5	611	611	0	-	-	2,372	639	-	-	1,446	389	-	1,449,379	-	390,218
42.5	656	656	0	-	-	2,951	794	-	-	2,025	545	-	1,935,669	-	521,142
37.5	1,023	1,023	0	-	-	3,529	950	-	-	2,604	701	-	3,610,459	-	972,047
32.5	734	734	0	-	-	4,108	1,106	-	-	3,182	857	-	3,015,167	-	811,776
27.5	334	334	0	-	-	4,686	1,262	-	-	3,761	1,013	-	1,565,267	-	421,418
22.5	252	252	0	-	-	5,265	1,418	-	-	4,339	1,168	-	1,326,780	-	357,210
17.5	125	125	0	-	-	5,844	1,573	-	-	4,918	1,324	-	730,446	-	196,659
12.5	47	47	0	-	-	6,422	1,729	-	-	5,496	1,480	-	301,841	-	81,265
7.5	22	22	0	-	-	7,001	1,885	-	-	6,075	1,636	-	154,016	-	41,466
2.5	13	13	0	-	-	7,579	2,041	-	-	6,654	1,791	-	98,531	-	26,528
-2.5	0	0	0	-	-	8,158	2,196	-	-	7,232	1,947	-	-	-	-
-7.5	0	0	0	-	-	8,736	2,352	-	-	7,811	2,103	-	-	-	-
TOTALS	**8,760**	**8,760**	**0**									**242**	**16,650,013**	**65**	**4,482,696**

Kearny NJ
CHA #20711
Building: Police & Water Department

ECM-2 Increase Wall Insulation

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Dry wall	810	sf	$ 1.15	$ 0.50		$ 913	$ 490	$ -	$ 1,403	Includes furring
Insulation	810	sf	$ 1.10	$ 0.41		$ 873	$ 402	$ -	$ 1,275	
Painting/Finishing	810	sf	$ 0.2	$ 1.0		$ 127	$ 1,019	$ -	$ 1,146	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 3,824	Subtotal
$ 382.43	10% Contingency
$ 631.00	Contractor 15% O&P
$ -	Engineering
$ 4,838	**Total**

APPENDIX D

ECM-3 Install Infrared Garage Heaters

Kearny NJ
CHA #20711
Building: Police & Water Department

ECM-3 Install Infrared Garage Heaters
For WD garage section replace air handlers with infrared heating

Building Footprint	10,488	SF
Steam Heat Content	100,000	Btu/Therm
Building Balance Temp.	60	*F
Internal Gains	37,585	btu/h
Unoc Internal Gain factor	0.03	
Ave Occ Internal Gain Factor	0.7	
Existing Heating Efficiency	78%	
Existing Heat Distribution Effectiveness	85%	
Proposed Burner Efficiency	85%	
Proposed Heat Distribution Effectiveness	95%	

Ex Occupied Htg Temp.	64	*F
Ex Unoccupied Htg Temp.	64	*F
Occupied Heating UA	1,467	btu/hr/°F
Unoccupied Heating UA	1,467	btu/hr/°F

Heating Energy Savings	**612**	**Therms/yr**
Electric Energy Savings	**11,276**	**kWh/yr**
Electric Demand Savings	**1.00**	**kW**

					EXISTING LOADS						PROPOSED LOADS							
					Occupied			Unoccupied			Occupied			Unoccupied				
Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Existing Equipment Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Unoccupied Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Unoccupied Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Existing Heating Energy Therms	Proposed Heating Energy Therms
A		B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	M	N
102.5	49.1	0	0	0	0	0	-26,310	0	0	-1,128	0	0	-26,310	0	0	-1,128	0	0
97.5	42.5	3	1	2	0	0	-26,310	0	0	-1,128	0	0	-26,310	0	0	-1,128	0	0
92.5	39.5	34	8	26	0	0	-26,310	0	0	-1,128	0	0	-26,310	0	0	-1,128	0	0
87.5	36.6	131	31	100	0	0	-26,310	0	0	-1,128	0	0	-26,310	0	0	-1,128	0	0
82.5	34.0	500	119	381	0	0	-26,310	0	0	-1,128	0	0	-26,310	0	0	-1,128	0	0
77.5	31.6	620	148	472	0	0	-26,310	0	0	-1,128	0	0	-26,310	0	0	-1,128	0	0
72.5	29.2	664	158	506	0	0	-26,310	0	0	-1,128	0	0	-26,310	0	0	-1,128	0	0
67.5	27.0	854	203	651	0	0	-26,310	0	0	-1,128	0	0	-26,310	0	0	-1,128	0	0
62.5	24.5	927	221	706	2,201	1,511	-26,310	2,201	1,085	-1,128	2,201	1,511	-26,310	2,201	1,085	-1,128	0	0
57.5	21.4	600	143	457	9,538	6,546	-26,310	9,538	4,703	-1,128	9,538	6,546	-26,310	9,538	4,703	-1,128	0	0
52.5	18.7	610	145	465	16,875	11,581	-26,310	16,875	8,320	-1,128	16,875	11,581	-26,310	16,875	8,320	-1,128	173	142
47.5	16.2	611	145	466	24,212	16,616	-26,310	24,212	11,938	-1,128	24,212	16,616	-26,310	24,212	11,938	-1,128	278	228
42.5	14.4	656	156	500	31,549	21,651	-26,310	31,549	15,555	-1,128	31,549	21,651	-26,310	31,549	15,555	-1,128	410	337
37.5	12.6	1,023	244	779	38,886	26,686	-26,310	38,886	19,173	-1,128	38,886	26,686	-26,310	38,886	19,173	-1,128	814	668
32.5	10.7	734	175	559	46,223	31,721	-26,310	46,223	22,791	-1,128	46,223	31,721	-26,310	46,223	22,791	-1,128	709	582
27.5	8.6	334	80	254	53,560	36,756	-26,310	53,560	26,408	-1,128	53,560	36,756	-26,310	53,560	26,408	-1,128	379	311
22.5	6.8	252	60	192	60,897	41,791	-26,310	60,897	30,026	-1,128	60,897	41,791	-26,310	60,897	30,026	-1,128	329	270
17.5	5.5	125	30	95	68,234	46,826	-26,310	68,234	33,643	-1,128	68,234	46,826	-26,310	68,234	33,643	-1,128	185	152
12.5	4.1	47	11	36	75,570	51,861	-26,310	75,570	37,261	-1,128	75,570	51,861	-26,310	75,570	37,261	-1,128	77	64
7.5	2.6	22	5	17	82,907	56,896	-26,310	82,907	40,878	-1,128	82,907	56,896	-26,310	82,907	40,878	-1,128	40	33
2.5	1.0	13	3	10	90,244	61,931	-26,310	90,244	44,496	-1,128	90,244	61,931	-26,310	90,244	44,496	-1,128	26	21
-2.5	0.0	0	0	0	97,581	66,966	-26,310	97,581	48,113	-1,128	97,581	66,966	-26,310	97,581	48,113	-1,128	0	0
-7.5	-1.5	0	0	0	104,918	72,001	-26,310	104,918	51,731	-1,128	104,918	72,001	-26,310	104,918	51,731	-1,128	0	0
TOTALS		**8,760**	**2,086**	**6,674**													**3,420**	**2,808**

Existing Building Ventilation & Infiltration (occ)	**932**	**cfm**
Overheat Ventilation Factor	**1.00**	
Additional ventilation to offset overheat	**0**	**cfm**
Existing Building Ventilation & Infiltration (unocc)	**670**	**cfm**

Unit Heater Fan Savings

#	Description	Voltage	Load Factor	Existing HP	Existing Efficiency	Proposed FLA	Existing # of Units	Proposed # of Units	Existing kW	Proposed kW	Annual Hours	Existing Use kWh	Proposed Use kWh	Savings kWh
AHU1	Blower Motor	115	0.8	1.0	78.0%		1		0.76	0.00	5,027	3,845	0	3,845
AHU1	Blower Motor	115	0.8	1.0	78.0%		1		0.76	0.00	13,187	10,086	0	10,086
Infrared	Blower Motor	120	0.8	0.0	82.5%	1.1		5	0.00	0.53	5,027	0	2,654	(2,654)
Total				2.0			2	5	1.53	0.53		13930	2654	**11,276**

Kearny NJ
CHA #20711
Police & Water Department

Garage Base Case

Garage Building Footprint	10,488	SF	Ex Occupied Htg Temp.	64	°F
Heat Content	100,000	Btu/Therm	Ex Unoccupied Htg Temp.	64	°F
Building Balance Temp.	60	°F	Occupied Heating UA	1,467	btu/hr/°F
Internal Gains	37,585	btu/h	Unoccupied Heating UA	1,467	btu/hr/°F
Unoc Internal Gain factor	0.03				
Ave Occ Internal Gain Factor	0.7				
Existing Heating Efficiency	78%				
Existing Heat Distribution Effectiveness	75%				

Heating Energy Consumption	3,876	Therms/yr

					EXISTING LOADS						
					Occupied			Unoccupied			
Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Existing Equipment Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Unoccupied Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Existing Heating Energy Therms
A		B	C	D	E	F	G	H	I	J	M
102.5	49.1	0	0	0	0	0	-26,310	0	0	-1,128	0
97.5	42.5	3	1	2	0	0	-26,310	0	0	-1,128	0
92.5	39.5	34	8	26	0	0	-26,310	0	0	-1,128	0
87.5	36.6	131	31	100	0	0	-26,310	0	0	-1,128	0
82.5	34.0	500	119	381	0	0	-26,310	0	0	-1,128	0
77.5	31.6	620	148	472	0	0	-26,310	0	0	-1,128	0
72.5	29.2	664	158	506	0	0	-26,310	0	0	-1,128	0
67.5	27.0	854	203	651	0	0	-26,310	0	0	-1,128	0
62.5	24.5	927	221	706	2,201	1,511	-26,310	2,201	1,085	-1,128	0
57.5	21.4	600	143	457	9,538	6,546	-26,310	9,538	4,703	-1,128	0
52.5	18.7	610	145	465	16,875	11,581	-26,310	16,875	8,320	-1,128	197
47.5	16.2	611	145	466	24,212	16,616	-26,310	24,212	11,938	-1,128	315
42.5	14.4	656	156	500	31,549	21,651	-26,310	31,549	15,555	-1,128	465
37.5	12.6	1,023	244	779	38,886	26,686	-26,310	38,886	19,173	-1,128	922
32.5	10.7	734	175	559	46,223	31,721	-26,310	46,223	22,791	-1,128	803
27.5	8.6	334	80	254	53,560	36,756	-26,310	53,560	26,408	-1,128	430
22.5	6.8	252	60	192	60,897	41,791	-26,310	60,897	30,026	-1,128	373
17.5	5.5	125	30	95	68,234	46,826	-26,310	68,234	33,643	-1,128	209
12.5	4.1	47	11	36	75,570	51,861	-26,310	75,570	37,261	-1,128	88
7.5	2.6	22	5	17	82,907	56,896	-26,310	82,907	40,878	-1,128	45
2.5	1.0	13	3	10	90,244	61,931	-26,310	90,244	44,496	-1,128	29
-2.5	0.0	0	0	0	97,581	66,966	-26,310	97,581	48,113	-1,128	0
-7.5	-1.5	0	0	0	104,918	72,001	-26,310	104,918	51,731	-1,128	0
TOTALS		8,760	2,086	6,674							3,876
			1,621								

Existing Building Ventilation & Infiltration (occ)	932	cfm
Overheat Ventilation Factor	1.00	
Additional ventilation to offset overheat	0	cfm
Existing Building Ventilation & Infiltration (unocc)	670	cfm

HEAT GAIN/LOSS WORKSHEET

Project Name: Keamy NJ
Location
Building Name Police & Water Department
Engineer: ND

Project No.: CHA #20711
Site Elevation: 460 Feet
Date:

Specific Volume 14.00 CF/#

Building/Facility Designation Water Department Garage

Outdoor Winter Design DB Temperature	14	*F	**Indoor Winter Design DB Temperature**	64 *F
Outdoor Summer Design DB Temperature	91	*F	**Indoor Summer Design DB Temperature**	74 *F
Outdoor Summer Design WB Temperature	73	*F	**Indoor Summer Design WB Temperature**	60 *F
Outdoor Summer Humidity Ratio	0.0121	#/#	**Indoor Air (70*F) Humidity Ratio**	0.0079 #/#

ENVELOPE DESCRIPTIONS (Descriptions are from Interior to Exterior)

Walls (Select One - Type X)

		R Value	Wall Type
	Steel Siding, 4" Insulation, Steel Siding	15.2	1
	Plaster or Gypsum, frame construction, 5" Insulation, 1" stucco	18.2	1
	4" WH CMU, 1" Insulation, Finished Exterior	5.2	2
	Plaster or Gypsum, frame construction, 3" Insulation, 8" LW CMU	7.8	5
	4" Face Brick, 2" Concrete, 1" Insulation, Exterior Finish	5.1	12
	4" Face Brick, 4" Concrete, 1" Insulation, Exterior Finish	4.0	11
	Interior Finish, 2" Insulation, 8" CMU, 4" Face Brick	10.9	16
	Finished Surface, 8" LW CMU (filled), Air Space, 4" Face Brick	11.1	16
	Stucco or Gypsum, 2.5" Insul, Face Brick	14.3	10
x	4" Block, 1" insulation, 8" Block	19.9	16
		7.0	

Roofs (Select One)

		R Value	Roof Type
x		13.0	1
	Tectum Deck, 3.3" Insul., BU Roof	18.2	1
	Steel Deck, 5" Insul., BU Roof	25.0	4
	Attic Roof with 6" Insul.	2.7	2
	4" HW Concrete Deck, BU Roof	14.9	4
	Ceiling, 3" Insulation, 4" Concrete Deck, BU Roof	18.5	13
	Ceiling, 4" Concrete Deck, 3" Insulation, BU Roof	21.7	14
	Ceiling, 4" Concrete Deck, 6" Insulation, BU Roof	22.7	10
	Ceiling, Wood Deck, 6" Insulation, Felt & Membrane	18.0	
	Other		

Windows (Select One)

		U Value
x	Aluminum Frame, 1/8" SP Glazing	1.05
	Aluminum Frame, 1/4" DP Glazing	0.60
	Aluminum Frame, 3/16" DP Glazing	0.62
	Aluminum Frame, 1/2" DP Glazing	0.50
	Skylights	0.90
	Other	

	No Storm
Flat Glass	1.05
Flat Glass (e=.6)	1.00
Flat Glass (e=0.4)	0.90
Flat Glass (e=0.2)	0.77
Double Glaze (3/16 in air)	0.63
Double Glaze (1/4 in air)	0.60
Double Glaze (1/2 in air)	0.53
Double Glaze (e=.6)	0.50
Double Glaze (e=0.4)	0.42
Double Glaze (e=0.2)	0.35
Triple Glaze (1/4 in air)	0.42
Triple Glaze (1/2 in air)	0.35

BUILDING CHARACTERISTICS

Occupied Area	10,488	SF	
Roof Area	10,488	SF	
Return Plenum?			n

	Gross Wall Length		Average Wall Height		Ceiling Height		Window Area		Door Area		Net Wall Area	
North Exposure	69	Ft	16.0	Ft	16.0	Ft	0	SF	0	SF	1,104	SF
East Exposure	152	Ft	16.0	Ft	16.0	Ft	0	SF	0	SF	2,432	SF
South Exposure	69	Ft	16.0	Ft	16.0	Ft	0	SF	0	SF	1,104	SF
West Exposure	152	Ft	16.0	Ft	16.0	Ft	0	SF	1,169	SF	1,263	SF

Forced Ventilation 263 cfm

COOLING HEAT GAINS TO THE ROOM - SENSIBLE

SOLAR GAINS

WINDOWS	AREA (SF)	SHGF		Shade Coef	Cooling Load Factor		Solar Heat Gain	
North Exposure	0	38	btu/h/sf	0.8	0.75	Glass Type C	0 Btu/hr	
East Exposure	0	216	btu/h/sf	0.8	0.31	Glass Type C	0 Btu/hr	
South Exposure	0	109	btu/h/sf	0.8	0.58	Glass Type C	0 Btu/hr	
West Exposure	0	216	btu/h/sf	0.8	0.29	Glass Type C	0 Btu/hr	
								0 Btu/h

CONDUCTION

	NET AREA (SF)	U-VALUE	Cooling Load Temp. Dif.	Return Air Factor	Room Heat Gain	
North Exposure	1,104	0.14	20 *F	1.0	3,154 Btu/hr	
East Exposure	2,432	0.14	39 *F	1.0	13,550 Btu/hr	
South Exposure	1,104	0.14	27 *F	1.0	4,258 Btu/hr	
West Exposure	1,263	0.14	22 *F	1.0	3,969 Btu/hr	
Roof	10,488	0.08	73 *F	1.0	58,894 Btu/hr	
Fenestration	0	0.60	17 *F		0 Btu/hr	
Doors	1,169	0.14	27 *F		4,408 Btu/hr	
Ceiling	10,488	0.14	0 *F		0 Btu/hr	
Partition		0.05	0 *F		0 Btu/hr	
Floor	10,488	0.04	0 *F		0 Btu/hr	
						88,234 Btu/h

INTERNAL HEAT GAINS

									Room Heat Gain	
Lights	0.80	w/sf x	10,488	Occ Area =	8.4	kW x 3.4x	1.0	RAF =	28,636 Btu/h	
Plug Load	0.25	w/sf x	10,488	Occ Area =	2.6	kW x 3.4x	1.0	RAF =	8,949 Btu/h	
People		people x	255	btu/person x		time in space =			0 Btu/h	
Computer Work Stations				Units x	120	W/Unit x 3414 =			0 Btu/h	
Equipment		kW x 3.413 =							0 Btu/h	
Misc.									0 Btu/h	
										37,585 Btu/h

VENTILATION AND INFILTRATION

		Infiltration Factor		Perimeter Ratio		Coef	Temp. Diff.	Room Heat Gain	
Walls	5,903 SF	0.10	CFM/SF			1.04	17 *F	11,313 Btu/h	
Doors	1,169 SF	0.20	CFM/LF	0.34	LF/SF	1.04	17 *F	1,526 Btu/h	
Windows	0 SF	0.20	CFM/LF	0.76	LF/SF	1.04	17 *F	0 Btu/h	
Ventilation	263 cfm					1.04	17 *F	5,031 Btu/h	
									17,869 Btu/h

COOLING HEAT GAINS TO THE RA PLENUM - SENSIBLE

4,950

CONDUCTION

	NET AREA (SF)	U-VALUE	Cooling Load Temp. Dif.	Return Air Factor	Room Heat Gain	
North Exposure	0	0.14	20	1.0	0 Btu/hr	
East Exposure	0	0.14	39	1.0	0 Btu/hr	
South Exposure	0	0.14	27	1.0	0 Btu/hr	
West Exposure	0	0.14	22	1.0	0 Btu/hr	
Roof	10,488	0.08	73	0.0	0 Btu/hr	
						0 Btu/h

INTERNAL HEAT GAINS

								Room Heat Gain	
Lights	0.80	w/sf x	10,488	Occ Area =	8.4	kW x3413x	0.00	RAF =	0 Btu/h	
Misc.									0 Btu/h	
										0 Btu/h

SENSIBLE HEAT GAINS - TEMP. DEPENDENT		SENSIBLE HEAT GAINS - TEMP. INDEPENDENT	
Solar	0	Internal Gains to Room	37,585
Conduction to Room	88,234	Internal Gains to Plenum	0
Conduction to Plenum	0		
Ventilaton and Infiltration	17,869		
Sub Total	106,103	Sub Total	37,585

LATENT COOLING LOADS

Infiltration

			Infiltration Factor		Air Density	Humidity Ratio Dif.		Room Heat Gain	
Walls	10,488	SF	0.10	CFM/SF	4,629	0.0042	##	20,597	Btu/h
Doors	1,169	SF	0.20	CFM/LF	4,629	0.0042	##	1,564	Btu/h
Windows	0	SF	0.20	CFM/LF	4,629	0.0042	##	0	Btu/h
Ventilation	263	cfm			4,629	0.0042	##	5,155	Btu/h
People	0	people	0.00	time in space		250	Btu/hr/person	0	Btu/h
									27,315 Btu/h

Cooling Load Summary

	Sensible	Latent	Total		
Temperature Dependent Gains	106,103	27,315	133,419		
Temperature Indep. Gains	37,585		37,585	SHR=	0.84
Total	143,689	27,315	171,004		

Building Cooling Load 14.3 Tons at 736 SF/Ton

Building Air Flow to Condition Space based on a 12°F Temp Rise is **11,472 CFM**

1.09 CFM/sf

HEATING CALCULATION

CONDUCTION

	NET AREA (SF)	U-VALUE	Heating Load Temp. Dif.	Room Heat Gain	
North Exposure	1,104	0.14	0	0	Btu/h
East Exposure	2,432	0.14	0	0	Btu/h
South Exposure	1,104	0.14	5	789	Btu/h
West Exposure	1,263	0.14	50	9,021	Btu/h
Fenestration	0	0.60	50	0	Btu/h
Roof	10,488	0.08	50	40,338	Btu/h
Doors	1,169	0.14	14	2,245	Btu/h
Ceiling	10,488	0.14	0	0	Btu/h
Partition	0	0.05	0	0	Btu/h
Floor	10,488	0.04	50	20,976	Btu/h

Ventilation and Infiltration

			Infiltration Factor		Coef	Temp. Difference		Room Heat Gain	
Walls	5,903	SF	0.10	CFM/SF	1.04	50	590 cfm	30,808	Btu/h
Doors	1,169	SF	0.20	CFM/LF	1.04	50	Air Flow	4,155	Btu/h
Windows	0	SF	0.20	CFM/LF	1.04	50	0 cfm	0	Btu/h
Ventilation Load	263	cfm			1.04	50	263 cfm	14,796	Btu/h
Total Ventilation & Infiltration Load							932 cfm	49,759	Btu/h

Building Heating Load **123,129** **btu/h**

11.7 btu/sf

Kearny NJ
CHA #20711
Building: Police & Water Department

Doors

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet		
North				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
			Sub-total	0.0	0.0		
East	3.5	7.0	2	49.0	42.0		
				0.0	0.0		
				0.0	0.0		
			Sub-total	49.0	42.0		
South	6.0	7.0	1	42.0	26.0		
	3.5	7.0	2	49.0	42.0		49.0
	12.0	12.0	1	144.0	48.0	garage	
				0.0	0.0		
			Sub-total	235.0	116.0		
West	3.5	7.0	2	49.0	42.0		24.5
	16.0	14.0	5	1120.0	300.0		
	12.0	14.0	1	168.0	52.0		
				0.0	0.0		
			Sub-total	1337.0	394.0		
						LF/SF	
			Total	**1621.0**	**552.0**	0.34	

Walls

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet		
North	206.0	20.0	1	4120.0	452.0		All wall quantities must remain equal to 1
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0	Ave. height	
	206.0			4120.0	452.0	20.0	Average height wall automatically linked to
East	49.0	22.0	1	1078.0	142.0		
	112.0	12.0	1	1344.0	248.0		
	45.0	21.0	1	945.0	132.0		
	11.0	9.0	1	99.0	40.0		
				0.0	0.0		
				0.0	0.0	Ave. height	
	217.0			3466.0	562.0	16.0	Average height wall automatically linked to
South	108.0	14.0	1	1512.0	244.0		
	98.0	28.0	1	2744.0	252.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0	Ave. height	
	206.0			4256.0	496.0	20.7	Average height wall automatically linked to
West	217.0	21.0	1	4557.0	476.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0	Ave. height	
	217.0			4557.0	476.0	21.0	Average height auto linked to block load sheet

Water Department

	70.0	9.0	630.0
	20.0	9.0	180.0
			810.0

Windows

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet		
North				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
			Sub-total	0.0	0.0		
East	7.0	5.0	3	105.0	72.0		
	4.0	5.0	2	40.0	36.0		
	1.0	2.0	1	2.0	6.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
			Sub-total	147.0	114.0		
South	4.0	5.0	4	80.0	72.0	80.0	
	4.0	2.5	2	20.0	26.0		
	10.0	12.0	1	120.0	44.0		
	4.0	4.0	3	48.0	48.0		
				0.0	0.0		
				0.0	0.0		
			Sub-total	268.0	190.0		
West	4.0	4.0	1	16.0	16.0	16.0	
	4.0	5.0	2	40.0	36.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
			Sub-total	56.0	52.0	96.0	
			Total	**471.0**	**356.0**	LF/SF 0.76	

Bldg foot print	44,700	
Police 1st	9,126	
Police 2nd	9,126	18252.0
Water dep	2,254	
Garages	33,320	
Total area	53,826	
Occupied area	20,506	

Kearny NJ
CHA #20711
Police & Water Department

ECM-3 Install Infrared Garage Heaters

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Demo air handlers	3	ea		$ 800		$ -	$ 2,904	$ -	$ 2,904	
NG Infrared Tube Heater garage area (125MBH)	5	ea	$ 1,830	$ 880		$ 8,967	$ 5,324	$ -	$ 14,291	VR125
Gas Piping, Valves, fittings, etc.	200	lf	$ 11	$ 13		$ 2,156	$ 3,146	$ -	$ 5,302	
4" Class B Vent Piping	50	lf	$ 6.70	$ 10		$ 328	$ 605	$ -	$ 933	
4" Chimney Cap	5	ea	$ 11	$ 10		$ 54	$ 61	$ -	$ 114	
Roof Flashing	5	ea	$ 28	$ 10		$ 137	$ 61	$ -	$ 198	
T-stats (w/setback, control wiring)	5	ea	$ 95	$ 30		$ 466	$ 182	$ -	$ 647	
Electric wiring for ignition	5	ea	$ 30	$ 90		$ 147	$ 545	$ -	$ 692	

Note: Unit selections and budgetary pricing are per Reznor VR series infrared tube heaters.
Install one above each door

$25,081	Subtotal
$5,016	20% Contingency
$4,515	15% Contractor O&P
$0	0% Engineering
$34,612	**Total**

APPENDIX E

ECM-4 Replace AC Units

Kearny NJ
CHA #20711
Building: Police & Water Department

ECM-4 Replace Window AC units w/ Ductless Splits

For (3) rooms: traffic room, locker room and gym replace window type units with split ductless systems

ASSUMPTIONS			Comments
Electric Cost	$0.151	/ kWh	
Average run hours per Week	55	Hours	Unit is manually turned on
Space Balance Point	55	F	
Space Temperature Setpoint	70	deg F	setpoint
Avg. BTU / Hr Rating of existing AC unit	14,000	Btu / Hr	(average size for cooling window type unit)
Average EER	7.0		Units appear to average 10 years old, EER was 8 when new

Item	Value	Units	Comments
Total Number of Units	3		
Existing Annual Electric Usage	1,860	kWh	
Proposed EER	14.4		New ductless mini-splits (per manufacturer)
Proposed Annual Electric Usage	904	kWh	Unit will cycle on w/ temp of room. Possible operating time shown below

ANNUAL SAVINGS		
Annual Savings	956	kWh
Annual Cost Savings	$144	

OAT - DB Bin Temp F	Annual Hours	Cooling Hrs at Temp Above balance point	Assumed % of time of operation	Assumed hrs of Operation
102.5	0	0	100%	0
97.5	3	1	89%	1
92.5	34	11	79%	9
87.5	131	43	68%	29
82.5	500	164	58%	95
77.5	620	203	47%	96
72.5	664	217	37%	80
67.5	854	0	0%	0
62.5	927	0	0%	0
57.5	600	0	0%	0
52.5	610	0	0%	0
47.5	611	0	0%	0
42.5	656	0	0%	0
37.5	1,023	0	0%	0
32.5	734	0	0%	0
27.5	334	0	0%	0
22.5	252	0	0%	0
17.5	125	0	0%	0
12.5	47	0	0%	0
7.5	22	0	0%	0
2.5	13	0	0%	0
-2.5	0	0	0%	0
-7.5	0	0	0%	0
Total	8,760	639	49%	310

Kearny NJ
CHA #20711
Building: Police & Water Department

ECM-4 Replace Window AC units w/ Ductless Splits

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Window AC Unit Removal	1	LS		$ 25		$ -	$ 30	$ -	$ 30	
Indoor wall unit	3	ea	$ 745	$ 210		$ 2,190	$ 762	$ -	$ 2,953	
Condensing unit	3	ea	$ 1,080	$ 290		$ 3,175	$ 1,053	$ -	$ 4,228	
Electrical	3	ea	$ 100	$ 165		$ 294	$ 599	$ -	$ 893	
Misc	1	LS	$ 20	$ 30		$ 20	$ 36	$ -	$ 56	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

Due to layout constrains individual condensing units are selected

$ 8,160	Subtotal	
$ 1,632	20%	Contingency
$ 1,224	15%	Contractor O&P
$ 1,224		Engineering
$ 12,239	**Total**	

APPENDIX F

ECM-5 Install Premium Efficiency Motors

Kearny NJ
CHA #20711
Building: Police & Water Department

ECM-5 Install Premium Efficiency Motors

Demand Cost $/kW-month
$ 13.03

Energy Cost $/kWh
$ 0.13

Multipliers		
Material	Labor	Equipment
0.98	1.21	1.09

Savings Analysis

Cost Estimates

#	Description	Location	Existing HP	Load Factor	Existing Efficiency[a]	Existing kW	New HP[b]	New Load Factor	New Efficiency[a]	New kW	Demand Savings	Demand Savings $	Annual Hours	kWh Savings	$ kWh Savings	Total $ Savings	Estimated Cost	Payback Years	Unit Costs Materials	Unit Costs Labor	Unit Costs Equipment	Subtotal Costs Materials	Subtotal Costs Labor	Subtotal Costs Equipment	Total Cost	Remarks
1	AHU	Ground floor	7.5	0.9	0.885	5.7	8	0.9	0.908	5.5	0.143	$ 22	8,760	1,252	$ 157	$ 179	$ 935	5.2	$ 621	$ 270	$ -	$ 609	$ 327	$ -	$ 935	
11																										
12																										
		Total	7.5			5.7	7.5			5.5	0.14	$ 22		1,252	$ 157	$ 179	$ 935									

Notes
a Existing and new efficiencies should be entered if known. If not known, use provided curve fit based on "DOE Survey Installed Average" and NEMA Premium values, respectively.

b Same as existing HP unless resized to better match load

Incentive Item	QTY	HP	Incentive	TOTAL SAVINGS	Cost W/O INCENTIVE	Cost W/ INCENTIVE
7.5 HP Premium TEFC Motor	1	7.5	$90	$90	$ 935	$845
				$90	$935	$845

Total ECM Cost w/ Incentives	$845

APPENDIX G

ECM-6 Rooftop Unit Replacement

Kearny NJ
CHA #20711
Police & Water Department

ECM-6 Replace Rooftop Units
Replace the existing old roof top condensing units with higher efficency AC unit.

ASSUMPTIONS			Comments
Electric Cost	$0.151	/ kWh	
Average run hours per Week	80	Hours	Unit is manually turned on (even if after hours)
Space Balance Point	55	F	
Space Temperature Setpoint	72	deg F	setpoint
Avg. BTU / Hr Rating of existing AC unit	180,000	Btu / Hr	(typical size for cooling office spaces in this type of building)
Average EER	7.0		Units are over 19 years old, EER is based on recip compresssors.

Item	Value	Units	Comments
Total Number of Units	2		
Existing Annual Electric Usage	23,191	kWh	
Proposed EER	13.0		(McQuay RCS 15) 11.5 max, 14.5 partial
Proposed Annual Electric Usage	12,487	kWh	Unit will cycle on w/ temp of room. Possible operating time shown below

ANNUAL SAVINGS		
Annual Savings	10,703	kWh
Annual Cost Savings	**$1,616**	
Simple Payback		

OAT - DB Bin Temp F	Annual Hours	Cooling Hrs at Temp Above balance point	Assumed % of time of	Assumed hrs of Operation
102.5	0	0	1	0
97.5	3	1	89%	1
92.5	34	16	79%	13
87.5	131	62	68%	43
82.5	500	238	58%	138
77.5	620	295	47%	140
72.5	664	316	37%	116
67.5	854	0	0%	0
62.5	927	0	0%	0
57.5	600	0	0%	0
52.5	610	0	0%	0
47.5	611	0	0%	0
42.5	656	0	0%	0
37.5	1,023	0	0%	0
32.5	734	0	0%	0
27.5	334	0	0%	0
22.5	252	0	0%	0
17.5	125	0	0%	0
12.5	47	0	0%	0
7.5	22	0	0%	0
2.5	13	0	0%	0
-2.5	0	0	0%	0
-7.5	0	0	0%	0
Total	8,760	930	49%	451

Kearny NJ
CHA #20711
Police & Water Department

ECM-6 Replace Rooftop Units

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Demo	2	ea		$ 1,100		$ -	$ 2,662	$ -	2,662	
Crane/Lift Rental & Operation	1	ls		$ 600	$ 1,500	$ -	$ 726	$ 1,635	2,361	
Electrical connections	2	ea	$ 350	$ 330		$ 686	$ 799	$ -	1,485	
Roof curb	2	ea	$ 450	$ 220		$ 882	$ 532	$ -	1,414	
15 Ton Packaged Air-Cooled Cmpresspr/Condenser	2	ea	$ 7,150	1775		$ 14,014	$ 4,296	$ -	18,310	
Misc	2	ea	$ 500	500		$ 980	$ 1,210	$ -	2,190	

Incentive	QTY	TONS	$ / TON	TOTAL SAVINGS	Cost W/O INCENTIVE	Cost W/ INCENTIVE
15 RTU	2	7.5	$73	$1,095	$38,369	$37,274
				$1,095	$38,369	$37,274

$ 28,422	Subtotal	
$ 5,684	20%	Contingency
$ 4,263	15%	Contractor O&P
$ -	0	Engineering
$ 38,369	**Total**	

Total ECM Cost w/ Incentives	**$37,274**

APPENDIX H

ECM-7 Lighting Replacements

Energy Audit of Kearny, NJ
CHA Project No. 20711 - Police/Water Department Building
ECM-7 Lighting Replacements

0 $0.125 $/kWh
$13.03 $/kW

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	NYSERDA Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * ($/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
226	OUTSIDE LIGHTS	11	70 W MH	MH70/1	95	1.0	Timer	4368	4,565	11	70 W MH	MH70/1	95	1.0	Timer	4,368	4,565	-	-	$ -	$ -	$0		
35	MAIN ENTRANCE	2	T 32 P F 3 (ELE)	F43ILL/2	90	0.2	Timer	4368	786	2	T 32 P F 3 (ELE)	F43ILL/2	90	0.2	Timer	4,368	786	-	-	$ -	$ -	$0		
117	MAIN ENTRANCE	4	CF 23	CFS23/1	23	0.1	Timer	4368	402	4	CF 23	CFS23/1	23	0.1	Timer	4,368	402	-	-	$ -	$ -	$0		
116	MAIN ENTRANCE	2	X 7.0 W 1	EI7.5/1	8	0.0	Breaker	8760	140	2	X 1.5C LED	ELED1.5/1	1.5	0.0	Breaker	8,760	26	114	0.0	$ 16.27	$ 237.50	$20	14.6	13.4
35	VESTIBULE	7	T 32 P F 3 (ELE)	F43ILL/2	90	0.6	SW	8760	5,519	7	T 32 P F 3 (ELE)	F43ILL/2	90	0.6	SW	8,760	5,519	-	-	$ -	$ -	$0		
53	DISPATCH	4	T 32 P F 2 (ELE)	F42LL	60	0.2	SW	8760	2,102	4	T 32 P F 2 (ELE)	F42LL	60	0.2	SW	8,760	2,102	-	-	$ -	$ -	$0		
116	DISPATCH	1	X 7.0 W 1	EI7.5/1	8	0.0	SW	8760	70	1	X 1.5C LED	ELED1.5/1	1.5	0.0	SW	8,760	13	57	0.0	$ 8.13	$ 118.75	$10	14.6	13.4
16	DISPATCH CLOSET	3	T 34 P F 2 (MAG)	F42EE	72	0.2	SW	8760	1,892	3	T 28 R F 2	F42SSILL	48	0.1	SW	8,760	1,261	631	0.1	$ 90.10	$ 318.75	$30	3.5	3.2
4	DISPATCH SHARED SPACE	1	2T 34 C F 2 (u) (MAG)	FU2EE	72	0.1	SW	8760	631	1	2T 17 R F 2 (ELE)	F22ILL	33	0.0	SW	8,760	289	342	0.0	$ 48.80	$ 101.25	$10	2.1	1.9
16	DISPATCH CLOSET #2	2	T 34 P F 2 (MAG)	F42EE	72	0.1	SW	1000	144	2	T 28 R F 2	F42SSILL	48	0.1	SW	1,000	96	48	0.0	$ 13.51	$ 212.50	$20	15.7	14.3
53	RECORDS	4	T 32 P F 2 (ELE)	F42LL	60	0.2	SW	2912	699	4	T 32 P F 2 (ELE)	F42LL	60	0.2	SW	2,912	699	-	-	$ -	$ -	$0		
53	RECORDS	4	T 32 P F 2 (ELE)	F42LL	60	0.2	SW	2912	699	4	T 32 P F 2 (ELE)	F42LL	60	0.2	SW	2,912	699	-	-	$ -	$ -	$0		
4	BR NEAR RECORDS	5	2T 34 C F 2 (u) (MAG)	FU2EE	72	0.4	SW	2080	749	5	2T 17 R F 2 (ELE)	F22ILL	33	0.2	SW	2,080	343	406	0.2	$ 81.19	$ 506.25	$50	6.2	5.6
201	RECORDS OFFICE	2	T 32 C F 3 (ELE)	F43ILL/2	90	0.2	SW	2912	524	2	T 32 C F 3 (ELE)	F43ILL/2	90	0.2	SW	2,912	524	-	-	$ -	$ -	$0		
204	A/C	1	S 96 C F 2 - 8'	F82EHE	207	0.2	SW	2912	603	1	(2) T 28 C F 2	F44ILL/2	118	0.1	SW	2,912	344	259	0.1	$ 46.31	$ 143.75	$30	3.1	2.5
53	CAPT	2	T 32 P F 2 (ELE)	F42LL	60	0.1	SW	2912	349	2	T 32 P F 2 (ELE)	F42LL	60	0.1	SW	2,912	349	-	-	$ -	$ -	$0		
53	CAPT	2	T 32 P F 2 (ELE)	F42LL	60	0.1	SW	2912	349	2	T 32 P F 2 (ELE)	F42LL	60	0.1	SW	2,912	349	-	-	$ -	$ -	$0		
6	MUSTER	4	T 34 R F 4 (MAG)	F44EE	144	0.6	SW	2912	1,677	4	T 28 R F 4	F44SSILL	96	0.4	SW	2,912	1,118	559	0.2	$ 99.91	$ 525.00	$80	5.3	4.5
6	MUSTER	4	T 34 R F 4 (MAG)	F44EE	144	0.6	SW	2912	1,677	4	T 28 R F 4	F44SSILL	96	0.4	SW	2,912	1,118	559	0.2	$ 99.91	$ 525.00	$80	5.3	4.5
53	MUSTER CLOSET	1	T 32 P F 2 (ELE)	F42LL	60	0.1	SW	1000	60	1	T 32 P F 2 (ELE)	F42LL	60	0.1	SW	1,000	60	-	-	$ -	$ -	$0		
18	KITCHEN	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	8760	1,962	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	8,760	1,962	-	-	$ -	$ -	$0		
18	STORAGE	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	1000	448	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	1,000	448	-	-	$ -	$ -	$0		
18	ID	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	2912	978	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	2,912	978	-	-	$ -	$ -	$0		
55	MAIN HALL	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	SW	8760	412	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	SW	8,760	412	-	-	$ -	$ -	$0		
55	MAIN HALL	3	2T 17 R F 3 (ELE)	F23ILL	47	0.1	Breaker	8760	1,235	3	2T 17 R F 3 (ELE)	F23ILL	47	0.1	Breaker	8,760	1,235	-	-	$ -	$ -	$0		
55	MAIN HALL	2	2T 17 R F 3 (ELE)	F23ILL	47	0.1	SW	8760	823	2	2T 17 R F 3 (ELE)	F23ILL	47	0.1	SW	8,760	823	-	-	$ -	$ -	$0		
55	MAIN HALL	3	2T 17 R F 3 (ELE)	F23ILL	47	0.1	Breaker	8760	1,235	3	2T 17 R F 3 (ELE)	F23ILL	47	0.1	Breaker	8,760	1,235	-	-	$ -	$ -	$0		
116	MAIN HALL	2	X 7.0 W 1	EI7.5/1	8	0.0	Breaker	8760	140	2	X 1.5C LED	ELED1.5/1	1.5	0.0	Breaker	8,760	26	114	0.0	$ 16.27	$ 237.50	$20	14.6	13.4
53	STORAGE NEAR LOCKERS	2	T 32 P F 2 (ELE)	F42LL	60	0.1	SW	1000	120	2	T 32 P F 2 (ELE)	F42LL	60	0.1	SW	1,000	120	-	-	$ -	$ -	$0		
204	STORAGE NEAR LOCKERS	2	S 96 C F 2 - 8'	F82EHE	207	0.4	SW	1000	414	2	(2) T 28 C F 2	F44ILL/2	118	0.2	SW	1,000	236	178	0.2	$ 50.08	$ 287.50	$60	5.7	4.5
204	STORAGE NEAR LOCKERS	3	S 96 C F 2 - 8'	F82EHE	207	0.6	SW	1000	621	3	(2) T 28 C F 2	F44ILL/2	118	0.4	SW	1,000	354	267	0.3	$ 75.12	$ 431.25	$90	5.7	4.5
4	STORAGE NEAR LOCKERS	3	2T 34 C F 2 (u) (MAG)	FU2EE	72	0.2	SW	1000	216	3	2T 17 R F 2 (ELE)	F22ILL	33	0.1	SW	1,000	99	117	0.1	$ 32.92	$ 303.75	$30	9.2	8.3
35	TRAFFIC	4	T 32 P F 3 (ELE)	F43ILL/2	90	0.4	SW	2912	1,048	4	T 32 P F 3 (ELE)	F43ILL/2	90	0.4	SW	2,912	1,048	-	-	$ -	$ -	$0		
65	TRAFFIC CLOSET	1	I 100	I100/1	100	0.1	SW	1000	100	1	CF 26	CFQ26/1-L	27	0.0	SW	1,000	27	73	0.1	$ 20.54	$ 37.50	$0	1.8	1.8
6	MENS LOCKERS	3	T 34 R F 4 (MAG)	F44EE	144	0.4	SW	8760	3,784	3	T 28 R F 4	F44SSILL	96	0.3	SW	8,760	2,523	1,261	0.1	$ 180.20	$ 393.75	$60	2.2	1.9
6	MENS LOCKERS	3	T 34 R F 4 (MAG)	F44EE	144	0.4	SW	8760	3,784	3	T 28 R F 4	F44SSILL	96	0.3	SW	8,760	2,523	1,261	0.1	$ 180.20	$ 393.75	$60	2.2	1.9
7	MENS LOCKERS	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	SW	8760	526	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	SW	8,760	526	-	-	$ -	$ -	$0		
4	MENS LOCKER BATH	1	2T 34 C F 2 (u) (MAG)	FU2EE	72	0.1	SW	8760	631	1	2T 17 R F 2 (ELE)	F22ILL	33	0.0	SW	8,760	289	342	0.0	$ 48.80	$ 101.25	$10	2.1	1.9
6	MENS LOCKER BATH	1	T 34 R F 4 (MAG)	F44EE	144	0.1	SW	8760	1,261	1	T 28 R F 4	F44SSILL	96	0.1	SW	8,760	841	420	0.0	$ 60.07	$ 131.25	$20	2.2	1.9
18	WOMENS LOCKERS	1	T 32 R F 4 (ELE)	F44ILL	112	0.1	SW	8760	981	1	T 32 R F 4 (ELE)	F44ILL	112	0.1	SW	8,760	981	-	-	$ -	$ -	$0		
5	DWI	1	2T 32 P F 2 (u) (ELE)	FU2LL	60	0.1	SW	2912	175	1	2T 32 P F 2 (u) (ELE)	FU2LL	60	0.1	SW	2,912	175	-	-	$ -	$ -	$0		
204	GYM	4	S 96 C F 2 - 8'	F82EHE	207	0.8	SW	2912	2,411	4	(2) T 28 C F 2	F44ILL/2	118	0.5	SW	2,912	1,374	1,037	0.4	$ 185.25	$ 575.00	$120	3.1	2.5
73	CELL BLOCK CELLS	8	2 I 60	I60/2	120	1.0	SW	2912	2,796	8	2 CF 26	CFQ26/2-L	50	0.4	SW	2,912	1,165	1,631	0.6	$ 291.40	$ 200.00	$0	0.7	0.7
71	CELL BLOCK ROOMS	4	I 60	I60/1	60	0.2	SW	2912	699	4	CF 26	CFQ26/1-L	27	0.1	SW	2,912	314	384	0.1	$ 68.69	$ 25.00	$0	0.4	0.4
73	CELL BLOCK HALL	5	2 I 60	I60/2	120	0.6	SW	8760	5,256	5	2 CF 26	CFQ26/2-L	50	0.3	SW	8,760	2,190	3,066	0.4	$ 437.98	$ 125.00	$0	0.3	0.3
116	CELL BLOCK	1	X 7.0 W 1	EI7.5/1	8	0.0	Breaker	2912	23	1	X 1.5C LED	ELED1.5/1	1.5	0.0	Breaker	2,912	4	19	0.0	$ 3.38	$ 118.75	$10	35.1	32.2
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8,760	2,102	-	-	$ -	$ -	$0		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8,760	2,102	-	-	$ -	$ -	$0		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8,760	2,102	-	-	$ -	$ -	$0		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8,760	2,102	-	-	$ -	$ -	$0		
32	POLICE GARAGE	2	1T 32 P F 2 (MAG)	F42LL	60	0.1	SW	8760	1,051	2	1T 32 P F 2 (MAG)	F42LL	60	0.1	SW	8,760	1,051	-	-	$ -	$ -	$0		
32	POLICE GARAGE	6	1T 32 P F 2 (MAG)	F42LL	60	0.4	SW	8760	3,154	6	1T 32 P F 2 (MAG)	F42LL	60	0.4	SW	8,760	3,154	-	-	$ -	$ -	$0		
32	POLICE GARAGE	8	1T 32 P F 2 (MAG)	F42LL	60	0.5	SW	8760	4,205	8	1T 32 P F 2 (MAG)	F42LL	60	0.5	SW	8,760	4,205	-	-	$ -	$ -	$0		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8,760	2,102	-	-	$ -	$ -	$0		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8,760	2,102	-	-	$ -	$ -	$0		
32	POLICE GARAGE	6	1T 32 P F 2 (MAG)	F42LL	60	0.4	SW	8760	3,154	6	1T 32 P F 2 (MAG)	F42LL	60	0.4	SW	8,760	3,154	-	-	$ -	$ -	$0		
32	POLICE GARAGE	6	1T 32 P F 2 (MAG)	F42LL	60	0.4	SW	8760	3,154	6	1T 32 P F 2 (MAG)	F42LL	60	0.4	SW	8,760	3,154	-	-	$ -	$ -	$0		
32	POLICE GARAGE	6	1T 32 P F 2 (MAG)	F42LL	60	0.4	SW	8760	3,154	6	1T 32 P F 2 (MAG)	F42LL	60	0.4	SW	8,760	3,154	-	-	$ -	$ -	$0		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8,760	2,102	-	-	$ -	$ -	$0		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8,760	2,102	-	-	$ -	$ -	$0		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8,760	2,102	-	-	$ -	$ -	$0		
32	POLICE GARAGE	36	1T 32 P F 2 (MAG)	F42LL	60	2.2	Breaker	8760	18,922	36	1T 32 P F 2 (MAG)	F42LL	60	2.2	Breaker	8,760	18,922	-	-	$ -	$ -	$0		
116	2ND FLOOR FLAG POLE RM	4	X 7.0 W 1	EI7.5/1	8	0.0	Breaker	8760	280	4	X 1.5C LED	ELED1.5/1	1.5	0.0	Breaker	8,760	53	228	0.0	$ 32.54	$ 475.00	$40	14.6	13.4
53	POLICE GARAGE OFFICE	3	T 32 P F 2 (ELE)	F42LL	60	0.2	SW	2912	524	3	T 32 P F 2 (ELE)	F42LL	60	0.2	SW	2,912	524	-	-	$ -	$ -	$0		
180	DB CAPT	2	T 32 P F 4 (ELE)	F44ILL	112	0.2	SW	2912	652	2	T 28 C F 4	F43SSILL	72	0.1	SW	2,912	419	233	0.1	$ 41.63	$ 256.50	$0	6.2	6.2
18	DETECTIVE BUREAU	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2912	1,957	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2,912	1,957	-	-	$ -	$ -	$0		
4	MAIN ENTRANCE	2	2T 34 C F 2 (u) (MAG)	FU2EE	72	0.1	SW	2912	419	2	2T 17 R F 2 (ELE)	F22ILL	33	0.1	SW	2,912	192	227	0.1	$ 40.59	$ 202.50	$20	5.0	4.5
53	UTILITY RM	1	T 32 P F 2 (ELE)	F42LL	60	0.1	SW	2912	175	1	T 32 P F 2 (ELE)	F42LL	60	0.1	SW	2,912	175	-	-	$ -	$ -	$0		
204	CHIEF OFFICE #1	2	S 96 C F 2 - 8'	F82EHE	207	0.4	Breaker	2912	1,206	2	(2) T 28 C F 2	F44ILL/2	118	0.2	Breaker	2,912	687	518	0.2	$ 92.62	$ 287.50	$60	3.1	2.5
204	CHIEF OFFICE #2	2	S 96 C F 2 - 8'	F82EHE	207	0.4	Breaker	2912	1,206	2	(2) T 28 C F 2	F44ILL/2	118	0.2	Breaker	2,912	687	518	0.2	$ 92.62	$ 287.50	$60	3.1	2.5
7	STAIRWELL #1	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	SW	8760	526	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	SW	8,760	526	-	-	$ -	$ -	$0		
7	STAIRWELL #1	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	SW	8760	526	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	SW	8,760	526	-	-	$ -	$ -	$0		
225	OUTSIDE LIGHT	2	70 High Pressure Sodium	HPS70/1	95	0.2	Timer	4368	830	2	70 High Pressure Sodium	HPS70/1	95	0.2	Timer	4,368	830	-	-	$ -	$ -	$0		
204	WD GARAGE	4	S 96 C F 2 - 8'	F82EHE	207	0.8	SW	3640	3,014	4	(2) T 28 C F 2	F44ILL/2	118	0.5	SW	3,640	1,718	1,296	0.4	$ 217.64	$ 575.00	$120	2.6	2.1
204	WD GARAGE	4	S 96 C F 2 - 8'	F82EHE	207	0.8	Breaker	3640	3,014	4	(2) T 28 C F 2	F44ILL/2	118	0.5	Breaker	3,640	1,718	1,296	0.4	$ 217.64	$ 575.00	$120	2.6	2.1
204	WD GARAGE	3	S 96 C F 2 - 8'	F82EHE	207	0.6	SW	3640	2,260	3	(2) T 28 C F 2	F44ILL/2	118	0.4	SW	3,640	1,289	972	0.3	$ 163.23	$ 431.25	$90	2.6	2.1
204	WD GARAGE	4	S 96 C F 2 - 8'	F82EHE	207	0.8	SW	3640	3,014	4	(2) T 28 C F 2	F44ILL/2	118	0.5	SW	3,640	1,718	1,296	0.4	$ 217.64	$ 575.00	$120	2.6	2.1
204	WD GARAGE	3	S 96 C F 2 - 8'	F82EHE	207	0.6	SW	3640	2,260	3	(2) T 28 C F 2	F44ILL/2	118	0.4	SW	3,640	1,289	972	0.3	$ 163.23	$ 431.25	$90	2.6	2.1
204	WD GARAGE	4	S 96 C F 2 - 8'	F82EHE	207	0.8	Breaker	3640	3,014	4	(2) T 28 C F 2	F44ILL/2	118	0.5	Breaker	3,640	1,718	1,296	0.4	$ 217.64	$ 575.00	$120	2.6	2.1
204	WD GARAGE	3	S 96 C F 2 - 8'	F82EHE	207	0.6	SW	3640	2,260	3	(2) T 28 C F 2	F44ILL/2	118	0.4	SW	3,640	1,289	972	0.3	$ 163.23	$ 431.25	$90	2.6	2.1
204	WD GARAGE	3	S 96 C F 2 - 8'	F82EHE	207	0.6	SW	3640	2,260	3	(2) T 28 C F 2	F44ILL/2	118	0.4	SW	3,640	1,289	972	0.3	$ 163.23	$ 431.25	$90	2.6	2.1
204	WD GARAGE	5	S 96 C F 2 - 8'	F82EHE	207	1.0	SW	3640	3,767	5	(2) T 28 C F 2	F44ILL/2	118	0.6	SW	3,640	2,148	1,620	0.4	$ 272.06	$ 718.75	$150	2.6	2.1
204	WD GARAGE	5	S 96 C F 2 - 8'	F82EHE	207	1.0	SW	3640	3,767	5	(2) T 28 C F 2	F44ILL/2	118	0.6	SW	3,640	2,148	1,620	0.4	$ 272.06	$ 718.75	$150	2.6	2.1
204	WD GARAGE	6	S 96 C F 2 - 8'	F82EHE	207	1.2	SW	3640	4,521	6	(2) T 28 C F 2	F44ILL/2	118	0.7	SW	3,640	2,577	1,944	0.5	$ 326.47	$ 862.50	$180	2.6	2.1
204	WD GARAGE	6	S 96 C F 2 - 8'	F82EHE	207	1.2	SW	3640	4,521	6	(2) T 28 C F 2	F44ILL/2	118	0.7	SW	3,640	2,577	1,944	0.5	$ 326.47	$ 862.50	$180	2.6	2.1
204	WD BREAK RM	2	S 96 C F 2 - 8'	F82EHE	207	0.4	SW	2912	1,206	2	(2) T 28 C F 2	F44ILL/2	118	0.2	SW	2,912	687	518	0.2	$ 92.62	$ 287.50	$60	3.1	2.5
204	WD STOCK RM	2	S 96 C F 2 - 8'	F82EHE	207	0.4	SW	2912	1,206	2	(2) T 28 C F 2	F44ILL/2	118	0.2	SW	2,912	687	518	0.2	$ 92.62	$ 287.50	$60	3.1	2.5
204	WD STOCK RM FILES	6	S 96 C F 2 - 8'	F82EHE	207	1.2	SW	2912	3,617	6	(2) T 28 C F 2	F44ILL/2	118	0.7	SW	2,912	2,062	1,555	0.5	$ 277.87	$ 862.50	$180	3.1	2.5
X1	WD STOCK RM FILES	2	X 1.5 W LED	ELED1.5/1	1.5	0.0	Breaker	2912	9	2	X 1.5 W LED	ELED1.5/1	1.5	0.0	Breaker	2,912	9	-	-	$ -	$ -	$0		

Energy Audit of Kearny, NJ

CHA Project No. 20711 - Police/Water Department Building 0 $0.125 $/kWh

ECM-7 Lighting Replacements $13.03 $/kW

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	NYSERDA Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(I) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * ($/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
54	WD BR #1	1	T 34 C F 1 (MAG)	F41EE	43	0.0	SW	2080	89	1	S 28 W F 1	F41SSILL	26	0.0	SW	2,080	54	35	0.0	$ 7.08	$ 141.75	$0	20.0	20.0
6	WD BR #2	1	T 34 R F 4 (MAG)	F44EE	144	0.1	SW	2080	300	1	T 28 R F 4	F44SSILL	96	0.1	SW	2,080	200	100	0.0	$ 19.99	$ 131.25	$20	6.6	5.6
4	WD BR #2	1	2T 34 C F 2 (u) (MAG)	FU2EE	72	0.1	SW	2080	150	1	2T 17 R F 2 (ELE)	F22ILL	33	0.0	SW	2,080	69	81	0.0	$ 16.24	$ 101.25	$10	6.2	5.6
6	WD BR #2	1	T 34 R F 4 (MAG)	F44EE	144	0.1	SW	2080	300	1	T 28 R F 4	F44SSILL	96	0.1	SW	2,080	200	100	0.0	$ 19.99	$ 131.25	$20	6.6	5.6
65	WD CLOSET	1	I 100	I100/1	100	0.1	SW	1000	100	1	CF 26	CFQ26/1-L	27	0.0	SW	1,000	27	73	0.1	$ 20.54	$ 37.50	$0	1.8	1.8
18	WD OPEN OFFICE AREA	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	2912	978	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	2,912	978	-	-	$ -	$ -	$0		
18	WD OPEN OFFICE AREA	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2912	1,305	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2,912	1,305	-	-	$ -	$ -	$0		
18	WD OPEN OFFICE AREA	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2912	1,957	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2,912	1,957	-	-	$ -	$ -	$0		
X1	WD OPEN OFFICE AREA	3	X 1.5 W LED	ELED1.5/1	1.5	0.0	SW	2912	13	3	X 1.5 W LED	ELED1.5/1	1.5	0.0	SW	2,912	13	-	-	$ -	$ -	$0		
42	WD OPEN OFFICE AREA	1	T 32 C F 1 (ELE)	F41LL	32	0.0	SW	2080	67	1	T 32 C F 1 (ELE)	F41LL	32	0.0	SW	2,080	67	-	-	$ -	$ -	$0		
18	WD OFFICE #1	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2912	652	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2,912	652	-	-	$ -	$ -	$0		
18	WD OFFICE #1	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2912	652	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2,912	652	-	-	$ -	$ -	$0		
18	WD OFFICE #2	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2912	652	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2,912	652	-	-	$ -	$ -	$0		
18	WD OFFICE #2	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2912	652	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2,912	652	-	-	$ -	$ -	$0		
	Total	**358**				**36.7**			**171,310**	**358**			**7,611**	**27**			**137,262**	**34,048**	**9.4**	**$5,723**	**$16,727**	**$2,840**		
																	Demand Savings			**9.4**	**$1,467**			
																	kWh Savings			**34,048**	**$4,256**			
																	Total savings				**$5,723**		**2.9**	**2.4**

APPENDIX I

ECM-8 Install Occupancy Sensors

Energy Audit of Kearny, NJ

CHA Project No. 20711 - Police/Water Department Building **0** **$0.125 $/kWh**

ECM-8 Install Occupancy Sensors **$13.03 $/kW**

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	NYSERDA Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kW Saved) * ($/kWh)	Cost for renovations to lighting system		Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
226	OUTSIDE LIGHTS	11	70 W MH	MH70/1	95	1.0	Timer	4368	4,564.6	11	70 W MH	MH70/1	95	1.0	None	4368	4,564.6	0.0	0.0	$0.00	$0.00	$0.00		
35	MAIN ENTRANCE	2	T 32 P F 3 (ELE)	F43ILL/2	90	0.2	Timer	4368	786.2	2	T 32 P F 3 (ELE)	F43ILL/2	90	0.2	None	4368	786.2	0.0	0.0	$0.00	$0.00	$0.00		
117	MAIN ENTRANCE	4	CF 23	CFS23/1	23	0.1	Timer	4368	401.9	4	CF 23	CFS23/1	23	0.1	None	4368	401.9	0.0	0.0	$0.00	$0.00	$0.00		
116	MAIN ENTRANCE	2	X 7.0 W 1	EI7.5/1	8	0.0	Breaker	8760	140.2	2	X 7.0 W 1	EI7.5/1	8	0.0	None	8760	140.2	0.0	0.0	$0.00	$0.00	$0.00		
35	VESTIBULE	7	T 32 P F 3 (ELE)	F43ILL/2	90	0.6	SW	8760	5,518.8	7	T 32 P F 3 (ELE)	F43ILL/2	90	0.6	None	8760	5,518.8	0.0	0.0	$0.00	$0.00	$0.00		
53	DISPATCH	4	T 32 P F 2 (ELE)	F42LL	60	0.2	SW	8760	2,102.4	4	T 32 P F 2 (ELE)	F42LL	60	0.2	None	8760	2,102.4	0.0	0.0	$0.00	$0.00	$0.00		
116	DISPATCH	1	X 7.0 W 1	EI7.5/1	8	0.0	SW	8760	70.1	1	X 7.0 W 1	EI7.5/1	8	0.0	None	8760	70.1	0.0	0.0	$0.00	$0.00	$0.00		
16	DISPATCH CLOSET	3	T 34 P F 2 (MAG)	F42EE	72	0.2	SW	8760	1,892.2	3	T 34 P F 2 (MAG)	F42EE	72	0.2	None	8760	1,892.2	0.0	0.0	$0.00	$0.00	$0.00		
4	DISPATCH SHARED SPACE	1	2T 34 C F 2 (u) (MAG)	FU2EE	72	0.1	SW	8760	630.7	1	2T 34 C F 2 (u) (MAG)	FU2EE	72	0.1	None	8760	630.7	0.0	0.0	$0.00	$0.00	$0.00		
16	DISPATCH CLOSET #2	2	T 34 P F 2 (MAG)	F42EE	72	0.1	SW	1000	144.0	2	T 34 P F 2 (MAG)	F42EE	72	0.1	None	1000	144.0	0.0	0.0	$0.00	$0.00	$0.00		
53	RECORDS	4	T 32 P F 2 (ELE)	F42LL	60	0.2	SW	2912	698.9	4	T 32 P F 2 (ELE)	F42LL	60	0.2	None	2912	698.9	0.0	0.0	$0.00	$0.00	$0.00		
53	RECORDS	4	T 32 P F 2 (ELE)	F42LL	60	0.2	SW	2912	698.9	4	T 32 P F 2 (ELE)	F42LL	60	0.2	None	2912	698.9	0.0	0.0	$0.00	$0.00	$0.00		
4	BR NEAR RECORDS	5	2T 34 C F 2 (u) (MAG)	FU2EE	72	0.4	SW	2080	748.8	5	2T 34 C F 2 (u) (MAG)	FU2EE	72	0.4	None	2080	748.8	0.0	0.0	$0.00	$0.00	$0.00		
201	RECORDS OFFICE	2	T 32 C F 3 (ELE)	F43ILL/2	90	0.2	SW	2912	524.2	2	T 32 C F 3 (ELE)	F43ILL/2	90	0.2	None	2912	524.2	0.0	0.0	$0.00	$0.00	$0.00		
204	A/C	1	S 96 C F 2 - 8'	F82EHE	207	0.2	SW	2912	602.8	1	S 96 C F 2 - 8'	F82EHE	207	0.2	None	2912	602.8	0.0	0.0	$0.00	$0.00	$0.00		
53	CAPT	2	T 32 P F 2 (ELE)	F42LL	60	0.1	SW	2912	349.4	2	T 32 P F 2 (ELE)	F42LL	60	0.1	OCC	1456	174.7	174.7	0.0	$21.84	$118.75	$40.00	5.4	3.6
53	CAPT	2	T 32 P F 2 (ELE)	F42LL	60	0.1	SW	2912	349.4	2	T 32 P F 2 (ELE)	F42LL	60	0.1	OCC	1456	174.7	174.7	0.0	$21.84	$118.75	$20.00	5.4	4.5
6	MUSTER	4	T 34 R F 4 (MAG)	F44EE	144	0.6	SW	2912	1,677.3	4	T 34 R F 4 (MAG)	F44EE	144	0.6	None	2912	1,677.3	0.0	0.0	$0.00	$0.00	$0.00		
6	MUSTER	4	T 34 R F 4 (MAG)	F44EE	144	0.6	SW	2912	1,677.3	4	T 34 R F 4 (MAG)	F44EE	144	0.6	None	2912	1,677.3	0.0	0.0	$0.00	$0.00	$0.00		
53	MUSTER CLOSET	1	T 32 P F 2 (ELE)	F42LL	60	0.1	SW	1000	60.0	1	T 32 P F 2 (ELE)	F42LL	60	0.1	None	1000	60.0	0.0	0.0	$0.00	$0.00	$0.00		
18	KITCHEN	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	8760	1,962.2	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	None	8760	1,962.2	0.0	0.0	$0.00	$0.00	$0.00		
18	STORAGE	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	1000	448.0	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	None	1000	448.0	0.0	0.0	$0.00	$0.00	$0.00		
18	ID	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	2912	978.4	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	OCC	1456	489.2	489.2	0.0	$61.15	$118.75	$40.00	1.9	1.3
55	MAIN HALL	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	SW	8760	411.7	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	None	8760	411.7	0.0	0.0	$0.00	$0.00	$0.00		
55	MAIN HALL	3	2T 17 R F 3 (ELE)	F23ILL	47	0.1	Breaker	8760	1,235.2	3	2T 17 R F 3 (ELE)	F23ILL	47	0.1	None	8760	1,235.2	0.0	0.0	$0.00	$0.00	$0.00		
55	MAIN HALL	2	2T 17 R F 3 (ELE)	F23ILL	47	0.1	SW	8760	823.4	2	2T 17 R F 3 (ELE)	F23ILL	47	0.1	None	8760	823.4	0.0	0.0	$0.00	$0.00	$0.00		
55	MAIN HALL	3	2T 17 R F 3 (ELE)	F23ILL	47	0.1	Breaker	8760	1,235.2	3	2T 17 R F 3 (ELE)	F23ILL	47	0.1	None	8760	1,235.2	0.0	0.0	$0.00	$0.00	$0.00		
116	MAIN HALL	2	X 7.0 W 1	EI7.5/1	8	0.0	Breaker	8760	140.2	2	X 7.0 W 1	EI7.5/1	8	0.0	None	8760	140.2	0.0	0.0	$0.00	$0.00	$0.00		
53	STORAGE NEAR LOCKERS	2	T 32 P F 2 (ELE)	F42LL	60	0.1	SW	1000	120.0	2	T 32 P F 2 (ELE)	F42LL	60	0.1	None	1000	120.0	0.0	0.0	$0.00	$0.00	$0.00		
204	STORAGE NEAR LOCKERS	2	S 96 C F 2 - 8'	F82EHE	207	0.4	SW	1000	414.0	2	S 96 C F 2 - 8'	F82EHE	207	0.4	None	1000	414.0	0.0	0.0	$0.00	$0.00	$0.00		
204	STORAGE NEAR LOCKERS	3	S 96 C F 2 - 8'	F82EHE	207	0.6	SW	1000	621.0	3	S 96 C F 2 - 8'	F82EHE	207	0.6	None	1000	621.0	0.0	0.0	$0.00	$0.00	$0.00		
4	STORAGE NEAR LOCKERS	3	2T 34 C F 2 (u) (MAG)	FU2EE	72	0.2	SW	1000	216.0	3	2T 34 C F 2 (u) (MAG)	FU2EE	72	0.2	OCC	1820	393.1	-177.1	0.0	-$22.14	$118.75	$20.00		
35	TRAFFIC	4	T 32 P F 3 (ELE)	F43ILL/2	90	0.4	SW	2912	1,048.3	4	T 32 P F 3 (ELE)	F43ILL/2	90	0.4	C-OCC	1820	655.2	393.1	0.0	$49.14	$187.50	$35.00	3.8	3.1
65	TRAFFIC CLOSET	1	I 100	I100/1	100	0.1	SW	1000	100.0	1	I 100	I100/1	100	0.1	C-OCC	1456	145.6	-45.6	0.0	-$5.70	$187.50	$35.00		
6	MENS LOCKERS	3	T 34 R F 4 (MAG)	F44EE	144	0.4	SW	8760	3,784.3	3	T 34 R F 4 (MAG)	F44EE	144	0.4	None	8760	3,784.3	0.0	0.0	$0.00	$0.00	$0.00		
6	MENS LOCKERS	3	T 34 R F 4 (MAG)	F44EE	144	0.4	SW	8760	3,784.3	3	T 34 R F 4 (MAG)	F44EE	144	0.4	C-OCC	1456	629.0	3,155.3	0.0	$394.42	$187.50	$35.00	0.5	0.4
7	MENS LOCKERS	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	SW	8760	525.6	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	None	8760	525.6	0.0	0.0	$0.00	$0.00	$0.00		
4	MENS LOCKER BATH	1	2T 34 C F 2 (u) (MAG)	FU2EE	72	0.1	SW	8760	630.7	1	2T 34 C F 2 (u) (MAG)	FU2EE	72	0.1	OCC	500	36.0	594.7	0.0	$74.34	$118.75	$20.00	1.6	1.3
6	MENS LOCKER BATH	1	T 34 R F 4 (MAG)	F44EE	144	0.1	SW	8760	1,261.4	1	T 34 R F 4 (MAG)	F44EE	144	0.1	None	8760	1,261.4	0.0	0.0	$0.00	$0.00	$0.00		
18	WOMENS LOCKERS	1	T 32 R F 4 (ELE)	F44ILL	112	0.1	SW	8760	981.1	1	T 32 R F 4 (ELE)	F44ILL	112	0.1	None	8760	981.1	0.0	0.0	$0.00	$0.00	$0.00		
5	DWI	1	2T 32 P F 2 (u) (ELE)	FU2LL	60	0.1	SW	2912	174.7	1	2T 32 P F 2 (u) (ELE)	FU2LL	60	0.1	None	2912	174.7	0.0	0.0	$0.00	$0.00	$0.00		
204	GYM	4	S 96 C F 2 - 8'	F82EHE	207	0.8	SW	2912	2,411.1	4	S 96 C F 2 - 8'	F82EHE	207	0.8	None	2912	2,411.1	0.0	0.0	$0.00	$0.00	$0.00		
73	CELL BLOCK CELLS	8	2 I 60	I60/2	120	1.0	SW	2912	2,795.5	8	2 I 60	I60/2	120	1.0	None	2912	2,795.5	0.0	0.0	$0.00	$0.00	$0.00		
71	CELL BLOCK ROOMS	4	I 60	I60/1	60	0.2	SW	2912	698.9	4	I 60	I60/1	60	0.2	None	2912	698.9	0.0	0.0	$0.00	$0.00	$0.00		
73	CELL BLOCK HALL	5	2 I 60	I60/2	120	0.6	SW	8760	5,256.0	5	2 I 60	I60/2	120	0.6	None	8760	5,256.0	0.0	0.0	$0.00	$0.00	$0.00		
116	CELL BLOCK	1	X 7.0 W 1	EI7.5/1	8	0.0	Breaker	2912	23.3	1	X 7.0 W 1	EI7.5/1	8	0.0	None	2912	23.3	0.0	0.0	$0.00	$0.00	$0.00		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102.4	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	None	8760	2,102.4	0.0	0.0	$0.00	$0.00	$0.00		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102.4	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	None	8760	2,102.4	0.0	0.0	$0.00	$0.00	$0.00		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102.4	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	None	8760	2,102.4	0.0	0.0	$0.00	$0.00	$0.00		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102.4	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	None	8760	2,102.4	0.0	0.0	$0.00	$0.00	$0.00		
32	POLICE GARAGE	2	1T 32 P F 2 (MAG)	F42LL	60	0.1	SW	8760	1,051.2	2	1T 32 P F 2 (MAG)	F42LL	60	0.1	None	8760	1,051.2	0.0	0.0	$0.00	$0.00	$0.00		
32	POLICE GARAGE	6	1T 32 P F 2 (MAG)	F42LL	60	0.4	SW	8760	3,153.6	6	1T 32 P F 2 (MAG)	F42LL	60	0.4	None	8760	3,153.6	0.0	0.0	$0.00	$0.00	$0.00		
32	POLICE GARAGE	8	1T 32 P F 2 (MAG)	F42LL	60	0.5	SW	8760	4,204.8	8	1T 32 P F 2 (MAG)	F42LL	60	0.5	None	8760	4,204.8	0.0	0.0	$0.00	$0.00	$0.00		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102.4	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	None	8760	2,102.4	0.0	0.0	$0.00	$0.00	$0.00		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102.4	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	None	8760	2,102.4	0.0	0.0	$0.00	$0.00	$0.00		
32	POLICE GARAGE	6	1T 32 P F 2 (MAG)	F42LL	60	0.4	SW	8760	3,153.6	6	1T 32 P F 2 (MAG)	F42LL	60	0.4	None	8760	3,153.6	0.0	0.0	$0.00	$0.00	$0.00		
32	POLICE GARAGE	6	1T 32 P F 2 (MAG)	F42LL	60	0.4	SW	8760	3,153.6	6	1T 32 P F 2 (MAG)	F42LL	60	0.4	None	8760	3,153.6	0.0	0.0	$0.00	$0.00	$0.00		
32	POLICE GARAGE	6	1T 32 P F 2 (MAG)	F42LL	60	0.4	SW	8760	3,153.6	6	1T 32 P F 2 (MAG)	F42LL	60	0.4	None	8760	3,153.6	0.0	0.0	$0.00	$0.00	$0.00		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102.4	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	None	8760	2,102.4	0.0	0.0	$0.00	$0.00	$0.00		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102.4	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	None	8760	2,102.4	0.0	0.0	$0.00	$0.00	$0.00		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102.4	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	None	8760	2,102.4	0.0	0.0	$0.00	$0.00	$0.00		
32	POLICE GARAGE	36	1T 32 P F 2 (MAG)	F42LL	60	2.2	Breaker	8760	18,921.6	36	1T 32 P F 2 (MAG)	F42LL	60	2.2	None	8760	18,921.6	0.0	0.0	$0.00	$0.00	$0.00		
116	2ND FLOOR FLAG POLE RM	4	X 7.0 W 1	EI7.5/1	8	0.0	Breaker	8760	280.3	4	X 7.0 W 1	EI7.5/1	8	0.0	None	8760	280.3	0.0	0.0	$0.00	$0.00	$0.00		
53	POLICE GARAGE OFFICE	3	T 32 P F 2 (ELE)	F42LL	60	0.2	SW	2912	524.2	3	T 32 P F 2 (ELE)	F42LL	60	0.2	None	2912	524.2	0.0	0.0	$0.00	$0.00	$0.00		
180	DB CAPT	2	T 32 P F 4 (ELE)	F44ILL	112	0.2	SW	2912	652.3	2	T 32 P F 4 (ELE)	F44ILL	112	0.2	None	2912	652.3	0.0	0.0	$0.00	$0.00	$0.00		
18	DETECTIVE BUREAU	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2912	1,956.9	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	C-OCC	1456	978.4	978.4	0.0	$122.30	$187.50	$35.00	1.5	1.2
4	MAIN ENTRANCE	2	2T 34 C F 2 (u) (MAG)	FU2EE	72	0.1	SW	2912	419.3	2	2T 34 C F 2 (u) (MAG)	FU2EE	72	0.1	C-OCC	1456	209.7	209.7	0.0	$26.21	$187.50	$35.00	7.2	5.8
53	UTILITY RM	1	T 32 P F 2 (ELE)	F42LL	60	0.1	SW	2912	174.7	1	T 32 P F 2 (ELE)	F42LL	60	0.1	None	2912	174.7	0.0	0.0	$0.00	$0.00	$0.00		
204	CHIEF OFFICE #1	2	S 96 C F 2 - 8'	F82EHE	207	0.4	Breaker	2912	1,205.6	2	S 96 C F 2 - 8'	F82EHE	207	0.4	None	2912	1,205.6	0.0	0.0	$0.00	$0.00	$0.00		
204	CHIEF OFFICE #2	2	S 96 C F 2 - 8'	F82EHE	207	0.4	Breaker	2912	1,205.6	2	S 96 C F 2 - 8'	F82EHE	207	0.4	None	2912	1,205.6	0.0	0.0	$0.00	$0.00	$0.00		
7	STAIRWELL #1	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	SW	8760	525.6	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	None	8760	525.6	0.0	0.0	$0.00	$0.00	$0.00		
7	STAIRWELL #1	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	SW	8760	525.6	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	None	8760	525.6	0.0	0.0	$0.00	$0.00	$0.00		
225	OUTSIDE LIGHT	2	70 High Pressure Sodium	HPS70/1	95	0.2	Timer	4368	829.9	2	70 High Pressure Sodium	HPS70/1	95	0.2	None	4368	829.9	0.0	0.0	$0.00	$0.00	$0.00		
204	WD GARAGE	4	S 96 C F 2 - 8'	F82EHE	207	0.8	SW	3640	3,013.9	4	S 96 C F 2 - 8'	F82EHE	207	0.8	None	3640	3,013.9	0.0	0.0	$0.00	$0.00	$0.00		
204	WD GARAGE	4	S 96 C F 2 - 8'	F82EHE	207	0.8	Breaker	3640	3,013.9	4	S 96 C F 2 - 8'	F82EHE	207	0.8	None	3640	3,013.9	0.0	0.0	$0.00	$0.00	$0.00		
204	WD GARAGE	3	S 96 C F 2 - 8'	F82EHE	207	0.6	SW	3640	2,260.4	3	S 96 C F 2 - 8'	F82EHE	207	0.6	None	3640	2,260.4	0.0	0.0	$0.00	$0.00	$0.00		
204	WD GARAGE	4	S 96 C F 2 - 8'	F82EHE	207	0.8	SW	3640	3,013.9	4	S 96 C F 2 - 8'	F82EHE	207	0.8	None	3640	3,013.9	0.0	0.0	$0.00	$0.00	$0.00		
204	WD GARAGE	3	S 96 C F 2 - 8'	F82EHE	207	0.6	SW	3640	2,260.4	3	S 96 C F 2 - 8'	F82EHE	207	0.6	None	3640	2,260.4	0.0	0.0	$0.00	$0.00	$0.00		
204	WD GARAGE	4	S 96 C F 2 - 8'	F82EHE	207	0.8	Breaker	3640	3,013.9	4	S 96 C F 2 - 8'	F82EHE	207	0.8	None	3640	3,013.9	0.0	0.0	$0.00	$0.00	$0.00		
204	WD GARAGE	3	S 96 C F 2 - 8'	F82EHE	207	0.6	SW	3640	2,260.4	3	S 96 C F 2 - 8'	F82EHE	207	0.6	None	3640	2,260.4	0.0	0.0	$0.00	$0.00	$0.00		
204	WD GARAGE	3	S 96 C F 2 - 8'	F82EHE	207	0.6	SW	3640	2,260.4	3	S 96 C F 2 - 8'	F82EHE	207	0.6	None	3640	2,260.4	0.0	0.0	$0.00	$0.00	$0.00		
204	WD GARAGE	5	S 96 C F 2 - 8'	F82EHE	207	1.0	SW	3640	3,767.4	5	S 96 C F 2 - 8'	F82EHE	207	1.0	None	3640	3,767.4	0.0	0.0	$0.00	$0.00	$0.00		
204	WD GARAGE	5	S 96 C F 2 - 8'	F82EHE	207	1.0	SW	3640	3,767.4	5	S 96 C F 2 - 8'	F82EHE	207	1.0	None	3640	3,767.4	0.0	0.0	$0.00	$0.00	$0.00		
204	WD GARAGE	6	S 96 C F 2 - 8'	F82EHE	207	1.2	SW	3640	4,520.9	6	S 96 C F 2 - 8'	F82EHE	207	1.2	None	3640	4,520.9	0.0	0.0	$0.00	$0.00	$0.00		
204	WD GARAGE	6	S 96 C F 2 - 8'	F82EHE	207	1.2	SW	3640	4,520.9	6	S 96 C F 2 - 8'	F82EHE	207	1.2	None	3640	4,520.9	0.0	0.0	$0.00	$0.00	$0.00		
204	WD BREAK RM	2	S 96 C F 2 - 8'	F82EHE	207	0.4	SW	2912	1,205.6	2	S 96 C F 2 - 8'	F82EHE	207	0.4	OCC	1456	602.8	602.8	0.0	$75.35	$118.75	$20.00	1.6	1.3
204	WD STOCK RM	2	S 96 C F 2 - 8'	F82EHE	207	0.4	SW	2912	1,205.6	2	S 96 C F 2 - 8'	F82EHE	207	0.4	None	2912	1,205.6	0.0	0.0	$0.00	$0.00	$0.00		
204	WD STOCK RM FILES	6	S 96 C F 2 - 8'	F82EHE	207	1.2	SW	2912	3,616.7	6	S 96 C F 2 - 8'	F82EHE	207	1.2	None	2912	3,616.7	0.0	0.0	$0.00	$0.00	$0.00		
X1	WD STOCK RM FILES	2	X 1.5 W LED	ELED1.5/1	1.5	0.0	Breaker	2912	8.7	2	X 1.5 W LED	ELED1.5/1	1.5	0.0	None	2912	8.7	0.0	0.0	$0.00	$0.00	$0.00		

Energy Audit of Kearny, NJ
CHA Project No. 20711 - Police/Water Department Building 0 $0.125 $/kWh
ECM-8 Install Occupancy Sensors $13.03 $/kW

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	NYSERDA Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'X2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'X2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kW Saved) * ($/kWh)	Cost for renovations to lighting system		Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
54	WD BR #1	1	T 34 C F 1 (MAG)	F41EE	43	0.0	SW	2080	89.4	1	T 34 C F 1 (MAG)	F41EE	43	0.0	None	2080	89.4	0.0	0.0	$0.00	$0.00	$0.00		
6	WD BR #2	1	T 34 R F 4 (MAG)	F44EE	144	0.1	SW	2080	299.5	1	T 34 R F 4 (MAG)	F44EE	144	0.1	None	2080	299.5	0.0	0.0	$0.00	$0.00	$0.00		
4	WD BR #2	1	2T 34 C F 2 (u) (MAG)	FU2EE	72	0.1	SW	2080	149.8	1	2T 34 C F 2 (u) (MAG)	FU2EE	72	0.1	None	2080	149.8	0.0	0.0	$0.00	$0.00	$0.00		
6	WD BR #2	1	T 34 R F 4 (MAG)	F44EE	144	0.1	SW	2080	299.5	1	T 34 R F 4 (MAG)	F44EE	144	0.1	None	2080	299.5	0.0	0.0	$0.00	$0.00	$0.00		
65	WD CLOSET	1	I 100	I100/1	100	0.1	SW	1000	100.0	1	I 100	I100/1	100	0.1	None	1000	100.0	0.0	0.0	$0.00	$0.00	$0.00		
18	WD OPEN OFFICE AREA	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	2912	978.4	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	None	2912	978.4	0.0	0.0	$0.00	$0.00	$0.00		
18	WD OPEN OFFICE AREA	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2912	1,304.6	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	C-OCC	1456	652.3	652.3	0.0	$81.54	$187.50	$35.00	2.3	1.9
18	WD OPEN OFFICE AREA	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2912	1,956.9	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	C-OCC	1456	978.4	978.4	0.0	$122.30	$187.50	$35.00	1.5	1.2
X1	WD OPEN OFFICE AREA	3	X 1.5 W LED	ELED1.5/1	1.5	0.0	SW	2912	13.1	3	X 1.5 W LED	ELED1.5/1	1.5	0.0	None	2912	13.1	0.0	0.0	$0.00	$0.00	$0.00		
42	WD OPEN OFFICE AREA	1	T 32 C F 1 (ELE)	F41LL	32	0.0	SW	2080	66.6	1	T 32 C F 1 (ELE)	F41LL	32	0.0	None	2080	66.6	0.0	0.0	$0.00	$0.00	$0.00		
18	WD OFFICE #1	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2912	652.3	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	OCC	1456	326.1	326.1	0.0	$40.77	$118.75	$20.00	2.9	2.4
18	WD OFFICE #1	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2912	652.3	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	OCC	1456	326.1	326.1	0.0	$40.77	$118.75	$20.00	2.9	2.4
18	WD OFFICE #2	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2912	652.3	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	OCC	1456	326.1	326.1	0.0	$40.77	$118.75	$20.00	2.9	2.4
18	WD OFFICE #2	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2912	652.3	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	OCC	1456	326.1	326.1	0.0	$40.77	$118.75	$20.00	2.9	2.4
	Total	358				36.7			171,310	358				37			161,824	9,485	0	1,186	$2,500	485		
																	Demand Savings			0.0	$0			
																	kWh Savings			9,485	$1,186			
																	Total Savings				$1,186		2.1	1.7

APPENDIX J

ECM-9 Lighting Replacements with Occupancy Sensors

Energy Audit of Kearny, NJ
CHA Project No. 20711 - Police/Water Department Building 0 $0.125 $/kWh
ECM-9 Lighting Replacements with Occupancy Sensors $13.03 $/kW

EXISTING CONDITIONS										RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
Field Code	Area Description	No. of Fixtures	Standard Fixture Code	NYSERDA Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * ($/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
226	OUTSIDE LIGHTS	11	70 W MH	MH70/1	95	1.0	Timer	4368	4,565	11	70 W MH	MH70/1	95	1.0	None	4,368	4,565	-	-	$ -	$ -	$ -		
35	MAIN ENTRANCE	2	T 32 P F 3 (ELE)	F43ILL/2	90	0.2	Timer	4368	786	2	T 32 P F 3 (ELE)	F43ILL/2	90	0.2	None	4,368	786	-	-	$ -	$ -	$ -		
117	MAIN ENTRANCE	4	CF 23	CFS23/1	23	0.1	Timer	4368	402	4	CF 23	CFS23/1	23	0.1	None	4,368	402	-	-	$ -	$ -	$ -		
116	MAIN ENTRANCE	2	X 7.0 W 1	EI7.5/1	8	0.0	Breaker	8760	140	2	X 1.5C LED	ELED1.5/1	1.5	0.0	None	8,760	26	114	0.0	$ 16.27	$ 237.50	$ 20	14.6	13.4
35	VESTIBULE	7	T 32 P F 3 (ELE)	F43ILL/2	90	0.6	SW	8760	5,519	7	T 32 P F 3 (ELE)	F43ILL/2	90	0.6	None	8,760	5,519	-	-	$ -	$ -	$ -		
53	DISPATCH	4	T 32 P F 2 (ELE)	F42LL	60	0.2	SW	8760	2,102	4	T 32 P F 2 (ELE)	F42LL	60	0.2	None	8,760	2,102	-	-	$ -	$ -	$ -		
116	DISPATCH	1	X 7.0 W 1	EI7.5/1	8	0.0	SW	8760	70	1	X 1.5C LED	ELED1.5/1	1.5	0.0	None	8,760	13	57	0.0	$ 8.13	$ 118.75	$ 10	14.6	13.4
16	DISPATCH CLOSET	3	T 34 P F 2 (MAG)	F42EE	72	0.2	SW	8760	1,892	3	T 28 R F 2	F42SSILL	48	0.1	None	8,760	1,261	631	0.1	$ 90.10	$ 318.75	$ 30	3.5	3.2
4	DISPATCH SHARED SPACE	1	2T 34 C F 2 (u) (MAG)	FU2EE	72	0.1	SW	8760	631	1	2T 17 R F 2 (ELE)	F22ILL	33	0.0	None	8,760	289	342	0.0	$ 48.80	$ 101.25	$ 10	2.1	1.9
16	DISPATCH CLOSET #2	2	T 34 P F 2 (MAG)	F42EE	72	0.1	SW	1000	144	2	T 28 R F 2	F42SSILL	48	0.1	None	1,000	96	48	0.0	$ 13.51	$ 212.50	$ 20	15.7	14.3
53	RECORDS	4	T 32 P F 2 (ELE)	F42LL	60	0.2	SW	2912	699	4	T 32 P F 2 (ELE)	F42LL	60	0.2	None	2,912	699	-	-	$ -	$ -	$ -		
53	RECORDS	4	T 32 P F 2 (ELE)	F42LL	60	0.2	SW	2912	699	4	T 32 P F 2 (ELE)	F42LL	60	0.2	None	2,912	699	-	-	$ -	$ -	$ -		
4	BR NEAR RECORDS	5	2T 34 C F 2 (u) (MAG)	FU2EE	72	0.4	SW	2080	749	5	2T 17 R F 2 (ELE)	F22ILL	33	0.2	None	2,080	343	406	0.2	$ 81.19	$ 506.25	$ 50	6.2	5.6
201	RECORDS OFFICE	2	T 32 C F 3 (ELE)	F43ILL/2	90	0.2	SW	2912	524	2	T 32 C F 3 (ELE)	F43ILL/2	90	0.2	None	2,912	524	-	-	$ -	$ -	$ -		
204	A/C	1	S 96 C F 2 - 8'	F82EHE	207	0.2	SW	2912	603	1	(2) T 28 C F 2	F44ILL/2	118	0.1	None	2,912	344	259	0.1	$ 46.31	$ 143.75	$ 30	3.1	2.5
53	CAPT	2	T 32 P F 2 (ELE)	F42LL	60	0.1	SW	2912	349	2	T 32 P F 2 (ELE)	F42LL	60	0.1	OCC	1,456	175	175	-	$ 21.84	$ 118.75	$ 40	5.4	3.6
53	CAPT	2	T 32 P F 2 (ELE)	F42LL	60	0.1	SW	2912	349	2	T 32 P F 2 (ELE)	F42LL	60	0.1	OCC	1,456	175	175	-	$ 21.84	$ 118.75	$ 20	5.4	4.5
6	MUSTER	4	T 34 R F 4 (MAG)	F44EE	144	0.6	SW	2912	1,677	4	T 28 R F 4	F44SSILL	96	0.4	None	2,912	1,118	559	0.2	$ 99.91	$ 525.00	$ 80	5.3	4.5
6	MUSTER	4	T 34 R F 4 (MAG)	F44EE	144	0.6	SW	2912	1,677	4	T 28 R F 4	F44SSILL	96	0.4	None	2,912	1,118	559	0.2	$ 99.91	$ 525.00	$ 80	5.3	4.5
53	MUSTER CLOSET	1	T 32 P F 2 (ELE)	F42LL	60	0.1	SW	1000	60	1	T 32 P F 2 (ELE)	F42LL	60	0.1	None	1,000	60	-	-	$ -	$ -	$ -		
18	KITCHEN	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	8760	1,962	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	None	8,760	1,962	-	-	$ -	$ -	$ -		
18	STORAGE	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	1000	448	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	None	1,000	448	-	-	$ -	$ -	$ -		
18	ID	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	2912	978	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	OCC	1,456	489	489	-	$ 61.15	$ 118.75	$ 40	1.9	1.3
55	MAIN HALL	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	SW	8760	412	1	2T 17 R F 3 (ELE)	F23ILL	47	0.0	None	8,760	412	-	-	$ -	$ -	$ -		
55	MAIN HALL	3	2T 17 R F 3 (ELE)	F23ILL	47	0.1	Breaker	8760	1,235	3	2T 17 R F 3 (ELE)	F23ILL	47	0.1	None	8,760	1,235	-	-	$ -	$ -	$ -		
55	MAIN HALL	2	2T 17 R F 3 (ELE)	F23ILL	47	0.1	SW	8760	823	2	2T 17 R F 3 (ELE)	F23ILL	47	0.1	None	8,760	823	-	-	$ -	$ -	$ -		
55	MAIN HALL	3	2T 17 R F 3 (ELE)	F23ILL	47	0.1	Breaker	8760	1,235	3	2T 17 R F 3 (ELE)	F23ILL	47	0.1	None	8,760	1,235	-	-	$ -	$ -	$ -		
116	MAIN HALL	2	X 7.0 W 1	EI7.5/1	8	0.0	Breaker	8760	140	2	X 1.5C LED	ELED1.5/1	1.5	0.0	None	8,760	26	114	0.0	$ 16.27	$ 237.50	$ 20	14.6	13.4
53	STORAGE NEAR LOCKERS	2	T 32 P F 2 (ELE)	F42LL	60	0.1	SW	1000	120	2	T 32 P F 2 (ELE)	F42LL	60	0.1	None	1,000	120	-	-	$ -	$ -	$ -		
204	STORAGE NEAR LOCKERS	2	S 96 C F 2 - 8'	F82EHE	207	0.4	SW	1000	414	2	(2) T 28 C F 2	F44ILL/2	118	0.2	None	1,000	236	178	0.2	$ 50.08	$ 287.50	$ 60	5.7	4.5
204	STORAGE NEAR LOCKERS	3	S 96 C F 2 - 8'	F82EHE	207	0.6	SW	1000	621	3	(2) T 28 C F 2	F44ILL/2	118	0.4	None	1,000	354	267	0.3	$ 75.12	$ 431.25	$ 90	5.7	4.5
4	STORAGE NEAR LOCKERS	3	2T 34 C F 2 (u) (MAG)	FU2EE	72	0.2	SW	1000	216	3	2T 17 R F 2 (ELE)	F22ILL	33	0.1	OCC	1,820	180	36	0.1	$ 22.77	$ 422.50	$ 50	18.6	16.4
35	TRAFFIC	4	T 32 P F 3 (ELE)	F43ILL/2	90	0.4	SW	2912	1,048	4	T 32 P F 3 (ELE)	F43ILL/2	90	0.4	C-OCC	1,820	655	393	-	$ 49.14	$ 187.50	$ 35	3.8	3.1
65	TRAFFIC CLOSET	1	I 100	I100/1	100	0.1	SW	1000	100	1	CF 26	CFQ26/1-L	27	0.0	C-OCC	1,456	39	61	0.1	$ 19.00	$ 225.00	$ 35	11.8	10.0
6	MENS LOCKERS	3	T 34 R F 4 (MAG)	F44EE	144	0.4	SW	8760	3,784	3	T 28 R F 4	F44SSILL	96	0.3	None	8,760	2,523	1,261	0.1	$ 180.20	$ 393.75	$ 60	2.2	1.9
6	MENS LOCKERS	3	T 34 R F 4 (MAG)	F44EE	144	0.4	SW	8760	3,784	3	T 28 R F 4	F44SSILL	96	0.3	C-OCC	1,456	419	3,365	0.1	$ 443.14	$ 581.25	$ 95	1.3	1.1
7	MENS LOCKERS	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	SW	8760	526	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	None	8,760	526	-	-	$ -	$ -	$ -		
4	MENS LOCKER BATH	1	2T 34 C F 2 (u) (MAG)	FU2EE	72	0.1	SW	8760	631	1	2T 17 R F 2 (ELE)	F22ILL	33	0.0	OCC	500	17	614	0.0	$ 82.88	$ 220.00	$ 30	2.7	2.3
6	MENS LOCKER BATH	1	T 34 R F 4 (MAG)	F44EE	144	0.1	SW	8760	1,261	1	T 28 R F 4	F44SSILL	96	0.1	None	8,760	841	420	0.0	$ 60.07	$ 131.25	$ 20	2.2	1.9
18	WOMENS LOCKERS	1	T 32 R F 4 (ELE)	F44ILL	112	0.1	SW	8760	981	1	T 32 R F 4 (ELE)	F44ILL	112	0.1	None	8,760	981	-	-	$ -	$ -	$ -		
5	DWI	1	2T 32 P F 2 (u) (ELE)	FU2LL	60	0.1	SW	2912	175	1	2T 32 P F 2 (u) (ELE)	FU2LL	60	0.1	None	2,912	175	-	-	$ -	$ -	$ -		
204	GYM	4	S 96 C F 2 - 8'	F82EHE	207	0.8	SW	2912	2,411	4	(2) T 28 C F 2	F44ILL/2	118	0.5	None	2,912	1,374	1,037	0.4	$ 185.25	$ 575.00	$ 120	3.1	2.5
73	CELL BLOCK CELLS	8	2 I 60	I60/2	120	1.0	SW	2912	2,796	8	2 CF 26	CFQ26/2-L	50	0.4	None	2,912	1,165	1,631	0.6	$ 291.40	$ 200.00	$ -	0.7	0.7
71	CELL BLOCK ROOMS	4	I 60	I60/1	60	0.2	SW	2912	699	4	CF 26	CFQ26/1-L	27	0.1	None	2,912	314	384	0.1	$ 68.69	$ 25.00	$ -	0.4	0.4
73	CELL BLOCK HALL	5	2 I 60	I60/2	120	0.6	SW	8760	5,256	5	2 CF 26	CFQ26/2-L	50	0.3	None	8,760	2,190	3,066	0.4	$ 437.98	$ 125.00	$ -	0.3	0.3
116	CELL BLOCK	1	X 7.0 W 1	EI7.5/1	8	0.0	Breaker	2912	23	1	X 1.5C LED	ELED1.5/1	1.5	0.0	None	2,912	4	19	0.0	$ 3.38	$ 118.75	$ 10	35.1	32.2
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	None	8,760	2,102	-	-	$ -	$ -	$ -		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	None	8,760	2,102	-	-	$ -	$ -	$ -		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	None	8,760	2,102	-	-	$ -	$ -	$ -		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	None	8,760	2,102	-	-	$ -	$ -	$ -		
32	POLICE GARAGE	2	1T 32 P F 2 (MAG)	F42LL	60	0.1	SW	8760	1,051	2	1T 32 P F 2 (MAG)	F42LL	60	0.1	None	8,760	1,051	-	-	$ -	$ -	$ -		
32	POLICE GARAGE	6	1T 32 P F 2 (MAG)	F42LL	60	0.4	SW	8760	3,154	6	1T 32 P F 2 (MAG)	F42LL	60	0.4	None	8,760	3,154	-	-	$ -	$ -	$ -		
32	POLICE GARAGE	8	1T 32 P F 2 (MAG)	F42LL	60	0.5	SW	8760	4,205	8	1T 32 P F 2 (MAG)	F42LL	60	0.5	None	8,760	4,205	-	-	$ -	$ -	$ -		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	None	8,760	2,102	-	-	$ -	$ -	$ -		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	None	8,760	2,102	-	-	$ -	$ -	$ -		
32	POLICE GARAGE	6	1T 32 P F 2 (MAG)	F42LL	60	0.4	SW	8760	3,154	6	1T 32 P F 2 (MAG)	F42LL	60	0.4	None	8,760	3,154	-	-	$ -	$ -	$ -		
32	POLICE GARAGE	6	1T 32 P F 2 (MAG)	F42LL	60	0.4	SW	8760	3,154	6	1T 32 P F 2 (MAG)	F42LL	60	0.4	None	8,760	3,154	-	-	$ -	$ -	$ -		
32	POLICE GARAGE	6	1T 32 P F 2 (MAG)	F42LL	60	0.4	SW	8760	3,154	6	1T 32 P F 2 (MAG)	F42LL	60	0.4	None	8,760	3,154	-	-	$ -	$ -	$ -		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	None	8,760	2,102	-	-	$ -	$ -	$ -		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	None	8,760	2,102	-	-	$ -	$ -	$ -		
32	POLICE GARAGE	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	SW	8760	2,102	4	1T 32 P F 2 (MAG)	F42LL	60	0.2	None	8,760	2,102	-	-	$ -	$ -	$ -		
32	POLICE GARAGE	36	1T 32 P F 2 (MAG)	F42LL	60	2.2	Breaker	8760	18,922	36	1T 32 P F 2 (MAG)	F42LL	60	2.2	None	8,760	18,922	-	-	$ -	$ -	$ -		
116	2ND FLOOR FLAG POLE RM	4	X 7.0 W 1	EI7.5/1	8	0.0	Breaker	8760	280	4	X 1.5C LED	ELED1.5/1	1.5	0.0	None	8,760	53	228	0.0	$ 32.54	$ 475.00	$ 40	14.6	13.4
53	POLICE GARAGE OFFICE	3	T 32 P F 2 (ELE)	F42LL	60	0.2	SW	2912	524	3	T 32 P F 2 (ELE)	F42LL	60	0.2	None	2,912	524	-	-	$ -	$ -	$ -		
180	DB CAPT	2	T 32 P F 4 (ELE)	F44ILL	112	0.2	SW	2912	652	2	T 28 C F 4	F43SSILL	72	0.1	None	2,912	419	233	0.1	$ 41.63	$ 256.50	$ -	6.2	6.2
18	DETECTIVE BUREAU	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2912	1,957	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	C-OCC	1,456	978	978	-	$ 122.30	$ 187.50	$ 35	1.5	1.2
4	MAIN ENTRANCE	2	2T 34 C F 2 (u) (MAG)	FU2EE	72	0.1	SW	2912	419	2	2T 17 R F 2 (ELE)	F22ILL	33	0.1	C-OCC	1,456	96	323	0.1	$ 52.60	$ 390.00	$ 55	7.4	6.4
53	UTILITY RM	1	T 32 P F 2 (ELE)	F42LL	60	0.1	SW	2912	175	1	T 32 P F 2 (ELE)	F42LL	60	0.1	None	2,912	175	-	-	$ -	$ -	$ -		
204	CHIEF OFFICE #1	2	S 96 C F 2 - 8'	F82EHE	207	0.4	Breaker	2912	1,206	2	(2) T 28 C F 2	F44ILL/2	118	0.2	None	2,912	687	518	0.2	$ 92.62	$ 287.50	$ 60	3.1	2.5
204	CHIEF OFFICE #2	2	S 96 C F 2 - 8'	F82EHE	207	0.4	Breaker	2912	1,206	2	(2) T 28 C F 2	F44ILL/2	118	0.2	None	2,912	687	518	0.2	$ 92.62	$ 287.50	$ 60	3.1	2.5
7	STAIRWELL #1	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	SW	8760	526	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	None	8,760	526	-	-	$ -	$ -	$ -		
7	STAIRWELL #1	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	SW	8760	526	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	None	8,760	526	-	-	$ -	$ -	$ -		
225	OUTSIDE LIGHT	2	70 High Pressure Sodium	HPS70/1	95	0.2	Timer	4368	830	2	70 High Pressure Sodium	HPS70/1	95	0.2	None	4,368	830	-	-	$ -	$ -	$ -		
204	WD GARAGE	4	S 96 C F 2 - 8'	F82EHE	207	0.8	SW	3640	3,014	4	(2) T 28 C F 2	F44ILL/2	118	0.5	None	3,640	1,718	1,296	0.4	$ 217.64	$ 575.00	$ 120	2.6	2.1
204	WD GARAGE	4	S 96 C F 2 - 8'	F82EHE	207	0.8	Breaker	3640	3,014	4	(2) T 28 C F 2	F44ILL/2	118	0.5	None	3,640	1,718	1,296	0.4	$ 217.64	$ 575.00	$ 120	2.6	2.1
204	WD GARAGE	3	S 96 C F 2 - 8'	F82EHE	207	0.6	SW	3640	2,260	3	(2) T 28 C F 2	F44ILL/2	118	0.4	None	3,640	1,289	972	0.3	$ 163.23	$ 431.25	$ 90	2.6	2.1
204	WD GARAGE	4	S 96 C F 2 - 8'	F82EHE	207	0.8	SW	3640	3,014	4	(2) T 28 C F 2	F44ILL/2	118	0.5	None	3,640	1,718	1,296	0.4	$ 217.64	$ 575.00	$ 120	2.6	2.1
204	WD GARAGE	3	S 96 C F 2 - 8'	F82EHE	207	0.6	SW	3640	2,260	3	(2) T 28 C F 2	F44ILL/2	118	0.4	None	3,640	1,289	972	0.3	$ 163.23	$ 431.25	$ 90	2.6	2.1
204	WD GARAGE	4	S 96 C F 2 - 8'	F82EHE	207	0.8	Breaker	3640	3,014	4	(2) T 28 C F 2	F44ILL/2	118	0.5	None	3,640	1,718	1,296	0.4	$ 217.64	$ 575.00	$ 120	2.6	2.1
204	WD GARAGE	3	S 96 C F 2 - 8'	F82EHE	207	0.6	SW	3640	2,260	3	(2) T 28 C F 2	F44ILL/2	118	0.4	None	3,640	1,289	972	0.3	$ 163.23	$ 431.25	$ 90	2.6	2.1
204	WD GARAGE	3	S 96 C F 2 - 8'	F82EHE	207	0.6	SW	3640	2,260	3	(2) T 28 C F 2	F44ILL/2	118	0.4	None	3,640	1,289	972	0.3	$ 163.23	$ 431.25	$ 90	2.6	2.1
204	WD GARAGE	5	S 96 C F 2 - 8'	F82EHE	207	1.0	SW	3640	3,767	5	(2) T 28 C F 2	F44ILL/2	118	0.6	None	3,640	2,148	1,620	0.4	$ 272.06	$ 718.75	$ 150	2.6	2.1
204	WD GARAGE	5	S 96 C F 2 - 8'	F82EHE	207	1.0	SW	3640	3,767	5	(2) T 28 C F 2	F44ILL/2	118	0.6	None	3,640	2,148	1,620	0.4	$ 272.06	$ 718.75	$ 150	2.6	2.1
204	WD GARAGE	6	S 96 C F 2 - 8'	F82EHE	207	1.2	SW	3640	4,521	6	(2) T 28 C F 2	F44ILL/2	118	0.7	None	3,640	2,577	1,944	0.5	$ 326.47	$ 862.50	$ 180	2.6	2.1
204	WD GARAGE	6	S 96 C F 2 - 8'	F82EHE	207	1.2	SW	3640	4,521	6	(2) T 28 C F 2	F44ILL/2	118	0.7	None	3,640	2,577	1,944	0.5	$ 326.47	$ 862.50	$ 180	2.6	2.1
204	WD BREAK RM	2	S 96 C F 2 - 8'	F82EHE	207	0.4	SW	2912	1,206	2	(2) T 28 C F 2	F44ILL/2	118	0.2	OCC	1,456	344	862	0.2	$ 135.58	$ 406.25	$ 80	3.0	2.4
204	WD STOCK RM	2	S 96 C F 2 - 8'	F82EHE	207	0.4	SW	2912	1,206	2	(2) T 28 C F 2	F44ILL/2	118	0.2	None	2,912	687	518	0.2	$ 92.62	$ 287.50	$ 60	3.1	2.5
204	WD STOCK RM FILES	6	S 96 C F 2 - 8'	F82EHE	207	1.2	SW	2912	3,617	6	(2) T 28 C F 2	F44ILL/2	118	0.7	None	2,912	2,062	1,555	0.5	$ 277.87	$ 862.50	$ 180	3.1	2.5
X1	WD STOCK RM FILES	2	X 1.5 W LED	ELED1.5/1	1.5	0.0	Breaker	2912	9	2	X 1.5 W LED	ELED1.5/1	1.5	0.0	None	2,912	9	-	-	$ -	$ -	$ -		

Energy Audit of Kearny, NJ

CHA Project No. 20711 - Police/Water Department Building 0 $0.125 $/kWh

ECM-9 Lighting Replacements with Occupancy Sensors $13.03 $/kW

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	NYSERDA Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * ($/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
54	WD BR #1	1	T 34 C F 1 (MAG)	F41EE	43	0.0	SW	2080	89	1	S 28 W F 1	F41SSILL	26	0.0	None	2,080	54	35	0.0	$ 7.08	$ 141.75	$ -	20.0	20.0
6	WD BR #2	1	T 34 R F 4 (MAG)	F44EE	144	0.1	SW	2080	300	1	T 28 R F 4	F44SSILL	96	0.1	None	2,080	200	100	0.0	$ 19.99	$ 131.25	$ 20	6.6	5.6
4	WD BR #2	1	2T 34 C F 2 (u) (MAG)	FU2EE	72	0.1	SW	2080	150	1	2T 17 R F 2 (ELE)	F22ILL	33	0.0	None	2,080	69	81	0.0	$ 16.24	$ 101.25	$ 10	6.2	5.6
6	WD BR #2	1	T 34 R F 4 (MAG)	F44EE	144	0.1	SW	2080	300	1	T 28 R F 4	F44SSILL	96	0.1	None	2,080	200	100	0.0	$ 19.99	$ 131.25	$ 20	6.6	5.6
65	WD CLOSET	1	I 100	I100/1	100	0.1	SW	1000	100	1	CF 26	CFQ26/1-L	27	0.0	None	1,000	27	73	0.1	$ 20.54	$ 37.50	$ -	1.8	1.8
18	WD OPEN OFFICE AREA	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	2912	978	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	None	2,912	970	-	-	$ -	$ -	$ -		
18	WD OPEN OFFICE AREA	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2912	1,305	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	C-OCC	1,456	652	652	-	$ 81.54	$ 187.50	$ 35	2.3	1.9
18	WD OPEN OFFICE AREA	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2912	1,957	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	C-OCC	1,456	978	978	-	$ 122.30	$ 187.50	$ 35	1.5	1.2
X1	WD OPEN OFFICE AREA	3	X 1.5 W LED	ELED1.5/1	1.5	0.0	SW	2912	13	3	X 1.5 W LED	ELED1.5/1	1.5	0.0	None	2,912	13	-	-	$ -	$ -	$ -		
42	WD OPEN OFFICE AREA	1	T 32 C F 1 (ELE)	F41LL	32	0.0	SW	2080	67	1	T 32 C F 1 (ELE)	F41LL	32	0.0	None	2,080	67	-	-	$ -	$ -	$ -		
18	WD OFFICE #1	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2912	652	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	OCC	1,456	326	326	-	$ 40.77	$ 118.75	$ 20	2.9	2.4
18	WD OFFICE #1	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2912	652	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	OCC	1,456	326	326	-	$ 40.77	$ 118.75	$ 20	2.9	2.4
18	WD OFFICE #2	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2912	652	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	OCC	1,456	326	326	-	$ 40.77	$ 118.75	$ 20	2.9	2.4
18	WD OFFICE #2	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2912	652	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	OCC	1,456	326	326	-	$ 40.77	$ 118.75	$ 20	2.9	2.4
	Total	**358**				**36.7**			**171,310**	**358**				**27.3**			**129,394**		**9.4**	**6,706**	**19,227**	**3,325**		
																		Demand Savings		**9.4**	**$1,467**			
																		kWh Savings		**41,916**	**$5,239**			
																		Total Savings			**$6,706**		**2.9**	**2.4**

APPENDIX K

New Jersey Pay For Performance Incentive Program

Kearny NJ
CHA #20711
Building: Police & Water Department

New Jersey Pay For Performance Incentive Program

Note: The following calculation is based on the New Jersey Pay For Performance Incentive Program per January, 2010. Building must have a minimum average electric demand of 200 kW. This minimum is waived for buildings owned by local governements or non-profit organizations.
The incentive values represented below are applicable through December 31, 2010.

	Annual Utilities	
	kWh	Therms
Existing Usage (from utility)	566,280	9,410
Proposed Savings	91,350	-190
Existing Total MMBtus	2,874	
Proposed Savings MMBtus	293	
% Reduction	10.2%	
Proposed Annual Savings	$15,200	

	≥ %15 - < 20%	
	$/kWh	$/therm
Incentive #2	$0.11	$1.10
Incentive #3	$0.07	$0.70

	≥ 20%	
	$/kWh	$/therm
Incentive #2	$0.22	$2.20
Incentive #3	$0.14	$1.40

	Incentives $		
	Elec	Gas	Total
Incentive #2	$0	$0	$0
Incentive #3	$0	$0	$0
Totals	**$0**	**$0**	**$0**

Total Project Cost	$144,100
% Incentives of Project Cost*	0.0%
Project Cost w/ Incentives*	$144,100

Project Payback (years)	
w/o Incentives	w/ Incentives
9.5	9.5

* Maximum allowable incentive is 80% of total project cost, or
$2 million per gas account and $2 million per electric account

APPENDIX L

Photovoltaic (PV) Rooftop Solar Power Generation

PVWatts *** AC Energy & Cost Savings

Cautions for Interpreting the Results

Station Identification	
City:	Newark
State:	New_Jersey
Latitude:	40.70° N
Longitude:	74.17° W
Elevation:	9 m
PV System Specifications	
DC Rating:	50.0 kW
DC to AC Derate Factor:	0.770
AC Rating:	38.5 kW
Array Type:	Fixed Tilt
Array Tilt:	40.7°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	15.1 ¢/kWh

Results			
Month	Solar Radiation ($kWh/m^2/day$)	AC Energy (kWh)	Energy Value ($)
1	3.36	4139	625.82
2	4.05	4469	675.71
3	4.58	5422	819.81
4	4.84	5299	801.21
5	5.30	5838	882.71
6	5.33	5506	832.51
7	5.27	5561	840.82
8	5.25	5503	832.05
9	5.06	5338	807.11
10	4.46	5027	760.08
11	3.15	3588	542.51
12	2.87	3460	523.15
Year	4.46	59150	8943.48

Output Hourly Performance Data

About the Hourly Performance Data

*

Output Results as Text

Saving Text from a Browser

Run PVWATTS v.1 for another US location or an International location
Run PVWATTS v.2 (US only)

Please send questions and comments regarding PVWATTS to Webmaster

Disclaimer and copyright notice

Cautions for Interpreting the Results

The monthly and yearly energy production are modeled using the PV system parameters you selected and weather data that are typical or representative of long-term averages. For reference, or comparison with local information, the solar radiation values modeled for the PV array are included in the performance results.

Because weather patterns vary from year-to-year, the values in the tables are better indicators of long-term performance than performance for a particular month or year. PV performance is largely proportional to the amount of solar radiation received, which may vary from the long-term average by ± 30% for monthly values and ± 10% for yearly values. How the solar radiation might vary for your location may be evaluated by examining the tables in the *Solar Radiation Data Manual for Flat-Plate and Concentrating Collectors* (*http://rredc.nrel.gov/solar/old_data/nsrdb/redbook/*).

For these variations and the uncertainties associated with the weather data and the model used to model the PV performance, future months and years may be encountered where the actual PV performance is less than or greater than the values shown in the table. The variations may be as much as 40% for individual months and up to 20% for individual years. Compared to long-term performance over many years, the values in the table are accurate to within 10% to 12%.

If the default overall DC to AC derate factor is used, the energy values in the table will overestimate the actual energy production if nearby buildings, objects, or other PV modules and array structure shade the PV modules; if tracking mechanisms for one- and two-axis tracking systems do not keep the PV arrays at the optimum orientation with respect to the sun's position; if soiling or snow cover related losses exceed 5%; or if the system performance has degraded from new. (PV performance typically degrades 1% per year.) If any of these situations exist, an overall DC to AC derate factor should be used with PVWATTS that was calculated using system specific component derate factors for *shading, sun-tracking, soiling,* and *age*.

The PV system size is the nameplate DC power rating. The energy production values in the table are valid only for crystalline silicon PV systems.

The cost savings are determined as the product of the number of kilowatt hours (kWh) and the cost of electricity per kWh. These cost savings occur if the owner uses all the electricity produced by the PV system, or if the owner has a net-metering agreement with the utility. With net-metering, the utility bills the owner for the net electricity consumed. When electricity flows from the utility to the owner, the meter spins forward. When electricity flows from the PV system to the utility, the meter spins backwards.

If net-metering isn't available and the PV system sends surplus electricity to the utility grid, the utility generally buys the electricity from the owner at a lower price than the owner pays the utility for electricity. In this case, the cost savings shown in the table should be reduced.

Besides the cost savings shown in the table, other benefits of PV systems include greater energy independence and a reduction in fossil fuel usage and air pollution. For commercial customers, additional cost savings may come from reducing demand charges. Homeowners can often include the cost of the PV system in their home mortgage as a way of accommodating the PV system's initial cost.

To accelerate the use of PV systems, many state and local governments offer financial incentives and programs. Go to http://www.nrel.gov/stateandlocal for more information.

Township of Kearny
Police and Water Departments

Cost of Electricity $0.151 $/kWh

Photovoltaic (PV) Rooftop Solar Power Generation-50kW System

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	New Jersey Renewable * Energy Incentive	New Jersey Renewable ** SREC	Payback (without incentive)	Payback (with incentive)
$	kW	kWh	therms	$	$	$	$	$	Years	Years
$500,000	**0.0**	**59,150**	**0**	**$8,900**	**0**	**$8,900**	**$50,000**	**$28,800**	**56.2**	**11.9**

Note: Budgetary cost is based on $10,000/kW.

*Incentive based on New Jersey renewable energy program for non-residential applications(PV)= $1.00/W of installed PV system

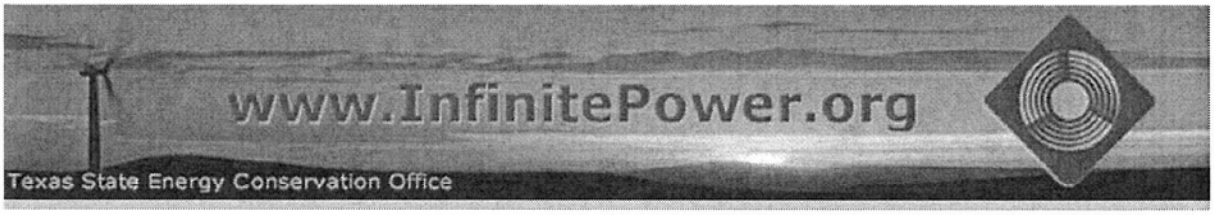
** Estimated Solar Renewable Energy Certificate Program (SREC) SREC for 15 Years= $487/1000kwh

Estimated Solar Renewable Energy Certificate Program (SREC) payments for 15 Years from RR Renewable Energy Consultants

Year	SREC
1	600
2	600
3	600
4	500
5	500
6	500
7	500
8	500
9	500
10	500
11	400
12	400
13	400
14	400
15	400
AVG	**487**

APPENDIX M

Solar Thermal Domestic Hot Water Plant



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RARE

Interactive Energy Calculators

RENEWABLE ENERGY
THE INFINITE POWER OF TEXAS

Our calculators help you understand energy production and consumption in a whole new way. Use them to develop a personal profile of your own energy use.

Carbon Pollution Calculator
Electric Power Pollution Calculator
PV System Economics
Solar Water Heating
What's a Watt?

Solar Water Heating Calculator

Water heating is a major energy consumer. Although the energy consumed daily is often less than for air conditioning or heating, it is required year round, making it a good application of solar energy. Use this calculator to explore the energy usage of your water heater, and to estimate whether a solar water heater could save you money.

Water Heater Characteristics			
Physical		**Thermal**	
? Diameter (feet)	1.5	? Water Inlet Temperature (Degrees F)	50
? Capacity (gallons)	25	? Ambient Temperature (Degrees F)	70
? Surface Area (calculated - sq ft)	12.45	? Hot Water Temperature (Degrees F)	120
? Effective R-value	NaN	? Hot Water Usage (Gallons per Day)	40
Energy Use			
957.8		? Heat Delivered in Hot Water (BTU/hr)	
0		? Heat loss through insulation (BTU/hr)	

Gas vs. Electric Water Heating		
Gas		**Electric**
0.8	? Overall Efficiency	0.98
0.8	? Conversion Efficiency	0.98
1197 BTU/hr	? Power Into Water Heater	977.3 BTU/hr
Cost		
$ 1.524 /Therm	? Utility Rates	$ 0.1512 /kWh
$ 159.802	? Yearly Water Heating Cost	$ 379.110
How Does Solar Compare?		
? Solar Water Heater Cost: $ 27100		? Percentage Solar: 70
242.263 years for gas	? Payback Time for Solar System	102.118 years for electric

NJBPU Energy Audits
CHA # 20711
Township of Kearny
Police and Water Departments

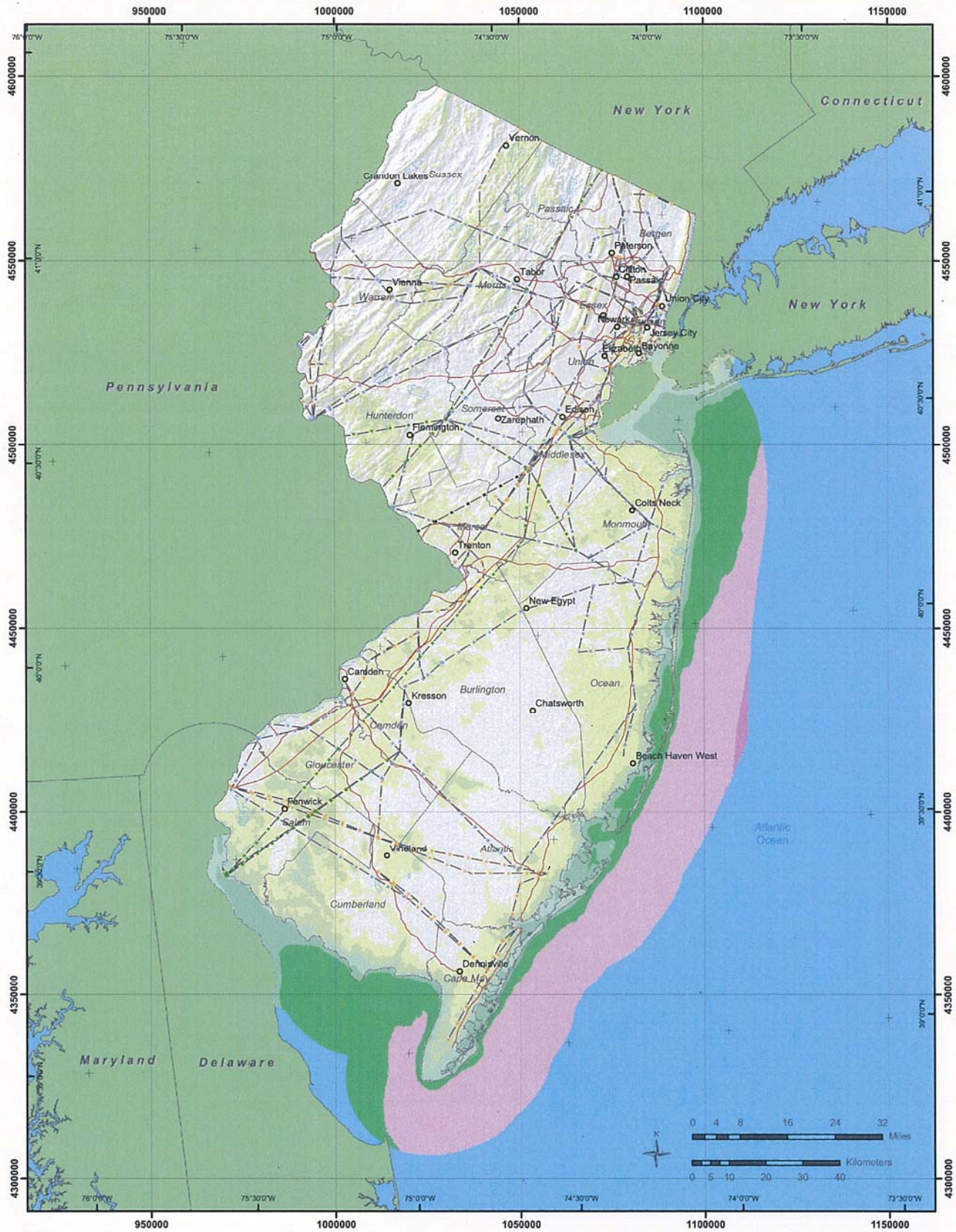
Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Synergy Solar Thermal System	2	ea			$ 3,600	$ -	$ -	$ 7,848	$ 7,848	
Piping modifications	1	ls	$ 2,000	$ 3,500		$ 1,960	$ 4,235	$ -	$ 6,195	
Electrical modifications	1	ls	$ 1,000	$ 1,000		$ 980	$ 1,210	$ -	$ 2,190	
65 GallonStorage Tanks	2	ea	$ 200	$ 250		$ 400	$ 500	$ -	$ 900	
10 Gallon Drip Tank	2	ea	$ 100	$ 78		$ 200	$ 156	$ -	$ 356	
						$ -	$ -	$ -	$ -	

$17,489	Subtotal
$ 2,623	15% Contingency
$ 2,623	15% Contractor O&P
$ 4,372	25% Engineering
$27,108	**Total**

APPENDIX N

Wind



Wind Resource of New Jersey

Mean Annual Wind Speed at 30 Meters

Features
- City
- Interstate Highway
- County Boundary
- Water Body

Generalized Transmission Line

Category	
Under 100 kV	500 kV
100 kV-161 kV	735 kV +
230 kV-287 kV	Step-Up
345 kV	DC Line

Mean Speed at 30 m		
mph	m/s	
< 10.1	< 4.5	13.4 - 14.5 / 6.0 - 6.5
10.1 - 11.2	4.5 - 5.0	14.5 - 15.7 / 6.5 - 7.0
11.2 - 12.3	5.0 - 5.5	15.7 - 16.8 / 7.0 - 7.5
12.3 - 13.4	5.5 - 6.0	16.8 - 17.9 / 7.5 - 8.0
		17.9 - 19.0 / 8.0 - 8.5
		> 19.0 / > 8.5

AWS Truewind

Projection: Tranverse Mercator, UTM Zone 17 WGS84
Spatial Resolution of Wind Resource Data: 200m
This map was created by AWS Truewind using the MesoMap system and historical weather data. Although it is believed to represent an accurate overall picture of the wind energy resource, estimates at any location should be confirmed by measurement.

The transmission line information was obtained by AWS Truewind from the Global Energy Decisions Velocity Suite. AWS does not warrant the accuracy of the transmission line information.

Bing Maps

237 Laurel Ave, Kearny, NJ 07032-3646

My Notes

APPENDIX O

EPA Portfolio Manager

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Police and Water Departments

Building ID: 2241184
For 12-month Period Ending: December 31, 2008[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: March 19, 2010

Facility
Police and Water Departments
237 Laurel Avenue
Kearny, NJ 07032

Facility Owner
Township of Kearny
357 Bergen Ave
Kearny, NJ 07032

Primary Contact for this Facility
Gerry Kerr
357 Bergen Ave
Kearny, NJ 07032

Year Built: 1900
Gross Floor Area (ft²): 46,000

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

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	1,932,147
Natural Gas (kBtu)[4]	940,900
Total Energy (kBtu)	2,873,047

Energy Intensity[5]

Site (kBtu/ft²/yr)	62
Source (kBtu/ft²/yr)	162

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	344

Electric Distribution Utility
Public Service Elec & Gas Co

National Average Comparison

National Average Site EUI	78
National Average Source EUI	157
% Difference from National Average Source EUI	3%
Building Type	Fire Station/Police Station

Stamp of Certifying Professional

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

Certifying Professional
N/A

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

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

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

ENERGY STAR® Data Checklist for Commercial Buildings

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

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

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	Police and Water Departments	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Fire Station/Police Station	Is this an accurate description of the space in question?		☐
Location	237 Laurel Avenue, Kearny, NJ 07032	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐
Police Department (Other)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	33,250 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.		☐
Number of PCs	40(Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	168Hours(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.		☐
Workers on Main Shift	40(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.		☐
Water Depatment (Other)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	12,750 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.		☐
Number of PCs	4(Optional)	Is this the number of personal computers in the space?		☐

Weekly operating hours	45Hours(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.		☐
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.		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

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

Fuel Type: Electricity		
Meter: PSE&G Electricity (kWh (thousand Watt-hours)) **Space(s):** Entire Facility **Generation Method:** Grid Purchase		
Start Date	**End Date**	**Energy Use (kWh (thousand Watt-hours))**
12/01/2008	12/31/2008	37,260.00
11/01/2008	11/30/2008	45,180.00
10/01/2008	10/31/2008	37,440.00
09/01/2008	09/30/2008	93,240.00
08/01/2008	08/31/2008	50,760.00
07/01/2008	07/31/2008	50,580.00
06/01/2008	06/30/2008	44,820.00
05/01/2008	05/31/2008	40,860.00
04/01/2008	04/30/2008	37,440.00
03/01/2008	03/31/2008	39,960.00
02/01/2008	02/29/2008	46,800.00
01/01/2008	01/31/2008	41,940.00
PSE&G Electricity Consumption (kWh (thousand Watt-hours))		**566,280.00**
PSE&G Electricity Consumption (kBtu (thousand Btu))		**1,932,147.36**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**1,932,147.36**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas		
Meter: PSE&G Natural Gas (therms) **Space(s):** Entire Facility		
Start Date	**End Date**	**Energy Use (therms)**
12/01/2008	12/31/2008	1,697.00
11/01/2008	11/30/2008	1,086.00
10/01/2008	10/31/2008	173.00
09/01/2008	09/30/2008	85.00
08/01/2008	08/31/2008	139.00
07/01/2008	07/31/2008	99.00
06/01/2008	06/30/2008	107.00
05/01/2008	05/31/2008	143.00
04/01/2008	04/30/2008	411.00
03/01/2008	03/31/2008	1,296.00

02/01/2008	02/29/2008	1,353.00
01/01/2008	01/31/2008	2,820.00
PSE&G Natural Gas Consumption (therms)		**9,409.00**
PSE&G Natural Gas Consumption (kBtu (thousand Btu))		**940,900.00**
Total Natural Gas Consumption (kBtu (thousand Btu))		**940,900.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		☐

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

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

Certifying Professional

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

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

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

Facility
Police and Water Departments
237 Laurel Avenue
Kearny, NJ 07032

Facility Owner
Township of Kearny
357 Bergen Ave
Kearny, NJ 07032

Primary Contact for this Facility
Gerry Kerr
357 Bergen Ave
Kearny, NJ 07032

General Information

Police and Water Departments	
Gross Floor Area Excluding Parking: (ft²)	46,000
Year Built	1900
For 12-month Evaluation Period Ending Date:	December 31, 2008

Facility Space Use Summary

Police Department	
Space Type	Other - Fire Station/Police Station
Gross Floor Area(ft²)	33,250
Number of PCs°	40
Weekly operating hours°	168
Workers on Main Shift°	40

Water Depatment	
Space Type	Other - Other
Gross Floor Area(ft²)	12,750
Number of PCs°	4
Weekly operating hours°	45
Workers on Main Shift°	6

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 12/31/2008)	**Baseline** (Ending Date 12/31/2008)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft²)	62	62	0	N/A	78
Source (kBtu/ft²)	162	162	0	N/A	157
Energy Cost					
$/year	N/A	N/A	N/A	N/A	N/A
$/ft²/year	N/A	N/A	N/A	N/A	N/A
Greenhouse Gas Emissions					
$MtCO_2e$/year	344	344	0	N/A	430
$kgCO_2e$/ft²/year	7	7	0	N/A	9

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

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

APPENDIX P

Equipment Inventory

New Jersey BPU Energy Audit Program
CHA #20711
Kearny
Police & Water Departments

Description	Manufacturer Name	Model No.	Equipment Type	Capacity/Size	Location	Areas Served	Date Installed	Useable Life Expectancy (years)
Boiler	AERCO	KC 1000 GWB, Serial G-97-235	Gas fired hot water condensing boiler	930 MBH output, 1000 MBH input	Ground floor	Entire building	1998	19
Boiler	AERCO	KC 1000 GWB, Serial G-97-238	Gas fired hot water condensing boiler	930 MBH output, 1000 MBH input	Ground floor	Entire building	1998	19
Boiler	AERCO	KC 1000 GWB, Serial G-97-236	Gas fired hot water condensing boiler	930 MBH output, 1000 MBH input	Ground floor	Entire building	1998	19
Boiler	AERCO	KC 1000 GWB, Serial G-97-237	Gas fired hot water condensing boiler	930 MBH output, 1000 MBH input	Ground floor	Entire building	1998	19
DMHWH	Bradford White	GX225S6BN, Serial EH10961721	Gas fired hot water heater	25 gallon, 78,000Bth/hr input	Basement	Entire building	2008	19
Air handler	Rheem	RKKA-A085CL13E, Serial 1R6219AAAF200116793	Outdoor HVAC package electric cooling, gas heating	7.5 ton, 208 V,3ph, 60Hz, 109 MBH output, 135 MBH input	Roof	Juvenile 2nd floor	1993	4
Split system	Mitsubishi	Evap: MS09NW2, Serial 0005535; Condensing unit: PU24EK	Evaporator/condensing unit	2 ton, 115, 1ph, 60hz	Dispatch/Roof	Dispatch	1995	6
Condensing unit	York	HAHB-T180AB, Serial NFCM052971	Condensing unit	15 ton, 208, 3ph, 60hz, R-22	Roof	Police section	1991	2
Condensing unit	York	HAHB-T180AB, Serial NFCM052984	Condensing unit	15 ton, 208, 3ph, 60hz, R-22	Roof	Police section	1991	2
Split system	Mitsubishi	MUM18NW, Serial 16900879B	Condensing unit	1.5 ton, 208, 1sp, 60 hz, R-22	Roof	Server room	N/A	N/A
Split system	Mitsubishi	PU12EK, Serial N/L	Condensing unit	1 ton, 208, 1sp, 60 hz, R-22	Roof	Server room	N/A	N/A
Packaged roof top	Trane	SFHC-8252-LA, Serial C90J-09673	Outdoor HVAC package electric cooling, gas heating	8 ton, R-22, 208 V,3ph, 60Hz; 75 MBH output	Roof		N/A	N/A
Air handler	Trane	N/A	Indoor mulitzone	N/A	Ground floor	All rooms on 2nd floor	N/A	N/A